

# 2018

## SECONDARY 1

### Express Exam Paper

# Science

1	Chung Cheng High	SA1	
2	Geylang Methodist	SA1	
3	CHIJ St Joseph	SA1	
4	East Spring Sec	SA1	
5	Gan Eng Seng	SA1	
6	Pasir Ris Crest	SA1	
7	Serangoon Garden	SA1	
8	Zhonghua Sec	SA1	
9	Ahmad Ibrahim		SA2
10	Hougang Sec		SA2
11	Bowen Sec		SA2
12	CHIJ St Joseph		SA2
13	Geylah Methodist		SA2
14	Hua Yi Sec		SA2
15	Juying Sec		SA2
16	Kent Ridge Sec		SA2







# 中正中学 (义顺)

## CHUNG CHENG HIGH SCHOOL (YISHUN)

### Mid-Year Examination (2018) Secondary One Express

<b>Candidate</b>			
	<b>Name</b>	<b>Index No.</b>	<b>Class</b>

## LOWER SECONDARY SCIENCE

Date: 9<sup>th</sup> May 2018

Duration: 2 hours

Additional materials: OTAS

### READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on the cover page.  
Write in blue or black pen.  
You may use a pencil for any diagrams, graphs or rough working.  
Electronic calculators may be used.  
A copy of the Periodic Table is printed on page 2.

#### Section A: Multiple Choice Questions (30 marks)

There are **thirty** questions in this section.

Answer **all** questions.

For each question, there are four possible answers, **A**, **B**, **C** and **D**. Choose the one you consider correct and record your choice in **soft pencil** on the separate Optical Answer Sheet (OTAS) provided.

#### Section B: Structured Questions (40 marks)

Answer **all** questions.

Write your answers in the spaces provided on Question Paper.

#### Section C: Free Response Questions (30 marks)

Answer **all** questions.

Write your answers in the spaces provided on Question Paper.

For Examiner's Use	
<b>Section A</b>	/ 30
<b>Section B</b>	/ 40
<b>Section C</b>	/ 30
<b>Total</b>	/ 100

Setter: Ms Mellissa Chia

This document consists of **20** printed pages, INCLUDING the cover page.

# The Periodic Table of Elements

Group																																																																																																							
I	II	III										IV	V	VI	VII	0																																																																																							
3 Li lithium 7	4 Be beryllium 9	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px;">                     1 H hydrogen 1                 </div> <div style="border: 1px solid black; padding: 5px;">                     proton (atomic) number atomic symbol name relative atomic mass                 </div> </div>																5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20	11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Mc moscovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganesson -

lanthanoids

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

actinoids

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

### Section A: Multiple Choice Questions (30 marks)

- 1 Grace works in a hospital. Her hospital is currently conducting a free health checkup for the public that involves blood, urine, and stool samples. Which of the following hazard symbol should be pasted on the samples?



- 2 Which of the following is **not** a good practice when conducting experiments in the Science laboratory?

- A Carrying out experiments on your own if you are already familiar with the procedure.
- B Closing the air hole of the Bunsen burner in between heating.
- C Pouring unused chemicals into the sink instead of pouring them back into the containers.
- D Reading instructions before starting the experiment.

- 3 Which of the following attitudes are desirable in the study of Science?

- A objectivity, integrity, aggressiveness
- B open mindedness, responsibility, anxiety
- C passiveness, curiosity, determination
- D integrity, resilience, patience

- 4 Dora was asked to investigate how the temperature of a solvent affects the solubility of a solute. The temperature of a solvent is known as the \_\_\_\_\_.

- A prediction
- B independent variable
- C controlled variable
- D dependent variable

- 5 Objects **A** and **B** are made up of different materials. When placed under the sun, object **A** feels cool when touched and object **B** feels hot. Which of the following about object **A** and **B** is true?

- A Both objects **A** and **B** are made of metal.
- B Object **A** is made of fabric and object **B** is made of plastic.
- C Object **A** is made of metal and object **B** is made of fabric.
- D Object **A** is made of fabric and object **B** is made of metal.

6 Which of the following statements is true about substances that are liquids at room temperature?

- I Their melting point is below room temperature.
- II Their boiling point is above room temperature.
- III Their melting point is above room temperature.
- IV Their boiling point is below room temperature.

**A** I and IV  
**C** I and II

**B** II and III  
**D** III and IV

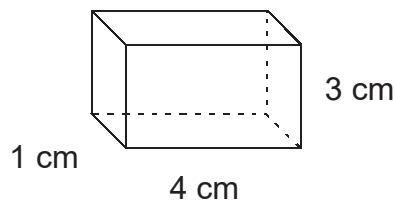
7 Tungsten is used in a light bulb because \_\_\_\_\_.

- I it has a high melting point
- II it can be bent without breaking
- III it is a good conductor of electricity
- IV it is magnetic

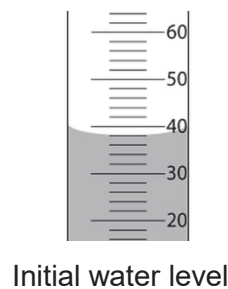
**A** I and III  
**C** I, II and IV

**B** I and II  
**D** I, II and III

8 A cuboid of length 3 cm by 4 cm by 1 cm (Fig. 1.1) is placed in a measuring cylinder as shown in Fig. 1.2 below.



**Fig 1.1**



**Fig 1.2**

What will be the final water level in the measuring cylinder after the cuboid was placed inside?

**A** 46 cm<sup>3</sup>  
**C** 50 cm<sup>3</sup>

**B** 48 cm<sup>3</sup>  
**D** 51 cm<sup>3</sup>

9 The density of mercury is 13.6 g/cm<sup>3</sup>. A piece of pinewood floats while a piece of platinum sinks in a beaker of mercury. Which of the following would be a possible density of pinewood and platinum?

	density of pinewood	density of platinum
<b>A</b>	11.2 g/cm <sup>3</sup>	20.1 g/cm <sup>3</sup>
<b>B</b>	13.6 g/cm <sup>3</sup>	17.2 g/cm <sup>3</sup>
<b>C</b>	9.0 g/cm <sup>3</sup>	10.9 g/cm <sup>3</sup>
<b>D</b>	13.9 g/cm <sup>3</sup>	26.3 g/cm <sup>3</sup>

10 Which of the following conversions is correct?

- A  $2.4 \text{ m}^2 = 24000 \text{ cm}^2$
- B  $1 \text{ mg} = 1000 \text{ g}$
- C  $40 \text{ kg} = 4000 \text{ g}$
- D  $5 \text{ cm}^3 = 5 \text{ l}$

11 A boy wants to measure the internal diameter of a beaker and decides to use a Vernier caliper. Fig. 1.3 shows the readings of the Vernier caliper.

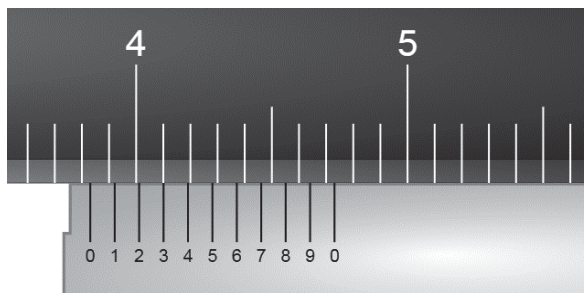


Fig 1.3

Which of the following shows the appropriate jaws to use and the correct readings of the Vernier caliper?

	jaws	reading
A	inside jaws	4.83 cm
B	inside jaws	3.83 cm
C	outside jaws	4.83 cm
D	outside jaws	3.83 cm

12 Bleach, contains the compound  $\text{NaBO}_3$ . How many types of elements are there in this compound?

- A 2
- B 3
- C 4
- D 5

13 A magnesium strip is burnt in oxygen to form magnesium oxide. Which statement is true?

- A Two compounds are burnt to form a new compound.
- B Two elements are burnt to form new compound.
- C An element and a compound are burnt to form a compound.
- D An element and a mixture are burnt to form a mixture.

14 Which of the following elements can be beaten into different shapes without breaking?

- I P
  - II He
  - III Ag
  - IV Ti
- A III only
  - B II and III
  - C I, III and IV
  - D III and IV

15 Ethanoic acid is represented by the formula  $\text{CH}_3\text{COOH}$ . Which of the following statement describes its chemical composition?

- I Ethanoic acid is a compound that can only be separated by chemical methods.
- II The ratio of C : H : O in ethanoic acid is 1 : 2 : 1.
- III Ethanoic acid is made up of the elements carbon, oxygen and hydrogen.
- IV Ethanoic acid is formed by a chemical reaction.

- A III only
- B II and III
- C I, III and IV
- D I, II, III and IV

16 The boiling points of some elements are listed in the table below.

element	melting point / °C	boiling point / °C
nitrogen	-210	-196
radon	-71	-62
oxygen	-219	-183
xenon	-112	-108

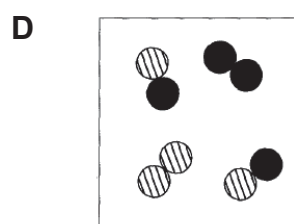
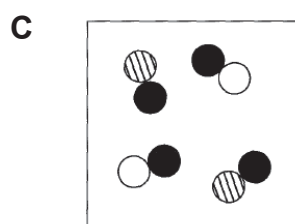
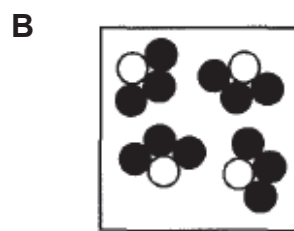
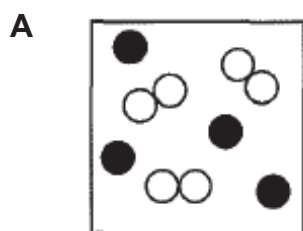
A mixture of nitrogen, radon, oxygen and xenon at an initial temperature of  $-300^\circ\text{C}$  is heated to  $-200^\circ\text{C}$ . Which elements are in the liquid state at  $-200^\circ\text{C}$ ?

- A radon only
- B nitrogen and xenon
- C nitrogen and oxygen
- D xenon and radon

17 Which of the following combinations show an element, a mixture and a compound?

- A fabric dyes, orange juice, water
- B sulfur, lead, copper sulfate
- C sand, water, carbon dioxide
- D air, boron, sodium chloride

18 Which of the following diagram represents a mixture of compounds?



- 19 Which of the following **cannot** be separated by magnetic attraction?
- A nickel and carbon  
 B iron and sulfur  
 C steel and sugar  
 D nickel and cobalt
- 20 Susan wants to demonstrate that seawater contains many dissolved substances. Which of the following separation techniques should she use?
- A evaporation  
 B paper chromatography  
 C filtration  
 D magnetic attraction
- 21 In an experiment, substance **P** and **Q** were heated strongly over a flame. The experiment is shown in Fig. 1.4.

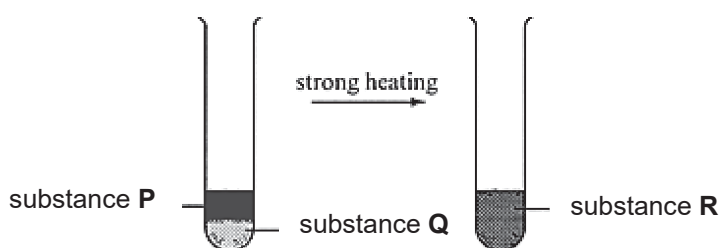


Fig 1.4

Which of the following statement is most possibly true?

- A Substance **P** and **Q** cannot be broken down further.  
 B Substance **P** and **R** have similar physical properties.  
 C Substance **R** has different properties from substance **P** and **Q**.  
 D Substance **R** will return to substance **P** and **Q** after it has cooled down.

Use Fig. 1.5 to answer questions **22** and **23**.

- 22 Fig. 1.5 below shows a filtration set-up.

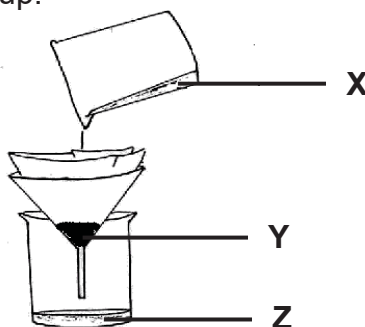


Fig 1.5

Which of the following correctly represents **X**, **Y** and **Z**?

	<b>X</b>	<b>Y</b>	<b>Z</b>
<b>A</b>	suspension	filtrate	residue
<b>B</b>	suspension	residue	filtrate
<b>C</b>	solution	residue	filtrate
<b>D</b>	solution	residue	distillate



- 23 Which of the following mixture can be separated using the set-up shown in Fig. 1.5?
- A a mixture of sand and saga seeds  
 B a mixture of alcohol and water  
 C a mixture of sugar solution and salt solution  
 D a mixture of iron filings and water
- 24 A lump of orange pulp and a bunch of tea leaves are added into a mug of hot water to form a herbal drink. Which of the following is formed?
- A A suspension is formed containing two solutes and one solvent.  
 B A suspension is formed containing two solvent and one solute.  
 C A solution is formed containing two solvents and one solute.  
 D A solution is formed containing two solutes and one solvent.
- 25 Three separating techniques are carried out as seen in Fig. 1.6 below. Sodium chloride is a soluble solid in water whereas calcium carbonate is an insoluble solid in water.

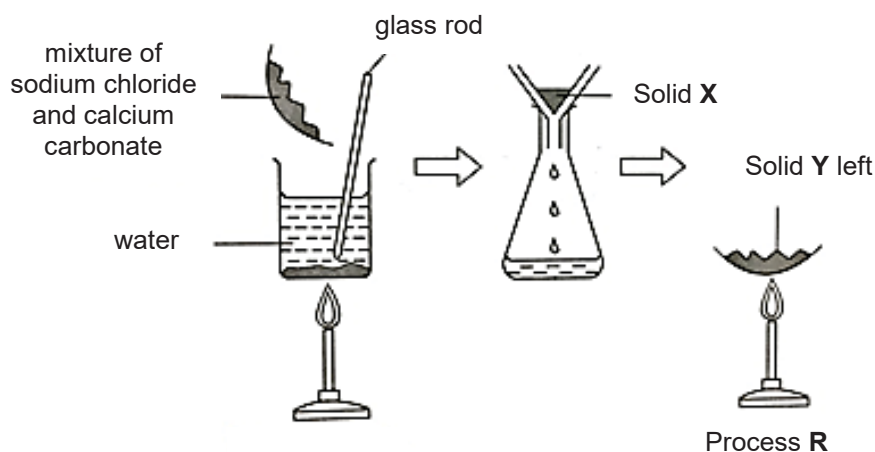


Fig 1.6

Identify process **R**, solid **X** and solid **Y**.

	<b>process R</b>	<b>solid X</b>	<b>solid Y</b>
<b>A</b>	distillation	sodium chloride	calcium carbonate
<b>B</b>	filtration	calcium carbonate	sodium chloride
<b>C</b>	evaporation to dryness	calcium carbonate	sodium chloride
<b>D</b>	evaporation to dryness	sodium chloride	calcium carbonate



- 26 A scientist wants to analyse the different components of sample **S** from a food colouring. Fig. 1.7 shows the results of the chromatogram.

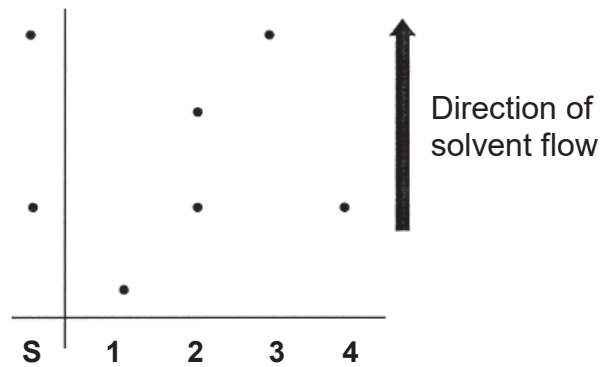


Fig 1.7

Which dyes does sample **S** contain?

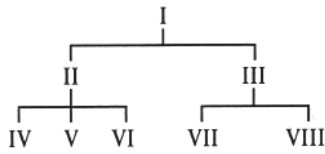
- A 2 only  
 B 2 and 3  
 C 2 and 4  
 D 3 and 4
- 27 Which of the following groups are all fishes under the classification of living things?
- A clownfish, whale, stingray  
 B mudskipper, clownfish, shark  
 C dolphin, shark, stingray  
 D whale, mudskipper, goldfish
- 28 Which of these classifications of living things is correct?

	living thing	classification
A	lobster	fish
B	toadstool	plant
C	bat	mammal
D	komodo dragon	amphibian

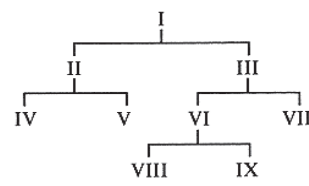
- 29 What of the following scenarios may result in the loss of biodiversity?
- I Plants are suddenly infected with anthracnose.  
 II Chemical waste from factories flow into the river.  
 III An international company wants to set up an industrial area and land has to be cleared.  
 IV More Javan myna in Singapore to compete for food with the Oriental Magpie-Robin.
- A I and III only  
 B II and III only  
 C I, II and III  
 D I, II, III and IV

30 Which of the following is/are dichotomous key(s)?

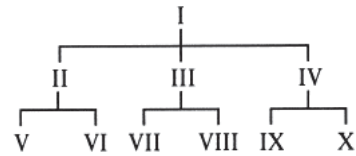
I



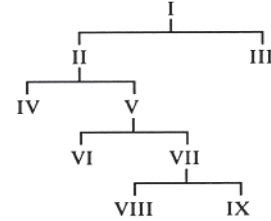
II



III



IV



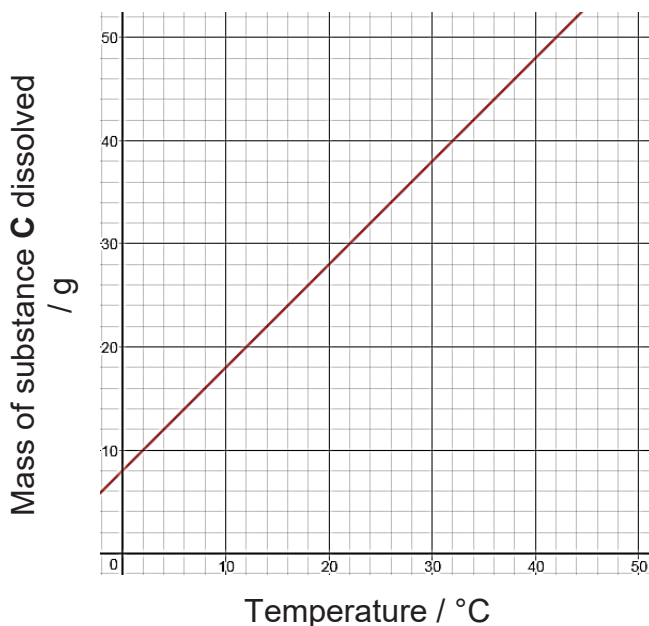
- A III only
- C II and IV

- B I and II
- D I, II, III and IV

- End of Section A -

### Section B: Structured Questions (40 marks)

- 1 A student carried out an experiment to determine the solubility of a solid substance **C** in water. After obtaining the results, he plotted a graph as shown in Fig. 1.8.



**Fig 1.8**

- (a) From the graph, determine the amount of substance **C** that dissolves at 40°C.

\_\_\_\_\_ [1]

- (b) State the dependent variable and one controlled variable in this experiment.

(i) dependent variable: \_\_\_\_\_ [1]

(ii) controlled variable: \_\_\_\_\_ [1]

After carrying out the experiment, the student carried out a second experiment to determine the effect of rate of stirring on the rate of dissolving.

- (c) Write a hypothesis for the second experiment.

\_\_\_\_\_ [1]

- (d) The student used 150 g of substance **C** in this experiment. However, he realized that regardless the rate of stirring, there were always some substance **C** left at the bottom of the beaker.

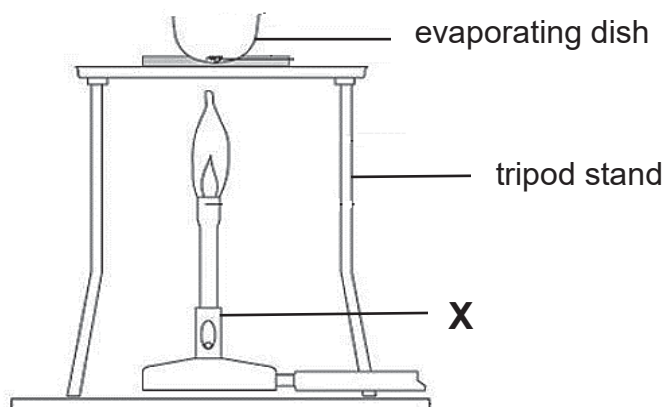
- (i) State a term used to describe this observation.

\_\_\_\_\_ [1]

- (ii) Explain what the term in (d)(i) means.

\_\_\_\_\_ [1]

- 2 During a Science experiment, students were asked to heat up a solution. A Bunsen burner was used in the experiment as shown in Fig. 1.9.



**Fig 1.9**

- (a) Identify part **X** of the Bunsen burner and state its function.

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[2]

- (b) Draw a scientific diagram of the set-up above, labelling the **tripod stand**, **evaporating dish** and representation of **heat**.

[3]



- (c) State the type of flame that should be used when heating the solution.

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[1]

- (d) Other than the colour of the flame, state two differences between a luminous and a non-luminous flame.

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[2]

(e) When the Bunsen burner was lit, a loud hissing sound was heard and a flame burns within the barrel of the Bunsen burner.

(i) Explain why this phenomenon happens.

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[2]

(ii) Suggest what a student could have done to avoid this phenomenon.

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[1]

3 The table below shows the properties of three substances.

substance	melting point / °C	description of substance
<b>A</b>	40 – 63	Substance <b>A</b> is a green solid at room temperature.
<b>B</b>	– 5	Upon heating, substance <b>B</b> melts into an orange liquid. Upon cooling, it returns to its original form and colour.
<b>C</b>	36.9	Substance <b>C</b> is a green liquid that decomposes to a black solid when heated strongly.

After analyzing the table, a student came to a conclusion.

Substance **A** is a compound.

Substance **B** is an element.

Substance **C** is an element.

(a) Using information from the table, state whether you agree with the student's conclusion. Explain your answer with the use of evidence from the table.

(i) Substance **A**

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[2]

(ii) Substance **B**

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[2]

(iii) Substance **C**

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[2]

(b) Given that substance **B** is a gas at room temperature ( $25^{\circ}\text{C}$ ), state a possible boiling point of substance **B**.

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[1]

4 An electric current is passed through a liquid of hydrogen chloride,  $\text{HCl}$  as shown in Fig. 2.0, to form two gases.

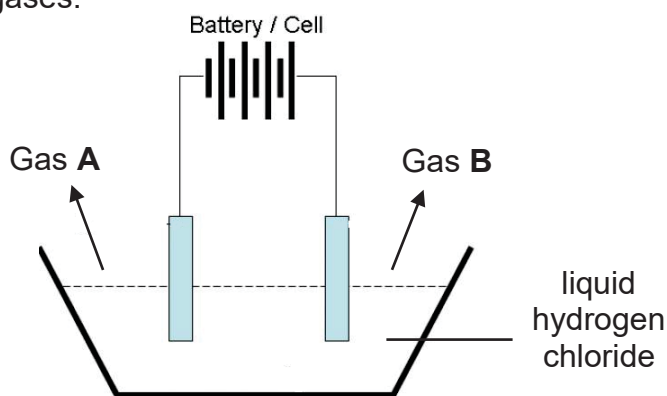


Fig 2.0

(a) Suggest the identity of gas **A** and gas **B**.

Gas **A**: \_\_\_\_\_ [1]

Gas **B**: \_\_\_\_\_ [1]

(b) Using this experiment, explain why hydrogen chloride is a compound.

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[2]

(c) (i) State the group and period that bromine is found in the Periodic Table.

Group: \_\_\_\_\_ [1]

Period: \_\_\_\_\_ [1]

- (ii) When elements **A** and **B** react to form hydrogen chloride, the reaction is rapid and takes place at high temperatures.

Predict if the element bromine will undergo a similar reaction when reacted with hydrogen. Explain your answer.

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[2]

- 5 Fig. 2.1 shows a fractional distillation set-up.

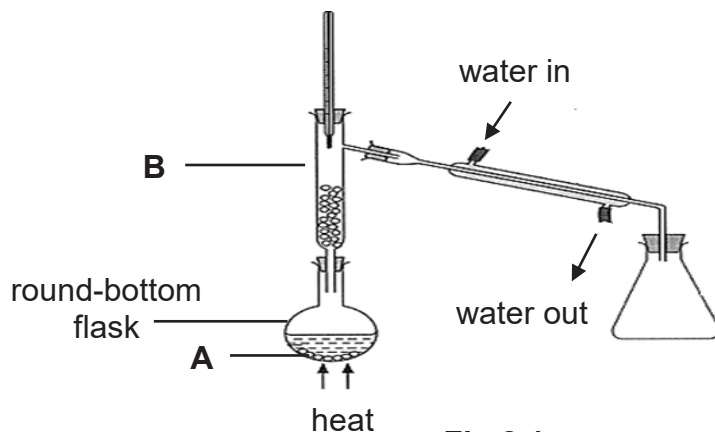


Fig 2.1

- (a) Identify part **A** and part **B** of the set-up.

Part **A**: \_\_\_\_\_ [1]

Part **B**: \_\_\_\_\_ [1]

Jenna wants to separate a mixture of acetone, butanol, ethanol and water. The table below shows the boiling point of the different substances.

substance	boiling point / °C
acetone	56
butanol	117
ethanol	78
water	100

- (b) State the sequence of distillation of the different substances.

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[2]

- (c) Identify and explain two mistakes in the set-up.

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[4]

**Section C: Free Response Questions (30 marks)**

- 1 Ahmad wants to carry out an experiment to determine the volume of a figurine which is made of styrofoam. Ahmad receives the materials he needs, listed in Fig. 2.2.

- |  |
|--|
| <ol style="list-style-type: none"><li>1. Measuring cylinder</li><li>2. Styrofoam figurine</li><li>3. String</li><li>4. Small rock</li><li>5. Water</li></ol> |
|--|

**Fig 2.2**

- (a) State the purpose of the small rock in this experiment.

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[2]

- (b) Given the materials listed in Fig. 2.2, describe how you would carry out an experiment to measure the volume of the **styrofoam** figurine.

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[4]

- (c) Showing your working clearly, find the density of the styrofoam figurine given that the mass is 0.75 g and its volume is 3.2 cm<sup>3</sup>. Leave your answer to 3 decimal places.

[2]

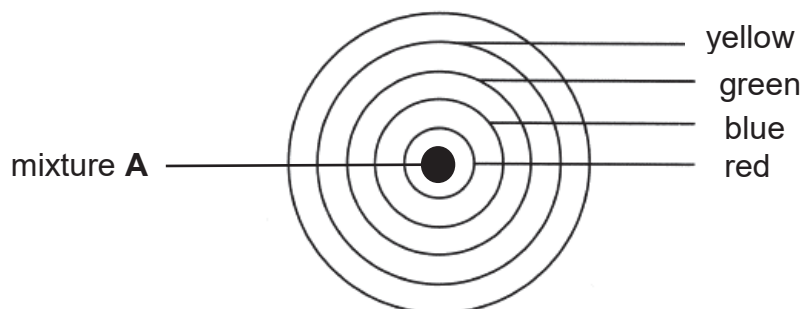


- (d) The styrofoam figurine is then cut into half. State whether there will be any change to its density.

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[1]

- 2 Fig. 2.3 shows the results of a chromatogram using a round chromatography paper.



**Fig 2.3**

The black dot in the middle shows where a drop of mixture **A** was added at the start of the experiment.

- (a) It is known that mixture **A** contains 5 different coloured components. However, the mixture was separated into only 4 dyes as shown in Fig. 2.3. Give a reason for this observation.

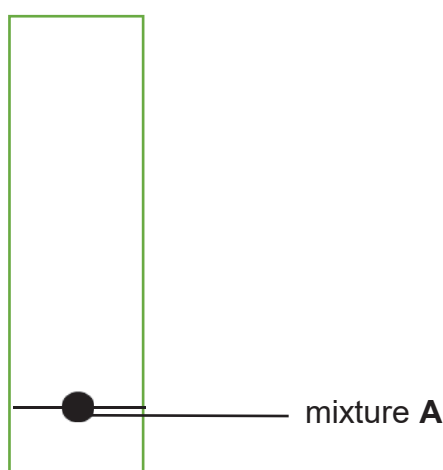
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[1]

- (b) The exact same experiment was carried out with mixture **A** but with a rectangular chromatography paper. In Fig. 2.4, **draw** and **label** how the results would look like.



**Fig 2.4**

[2]

- (c) State one precaution that must be taken when carrying out paper chromatography. Explain why this precaution is necessary.

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[2]

- (d) Mixture **B** is made up of three different substances **P**, **Q** and **R**. The characteristics of substance **P**, **Q** and **R** are listed in the table below.

substance	characteristic
<b>P</b>	<b>P</b> is soluble in ethanol but not water
<b>Q</b>	<b>Q</b> is insoluble in both water and ethanol
<b>R</b>	<b>R</b> is only soluble in water

- (i) Briefly describe how a food scientist can obtain a dry sample of substance **P** from mixture **B**.

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[5]

**3** Biodiversity is very important to our planet as it contributes to the stability of systems in the natural world. Environmentalists have expressed their concerns for the declining biodiversity and emphasize that appropriate conservation and sustainable development strategies must be taken to preserve biodiversity.

(a) State, with examples, two ways in which biodiversity benefits humans.

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---

[4]

(b) The organisms shown below are part of Singapore's biodiversity.

(i) Complete the table below by placing a tick (✓) against the characteristics of the organisms.



**Tiger Barb**



**King Cobra**



**Dugong**



**Plantain Squirrel**

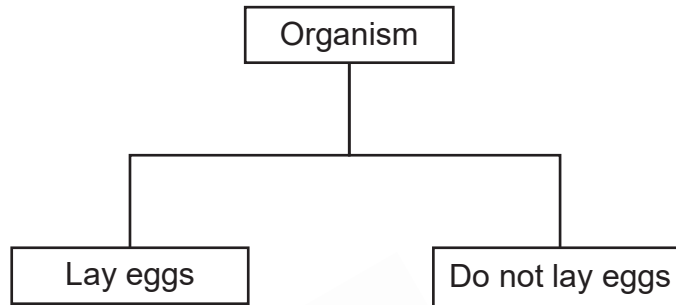


**Javan Myna**

Organisms Characteristics	Tiger Barb	King Cobra	Dugong	Plantain Squirrel	Javan Myna
Lay eggs					
Live on land					
Have scales					

[2]

- (ii) Using the characteristics in the table above, construct a dichotomous key to identify the organisms. The first level of classification has been completed for you. [5]



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**ANSWER KEY FOR MYE 2018 SEC 1 EXPRESS SCIENCE****Section A**

1	D	11	B	21	C
2	A	12	B	22	B
3	D	13	B	23	D
4	B	14	D	24	A
5	D	15	B	25	C
6	C	16	C	26	D
7	D	17	D	27	B
8	C	18	C	28	C
9	A	19	D	29	D
10	A	20	A	30	C

**Section B**

Qn		Suggested answer	Marks awarded	Remarks
1	a	48 g	[1]	
	bi	Dependent variable: mass of substance C dissolved	[1]	
	ii	Controlled variable: rate of stirring, volume of solvent, size of particles, type of solute, type of solvent.	[1]	Accept any other reasonable answers.
	c	The <u>faster the rate of stirring, the greater the mass of substance C dissolved.</u>	[1]	
	di	The solution was <u>saturated.</u>	[1]	
	dii	It has come to a point where <u>no solvent can dissolve any more solute/no more solute can dissolve in the solvent</u>	[1]	
2	a	Identity: Collar Function: To <u>regulate the amount of air</u> entering the burner through the <u>air-hole</u>	[1] [1]	
	b		[1] for tripod stand and evaporating dish [1] for Bunsen burner [1] for labels	- Straight lines must be drawn using ruler. - No sketchy lines

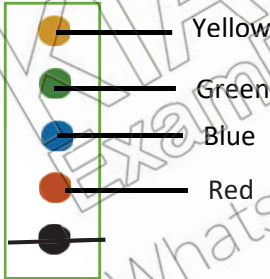
	<b>c</b>	Non – luminous flame	[1]	
	<b>d</b>	A luminous flame is <u>unsteady</u> while a non-luminous flame is a <u>steady</u> flame.  <b>OR</b> A luminous flame occurs when there is <u>incomplete combustion</u> while a non-luminous flame occurs when there is <u>complete combustion</u> .  <b>OR</b> A luminous flame <u>produces soot</u> while a non-luminous flame <u>does not produce soot</u> .  <b>OR</b> A non-luminous flame is <u>hotter</u> than a luminous flame.	[1]  [1]  [1]  [1]	Max 2M
	<b>ei</b>	There is <u>too much oxygen entering the airhole</u> , leading to <u>complete combustion</u> when lighting the Bunsen burner.  <b>OR</b> The <u>air hole is open when lighting the Bunsen burner/strike back</u> has occurred due to <u>too much oxygen entering the airhole</u> .	[1] [1]  [1] [1]	Max 2M
	<b>ii</b>	This can be avoided by <u>closing the air-hole</u> when lighting the Bunsen burner.	[1]	
<b>3</b>	<b>ai</b>	I <u>do not agree</u> with the student's conclusion. A compound should have a <u>fixed boiling point</u> . However, according to the table, substance A has a variable melting point from <u>40-63°C</u> .	[1] [1]	Please penalise one mark overall if students do not quote any evidence (data) from the table.
	<b>ii</b>	I <u>agree</u> with the student's conclusion. There is only a <u>physical change</u> after substance B goes through heating. This is seen when it melts when heated and returning to its original form when cooled.	[1] [1]	
	<b>iii</b>	I <u>do not agree</u> with the student's conclusion. An element is a substance that <u>cannot be broken down into 2 or more simpler substances by any means</u> . However, according to the table, substance c decomposes upon heating.	[1] [1]	
	<b>b</b>	Accept any answer more than -5°C and less than 25°C	[1]	

4	a	Gas A – Hydrogen/Chlorine Gas B – Chlorine/Hydrogen	[1] [1]	
	b	Hydrogen chloride is classified as a compound because it can be <u>broken down</u> further by electrolysis, <u>which is a chemical method.</u>	[1] [1]	
	ci	Group VII Period 4	[1] [1]	
	cii	Yes, it will. Bromine is in the <u>same group as chlorine</u> in the Periodic table. This means that it has <u>similar chemical properties</u> to oxygen.	[1] [1]	
5	a	Part A – Boiling chips Part B – Fractionating column	[1] [1]	
	b	Acetone, Ethanol, Water, Butanol	[2]	[1] M for Acetone, ethanol  [1] M for water, butanol
	c	There is a <u>stopper</u> at the conical flask. There should not be a stopper as this <u>causes pressure to build up</u> in the flask and this could be dangerous.  <u>Water should enter from the bottom of the condenser and leave from the top/the direction of water flow is wrong.</u> Water should enter at the end of the condenser to ensure that the <u>coolest part of the condenser is at the end</u> to ensure that <u>all vapour has cooled into liquid droplets</u> to be collected as distillate. <b>OR</b> To ensure that <u>all the vapour condenses into liquid</u> before leaving the condenser.	[1] [1]  [1]  [1]  Max 4M	

**Section C**

Qn		Suggested answer	Marks awarded	Remarks
1	a	The small rock helps to <u>add density/weigh down the styrofoam</u> to ensure that the <u>Styrofoam is fully immersed in the water/Styrofoam sinks in the water.</u>	[1] [1]	



	<b>b</b>	<p>First, <u>measure the volume of the small rock</u> by placing it in the measuring cylinder and reading the measurements.</p> <p>Secondly, <u>tie the rock at the bottom of the string</u> and the <u>styrofoam figurine at the top</u>. OR <u>tie the rock and string together with a string</u>.</p> <p>Thirdly, slowly <u>immerse the rock and string into the water</u> in the measuring cylinder and <u>read the measurements</u>.</p> <p>After reading the measurement, find the volume of the Styrofoam by <u>taking the final volume and subtracting the initial volume as well as the volume of the rock</u>.</p>	[1] [1] [1] [1]	Accept alternative phrasing/logical answers.
	<b>c</b>	$D = \frac{0.75}{3.2}$ $= 0.234 \text{ g/cm}^3$	[1] [1]	Minus one mark if units are missing for density
	<b>d</b>	There will be <u>no change in density</u> .	[1]	
<b>2</b>	<b>a</b>	One of the dyes in the mixture is <u>insoluble in the solvent</u> .	[1]	
	<b>b</b>		[1] mark for every 2 correct dye spots	
	<b>c</b>	<p>The <u>starting line</u> should be <u>drawn with a pencil</u> as pencil is <u>made up of carbon</u> which is <u>insoluble in the solvent</u> and will not affect the results of the experiment. / <u>carbon will not be separated out into different components</u>.</p> <p><b>OR</b></p> <p>The <u>solvent</u> should be <u>below the starting line</u> To ensure that the dye <u>does not dissolve into the solvent</u> and affect the results of the experiment.</p>	[1] [1] [1] [1] [1] [1] Max 2M	
	<b>d</b>	Firstly, the food scientist should <u>dissolve mixture B in water</u> .	[1]	Award marks if students reorder

		<p>He will then <u>carry out filtration</u> by pouring the mixture through a filter paper. As only R is soluble in water, <u>P and Q will be left as the residue.</u></p> <p><u>Dissolve P and Q in ethanol</u> and then carry out <u>filtration</u> by pouring the mixture through a filter paper. As only P is soluble in ethanol, <u>P dissolved in ethanol will be the filtrate.</u></p> <p><u>Carry out crystallisation/evaporation to dryness</u> on to obtain a dry sample of P.</p>	<p>[1]</p> <p>[1] [1]</p> <p>[1]</p>	<p>steps and dissolve mixture B in ethanol first.</p>																								
3	a	<p>Biodiversity provides humans with <u>raw materials</u> such as <u>wood</u> to build furniture and houses.</p> <p><b>OR</b></p> <p>Biodiversity provides humans with <u>food</u> such as <u>vegetables, fruits, spices</u> etc.</p> <p><b>OR</b></p> <p>Biodiversity provide humans with <u>medicine</u> such as <u>penicillin (antibiotic).</u></p>	<p>[1] [1] for eg</p> <p>[1] [1] for eg</p> <p>[1] [1] for eg</p> <p>Max 4M</p>	<p>Award marks if other examples given by students are reasonable.</p>																								
	bi	<table border="1"> <thead> <tr> <th>Organisms</th> <th>Tiger Barb</th> <th>King Cobra</th> <th>Dugong</th> <th>Plantain Squirrel</th> <th>Javan Myna</th> </tr> </thead> <tbody> <tr> <td>Lay Eggs</td> <td></td> <td>✓</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>Live on land</td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Have scales</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>1 mark for 4 correct ticks</p> <p>Max 2 marks</p>	Organisms	Tiger Barb	King Cobra	Dugong	Plantain Squirrel	Javan Myna	Lay Eggs		✓			✓	Live on land		✓		✓	✓	Have scales	✓	✓					
Organisms	Tiger Barb	King Cobra	Dugong	Plantain Squirrel	Javan Myna																							
Lay Eggs		✓			✓																							
Live on land		✓		✓	✓																							
Have scales	✓	✓																										

ii	<div style="text-align: center;"> <pre> graph TD     Organism --&gt; LayEggs[Lay eggs]     Organism --&gt; NoLayEggs[Do not lay eggs]     LayEggs --&gt; LiveInWater1[Live in water]     LayEggs --&gt; LiveOnLand1[Live on land]     LiveInWater1 --&gt; TigerBarb[Tiger Barb]     LiveOnLand1 --&gt; HaveScale[Have scale]     LiveOnLand1 --&gt; NoScale[Have no scale]     HaveScale --&gt; KingCobra[King Cobra]     NoScale --&gt; JavanMyna[Javan Myna]     NoLayEggs --&gt; LiveInWater2[Live in water]     NoLayEggs --&gt; LiveOnLand2[Live on land]     LiveInWater2 --&gt; Dugong[Dugong]     LiveOnLand2 --&gt; PlantainSquirrel[Plantain squirrel]         </pre> </div> <p>Remarks:</p> <ul style="list-style-type: none"> <li>- 1 mark for each organism that is classified correctly.</li> <li>- Neat dichotomous key with two branches from each characteristic clearly defined (<b>minus 1 mark if condition not satisfied</b>).</li> <li>- No spelling or grammer mistakes (<b>minus 1 mark if there are 2 or more spelling mistakes</b>).</li> <li>- Lines should be drawn with ruler.</li> </ul> <p>Max 5 marks</p>





# Geylang Methodist School (Secondary)

## Mid-Year Examination 2018

Candidate Name

Class  Index Number

### LOWER SECONDARY SCIENCE

**Sec 1 Express**

Additional materials: Optical Answer Sheet

**2 hours**

**Setters:** Ms Goh Yi Hui  
Mr Kelvin Teo

**3 May 2018**

### READ THESE INSTRUCTIONS FIRST

**Do not open this booklet until you are told to do so.**

Write your name, index number and class on all the work you hand in.

Write in dark blue or black pen on both sides of the paper.

Do not use staples, paper clips, highlighters, glue or correction fluid.

#### Section A

There are twenty questions in this section. Answer **all** questions. For each question, there are four possible answers, **A, B, C** or **D**. Choose the one you consider correct and record your choice in **soft pencil** on the separate Optical Answer Sheet provided.

#### Section B

Answer **all** the questions in the spaces provided.

#### Section C

Answer **all** three questions in the spaces provided.

The number of marks is given in brackets [ ] at the end of each question or part question. All numerical values have to be rounded off to 3 significant figures.

A copy of the Periodic Table is printed on page 27.

For Examiner's Use	
<b>Section A</b>	<b>20</b>
<b>Section B</b>	<b>50</b>
<b>Section C</b>	<b>30</b>
<b>Total</b>	<b>100</b>

This document consists of **27** printed pages and **1** blank page.

**[Turn over**

**Section A**

- 1 Which statement about the work of the scientist is wrong?
- A** A scientist supports a theory by data.  
**B** A scientist only works in a laboratory.  
**C** A scientist can work anywhere.  
**D** A scientist does research and experiments to make new discoveries.
- 2 Pouring unused chemicals back into their containers is not allowed.  
Why is this so?
- A** The chemicals in the container may be diluted.  
**B** The chemicals in the container may increase in concentration.  
**C** This may cause an explosion.  
**D** The chemicals in the container may be contaminated.
- 3 Three hazard symbols found in a science laboratory are shown below.



I



II



III

What do I, II and III represent respectively?

	I	II	III
A	irritable	flammable	toxic
B	flammable	toxic	irritable
C	irritable	corrosive	toxic
D	explosive	corrosive	irritable

- 4 The position of some elements are shown on the outline of part of the Periodic Table.

														6
1												3		
			5								4			
												2		

Which two elements have similar chemical properties?

- A** 1 and 3                                  **B** 2 and 3  
**C** 4 and 5                                  **D** 3 and 6
- 5 An equal amount of sugar is added to identical solvent and containers of different conditions.  
In which setup would sugar dissolve the fastest?

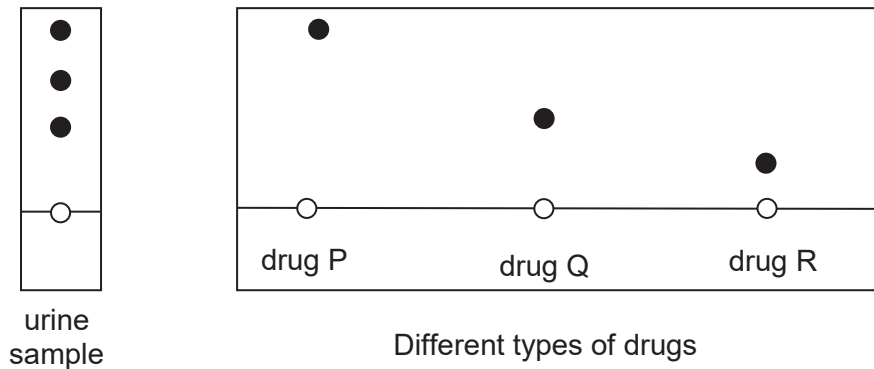
	temperature of solvent	size of sugar
<b>A</b>	80°C	small pieces
<b>B</b>	20°C	small pieces
<b>C</b>	80°C	large piece
<b>D</b>	20°C	large piece

- 6 Which statement(s) about a concentrated solution is/are true?

- I** A concentrated solution allows light to pass through.  
**II** It contains the maximum amount of solute that can be dissolved.  
**III** It contains insoluble particles when the solution is left to stand.

- A** I only    **B** II and III  
**C** I and II                                        **D** I, II and III

- 7 An athlete was suspected of cheating by using an energy boosting drug in a 100 metres race. His urine sample was sent to the laboratory. The chromatograms of 3 different types of drugs and his urine sample are shown below.



Which of the following statement is most accurate about the chromatogram results?

- A The athlete cheated with drugs P and Q.  
 B The athlete cheated with drugs P, Q and R.  
 C The athlete did not cheat as there is an unknown substance in the sample.  
 D The athlete did not cheat as drug R is not found in the sample.
- 8 Which of the following is **not** in the citrus fruit family?
- A lemon  
 B grape  
 C grapefruit  
 D orange
- 9 What is the benefit of having division of labour in a multi-cellular organism?
- A It enables the multi-cellular organism to defend against the bacteria better.  
 B It enables efficient functioning of the processes in the multi-cellular organism.  
 C It reduces the amount of waste products produced in a multi-cellular organism.  
 D It reduces the energy requirement in a multi-cellular organism.



10 Most of the chemical reactions in a cell take place in the \_\_\_\_\_.

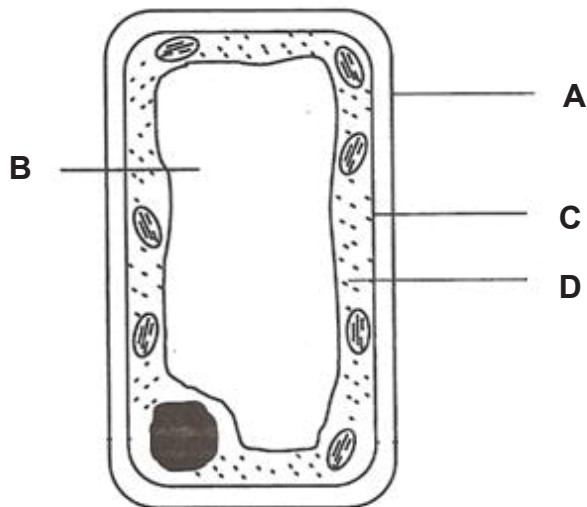
- A cytoplasm
- B mitochondrion
- C nucleus
- D vacuole

11 Which of the following is **not** found in a human muscle cell?

- A cell membrane
- B cellulose
- C chromosomes
- D cytoplasm

12 The diagram below shows a typical plant cell.

Which of the labelled structure is partially permeable?



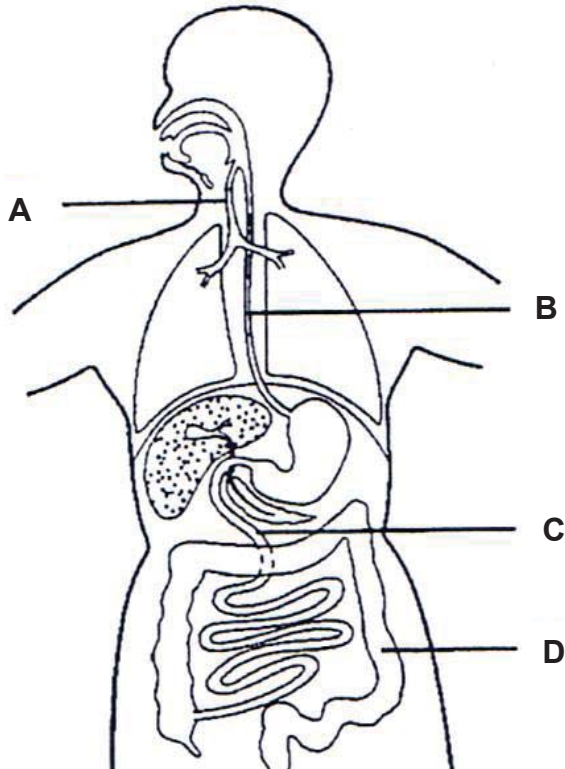
13 Which one of the following shows the correct sequences of organisation within a living organism?

- A tissues → organs → cells → systems
- B cells → tissues → organs → systems
- C systems → tissues → organs → cells
- D organs → tissues → systems → cells

- 14** Which of the following correctly describes the purpose of digestion?
- A** to make complex food molecules from simpler molecules
  - B** to remove complex food molecules from the body
  - C** to break down complex food molecules into simpler molecules
  - D** to use simpler molecules in the body
- 15** If the bile duct of a mammal became blocked, which symptom would be shown by the mammal?
- A** The amount of bile in the blood would increase.
  - B** Fat digestion would increase.
  - C** Fat digestion would stop.
  - D** Fat digestion would decrease.
- 16** The recommended diet for soldiers in freezing Arctic conditions is different from that recommended for tropical conditions.  
What should the Arctic diet include?
- A** more proteins
  - B** more carbohydrates
  - C** more fats
  - D** more fibre
- 17** Where do chemical digestion and absorption of digested food occur in the human digestive system?

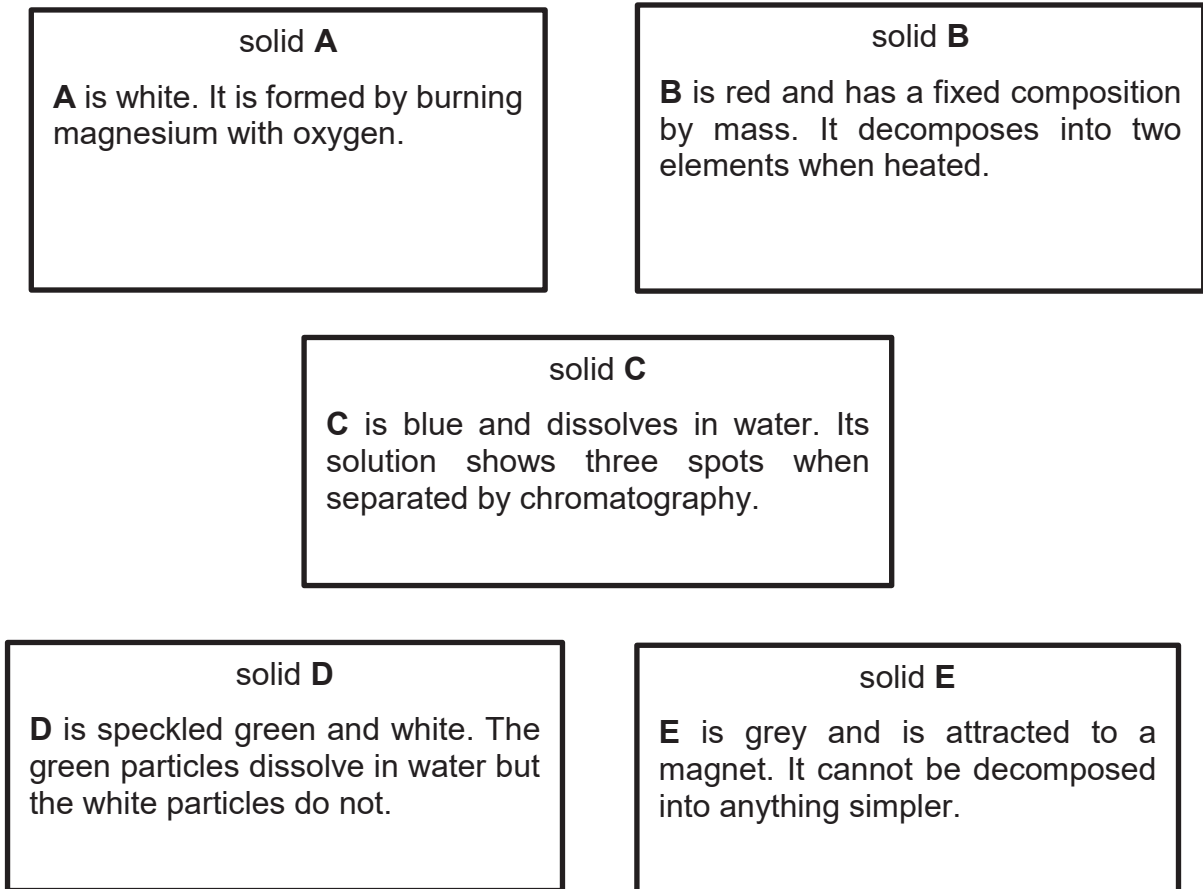
	chemical digestion	absorption
<b>A</b>	large intestine	stomach
<b>B</b>	large intestine	small intestine
<b>C</b>	small intestine	stomach
<b>D</b>	small intestine	small intestine

- 18 The diagram shows some organs of the human body.  
Which structure does **not** move its contents by peristalsis?



- 19 Which of the following is **false** about proteins?
- A Protein digestion begins in the mouth.
  - B Proteins are broken down into amino acids.
  - C Proteins are digested in the small intestine.
  - D Some proteins function as enzymes in the human body.
- 20 Mary accidentally injured herself and her wounds were taking a long time to heal fully. She should take in more \_\_\_\_\_ to help her wounds heal faster.
- A starch
  - B proteins
  - C fats
  - D carbohydrates

**End of Section A**

**Section B**Answer **all** the questions in the spaces provided.**21** Fig. 21.1 contains information about solids **A** to **E**.**Fig. 21.1**Using the labels **A** to **E**, identify:**(a)** a compound,

..... [1]

**(b)** a mixture.

..... [1]

**22** A sucrose molecule has the formula  $C_{12}H_{22}O_{11}$ . Sucrose is extracted from sugar beet or sugar cane. It is processed in factories to produce sugar. Sugar is often used as an added ingredient in food production.

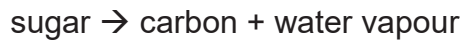
**(a)** Name all the elements present in the sucrose molecule.

..... [1]

**(b)** Which element is found in greatest abundance in the sucrose molecule?

..... [1]

**(c)** Sugar can be decomposed by heat to carbon and water vapour. This reaction is represented by the equation below.



Explain how this reaction shows that sugar is a compound and not an element.

.....  
..... [1]

**(d)** A student suggested obtaining sugar from the sugar solution through evaporation by heating directly on the evaporating dish.

**(i)** Explain why this is not a good idea.

.....  
..... [1]

**(ii)** Suggest a method to obtain sugar from the sugar solution.

..... [1]

- 23 The solubility of three solids in two different solvents, **P** and **Q**, are shown in Table 23.1.

**Table 23.1**

solid	solubility	
	solvent <b>P</b>	solvent <b>Q</b>
sand	insoluble	insoluble
sulfur	soluble	insoluble
salt	insoluble	soluble

A mixture consists of sand, sulfur and salt needs to be separated. Describe the steps taken to obtain each substance separately from the mixture.

(Dissolved substance **does not** need to be removed from the solution.)

.....

.....

.....

..... [3]

24 Fig. 24.1 shows a separation of salt solution using simple distillation.

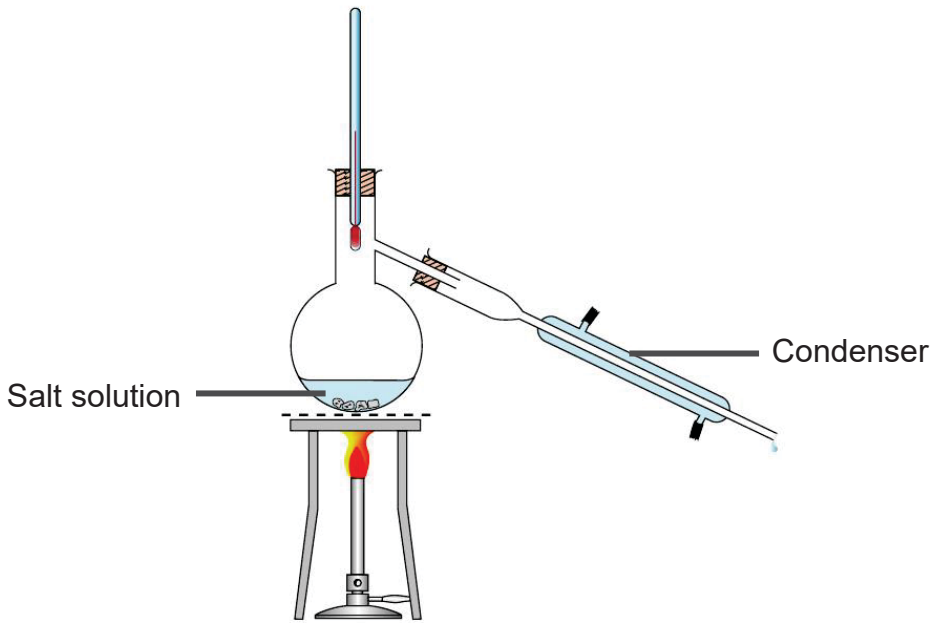


Fig. 24.1

(a) Identify the distillate collected.

..... [1]

(b) Explain the function of the condenser.

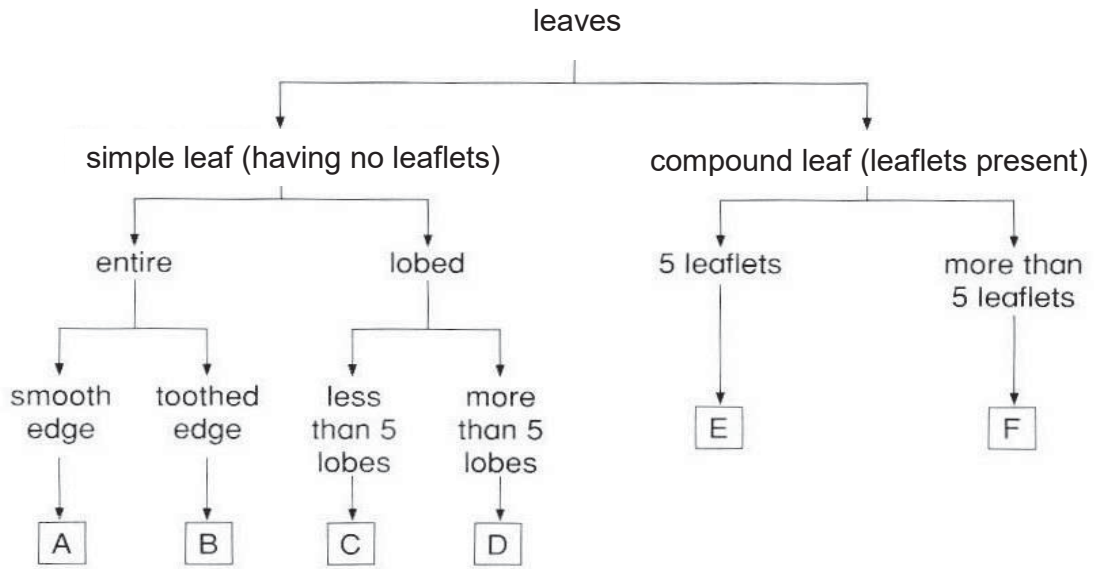
.....  
..... [1]

(c) With the use of arrows, label “water in” and “water out” on the condenser in Fig. 24.1. [2]

(d) Suggest why distillation could not take place effectively if the directions of “water in” and “water out” are switched.

.....  
.....  
..... [2]

25 Study the classification key below carefully.



With the help of the classification key and Fig. 25.1, give the alphabet (A – F) that corresponds to the plant.



Maple



Sweet buckeye



Honey locust



Honeysuckle

**Fig. 25.1**

Maple: .....

Sweet buckeye: .....

Honey locust: .....

Honeysuckle: .....

[4]



26 Fig. 26.1 shows a plant cell.

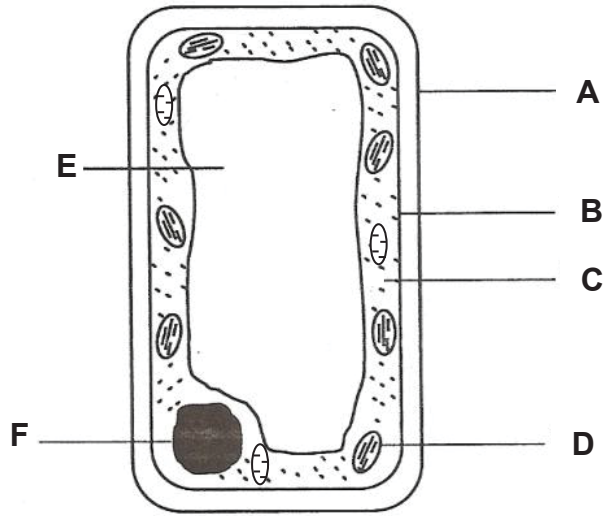


Fig. 26.1

(a) Name the parts labelled **A – F**. [3]

**A:** .....

**B:** .....

**C:** .....

**D:** .....

**E:** .....

**F:** .....

(b) State one function of part **A** and one function of part **D**.

**A:** .....  
.....[1]

**D:** .....  
.....[1]

(c) Give three differences between a plant cell and an animal cell.

	plant cell	animal cell
1		
2		
3		

[3]

(d) State the part(s) in Fig. 26.1 (A – F) which make(s) up the protoplasm.

..... [1]

(e) Fig. 26.2 shows a cell taken from the underground root of a plant.

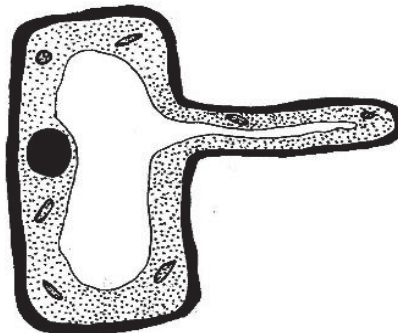


Fig. 26.2

Identify an organelle that is **not** found in Fig. 26.2 but is present in a typical plant cell. Explain why this organelle is not found in this type of root cell.

.....  
 .....  
 ..... [2]

27 Fig. 27.1 shows the human digestive system.

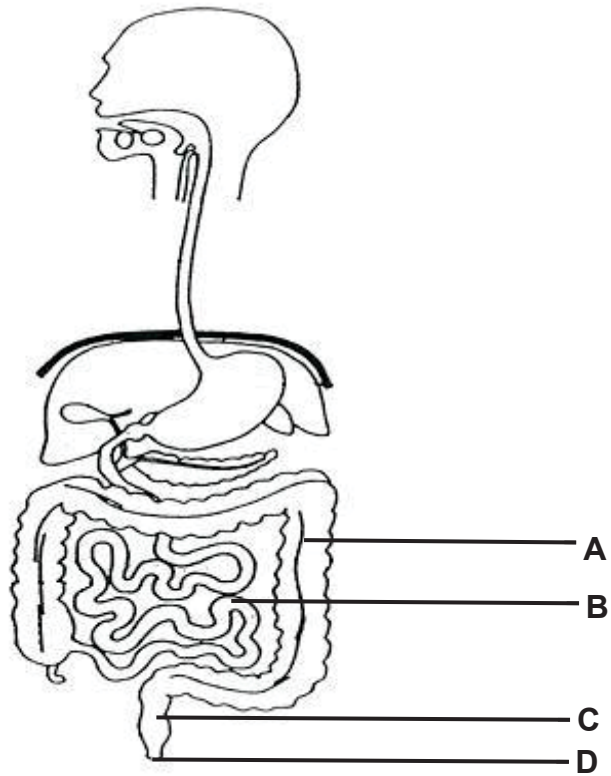


Fig. 27.1

(a) Name the parts labelled A – D. [2]

A: .....

B: .....

C: .....

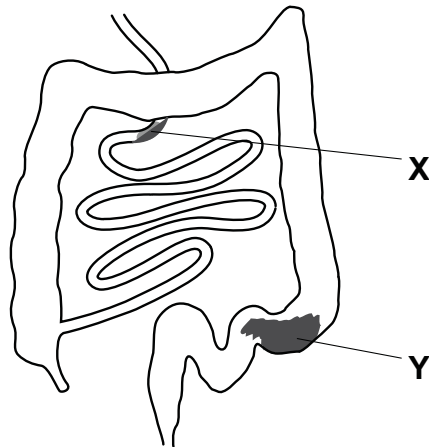
D: .....

(b) State one function of part C and one function of part D.

C: .....  
.....[1]

D: .....  
.....[1]

(c) Fig. 27.2 shows part of the human alimentary canal.



**Fig. 27.2**

Comparing the concentrations of the following substances between region **X** and **Y**, state the region that has a higher concentration of:

(i) glucose,

.....[1]

(ii) water,

.....[1]

(iii) fibre.

.....[1]

28 Fig. 28.1 shows the action of enzyme X on two food types 1 and 2 in the human digestive system.

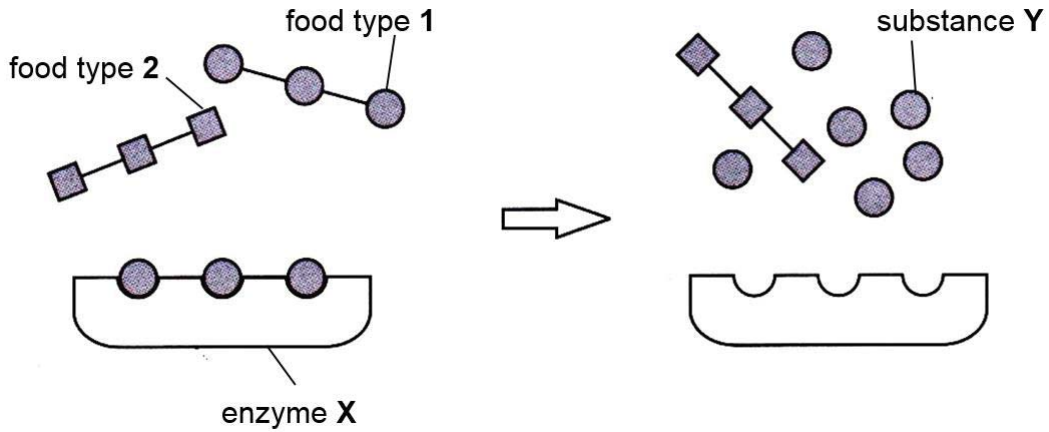


Fig. 28.1

(a) State one characteristic of an enzyme that is shown in Fig. 28.1 above.

.....  
..... [1]

(b) State one characteristic of an enzyme that is **not** shown in Fig. 28.1 above.

.....  
..... [1]

- 29 The graph in Fig. 29.1 shows the effect of changing temperature on the rate of reactions controlled by two different enzymes.

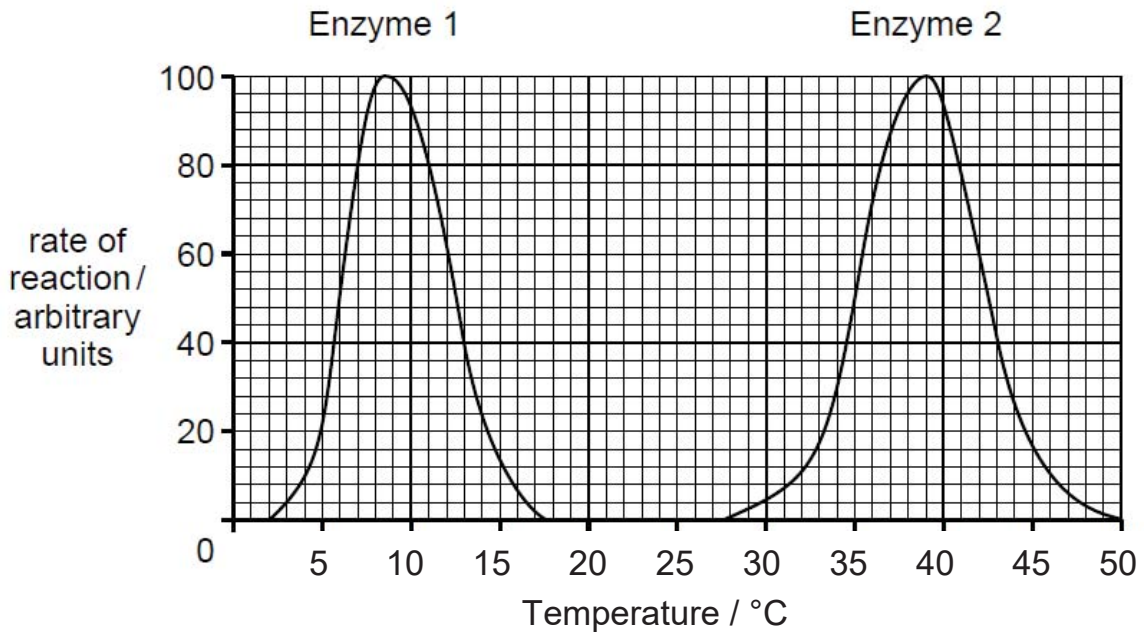


Fig. 29.1

- (a) State the optimum temperature of enzyme 1 and enzyme 2. [1]

Enzyme 1: .....

Enzyme 2: .....

- (b) Suggest whether enzyme 1 or enzyme 2 is likely to be found in humans. Give a reason for your suggestion.

.....

.....

..... [2]

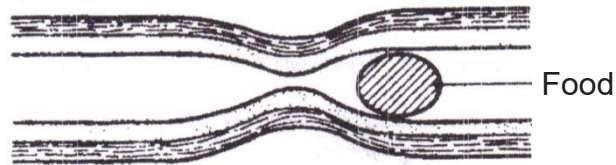
**30** The pancreas produces three types of enzymes.

Name these enzymes, the substrate each enzyme acts on and the respective end-products.

	name of enzyme	substrate	end-product(s)
<b>(a)</b>			
<b>(b)</b>			
<b>(c)</b>			

[3]

**31** Fig. 31.1 below shows food moving through the alimentary canal.



**Fig. 31.1**

**(a)** Name the process occurring in Fig 31.1 which causes food to move through the alimentary canal.

..... [1]

**(b)** Explain what is meant by the term stated in **31(a)**.

.....  
..... [1]

32 Fig. 32.1 below shows the amount of carbohydrates and proteins that are left undigested as food passes through the alimentary canal.

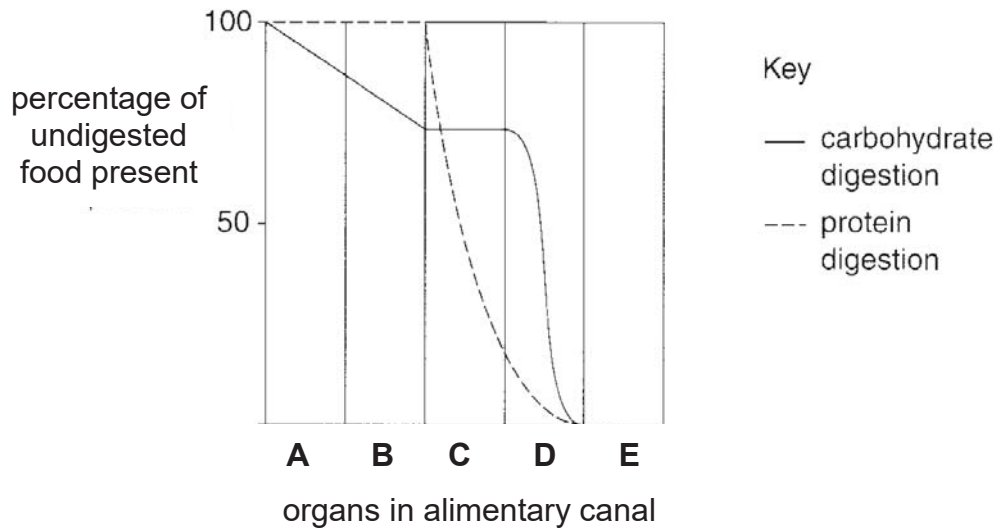


Fig. 32.1

Name the organ in the alimentary canal that is represented by the following letters in Fig. 32.1.

C: .....

E: .....

[2]

End of Section B



**Section C**

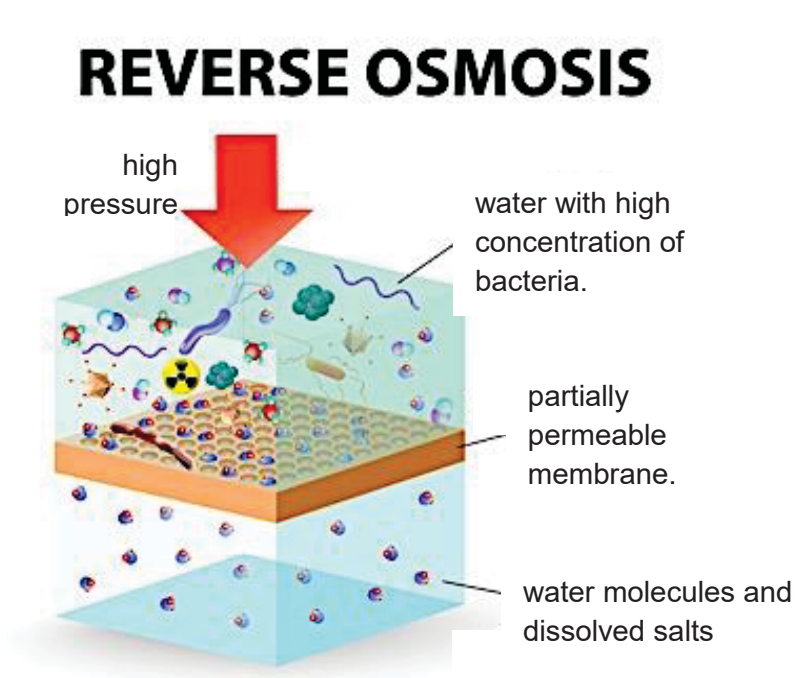
Answer **all** the questions in the spaces provided.

- 33** Singapore has built a robust, diversified and sustainable water supply from four water sources known as the Four National Taps – Water from Local Catchment, Imported Water, high-grade reclaimed water known as NEWater and Desalinated Water.

We have five NEWater plants supplying up to 40% of Singapore's current water needs. The NEWater plants use microfiltration, reverse osmosis and ultraviolet disinfection technology to produce clean water.

Source: <http://www.pub.gov.sg/watersupply/fournationaltaps>

A simplified version of the reverse osmosis process is shown below.



Source: <http://www.filterwater.com/t-articles.ReverseOsmosis.aspx>

- (a) With reference to the diagram,
- (i) state an example of a filtrate and a residue.

Filtrate: .....

Residue: .....

[2]

(ii) describe how the partially permeable membrane can help to remove the bacteria in the water.

.....  
.....  
.....[3]

(b) A scientist argued that a membrane with large pores could be used to speed up the process of obtaining clean water.

Do you agree with his argument? Give reasons to support your answer.

.....  
.....  
..... [2]

(c) Give a reason why technologies such as reverse osmosis to obtain clean water is important to Singapore.

..... [1]

(d) Singapore has two desalination plants and is able to meet 25% of water demand. Three more desalination plants will be ready by 2020. Desalinated water is expected to meet up to 30% of Singapore’s future water needs by 2060.

Source - <https://www.pub.gov.sg/watersupply/fournationaltaps/desalinatedwater>

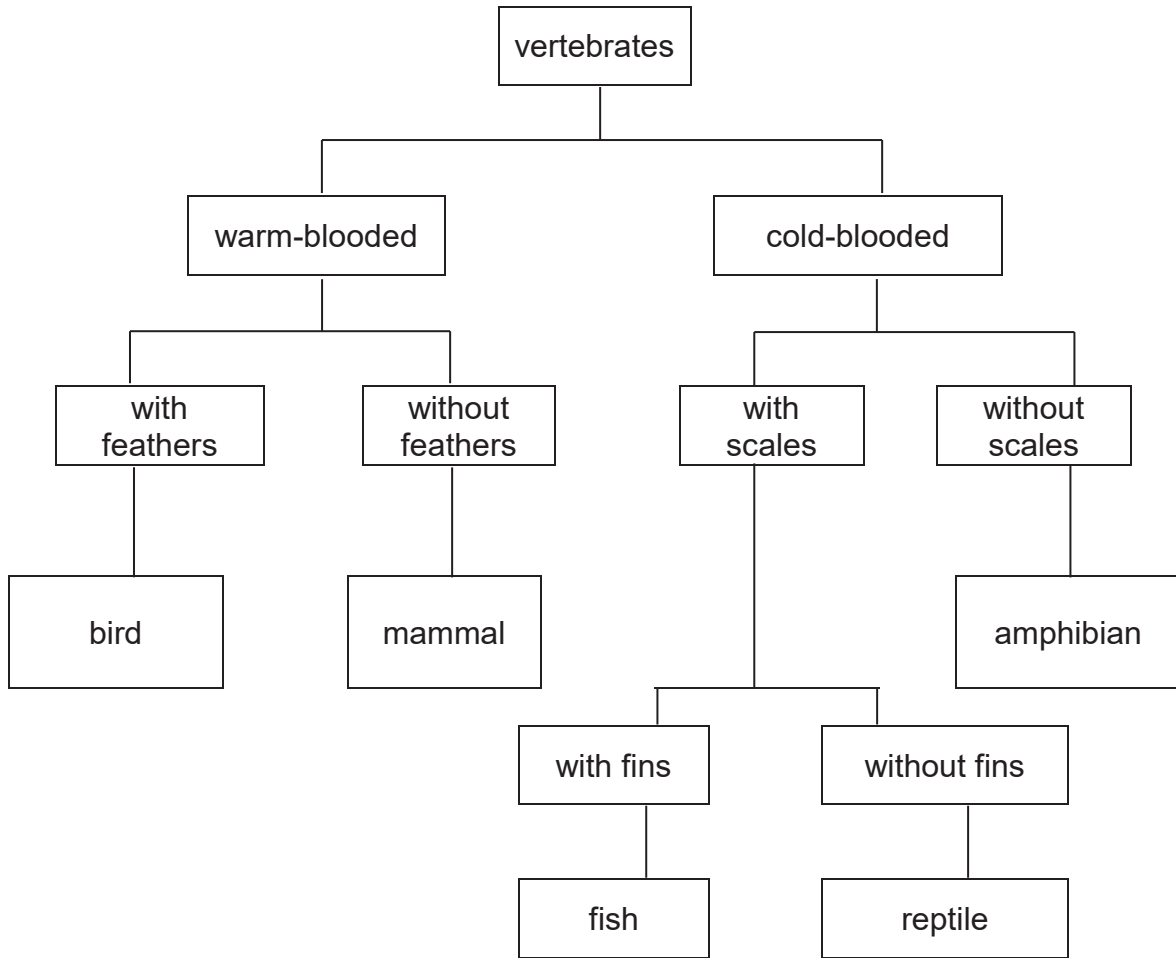
(i) State the source of water used in desalination plants.

..... [1]

(ii) Suggest a possible reason why Singapore does not depend entirely on desalinated water to meet the country’s water demand.

.....  
.....[1]

34 Study the classification key below which uses some of the characteristics of vertebrates to classify them and answer the questions that follow.



(a) Is the key shown above a dichotomous key? Give a reason for your answer.

.....

..... [2]

- (b) Given the characteristics of the following organisms, state the group that each of them is in. The first organism has been done for you. [2]

organism	characteristics	group
organism A	no scales, warm-blooded, 50 cm long, no fins, no feathers	mammal
organism B	with scales, cold-blooded, 4 cm long, no fins, no feathers	.....
organism C	no scales, cold-blooded, 1 m long, no fins, no feathers	.....

- (c) State **two** uses of a dichotomous key.

.....

.....

..... [2]

- (d) Describe **two** benefits of biodiversity to **humans**, with **named examples**.

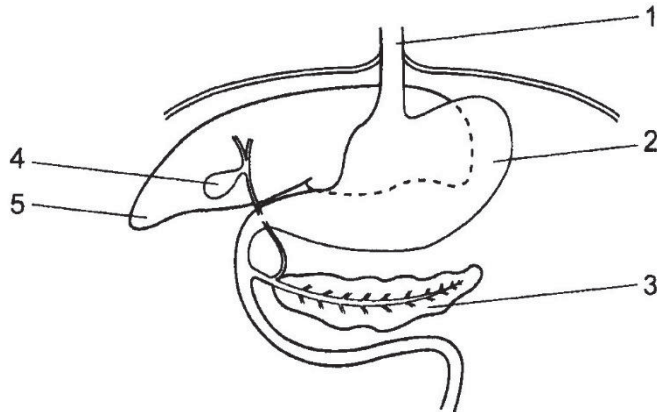
.....

.....

.....

..... [4]

35 The diagram below shows part of the human digestive system.



(a) Explain what is meant by the term 'digestion'.

.....  
.....  
..... [1]

(b) List down all the organs (1-5) in the diagram above which play a role in the digestion of fats.

..... [1]

(c) Name the organ(s) mentioned in (b) and explain how does/do the organ(s) help with the digestion of fats.

.....  
.....  
.....  
.....  
..... [6]

(d) Some people suffer from acid indigestion, a condition where excess acid is produced in the stomach. Besides causing extreme discomfort, it can also cause stomach ulcers if left untreated. Doctors usually recommend that patients consume antacids to reduce the discomfort caused.

(i) Describe one function of acid in the stomach.

.....  
..... [1]

(ii) Suggest why consuming antacids will alleviate the discomfort.

.....  
..... [1]

**END OF PAPER**

# The Periodic Table of Elements

		Group															
I	II	III	IV	V	VI	VII	0										
3 Li lithium 7	4 Be beryllium 9	1 H hydrogen 1	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20									
11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40										
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -
87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	114 Fl flerovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganesson -	119 Uue unbinilium -	120 Uuo unbinilium -

**Key**  
proton (atomic) number  
atomic symbol  
name  
relative atomic mass

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

lanthanoids

actinoids

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

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## GEYLANG METHODIST SCHOOL (SEC)

## 1E LSS MYE 2018 ANS

1	2	3	4	5	6	7	8	9	10
B	D	C	B	A	A	A	B	B	A
11	12	13	14	15	16	17	18	19	20
B	C	B	C	D	C	D	A	A	B

Item	Answers	Marks
21 (a) (b)	A or B / A and B also acceptable C or D / C and D also acceptable	1m each
22 (a)	Carbon, hydrogen, oxygen	1m (must name all)
(b)	Hydrogen	1m
(c)	Sugar is able to <b>decompose</b> when heated and be <b>broken down</b> into simpler substances/carbon and water vapour.	1m – either point mention
(d) (i)	Not a good idea as sugar will <b>decompose</b> into carbon.	1m
(ii)	Crystallization	1m
23	1) Add <b>solvent P</b> to the mixture, stir and <b>filter, Sulfur will be separated as filtrate.</b> 2) Add <b>the residue</b> from step 1 into <b>solvent Q</b> , stir and filter, <b>Salt solution will be separated as filtrate.</b> (question focus on filtration and the sequence of filtration. Any separation of solution is not needed)	1m – filtration 1m – state correct filtrate 1m – mention residue after first filtration
24(a)	Water	1m
(b)	To condense the vapour from the mixture	1m
(c)	“water in” – below “water out” – above	1m 1m
(d)	Water will <b>flow too quickly downwards</b> and the entire condenser <b>will not be filled.</b>	1m 1m
25	Maple – C Sweet Buckeye – E Honey locust – F Honeysuckle – A	1m each, 4m in total

Item	Answers	Marks																		
26 (a)	A – cell wall B – cell membrane C – cytoplasm D – chloroplast E – vacuole (reject cell sap, cell sap is contents, not part) F – nucleus	Any 2 for 1m, no 0.5m, 3m in total																		
(b)	A – supports the cell / gives the cell a regular shape D – contains chlorophyll to trap light energy for photosynthesis	1m 1m																		
(c)	<table border="1"> <thead> <tr> <th></th> <th>Plant cell</th> <th>Animal cell</th> </tr> </thead> <tbody> <tr> <td><b>1</b></td> <td>Presence of cell wall</td> <td>Absence of cell wall</td> </tr> <tr> <td><b>2</b></td> <td>Presence of chloroplasts</td> <td>Absence of chloroplasts</td> </tr> <tr> <td><b>3</b></td> <td>A large, central vacuole</td> <td>Many tiny vacuoles</td> </tr> <tr> <td><b>4</b></td> <td>Contains a thin lining of cytoplasm</td> <td>Cytoplasm fills the cell</td> </tr> <tr> <td><b>5</b></td> <td>Presence of cell sap</td> <td>Absence of cell sap</td> </tr> </tbody> </table>		Plant cell	Animal cell	<b>1</b>	Presence of cell wall	Absence of cell wall	<b>2</b>	Presence of chloroplasts	Absence of chloroplasts	<b>3</b>	A large, central vacuole	Many tiny vacuoles	<b>4</b>	Contains a thin lining of cytoplasm	Cytoplasm fills the cell	<b>5</b>	Presence of cell sap	Absence of cell sap	Any 1 for 1m, 3m in total, both plant and animal cell must be correct to get 1m, no 0.5m, must compare the same thing (e.g. cell wall for both columns)
	Plant cell	Animal cell																		
<b>1</b>	Presence of cell wall	Absence of cell wall																		
<b>2</b>	Presence of chloroplasts	Absence of chloroplasts																		
<b>3</b>	A large, central vacuole	Many tiny vacuoles																		
<b>4</b>	Contains a thin lining of cytoplasm	Cytoplasm fills the cell																		
<b>5</b>	Presence of cell sap	Absence of cell sap																		
(d)	B, C and F	All 3 to get 1m																		
(e)	Chloroplast This cell has no access to sunlight and is hence unable to photosynthesise.	1m 1m																		
27(a)	A – large intestine B – small intestine C – rectum D – anus	2 for 1m, 2m max																		
(b)	C – to store the faeces temporarily D – for the faeces to be passed out of the body	1m 1m																		
(c)(i)	<b>X</b>	1m																		
(ii)	<b>X</b>	1m																		
(iii)	<b>Y</b>	1m																		

Item	Answers	Marks												
28 (a)	The enzyme remains chemically unchanged at the end of the reaction. <u>OR</u> The enzyme is highly specific in its action.	1m												
(b)	<u>OR</u> The enzyme is reusable. <u>OR</u> The enzyme is required in small quantities.  The enzyme is sensitive to pH/temperature.	1m												
29(a)	Enzyme 1 – 8 or 9 °C Enzyme 2 – 39 °C	No units – 0m Both right to get 1m												
(b)	Enzyme 2. Its optimum temperature is closer to the human body temperature of 37°C.	1m 1m												
30	<table border="1"> <thead> <tr> <th>Name of enzyme</th> <th>Substrate</th> <th>End-product(s)</th> </tr> </thead> <tbody> <tr> <td>(a) Amylase</td> <td>Starch</td> <td>Maltose</td> </tr> <tr> <td>(b) Protease</td> <td>Protein</td> <td>Amino acids</td> </tr> <tr> <td>(c) Lipase</td> <td>Fat</td> <td>Fatty acids and glycerol</td> </tr> </tbody> </table>	Name of enzyme	Substrate	End-product(s)	(a) Amylase	Starch	Maltose	(b) Protease	Protein	Amino acids	(c) Lipase	Fat	Fatty acids and glycerol	Pancreatic amylase/ protease/ lipase are accepted. 1m each row, no 0.5m. -1m overall for all spelling errors.  Carbohydrase not accepted as enzyme, carbohydrate not accepted as substrate.
Name of enzyme	Substrate	End-product(s)												
(a) Amylase	Starch	Maltose												
(b) Protease	Protein	Amino acids												
(c) Lipase	Fat	Fatty acids and glycerol												
31 (a)	Peristalsis	1m												
(b)	It is the <b><u>continuous wave-like contractions of the muscles</u></b> along the gut/alimentary canal that help to push the food forward.	1m												
32	<b>C</b> – Stomach <b>E</b> – Large intestine	1m each												

Item	Answers	Marks
33		
(a)(i)	Filtrate: Water molecules and dissolved salts  Residue: Bacteria / disease causing organisms	1m – either answer 1m
(ii)	Bacteria are <b>bigger than the pores</b> of the permeable membrane. Particles like water and dissolved salt are <b>smaller and can pass through</b> . This <b>separates</b> the bacteria from the water and the dissolved salt / the bacteria will <b>remain</b> on the permeable membrane.	1m 1m 1m
(b)	No. The <b>larger pores</b> of the permeable membrane <b>will not be able to trap the bacteria</b> and they <b>can pass through</b> the membrane.	1m 1m
(c)	Singapore has shortage of water or any other acceptable ans	1m
(d)		
(i)	Seawater	1m
(ii)	Desalination is very <b>expensive</b> . Total dependency on desalination plants will cause the price of water to be very high.	1m
34 (a)	Yes. A dichotomous key classifies living things / organisms into <b>two smaller groups at each stage</b> .	1m 1m
(b)	Organism B – Reptile Organism C – Amphibian	1m each
(c)	<ul style="list-style-type: none"> <li>To classify organisms</li> <li>To identify organisms</li> <li>To recognise how organisms are related</li> </ul>	1m each, any 2 for 2m
(d)	<ul style="list-style-type: none"> <li>Important for maintaining a stable system in nature For example, honeybees help to fertilise crops which are important food sources for humans</li> <li>Provide valuable resources For example, wood is a raw material to make wooden furniture/some plants or fungi can be used as medicine/ some plants can be used as food such as herbs and spices</li> <li>Any other acceptable answer</li> </ul>	1m for benefit, 1m for relevant example (2 benefits with 2 examples to get 4 m)

Item	Answers	Marks
35(a)	Digestion is the process of <b><u>breaking down</u></b> the <b><u>large molecules</u></b> into <b><u>smaller molecules</u></b> that can be <b><u>absorbed</u></b> by the body.	All bold and underlined to get 1m
(b)	3, 4 and 5	All to get 1m
(c)	3 – pancreas Pancreas secrete pancreatic juice that contains (pancreatic) <b><u>lipase</u></b> , which <b><u>breaks down fats into fatty acid and glycerol</u></b> .  4 – gall bladder Gall bladder <b><u>secretes bile</u></b> , which <b><u>emulsifies large fat droplet into smaller fat droplets</u></b> .  5 – liver Liver <b><u>produces bile</u></b> , which <b><u>is stored in the gall bladder</u></b> .	1m for the named organ, 1m for the explanation, all bold and underlined to get the mark  The part “emulsifies large fat droplet into smaller fat droplets” only need to be present <b>once</b> .
(d) (i)	<ul style="list-style-type: none"> <li>Provides a slightly acidic medium suitable for the action of gastric enzymes</li> <li>Kills bacteria in food</li> </ul>	Any one to get 1m
(d) (ii)	Antacids can remove the excess acid. <b><u>OR</u></b> Antacids can neutralise the acid.	1m



Index Number	Class	Name
--------------	-------	------



# CHIJ ST JOSEPH'S CONVENT SEMESTRAL ASSESSMENT 1



## SCIENCE (CHEMISTRY)

Secondary 1 Express

Thursday, 3 May 2018  
50 minutes

### READ THESE INSTRUCTIONS FIRST

Write your index number, class and name on all the work you hand in.  
Write in dark blue or black pen.  
Do not use staples, paper clips, highlighters, glue or correction fluid.

#### Section A

There are **ten** questions. Answer **all** questions. For each question there are four possible answers **A, B, C,** and **D**.

Choose the **one** you consider correct and shade your choice in the Multiple Choice Answer Sheet with a 2B pencil.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

#### Section B

Answer **all** questions in the spaces provided.

The number of marks is given in brackets [ ] at the end of each question or part question.

Show all your working on the same page as the rest of the answer.

Omission of essential working will result in loss of marks.

Electronic calculator may be used in this paper.

The total of the marks for this paper is 40.

A copy of the Periodic Table is printed on page **11**.

FOR EXAMINER'S USE	
A	
B	
Total	<b>40</b>

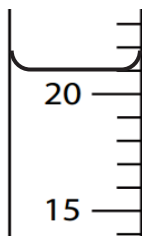
This document consists of **11** printed pages.

Setter(s) : Mrs. Ken Oh and Mr. Tan Keng Chiaw



**Section A (10 marks)**Answer **all** questions.

- 1 Which of the following are good practices in the laboratory?
- I Discarding broken glassware in the dustbin.
  - II Wearing safety goggles while heating substances.
  - III Having a fire extinguisher and fire blanket in the laboratory.
  - IV Pouring excess chemicals back into containers to reduce wastage.
- A** I and II only  
**B** II and III only  
**C** I, II and IV only  
**D** All of the above
- 2 Which of the following substances may corrode the skin upon contact?
- A** helium  
**B** ethanol  
**C** mercury  
**D** sulfuric acid
- 3 A student wanted to add  $15.50 \text{ cm}^3$  of hydrochloric acid to magnesium carbonate. Which of the following apparatus is most suitable?
- A** burette  
**B** beaker  
**C** measuring cylinder  
**D** pipette
- 4 What volume of solution is shown in the measuring cylinder below?



- A**  $20 \text{ cm}^3$   
**B**  $21 \text{ cm}^3$   
**C**  $22 \text{ cm}^3$   
**D**  $24 \text{ cm}^3$

- 5 Which of the following statements about the Periodic Table is **incorrect**?
- A** It is organised into groups and periods.  
**B** Both elements and compounds are listed in the table.  
**C** The table classifies elements broadly into metals and non-metals.  
**D** The names of the elements are represented by chemical symbols.
- 6 Which of the following pairs of elements have the same chemical properties?
- A** lithium and hydrogen  
**B** carbon and nitrogen  
**C** nitrogen and phosphorus  
**D** sodium and chlorine
- 7 Which of the following are physical properties of calcium?

	sonorous	malleable	high melting point
<b>A</b>	√	√	√
<b>B</b>	√	X	X
<b>C</b>	X	√	√
<b>D</b>	X	X	√

- 8 A human tooth is largely made up of hydroxyapatite. Hydroxyapatite has a chemical formula,  $\text{Ca}_5(\text{PO}_4)_3(\text{OH})$ .

How many types of elements does hydroxyapatite contain?

- A** 4  
**B** 5  
**C** 6  
**D** 7
- 9 A student mixed some soybean powder into water to make soybean milk. Then, he tried to separate the soybean powder from the water through filtration. He was unsuccessful.

What could be a possible reason?

- A** Soybean milk is a solution so there is no residue.  
**B** Soybean milk is a suspension so there is no filtrate.  
**C** Soybean milk particles are too big to pass through the filter paper.  
**D** Soybean milk particles are smaller than the pores on the filter paper.

- 10 Which of the following mixtures can be separated using magnetic attraction?
- A iron and steel
  - B paper and cloth
  - C nickel and silver
  - D plastic and copper

**Section B (30 marks)**Answer **all** questions in the spaces provided.

- 1 Methanol is an alcohol commonly found in the laboratory.

The following diagram shows a warning label found on a bottle of methanol.

*For  
Examiner's  
Use*





**RESPONSE**

**If swallowed:** Immediately call a poison center. Rinse mouth. **If inhaled:** Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a poison center. **If on skin (or hair):** Wash with plenty of water, and soap if available. Call a poison center if you feel unwell.

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide for extinction.

**WARNING:** This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

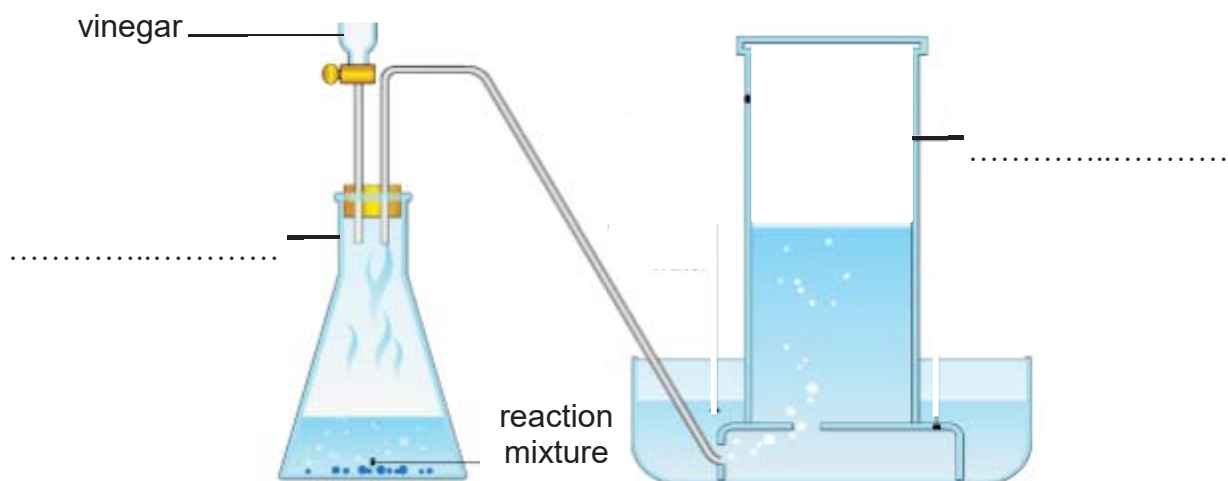
Tick (✓) in the boxes to identify the correct hazard symbols for methanol.

[2]

- 2 Baking soda reacts with vinegar to produce carbon dioxide gas.  
**Fig 2.1** shows a set-up of the above reaction to collect the carbon dioxide gas.

*For  
Examiner's  
Use*



**Fig 2.1**

- (a) (i) Name the method of gas collection shown in **Fig 2.1**.

..... [1]

- (ii) Label the apparatus in **Fig 2.1**. [2]

- (iii) A student wants to collect and measure the volume of carbon dioxide. Name and draw a suitable apparatus.

name of apparatus: .....

diagram:

[2]

- (b) A student suggests that the downward delivery method is more suitable than the one shown in Fig 2.1.

For  
Examiner's  
Use

Explain.

.....

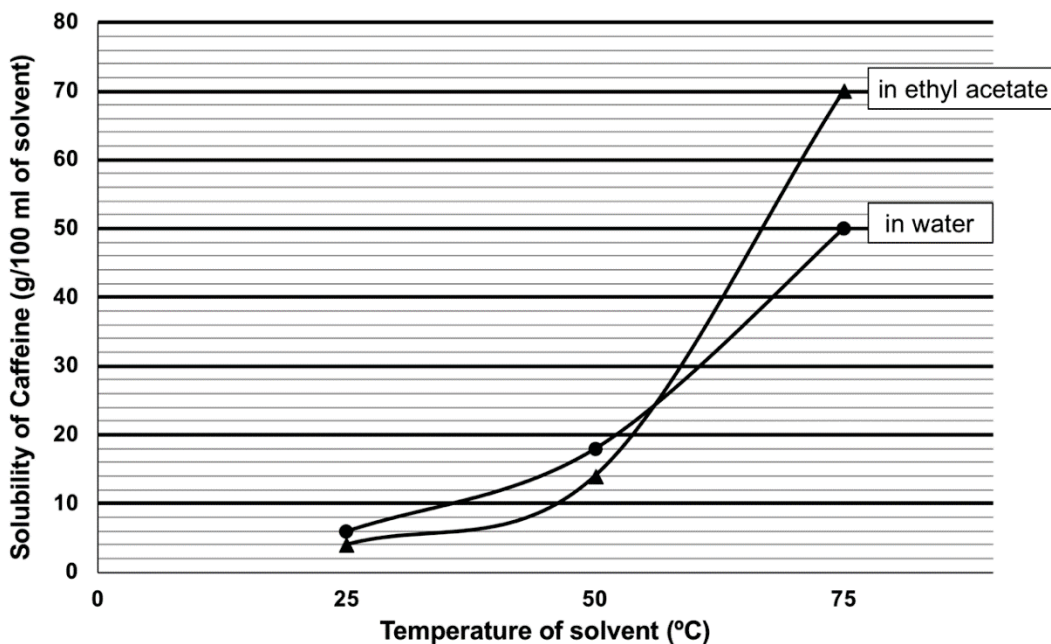
.....

.....

[2]

- 3 Caffeine is a substance commonly found in coffee beans.

The graph below shows the *solubility* of caffeine in two different solvents, ethyl acetate and water, at various temperatures.



- (a) Explain the term *solubility*.

.....

.....

[1]

- (b) Describe the relationship between temperature and solubility of caffeine in water.

.....

.....

[1]

- (c) Determine the maximum mass of caffeine that can dissolve in 200 ml of water at 25 °C.

..... [1]

- (d) Calculate the increase in mass of caffeine that can be dissolved in 100 ml of ethyl acetate when temperature is increased from 25 °C to 50 °C.

..... [1]

- (e) (i) Caffeine has a chemical formula of  $C_8H_{10}N_4O_2$ .  
State with a reason, if caffeine is a compound or a mixture.

.....  
.....

- (ii) Name an element that makes up caffeine, hence, state its group number and period number.

name of element: .....

group number: .....

period number: .....

[3]

- 4 Borax solution can be added to glue to form a non-Newtonian liquid that resembles slime.

Amy conducted an experiment to find out if the amount of borax solution affects the hardness of the slime.

- (a) Suggest a suitable hypothesis for the experiment.

.....  
..... [1]

- (b) Identify the independent and dependent variables for the experiment.

independent variable: .....

dependent variable: ..... [2]

- 5 The table below shows the characteristics of three substances.

substance	soluble in water	soluble in alcohol	magnetic
<b>R</b>	yes	no	yes
<b>S</b>	yes	no	no
<b>T</b>	no	yes	yes

- (a) Briefly describe how you would separate a powdered mixture of substance **R**, **S** and **T** into its individual components.

You might want to number your steps for clarity.

.....

.....

.....

.....

.....

.....

[3]

- (b) In a separate experiment, substance **S** was dissolved in water to form a mixture.

- (i) Draw a diagram to show how you can use evaporation to dryness to obtain solid substance **S** from this mixture.

You need to label your diagram clearly.

[3]



(ii) A non-luminous flame was used for (i).

Describe how a non-luminous flame was achieved and explain why it was used in preference to a luminous flame.

.....

.....

.....

.....

[2]

For  
Examiner's  
Use

6 The boxes in the figure below contain descriptions of three different substances, **A**, **B**, and **C**.

**A** can be separated into two different substances by adding water and filtering.

**B** is a gas that cannot be broken down into simpler substance.

**C** is formed when **B** and a metal undergoes a chemical reaction upon heating.

Classify each substance by ticking (✓) the correct box in the table below.

substance	element	compound	mixture	either an element or a compound
<b>A</b>				
<b>B</b>				
<b>C</b>				

[3]

## The Periodic Table of Elements

		Group																																																																																																																																																																																																																																																																											
I	II	III	IV	V	VI	VII	0						0																																																																																																																																																																																																																																																																
3 Li lithium	4 Be beryllium	5 B boron	6 C carbon	7 N nitrogen	8 O oxygen	9 F fluorine	10 Ne neon	11 Na sodium	12 Mg magnesium	13 Al aluminium	14 Si silicon	15 P phosphorus	16 S sulfur	17 Cl chlorine	18 Ar argon	19 K potassium	20 Ca calcium	21 Sc scandium	22 Ti titanium	23 V vanadium	24 Cr chromium	25 Mn manganese	26 Fe iron	27 Co cobalt	28 Ni nickel	29 Cu copper	30 Zn zinc	31 Ga gallium	32 Ge germanium	33 As arsenic	34 Se selenium	35 Br bromine	36 Kr krypton	37 Rb rubidium	38 Sr strontium	39 Y yttrium	40 Zr zirconium	41 Nb niobium	42 Mo molybdenum	43 Tc technetium	44 Ru ruthenium	45 Rh rhodium	46 Pd palladium	47 Ag silver	48 Cd cadmium	49 In indium	50 Sn tin	51 Sb antimony	52 Te tellurium	53 I iodine	54 Xe xenon	55 Cs caesium	56 Ba barium	57-71 lanthanoids	72 Hf hafnium	73 Ta tantalum	74 W tungsten	75 Re rhenium	76 Os osmium	77 Ir iridium	78 Pt platinum	79 Au gold	80 Hg mercury	81 Tl thallium	82 Pb lead	83 Bi bismuth	84 Po polonium	85 At astatine	86 Rn radon	87 Fr francium	88 Ra radium	89-103 actinoids	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium	109 Mt meitnerium	110 Ds darmstadtium	111 Rg roentgenium	112 Cn copernicium	113 Nh nihonium	114 Fl flerovium	115 Lv livermorium	116 Lv livermorium	117 Ts tennessine	118 Og oganeson	119 Uu unbinetium	120 Uub unbinetium	121 Uut unbinetium	122 Uuq unbinetium	123 Uuq unbinetium	124 Uuq unbinetium	125 Uuq unbinetium	126 Uuq unbinetium	127 Uuq unbinetium	128 Uuq unbinetium	129 Uuq unbinetium	130 Uuq unbinetium	131 Uuq unbinetium	132 Uuq unbinetium	133 Uuq unbinetium	134 Uuq unbinetium	135 Uuq unbinetium	136 Uuq unbinetium	137 Uuq unbinetium	138 Uuq unbinetium	139 Uuq unbinetium	140 Uuq unbinetium	141 Uuq unbinetium	142 Uuq unbinetium	143 Uuq unbinetium	144 Uuq unbinetium	145 Uuq unbinetium	146 Uuq unbinetium	147 Uuq unbinetium	148 Uuq unbinetium	149 Uuq unbinetium	150 Uuq unbinetium	151 Uuq unbinetium	152 Uuq unbinetium	153 Uuq unbinetium	154 Uuq unbinetium	155 Uuq unbinetium	156 Uuq unbinetium	157 Uuq unbinetium	158 Uuq unbinetium	159 Uuq unbinetium	160 Uuq unbinetium	161 Uuq unbinetium	162 Uuq unbinetium	163 Uuq unbinetium	164 Uuq unbinetium	165 Uuq unbinetium	166 Uuq unbinetium	167 Uuq unbinetium	168 Uuq unbinetium	169 Uuq unbinetium	170 Uuq unbinetium	171 Uuq unbinetium	172 Uuq unbinetium	173 Uuq unbinetium	174 Uuq unbinetium	175 Uuq unbinetium	176 Uuq unbinetium	177 Uuq unbinetium	178 Uuq unbinetium	179 Uuq unbinetium	180 Uuq unbinetium	181 Uuq unbinetium	182 Uuq unbinetium	183 Uuq unbinetium	184 Uuq unbinetium	185 Uuq unbinetium	186 Uuq unbinetium	187 Uuq unbinetium	188 Uuq unbinetium	189 Uuq unbinetium	190 Uuq unbinetium	191 Uuq unbinetium	192 Uuq unbinetium	193 Uuq unbinetium	194 Uuq unbinetium	195 Uuq unbinetium	196 Uuq unbinetium	197 Uuq unbinetium	198 Uuq unbinetium	199 Uuq unbinetium	200 Uuq unbinetium	201 Uuq unbinetium	202 Uuq unbinetium	203 Uuq unbinetium	204 Uuq unbinetium	205 Uuq unbinetium	206 Uuq unbinetium	207 Uuq unbinetium	208 Uuq unbinetium	209 Uuq unbinetium	210 Uuq unbinetium	211 Uuq unbinetium	212 Uuq unbinetium	213 Uuq unbinetium	214 Uuq unbinetium	215 Uuq unbinetium	216 Uuq unbinetium	217 Uuq unbinetium	218 Uuq unbinetium	219 Uuq unbinetium	220 Uuq unbinetium	221 Uuq unbinetium	222 Uuq unbinetium	223 Uuq unbinetium	224 Uuq unbinetium	225 Uuq unbinetium	226 Uuq unbinetium	227 Uuq unbinetium	228 Uuq unbinetium	229 Uuq unbinetium	230 Uuq unbinetium	231 Uuq unbinetium	232 Uuq unbinetium	233 Uuq unbinetium	234 Uuq unbinetium	235 Uuq unbinetium	236 Uuq unbinetium	237 Uuq unbinetium	238 Uuq unbinetium	239 Uuq unbinetium	240 Uuq unbinetium	241 Uuq unbinetium	242 Uuq unbinetium	243 Uuq unbinetium	244 Uuq unbinetium	245 Uuq unbinetium	246 Uuq unbinetium	247 Uuq unbinetium	248 Uuq unbinetium	249 Uuq unbinetium	250 Uuq unbinetium	251 Uuq unbinetium	252 Uuq unbinetium	253 Uuq unbinetium	254 Uuq unbinetium	255 Uuq unbinetium	256 Uuq unbinetium	257 Uuq unbinetium	258 Uuq unbinetium	259 Uuq unbinetium	260 Uuq unbinetium	261 Uuq unbinetium	262 Uuq unbinetium	263 Uuq unbinetium	264 Uuq unbinetium	265 Uuq unbinetium	266 Uuq unbinetium	267 Uuq unbinetium	268 Uuq unbinetium	269 Uuq unbinetium	270 Uuq unbinetium	271 Uuq unbinetium	272 Uuq unbinetium	273 Uuq unbinetium	274 Uuq unbinetium	275 Uuq unbinetium	276 Uuq unbinetium	277 Uuq unbinetium	278 Uuq unbinetium	279 Uuq unbinetium	280 Uuq unbinetium	281 Uuq unbinetium	282 Uuq unbinetium	283 Uuq unbinetium	284 Uuq unbinetium	285 Uuq unbinetium	286 Uuq unbinetium	287 Uuq unbinetium	288 Uuq unbinetium	289 Uuq unbinetium	290 Uuq unbinetium	291 Uuq unbinetium	292 Uuq unbinetium	293 Uuq unbinetium	294 Uuq unbinetium	295 Uuq unbinetium	296 Uuq unbinetium	297 Uuq unbinetium	298 Uuq unbinetium	299 Uuq unbinetium	300 Uuq unbinetium

1  
H  
hydrogen  
1

Key  
 atomic number  
 atomic symbol  
 name  
 relative atomic mass

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium	94 Pu plutonium	95 Am americium	96 Cm curium	97 Bk berkelium	98 Cf californium	99 Es einsteinium	100 Fm fermium	101 Md mendelevium	102 No nobelium	103 Lr lawrencium

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.)



Number	Class	Name
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# CHIJ ST JOSEPH'S CONVENT SEMESTRAL ASSESSMENT 1



**Lower Sec SCIENCE: PHYSICS module**

**5076**

Secondary 1 Express

Friday, 4 May 2018  
50 minutes

Additional Materials: Multiple Choice Answer Sheet

## READ THESE INSTRUCTIONS FIRST

Write your index number, class and name on all the work you hand in.  
Write in dark blue or black pen on both sides of the paper.  
You may use a soft pencil for any diagrams, graphs or rough working  
Do not use staples, paper clips, highlighters, glue or correction fluid.

### Section A

There are **ten** questions in Section A. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.  
Choose the **one** you consider correct and record your choice in the Multiple Choice Answer Sheet provided.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.  
Any rough working should be done in this booklet.

### Section B

Answer all questions in Section B in the spaces provided.

Candidates are reminded that **all** quantitative answers should include appropriate units.  
Candidates are advised to show all their working in a clear and orderly manner, as more marks are awarded for sound use of Physics than for correct answers.

The number of marks is given in brackets [ ] at the end of each question or part question.

FOR EXAMINER'S USE	
Section A	/ 10
Section B	/ 30
TOTAL	/ 40

This document consists of **10** printed pages.

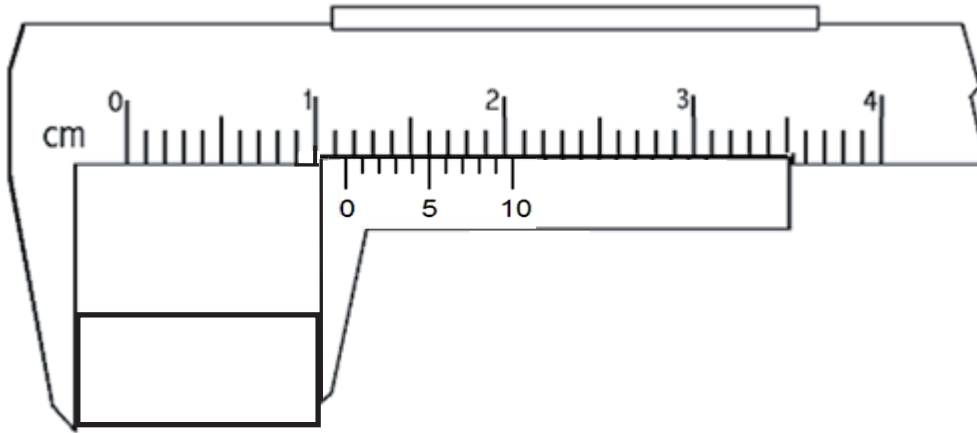
**Setter(s):** Mr Tan T. H.

**[Turn over**

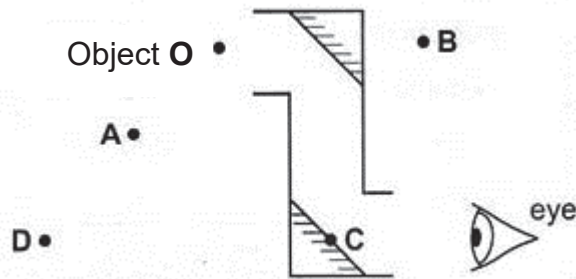
Need Home Tuition? Visit [Mindworkstuition.com](http://Mindworkstuition.com) now or call 85000358 for assistance :)

**Section A**Answer **all** the questions in this section.

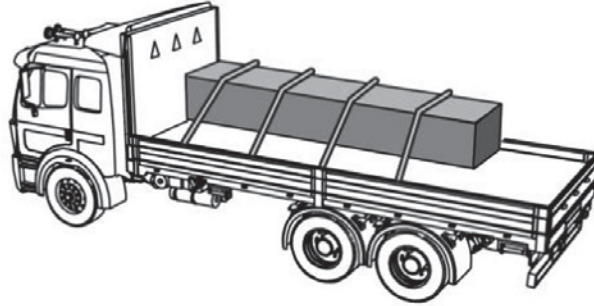
- 1 What is the reading shown by the vernier caliper below?



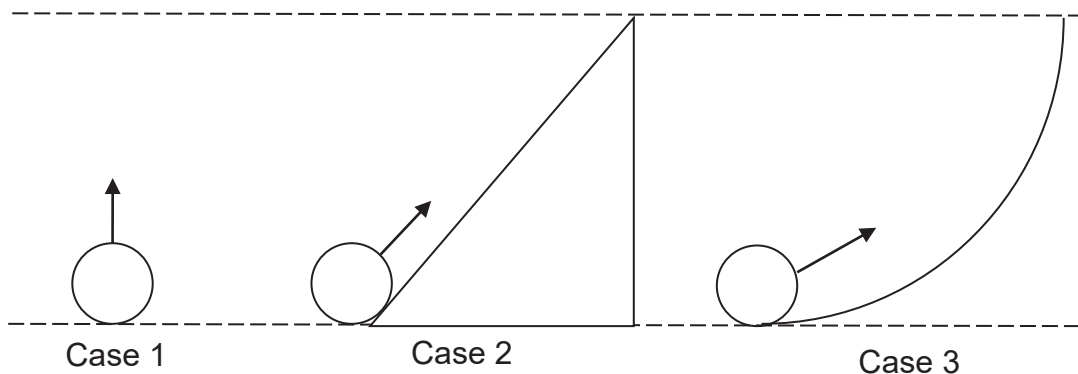
- A 1.04 cm      B 1.05 cm      C 1.14 cm      D 1.54 cm
- 2 An observer sees the image of an object **O** through a periscope. Where is the final image of the object as seen through the periscope?



- 3 Why must cargo be secured tightly on a truck while moving on the road?



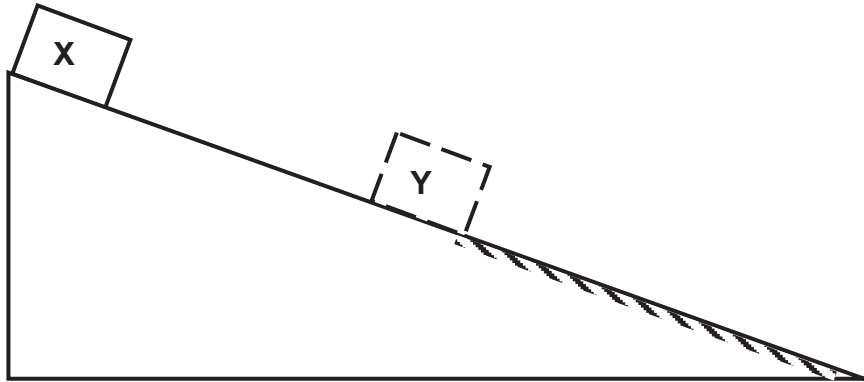
- A** The weight of the cargo may cause it to slide backwards when the truck starts to move forward.
- B** The volume of the cargo may cause it to shift sideways during a turn.
- C** The lower density of the cargo may cause it to float upwards when the truck moves over a hump.
- D** The inertia of the cargo may cause it to move forward when the truck stops suddenly.
- 4 The work done to lift a 40 kg solid object to the same height is lower on planet **A** than on planet **B**. Which of the following statements is NOT true?
- A** The inertia of the object on planet **A** is lower than on planet **B**.
- B** The weight of the object on planet **A** is lower than on planet **B**.
- C** The gravitational field strength on planet **A** is lower than on planet **B**.
- D** The minimum lift force to raise the object on planet **A** is lower than on planet **B**.
- 5 The figure below shows three possible paths for an object to reach the same height. Assume no air resistance and all paths are smooth.



Which of the following statements is true?

- A** The force required to bring the object to the top is the same for all three cases.
- B** The work done on the objects to bring them to the top is the same for all three cases.
- C** The work done to bring the object in Case 3 to the top is the largest as it travels the longest distance.
- D** There is no work done on the object in Case 3 as the direction of the force acting on the object is not the same as the direction of its path.

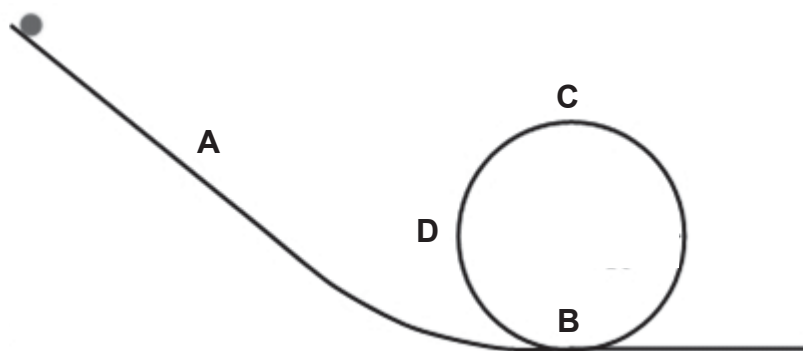
- 6 A slope has a smooth surface between **X** and **Y** and a rough surface from point **Y** onwards. A block slides down from rest at point **X** and travels at constant speed from point **Y** onwards.



Which of the following best describes what happens to the loss of gravitational potential energy of the block as it slides down?

	from <b>X</b> to <b>Y</b> , gravitational potential energy	from <b>Y</b> onwards, gravitational potential energy
<b>A</b>	→ kinetic energy	→ thermal energy
<b>B</b>	→ kinetic energy	→ kinetic energy
<b>C</b>	→ thermal energy	→ thermal energy
<b>D</b>	→ thermal energy	→ kinetic energy

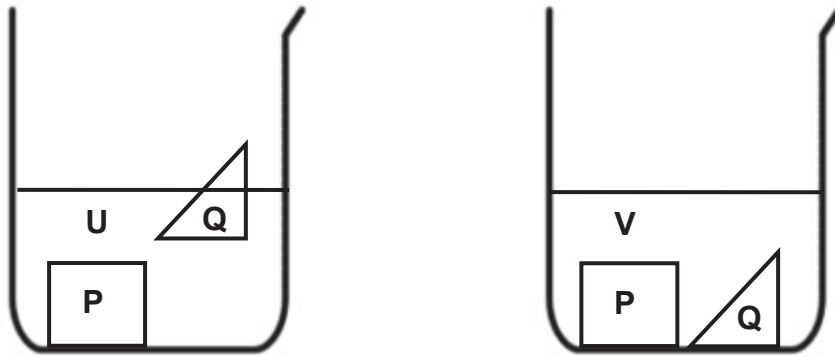
- 7 The figure below shows the smooth, looped path that a ball slides along from rest. At which point is the ball at its fastest speed? Assume no air resistance.



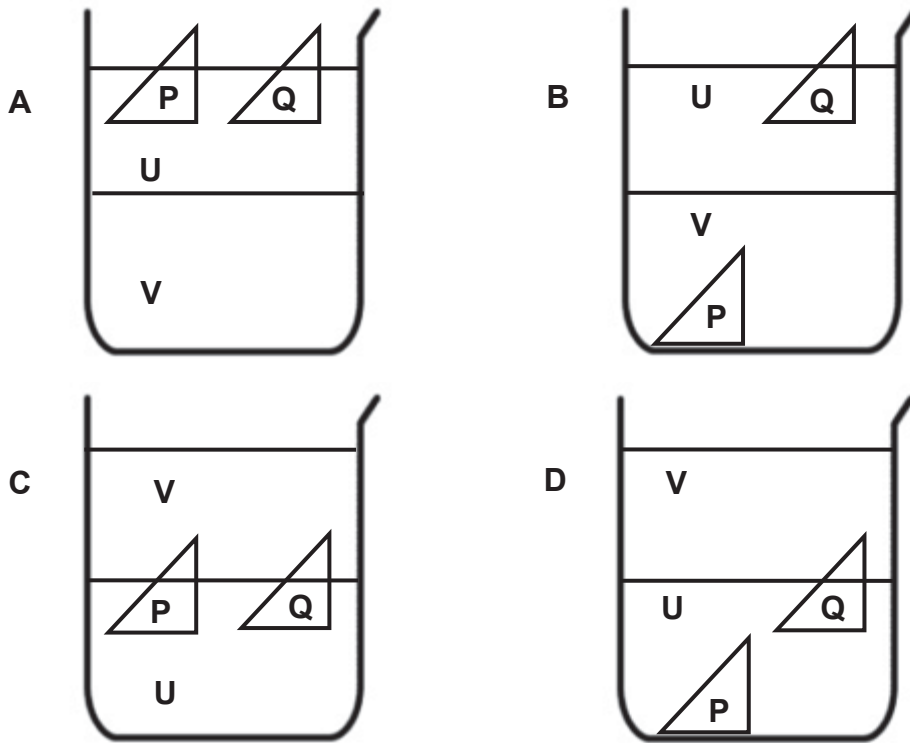
- 8 The investigating satellite “Juno” orbiting the planet Jupiter takes 35 min to send a signal from Jupiter to Earth at the speed of light. Calculate the distance between Jupiter and Earth.

- A**  $6.3 \times 10^{11}$  m  
**B**  $1.05 \times 10^{10}$  m  
**C** 630 000 m  
**D** 10 500 m

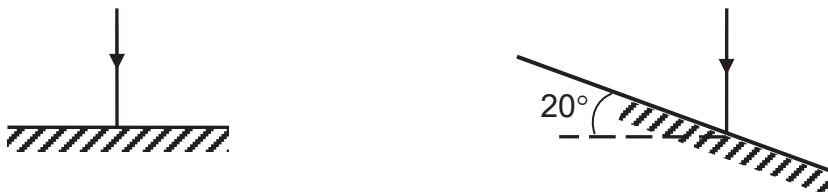
- 9 The figures below shows the positions of two objects **P** and **Q** being placed into two liquids **U** and **V** separately.



Object **P** is then cut into half and placed together with **Q** into a mixture of the immiscible liquids **U** and **V**. Which of the following options shows their final positions?



- 10 A ray incidents normally on a horizontal mirror. The mirror is rotated clockwise by an angle of  $20^\circ$ .



What is the *change* in angle for the reflected ray?

- A  $70^\circ$                       B  $50^\circ$                       C  $40^\circ$                       D  $20^\circ$

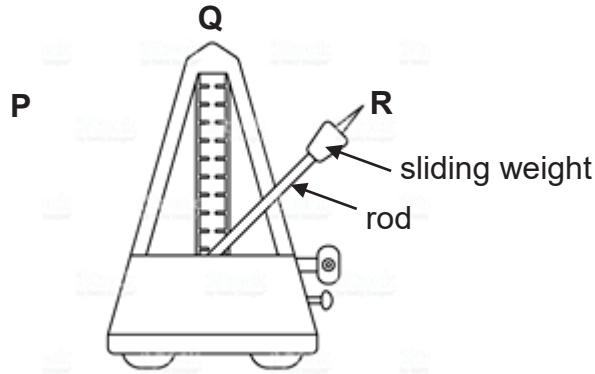


**Section B**

Answer **all** questions in this section in the spaces provided.

*For  
Examiner's  
Use*

- 1 State
- (a) The physical quantity measured in Kelvin: ..... [1]
- (b) The instrument used to measure force: ..... [1]
- 2 Figure 2.1 shows a metronome with a sliding weight oscillating between **P** and **R**.



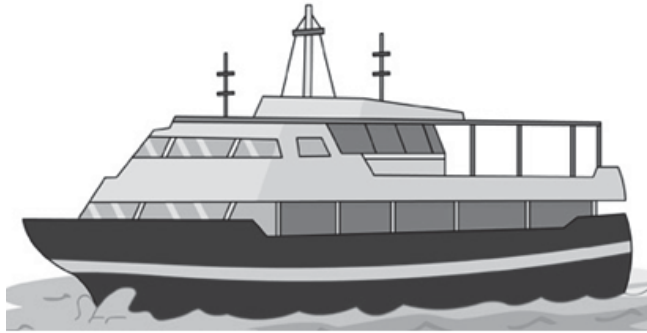
**Fig 2.1**

A stopwatch records 21.60 s for the sliding weight to complete 10 oscillations.

Calculate the time taken for the sliding weight to move from **P** to **Q**.

time taken = ..... [2]

- 3 Figure 3.1 shows an 850 g model ferry used to test out methods to raise a sunken ferry.



**Fig 3.1**

- (a) The total volume of the model ferry is  $940 \text{ cm}^3$ . Calculate the average density of the model ferry.

density = ..... [2]

- (b) Calculate the weight of the model ferry.  
Take gravitational field strength =  $10 \text{ N/kg}$ .

weight = ..... [2]

- (c) The model ferry's hull is filled with water to make it sink. One method to raise the sunken ferry is to pump air into the sunken ferry's hull to displace the water in the hull. Explain why this method may work.

.....

.....

.....

..... [2]

- 4 Figure 4.1 shows an observer standing in front of a plane mirror.

For  
Examiner's  
Use

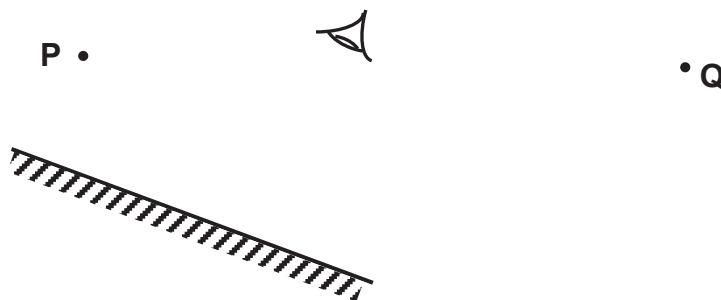


Fig 4.1

- (a) Draw a ray diagram to show how the observer see the image of **P** in the plane mirror by
- (i) locating and labelling the image **P'**, [1]
  - (ii) drawing the reflected ray, [1]
  - (iii) drawing the incident ray. [1]
- (b) Draw, in Fig 4.1, another ray diagram to show whether the observer can see the image of **Q** in the plane mirror. [2]

- 5 Figure 5.1(a) shows a man pushing a 10 kg crate from the bottom of a smooth slope up the slope at a constant speed of 70 cm/s.

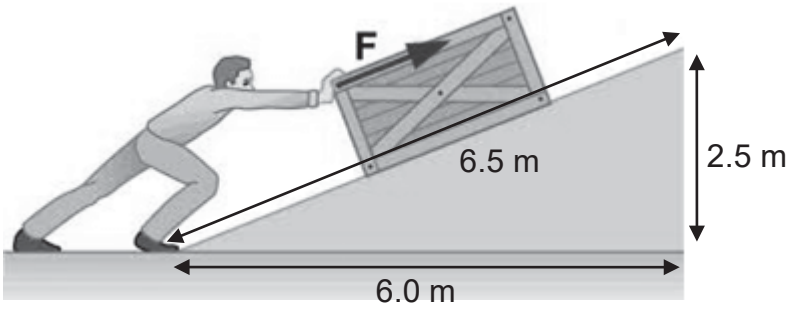


Fig 5.1(a)

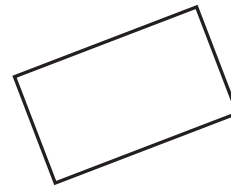


Fig 5.1(b)

- (a) Draw and label in words, in Fig 5.1(b), all the forces acting on the crate. [2]  
 (b) Calculate the kinetic energy of the crate during the push.

kinetic energy = ..... [2]

- (c) Calculate the gain in gravitational potential energy by the crate when it reached the top. Take gravitational field strength = 10 N/kg.

gain in gravitational potential energy = ..... [2]

- (d) Calculate the amount of push force, **F**, on the crate.

push force = ..... [2]

6 A block is moving on a smooth horizontal surface. Its speed increases when a horizontal push force of 50 N is applied on it for 0.45 min. During this time, it travels over a distance of 0.40 km and reaches a final kinetic energy of 30 000 J.

(a) Calculate the amount of work done when the speed increases.

work done = ..... [2]

(b) Calculate the average power produced by the push force.

power = ..... [2]

(c) Calculate the initial kinetic energy of the block before it speeds up.

initial kinetic energy = ..... [1]

7 A ball of mass  $m$  is thrown upwards on Earth with an initial speed  $v$  and gain a height  $h$  when it reaches its highest point. Explain whether the height gain will be different if a larger mass  $M$  is thrown up at the same initial speed. Assume no air resistance.

.....  
.....  
.....  
.....  
..... [2]














**END OF PAPER**



## Section A (10m)

1	2	3	4	5	6	7	8	9	10
B	D	A	B	B	C	A	A	D	C

## Section B (30m)

Qn	Answers	Marks								
1	<table border="1"> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>√</td> <td></td> <td>√</td> </tr> </table>						√		√	<p>Each correct tick is 1m (2m)</p> <p>any extra ticks minus 1</p>
										
	√		√							
2	<p>a)i) Water displacement/ displacement of water BOD: if student has missing 'e' in spelling</p> <p>(ii) conical flask gas jar A: gas collection jar R: Any spelling mistake</p> <p>(iii) gas syringe Must have both words 'gas' and 'syringe' in the answer R: any spelling mistake</p>  <p>Drawing must include:</p> <ul style="list-style-type: none"> <li>• Markings</li> <li>• Plunge</li> <li>• Nozzle</li> <li>• Appropriate shape</li> <li>• Fuzzy lines minus 1m overall in paper together with Qn 5</li> <li>• If student draw the entire setup, drawing must be logical if not is 0m</li> </ul> <p>Note: Name of apparatus and drawing marked separately</p> <p>(b)</p> <ul style="list-style-type: none"> <li>• carbon dioxide is soluble <b>in water</b>; A: slightly soluble in water R: highly soluble in water R: if student says carbon dioxide <u>may</u> dissolve in water/ soluble in water throughout the answer (vague)</li> <li>• carbon dioxide has higher density/heavier <b>than air</b> R: denser than water, heavy (must have show comparison)</li> </ul> <p>Any answer that does not answer the question (e.g. talk about what type of gas can downward delivery collect in general) → 0m</p>	<p>1</p> <p>1</p> <p>1</p> <p>1 – name</p> <p>1 - diagram</p> <p>1</p> <p>1</p>								

	If any contradiction in answer 2-1 or 1-1.																
3 (a)	It is the <b>ability of a solute to dissolve in a solvent.</b>  Note: Definition must be followed strictly R: how well a solute dissolve, ability of solute to dissolve, capability of solute to dissolve, whether solute can dissolve or not A: amount of solute that can dissolve in a fixed amount of solvent at a given temperature (must have all 3 factors for this answer to be correct)/ BOD: ability of a solute dissolving in solvent/ ability to dissolve a solute in a solvent	1															
(b)	The <b>higher the temperature, the higher the solubility</b> of caffeine in water.  R: more soluble/ increase rate of solubility/ more amount or mass dissolve/ the higher the solubility, the higher the temperature (wrong cause and effect relationship)	1															
(c)	$6 \times 2 = 12 \text{ g}$	1															
(d)	$14 \text{ g} - 4 \text{ g} = \mathbf{10 \text{ g}}$  For both 3c and 3d: <ul style="list-style-type: none"> <li>number correct but both no units/ wrong units <math>\rightarrow</math> 2-1</li> <li>if only 1 number is correct but has wrong/ no units <math>\rightarrow</math> 0m</li> </ul>	1															
(e)	(i) Compound; is made up of <b>elements</b> in fixed ratio/ proportion  (ii) Any of the elements CHNO  <table border="1"> <thead> <tr> <th>Name</th> <th>Carbon</th> <th>Nitrogen</th> <th>Oxygen</th> <th>Hydrogen</th> </tr> </thead> <tbody> <tr> <td>Group</td> <td>IV</td> <td>V</td> <td>VI</td> <td>-</td> </tr> <tr> <td>Period</td> <td>2</td> <td>2</td> <td>2</td> <td>1</td> </tr> </tbody> </table> If student write hydrogen, there should not be any Group number assigned so if student write then that item will be wrong. For Group number: R $\rightarrow$ iv/ 4 For Period number: R $\rightarrow$ II Ignore if student write 'group' or 'period' in answer.	Name	Carbon	Nitrogen	Oxygen	Hydrogen	Group	IV	V	VI	-	Period	2	2	2	1	1  3 correct $\rightarrow$ 2m 2 correct $\rightarrow$ 1m
Name	Carbon	Nitrogen	Oxygen	Hydrogen													
Group	IV	V	VI	-													
Period	2	2	2	1													
4 (a)	The higher/lower the amount of borax solution used, the harder/softer the slime  Comments: (1) Penalized for paraphrasing of question (i.e. the amount of borax solution will/will not affect the hardness of the slime)	1															
(b)	Independent variable: volume of borax solution Dependent variable: hardness of slime  Comments: (1) Reject "amount" of borax solution.	1 1															
5 (a)	Use magnet to attract R and T to remove S.	1															



	<p>Add water to R and T to dissolve R. Filter to remove T/ obtain R.</p> <p>Also accept Use magnet to attract R and T Add alcohol to dissolve T Filter to remove R/obtain T</p> <p>Comments: (1) Did not penalise for sequence as long as it is scientifically accurate. Teachers to remind students to think of the most efficient separation process. (2) Penalised for statements that are not scientifically accurate (e.g. using a magnet to separate a solution, identifying wrong residue/substrate) (3) Penalised if students did not mention what specific substance was obtained after a separation technique was used (e.g. use magnet to obtain substance, add water to remaining substance)</p> <p>(i) Set up: evaporating dish, tripod stand with (wire gauze-optional) and Bunsen burner</p> <p>Feasibility of set up Correct drawing Correct labels</p> <p>Comments: (1) Maximum 1 character threshold for spelling</p> <p>(iii) open the air hole Steady/strong heating/hotter</p> <p>Comments: (1) Some students did not describe how to obtain a non-luminous flame. Teachers to remind students to read question carefully.</p>	<p>1 1</p> <p>1 1 1</p> <p>1 1</p>
<b>6</b>	<p>Substance A: mixture Substance B: element Substance C: compound</p>	<p>1 1 1</p>

\*-1M overall for sketchy diagrams

**Answer Key****Lower Sec Science: Physics**  
**Sec 1 Express SA1 2018****Section A**

1	C	2	D	3	D	4	A	5	B
6	A	7	B	8	A	9	D	10	C

**Section B****Q1**

- (a) Temperature B1 Stated other
- physical quantities e.g. weight, heat
  - units e.g. °C, K
- (b) spring balance /  
compression balance /  
newton-meter B1 Stated other instruments
- beam / weight balance / scale,
  - stopwatch, vernier

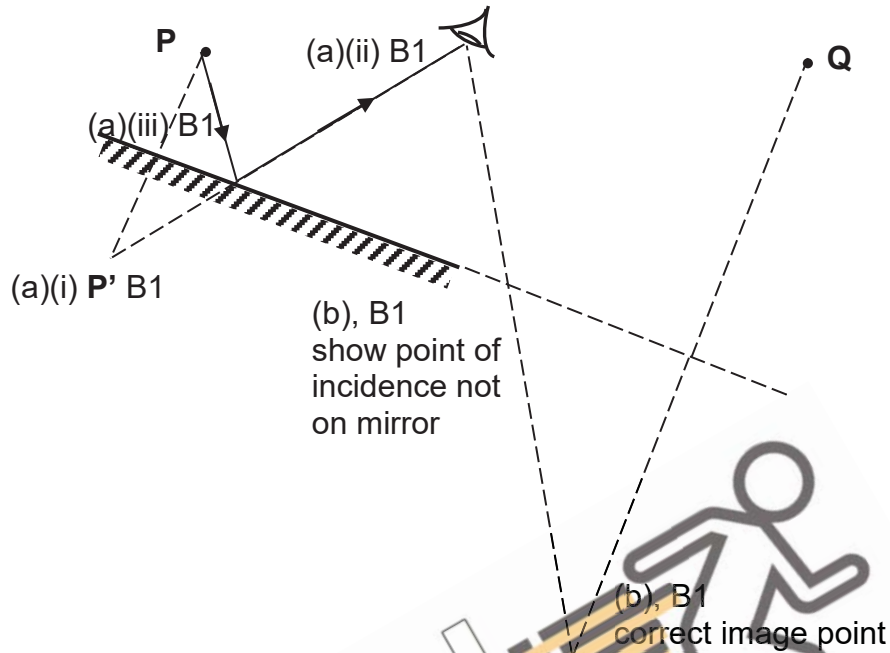
**Q2**

- (a) period, T = 21.60 s ÷ 10  
= 2.16 s M1 2.160 (3 d.p. as 3 s.f.)
- time from P to Q = 2.16 ÷ 4 s A1
- = 0.54 s or 0.540 s
- ÷ (10 × 2)
  - ÷ 2 (PR) / 8
  - ÷ 3 (PQR) / 5 (PQRQP)
  - ÷ (2/3)

**Q3**

- (a) D = m ÷ v M1 • m × v
- = 850 g ÷ 940 cm<sup>3</sup> A1 • kg/cm<sup>3</sup>
- = 0.904 g/cm<sup>3</sup> (accept 2~3 s.f.)
- Deduct 1 m once from paper if not 2~3 s.f.
- 1 or 5 s.f.
  - answer in fraction
  - no / wrong unit
  - conversion error eg 940 cm<sup>3</sup> = 0.94 m<sup>3</sup>
- (b) m = 0.85 kg B1 • D × g
- W = mg A1 • 850 g × 10 N/kg = 8.50 N (no mark)
- = 0.85 kg × 10 N/kg
- = 8.50 N
- (c) P: D = m / v both m • Did not use PRO struct
- R: while v of hull remains the same and v M1 • used ambiguous term eg "heavier" / "lighter"
- m decreases as water is displaced by air A1 • claim instead of explain eg air lower density so ferry density decrease
- O: D decreases, may float

Q4



- Correct position of image and label B1
- Correct reflected ray B1
- Correct incident ray B1

If draw 1 pairs of rays, both rays must be correct to award full mark

Deduct 1 m per item below from whole question if

- missing or wrong direction arrow
- draw arrow for lines behind mirror
- extend mirror with shaded portion

Locating image

- measured from end of shaded part
- measured vertical distance
- measured from P to image of eye
- image same location as object / image on mirror
- labelled using other letter eg I (highlighted, but did not penalise)

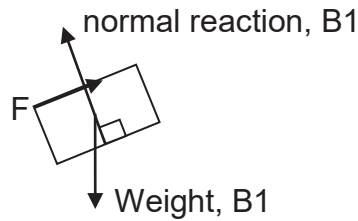
Rays

- missing arrows / rays
- drawn arrows behind mirror / from eye to mirror
- assumed normal line to identify point of incidence eg from eye to mirror

Determining Q

- measure to edge of mirror
- extended mirror to reflect
- drawn arrow / reflected ray
- drawn additional mirror / observer

**Q5**  
**(a)**



- drawn friction even when “smooth”
- did not draw F even when “all”
- drawn tension even when no rope
- drawn normal vertical
- drawn weight perpendicular into surface
- label with letters

Starting point and direction correct then B1

Deduct max 1 m from whole question if awarded 2 m, but

- no arrow(s)
- not in word(s)
- missing F

**(b)**  $v = 0.70 \text{ m/s}$

$$\begin{aligned} \text{KE} &= \frac{1}{2} mv^2 \\ &= \frac{1}{2} (10 \text{ kg})(0.70 \text{ m/s})^2 \\ &= 2.45 \text{ J} \end{aligned}$$

No B1 if correct answer but wrong working

e.g.  $\frac{1}{2} \times 10 \text{ kg} \times 0.70 \text{ m/s}^2$   
or  $\frac{1}{2} \times 10 \text{ kg} \times 0.70 \text{ m/s}$

**(c)**  $\Delta\text{GPE} = mg\Delta h$   
 $= (10 \text{ kg})(10 \text{ N/kg})(2.5 \text{ m})$   
 $= 250 \text{ J}$

**(d)**  $\text{WD by push} = \Delta\text{GPE}$   
 $F \times 6.5 \text{ m} = 250 \text{ J}$   
 $F = 250 \text{ J} / 6.5 \text{ m}$   
 $= 38.5 \text{ N (accept 2~3 s.f.)}$

B1 • did not convert

- $(\frac{1}{2}mv)^2$ ,  $\frac{1}{2} mv$
- No bracket eg  $0.70 \text{ m/s}^2$

B1 ecf if not converted

M1 • Used 6.5 m  
A1 • GPE = KE  
• mg or gh only

M1 • KE / 2.5 or 6.5  
• TE / 6.5  
A1 • force = energy

**Q6**

(a)  $d_{//} = 400 \text{ m}$  B1 did not convert

$$\begin{aligned} \text{WD by } 50 \text{ N} &= F \times d_{//} \\ &= 50 \text{ N} \times 400 \text{ m} \\ &= 20\,000 \text{ J} \end{aligned}$$

B1  
ecf

(b) time =  $0.45 \times 60$   
= 27 s B1

$$\begin{aligned} \text{average power} &= \text{WD} / t \\ &= 20\,000 \text{ J} / 27 \text{ s} \\ &= 741 \text{ W (accept 2-3 s.f.)} \end{aligned}$$

B1  
ecf

- Did not convert or convert wrongly eg 0.75 s, 0.0075 h
- WD as F or final KE
- wrong unit eg N, J

(c) Initial K.E. = final K.E. – WD by 2000 N  
= 30 000 J – 20 000 J  
= 10 000 J B1  
ecf

- try to calculate initial speed from distance / time
- final = initial

**Q7**

P: by PCOE,  
gain in GPE = lost in KE  
 $mg\Delta h = \frac{1}{2}mv^2$   
 $g\Delta h = \frac{1}{2}v^2$

R:  $\Delta h$  is not affected by m

O: will reach the same height

- B1
- tried to use density to explain
  - intuitive eg more mass, less height or more energy, more height
- B1

**Notes:**

- 1) Deduct maximum 1 mark from the whole paper for error in significant figures
- 2) Deduct maximum 1 mark from the whole paper for answers in fraction
- 3) Deduct maximum 1 mark per question for error in units
- 4) Deduct maximum 1 mark per question for answer in fraction





**East Spring Secondary School**  
Towards Excellence and Success

Name: \_\_\_\_\_ (      )

Class: 1 \_\_\_\_\_

**First Semester Examination 2018**  
**Secondary 1 Express**

**Science**

**02 May 2018**  
**Wednesday**

**2 hours**  
**0845 - 1045**

Additional materials:  
1 sheet of OTAS

**INSTRUCTIONS TO CANDIDATES**

Write your name, class and register number in the spaces provided above, and on all the work you hand in.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams, graphs, tables or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Calculators and mathematical sets are allowed.

**Section A [30 marks]**

Answer all questions on the OTAS.

**Section B [30 marks]**

Answer all questions.

Write your answers in the spaces provided.

**Section C [40 marks]**

Answer question **C1** and **any three** of the other four questions.

Write your answers in the spaces provided.

A Periodic Table is given on page 22.

The number of marks is given in brackets [   ]  
at the end of each question or part question.

Section	Marks
<b>A</b>	<b>/ 30</b>
<b>B</b>	<b>/ 30</b>
<b>C</b>	<b>/ 40</b>
<b>Total:</b>	<b>/ 100</b>

This question paper consists of **22** printed pages including the cover page.



**SECTION A [30 marks]**Answer **all** questions.**A1** Which hazard warning symbol is found on the label of a radioactive substance?**A****B****C****D****A2** Which of the following statements about laboratory safety is incorrect?

- A** Eating and drinking are not allowed in the laboratory.
- B** Return all unused chemicals back into its original container.
- C** Safety goggles should be worn when handling chemicals.
- D** All doors and windows should be open during heating experiments.

**A3** Which of the following is the correct working sequence in lighting up a Bunsen Burner?

- 1 Ensure air-hole is opened
- 2 Ensure air-hole is closed
- 3 Open the gas valve
- 4 Light the Bunsen Burner

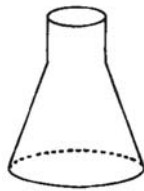
**A** 3,4,1,2**B** 3,4,2,1**C** 2,3,4,1**D** 1,3,4,2**A4** The scientific method usually involves the following steps:identify a problem → **X** → conduct an experiment → **Y** → make conclusionsWhich of the following best describes what **X** and **Y** represent?

	<b>X</b>	<b>Y</b>
<b>A</b>	write a report	make a hypothesis
<b>B</b>	plan an experiment	write a report
<b>C</b>	collect experimental data	plan an experiment
<b>D</b>	make a hypothesis	collect experimental data



**A5** Which of the following shows the correct scientific drawing of a conical flask?

**A**



**B**



**C**



**D**



**A6** The fish tank is an example of a community.

What is a community?

- A** A collection of activities of a group of organisms.
- B** A group of different kinds of organisms living in a habitat.
- C** A group of organisms sharing the same food source.
- D** A place where many different organisms live.

**A7** In an ecosystem, butterflies feed on nectar from flowers and in exchange, the butterflies help the flowers in pollination.

Which of the following correctly describes the relationship between butterflies and flowers?

- A** predator-prey
- B** mutualism
- C** commensalism
- D** parasitism

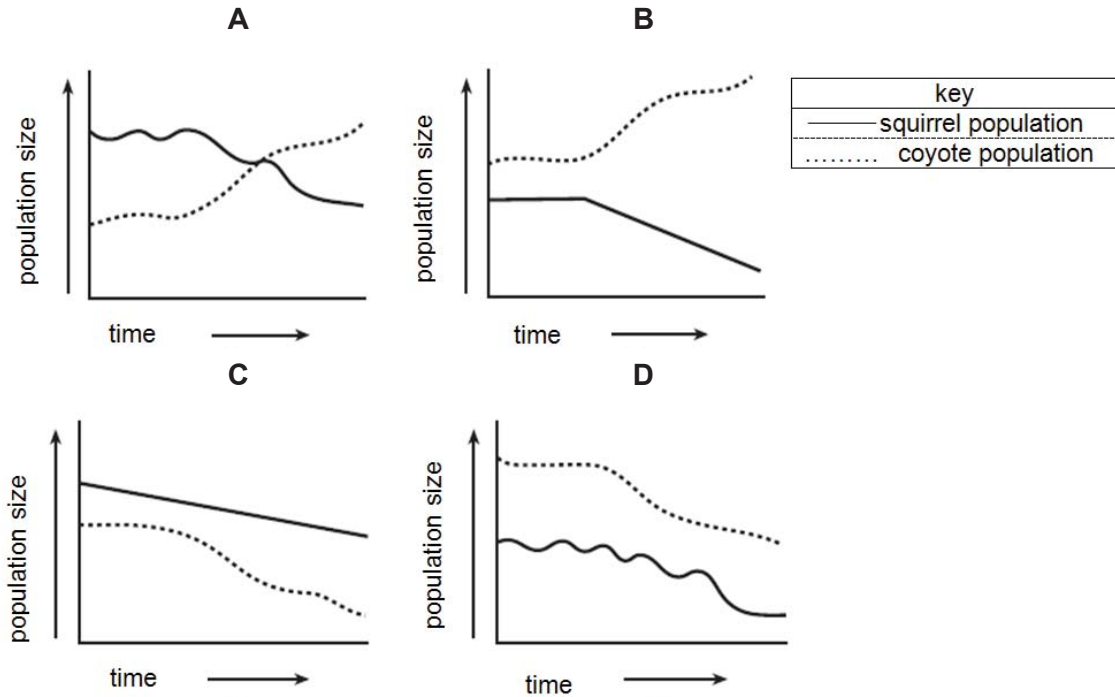
**A8** Which statement(s) is / are true about bacteria?

- I** Bacteria can be found in all types of places such as water, soil, food and even in our body.
- II** Bacteria may be beneficial as certain kinds of bacteria found in our intestines are used to digest food.
- III** Bacteria may be beneficial as certain kinds of bacteria are used in waste treatment plants to break down waste into harmless products.
- IV** Bacteria may be harmful as it can infect our digestive system and leads to diseases such as food poisoning.

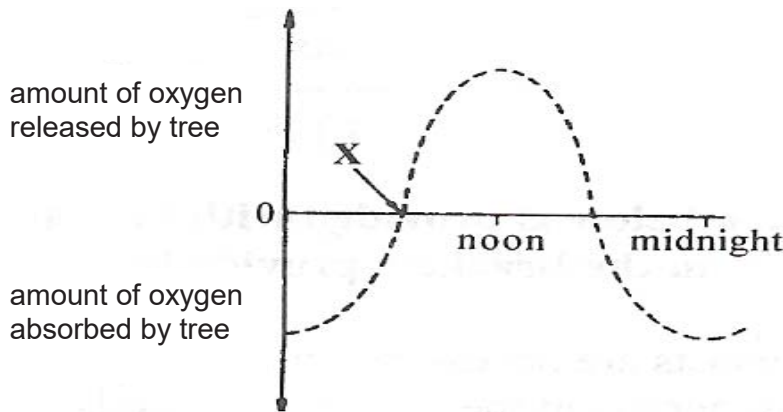
- A** I and II only
- B** II and III only
- C** I, II and III only
- D** All of the above

**A9** In a particular ecosystem, squirrels make up a large portion of the diet of coyotes. As a result of a fatal disease, the squirrel population begins to reduce over a period of months.

Which graph best represents the expected changes in population size of the coyotes and the squirrels?

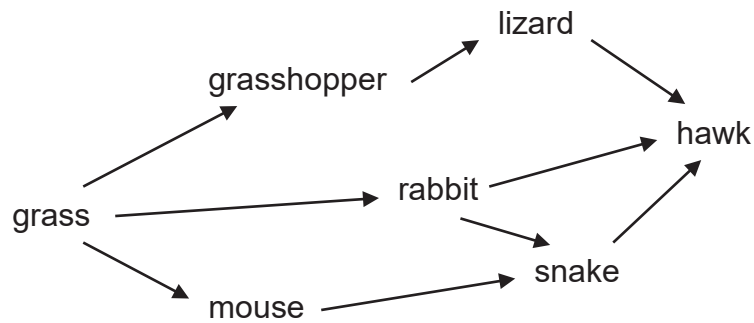


**A10** The figure below shows the amount of oxygen released and absorbed by a tree in a day. Which of the following statements describes the situation at point X?



- A** Photosynthesis begins.
- B** Rate of respiration is lower than rate of photosynthesis.
- C** Rate of respiration is equal to rate of photosynthesis.
- D** Rate of respiration is higher than rate of photosynthesis.

**A11** The diagram below shows a food web of an ecosystem.



How many food chains contain four trophic levels based on the food web?

- A** 1                      **B** 2                      **C** 3                      **D** 4

**A12** Certain desert plants have roots that spread out far around them. Which of the following conditions of the desert have these plants adapted to?

- A** high day time temperature      **B** infrequent rainfall  
**C** low night time temperature      **D** unstable ground

**A13** How is a whale (mammal) different from a shark (fish)?

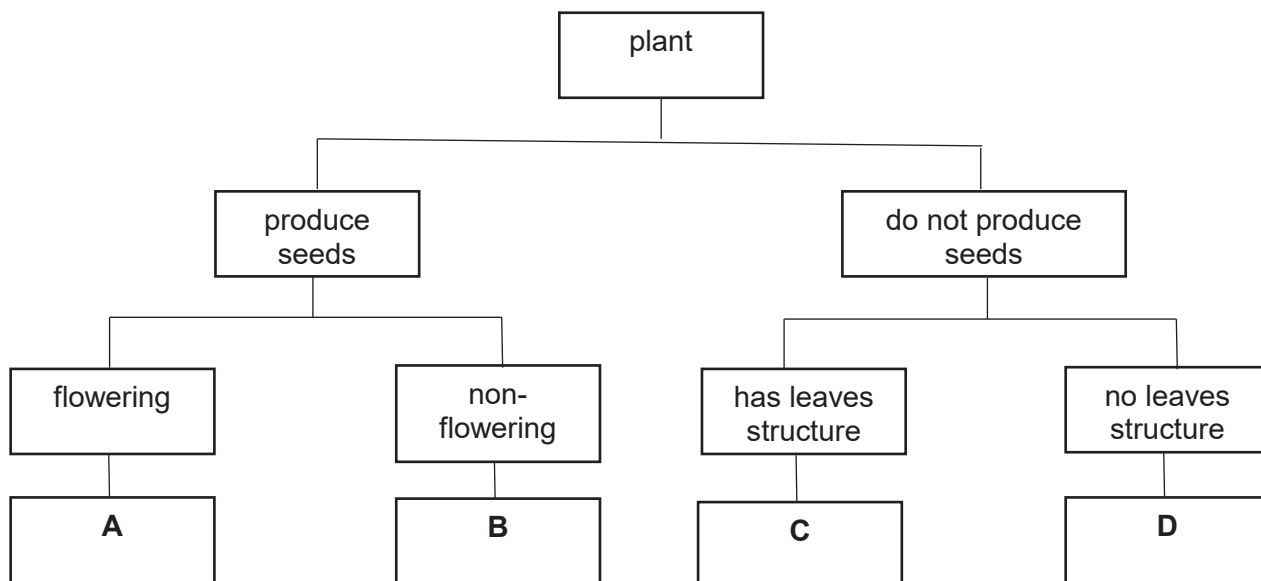
- A** A whale has a backbone unlike a shark.  
**B** A whale breathes through its lungs while a shark breathes through its gills.  
**C** A whale is covered with scales unlike a shark.  
**D** A whale is cold blooded unlike a shark.

**A14** Which one of the following characteristics is present in a reptile?

- A** gives birth to its young  
**B** body is covered with fur  
**C** absence of a backbone  
**D** lack of constant body temperature

**A15** The dichotomous key below can be used to identify plants.

Which of the following best describes a tree fern?



**A16** How many different elements are there in copper (II) sulfate,  $\text{CuSO}_4$ ?

- A** 1                      **B** 2                      **C** 3                      **D** 4

**A17** Moving across the Periodic Table from left to right, the elements \_\_\_\_\_.

- A** become more acidic  
**B** become less acidic  
**C** change from metal to non-metal  
**D** change from non-metal to metal

**A18** Solid **B** is red and has a fixed composition. It decomposes into two elements when heated. What type of substance is solid **B**?

- A** Element                      **B** compound  
**C** Solution                      **D** suspension

**A19** Which of the following is **not** a property of suspensions?

- A** can be separated by filtration  
**B** has solid particles settling at the bottom  
**C** has residue after filtration  
**D** light passes through fully

**A20** Which of the following scenarios will take the **longest** time to dissolve salt in water?

- A** blowing bubbles into the mixture using a straw
- B** mixing the mixture between two cups
- C** stirring the mixture
- D** let the mixture stand in the shade

**A21** The table below shows the maximum amount of solutes **P**, **Q**, **R** and **S** that can be dissolved in 100 g of water.

	<b>P</b>	<b>Q</b>	<b>R</b>	<b>S</b>
maximum amount of solute dissolved in 100 g of water / g	10	20	15	35

Which of the following statements is true?

- A** P has the highest solubility in water.
- B** S has the highest solubility in water.
- C** P is more soluble in water than Q.
- D** Q is less soluble in water than R.

**A22** Which of the following is likely to take place when sulfur burns in oxygen to form sulfur dioxide?

- A** Two elements are combined together to form a mixture.
- B** Two compounds are combined together to form an element.
- C** Two elements are combined together to form a compound.
- D** Two mixtures are combined together to form a compound.

**A23** Which of the following processes is considered a chemical change?

- A** melting ice
- B** burning plastic
- C** adding cooking oil to water
- D** adding salt to water

**A24** Silver bromide breaks down in the presence of light to form silver and bromine. What is the name of this reaction?

- A** electrolysis
- B** photosynthesis
- C** combustion
- D** decomposition

- A25** Some metals like silver and copper tarnish in the presence of air. The word equation for the chemical reaction is given below.



Which reaction **best** describes the tarnishing of these metals?

- A** oxidation   **B** thermal decomposition  
**C** combustion   **D** photosynthesis
- A26** Which of the following is a characteristic of combustion?
- A** Combustion occurs at low temperatures.  
**B** Water is needed for combustion to occur.  
**C** Heat is not produced from combustion.  
**D** Carbon dioxide is produced when combustion occur.

- A27** Which of the following is **not** a property of an alkali?

- A** It is corrosive.  
**B** It has a bitter taste.  
**C** It turns blue litmus paper red.  
**D** It reacts with acid to form salt and water.

- A28** The table below shows the pH values of four solutions.  
Which two solutions produce an acidic solution when mixed?

<b>solution</b>	<b>V</b>	<b>W</b>	<b>X</b>	<b>Y</b>	<b>Z</b>
<b>pH</b>	3	6	7	10	12

- A** V and W   **B** W and Y  
**C** X and Y   **D** Y and Z

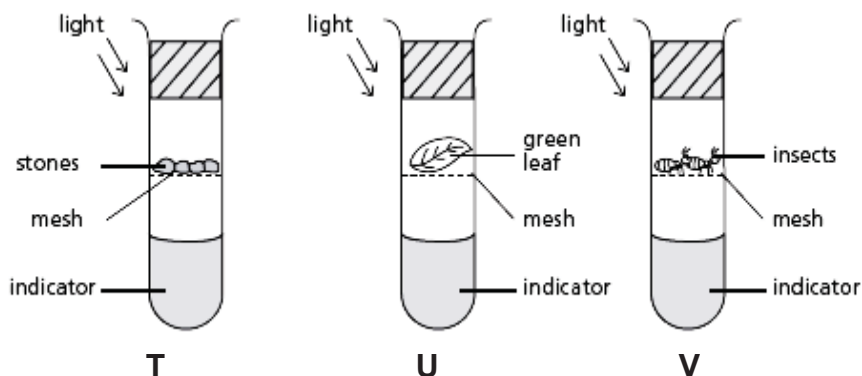
- A29** The table below shows information about the different colours observed in acidic, neutral and alkaline solutions when indicators **E**, **F**, **G**, and **H** are added.

indicator	colour in		
	acidic solution	neutral solution	alkaline solution
<b>E</b>	yellow	blue	blue
<b>F</b>	red	colourless	green
<b>G</b>	colourless	colourless	yellow
<b>H</b>	red	orange	yellow

Which indicator **cannot** be used to distinguish water from vinegar (acetic acid)?

- A** E                      **B** F                      **C** G                      **D** H

- A30** Test tubes **T**, **U** and **V** were set up as shown in the figure below.



At the beginning of the experiment, the indicator in each test tube is light green. When there is an increase in amount of carbon dioxide, the indicator changes from light green to yellow. When there is a decrease in the amount of carbon dioxide, the indicator will change from light green to dark green.

What will the colour of the indicator be in each test tube after three hours?




	<b>T</b>	<b>U</b>	<b>V</b>
<b>A</b>	light green	dark green	yellow
<b>B</b>	dark green	dark green	light green
<b>C</b>	light green	yellow	dark green
<b>D</b>	dark green	light green	yellow

**End of Section A**

**Section B [30 marks]**Answer **all** the questions in the space provided.

**B1** Safety is an important concern in the laboratory. Experiments are carried out with much consideration made to safety. Some of these considerations include hazard labels and precautions while heating.

- (a) Scientists use many chemicals every day. Each chemical comes with their own hazard labels. Complete Table B1.1 by filling in the name and one example of each hazards. [3]

hazard	name of hazard	example
		
		
		

**Table B1.1**

- (b) Bunsen burners are commonly used as a means for heating substances in experiments. There are two types of flames, luminous and non-luminous flame.

- (i) State **two** differences between a luminous flame and non-luminous flame. [2]

.....

.....

.....

- (ii) Explain why a luminous flame should be used if a student is not using the Bunsen burner temporarily. [1]

.....

.....



**B2 (a)** During a class test, a student wrote the following incorrect statement:

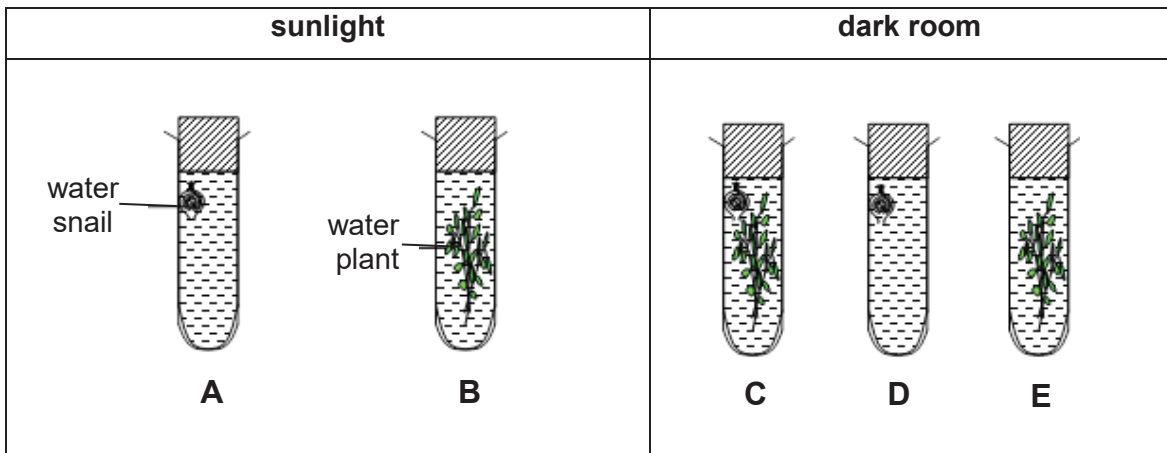
*“Plants only photosynthesise in the day and only respire in the night.”*

Correct **one** mistake in the above statement.

[1]

.....  
 .....

**(b)** Figure B2.1 shows an experimental set-up with different test tubes containing snail and/or plant exposed to different conditions.



**Figure B2.1**

**(i)** Write the word equation for respiration.

[1]

.....

**(ii)** State and explain which test-tube will have the highest concentration of dissolved **oxygen** at the end of five hours.

[2]

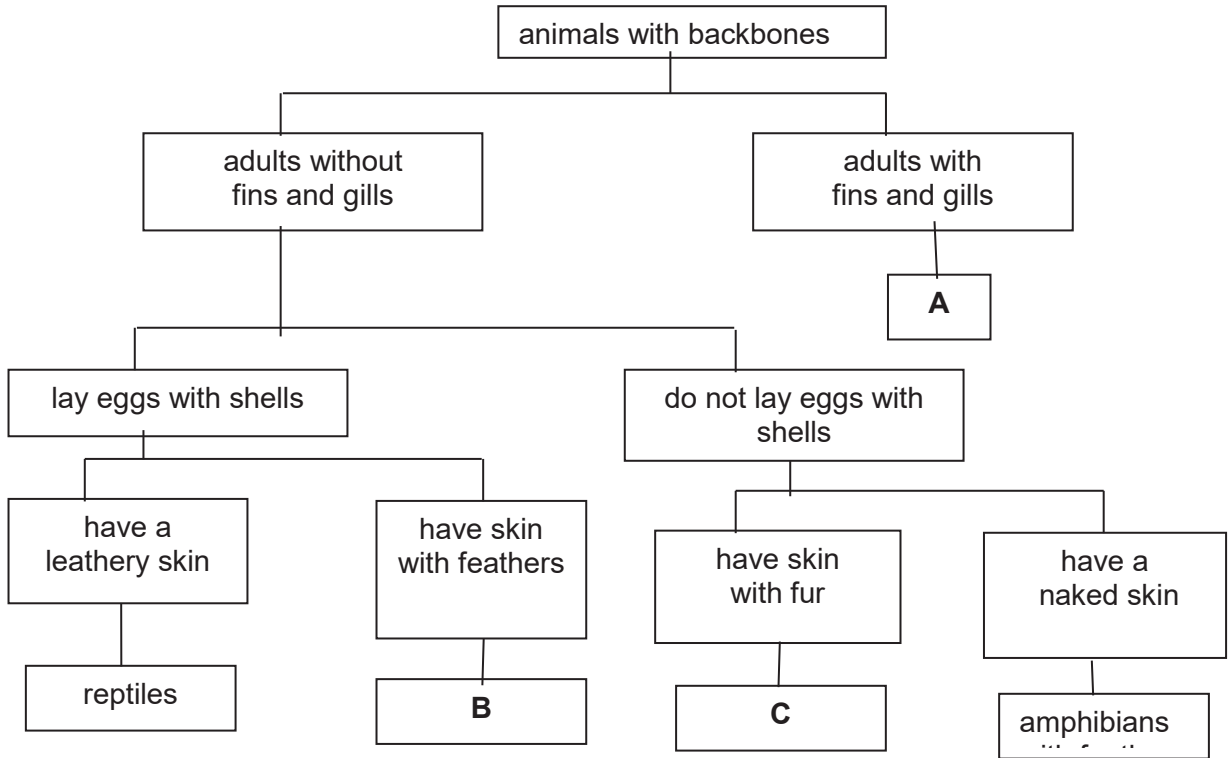
.....  
 .....

**(iii)** State and explain which test-tube will have the highest concentration of dissolved **carbon dioxide** after five hours.

[2]

.....  
 .....

**B3** Figure B3.1 shows a dichotomous key used to classify vertebrates.



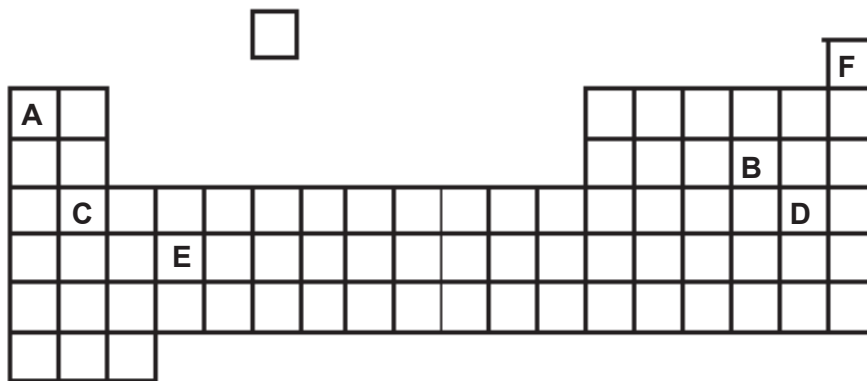
**Figure B3.1**

[3]

With reference to Figure B3.1, identify the organisms **A** to **C**.

- (a) **A** .....
- (b) **B** .....
- (c) **C** .....

**B4** Figure B4.1 shows part of the Periodic Table.



**Figure B4.1**

- (a) Using the letters **A** to **F**, identify [2]
  - (i) two elements that are in the same period, ..... and .....
  - (ii) two elements that cannot conduct electricity. .... and .....

(b) Sodium reacts vigorously with water. Element **A** also reacts with water.

Explain why element **A** is able to react with water just like sodium. [2]

.....  
 .....

**B5 (a)** State **two** differences between a compound and a mixture. [2]

.....  
 .....

(b) Figure B5.1 shows students' drawings of particles in some substances.

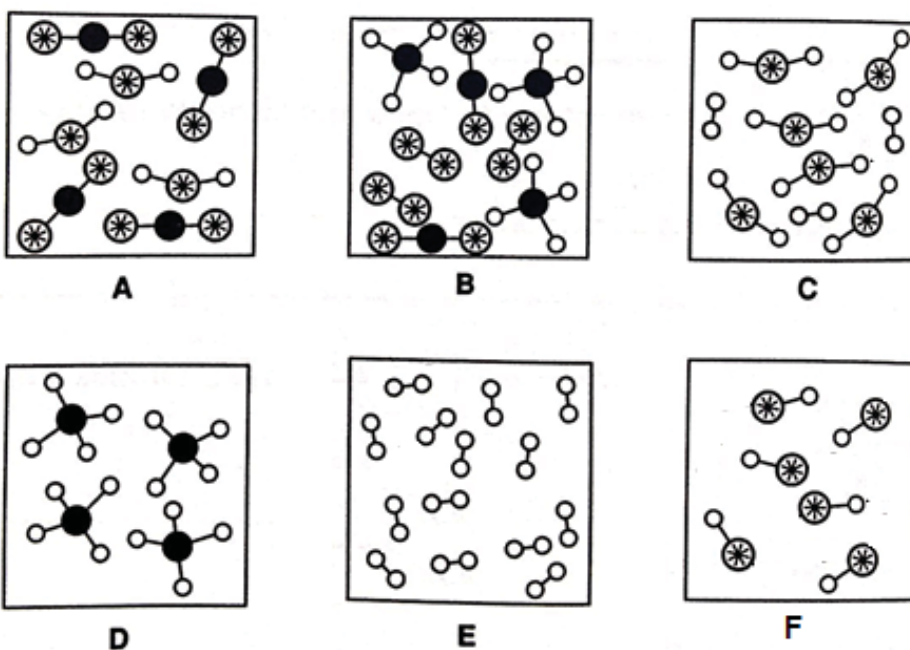


Figure B5.1

Which of the students' drawings, A, B, C, D, E or F, best represents

- (i) an element ..... [1]
- (ii) a mixture of one element and two compounds ..... [1]
- (ii) a mixture of compounds. .... [1]

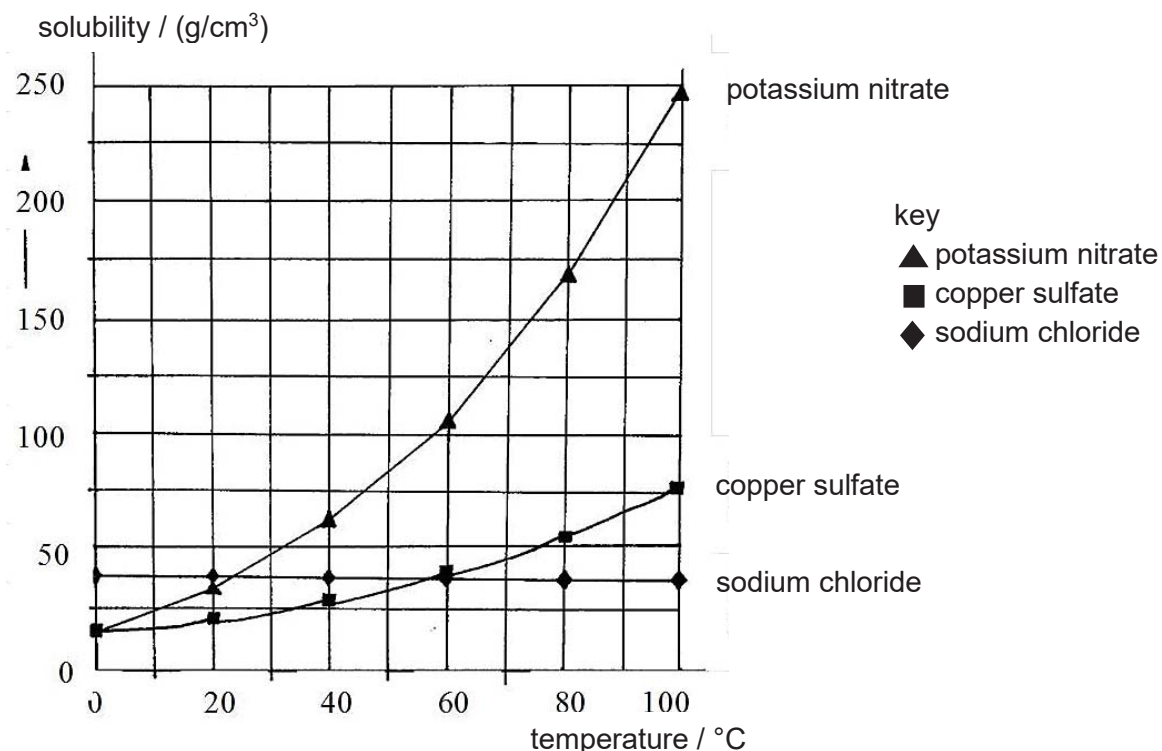
- B6 (a)** A spoonful of sugar is added into a beaker of water, and stirred until all sugar has dissolved.  
Explain why this is considered a physical change. [1]
- .....  
.....
- (b)** Magnesium metal was added to a beaker of hydrochloric acid. Bubbles of gas and a rise in temperature of the reaction mixture was observed.
- (i)** Name the gas that is formed in the reaction between magnesium and hydrochloric acid. [1]
- .....
- (ii)** Describe the test and observation for the gas that is produced in **(b)(i)**. [2]
- .....  
.....  
.....
- (iii)** Write a word equation for the chemical reaction occurring between magnesium and hydrochloric acid. [1]
- .....
- (iv)** Magnesium hydroxide (alkali) is also able to react with hydrochloric acid. Name the type of reaction between magnesium hydroxide and hydrochloric acid. [1]
- .....

**End of Section B**

**Section C [40 marks]**

Answer **C1** and **any three** questions in the space provided.

**C1** Joel was doing an experiment to investigate how temperature of water affects the solubility of a salt. He used three different salts and the results are shown in C1.1.



**Figure C1.1**

With reference to Figure C1.1, answer the following questions.

(a) Suggest a possible hypothesis for this experiment. [1]

.....

(b) Describe the relationship between temperature of the water and the solubility of the potassium nitrate salt. [1]

.....

.....

(c) Complete Table C1.2. [2]

temperature / °C	most soluble	least soluble
20		
100		

**Table C1.2**

- (d) Name the salt with solubility most and least affected by temperature. [2]
- (i) most affected by temperature: .....
- (ii) least affected by temperature: .....

(e) State **one** other factor that needs to be kept constant throughout this experiment. [1]

.....

(f) Joel conducted another experiment to investigate the rate sugar crystals dissolves in 100 cm<sup>3</sup> of water at a temperature of 40 °C.

30 g of sugar crystals were added separately to three beakers of 100 cm<sup>3</sup> of water. Table C1.3 shows the different conditions used for each beaker.

beaker	conditions
A	small sugar crystals with stirring
B	small sugar crystals without stirring
C	large sugar crystals without stirring

**Table C1.3**

State which beaker, **A**, **B** or **C**, do the sugar crystals have the highest rate of dissolving. Explain your answer. [3]

.....

.....

.....

.....

.....

**C2** Erina noticed that certain parts of her father’s car door have started to rust.

(a) Name the process that caused the formation of rust on the car door. [1]

.....

- (b) Erina read that Coca-Cola can be used to remove the rust on the car door. Using a cloth and a bottle of Coca-Cola, she managed to remove some rust.

Table C2.1 shows some of the ingredients present in Coca-Cola. She deduced that the key ingredient to remove rust should have a pH less than 7.

water high fructose corn syrup phosphoric acid stabiliser
--

**Table C2.1**

- (i) Suggest which ingredient might be responsible for removing rust. [1]  
 .....
- (ii) Explain why the ingredient in (b)(i) is able to remove rust. [1]  
 .....
- (iii) State the observation when a few drops of Universal indicator is added to a sample of Coca-Cola. [1]  
 .....
- (c) While preparing food for her father, Erina accidentally spilt some lemon juice onto some baking soda (sodium bicarbonate). She noticed bubbles forming on the surface of the baking soda. Lemon juice contains citric acid.
- (i) Write a word equation for the reaction between lemon juice and baking soda. [1]  
 .....
- (ii) Describe the test and observation for the gas formed from the reaction between lemon juice and baking soda. [2]  
 .....  
 .....
- (d) Erina was working in the lab when she found two unlabelled bottles. One of the bottles contains water, while the other contains sulfuric acid.
- Describe how Erina can distinguish the two bottles using only blue and red litmus paper. [3]  
 .....  
 .....  
 .....  
 .....

C3 Figure C3.1 shows part of a food web in a freshwater ecosystem.

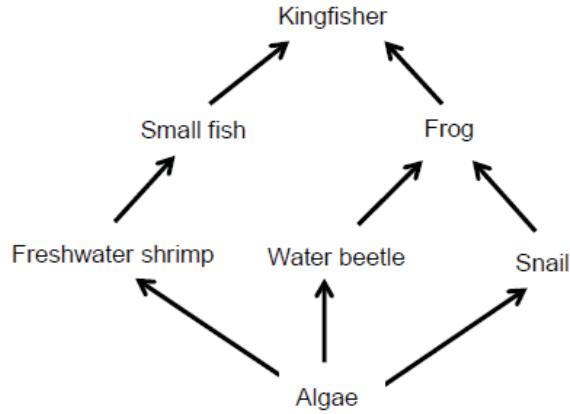


Figure C3.1

(a) State the primary and secondary consumers in this food web. [2]

Primary consumers : .....

Secondary consumers: .....

(b) State the percentage of energy that the kingfisher obtains from the algae, assuming that the algae starts with 100% energy. [1]

.....

(c) Explain why the maximum number of trophic levels found in this food web does not exceed four. [2]

.....

.....

(d) State and explain how a drastic increase in the population of freshwater shrimp would affect the population size of water beetles. [3]

.....

.....

.....

(e) Freshwater shrimps are decomposers in the freshwater system.

(i) State the role of decomposers in ecosystems. [1]

.....

(ii) Name two products formed from decomposition. [1]

.....



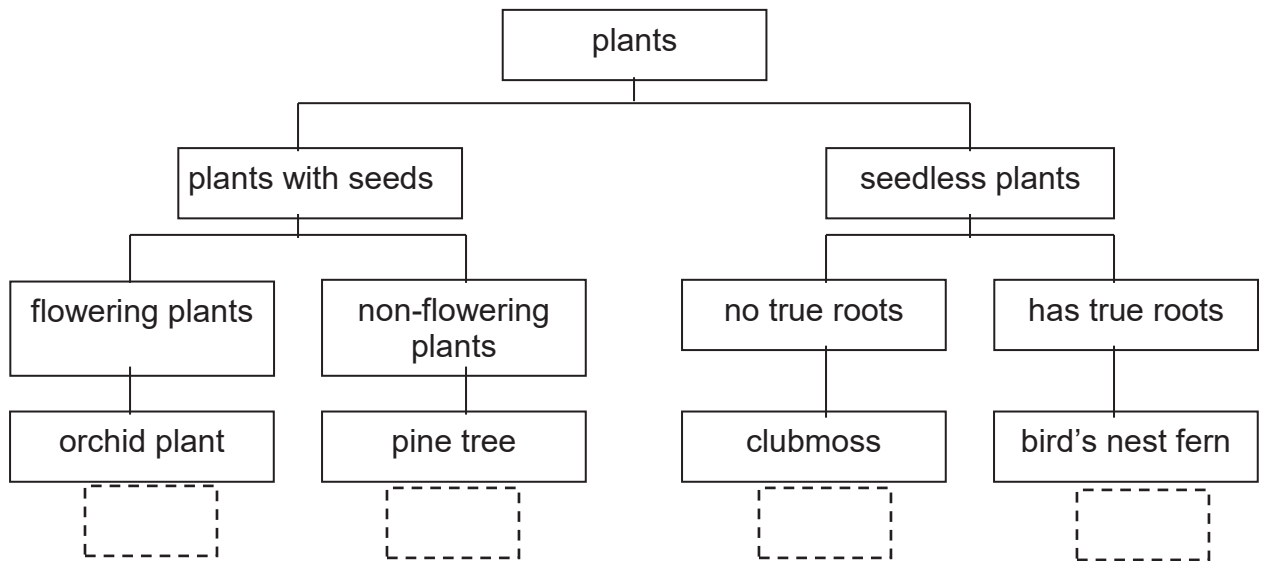
- C4** Vivian wanted to find out which type of fertilisers will enable her plants to grow healthily. She suggests that brand **Y** is the best fertilizer. Table C4.1 shows growth in height of the different types of plants in a week according to the brand of fertilizer used, the amount of the fertilizer and the type of soil used.

brand of fertiliser	amount of fertiliser/ g	type of plant	type of soil	growth in height of the plant / cm
<b>W</b>	2.0	money plant	peat	3.4
<b>X</b>	2.4	morning glory	peat	3.0
<b>Y</b>	2.2	chili	peat	4.9
<b>Z</b>	2.1	rose	peat	1.8

**Table C4.1**

- (a) Suggest a hypothesis that Vivian can use for this experiment. [1]  
 .....
- (b) State one factor she kept constant in the experiment. [1]  
 .....
- (c) State and explain if this experiment is fair. [2]  
 .....  
 .....
- (d) Suggest one other factor not stated in Table C4.1 that she needs to keep constant to ensure that the experiment is fair. [1]  
 .....
- (e) Vivian was trying to determine the different factors that will affect an experiment. Identify the independent, dependent and controlled variables in the following experiments.
- (i) The rate of decomposition by bacteria is dependent on the volume of oxygen present in a sealed petri dish. [2]  
 independent variable: .....  
 dependent variable: .....
- (ii) The mass of catalyst will affect the volume of oxygen produced by the decomposition of 100 cm<sup>3</sup> of hydrogen peroxide. [3]  
 independent variable: .....  
 dependent variable: .....  
 controlled variable: .....

**C5 (a)** Figure C5.1 shows a dichotomous key of plants found in a forest.



**Figure C5.1**

Study Figure C5.1 and answer the following questions.

**(i)** State one similarity and one difference between the orchid plant and the pine tree. **[2]**

similarity:

.....

.....

difference:

.....

.....

**(ii)** A new species of plant was discovered. The plant has bright yellow star-shaped flowers and berry-like fruits with seeds inside. Place an 'x' into the dotted box in Figure C5.1 to indicate where this plant should be placed in the dichotomous key. **[1]**

(iii) The following information is given about three organisms:

The pitcher plant is a flowering carnivorous plant that traps insects by luring them into modified leaves shaped as a pitfall trap.

The Venus flytrap is a flowering carnivorous plant. The hairs on the leaves are stimulated when an insect walks on it, causing the trap structure to close.

The truffle is a fungus that grows on tree roots and disperse spores as a mean of reproduction.

Using the above information, create a dichotomous key for the pitcher plant, Venus flytrap and truffle.

[3]

(b) Biodiversity is important to maintain a stable system in nature as all the species are interdependent.

(i) State one reason why biodiversity is beneficial to humans. [1]

.....

(ii) State one threat to biodiversity and explain how it can affect biodiversity. [2]

.....

.....

.....

(iv) State one method to preserve biodiversity in Singapore. [1]

.....

End of Paper

# The Periodic Table of Elements

I		II		Group																VII		0											
				III	IV	V	VI																										
3 Li lithium 7		4 Be beryllium 9		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>Key</b>            proton (atomic) number            atomic symbol            name            relative atomic mass         </div>																9 F fluorine 19		10 Ne neon 20											
				5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20																								
11 Na sodium 23		12 Mg magnesium 24		13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40																								
19 K potassium 39		20 Ca calcium 40		21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84														
37 Rb rubidium 85		38 Sr strontium 88		39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131														
55 Cs caesium 133		56 Ba barium 137		57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -														
87 Fr francium -		88 Ra radium -		89-103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Mc moscovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganeson -														
lanthanoids		actinoids		57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175	89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).






2018 1SE  
Sec 1E Science Mark Scheme

## Section A [30m]

<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A4</b>	<b>A5</b>	<b>A6</b>	<b>A7</b>	<b>A8</b>	<b>A9</b>	<b>A10</b>
B	B	C	D	D	B	B	D	C	C
<b>A11</b>	<b>A12</b>	<b>A13</b>	<b>A14</b>	<b>A15</b>	<b>A16</b>	<b>A17</b>	<b>A18</b>	<b>A19</b>	<b>A20</b>
C	B	B	D	C	C	C	B	D	D
<b>A21</b>	<b>A22</b>	<b>A23</b>	<b>A24</b>	<b>A25</b>	<b>A26</b>	<b>A27</b>	<b>A28</b>	<b>A29</b>	<b>A30</b>
B	C	B	D	A	D	C	A	C	A

## Sect B [30M]

Qn	Answer	Mark
B1a	 biohazard Toxin, microorganisms, virus, blood, urine	6c – 3 4-5c – 2 2-3c – 1 0-1c – 0
	 explosive flash powder	
	 toxic methanol/ cyanide/ mercury, carbon monoxide/ chlorine	
B1bi	Non-luminous flame is <b>hotter</b> than luminous flame/ Non-luminous flame <b>does not produce soot</b> but luminous flame <b>produces soot.</b> Non-luminous flame burns with an <b>blue flame</b> but luminous flame burns with a <b>yellow flame</b> .	Any 2 – 2
B1bii	A luminous flame <b>can be seen clearly</b> so that other students are aware that the Bunsen burner is turned on.	1

B2a	Photosynthesis occurs in <b><u>the presence of light.</u></b> / <b><u>Respiration occurs all the time.</u></b>	1
B2bi	Glucose + oxygen → carbon dioxide and water	1
B2bii	B. The plant will <b><u>photosynthesise</u></b> in the <b><u>presence of sunlight</u></b> and release <b><u>oxygen.</u></b>	1 1
B2biii	C. <b><u>Both</u></b> the plant and the water snail will <b><u>respire</u></b> and <b><u>release carbon dioxide.</u></b>	1 1
B3a	Fish	1
B3b	Birds	1
B3c	Mammals	1
B4ai	C and D	1
B4aii	B/D/F	Any 2 - 1
B4b	Element A and sodium are in the <b><u>same Group</u></b> and thus will have <b><u>similar chemical properties.</u></b>	1 1
B5a	Properties of compounds are <b><u>different from its constituent elements</u></b> but properties of mixtures are the <b><u>same from its constituent substances/compounds.</u></b>  Compounds have <b><u>fixed melting and/or boiling point</u></b> but <b><u>mixtures do not have fixed melting and/or boiling points/mixtures have a range of melting and/or boiling points.</u></b>  Compounds are separated by <b><u>chemical means or electricity</u></b> but mixtures are separated by <b><u>physical methods/ physical means/separation techniques.</u></b>  Compounds are <b><u>formed by chemical reactions</u></b> but mixtures are formed by <b><u>physically mixing substances together.</u></b>	Any 2 - 2
B5bi	E	1
B5bii	B	1
B5biii	A	1

<b>B6a</b>	The process/change is <b>reversible</b> ./ No heat or light is given out. /No new products are formed	<b>1</b>
<b>B6bi</b>	Hydrogen gas	<b>1</b>
<b>B6bii</b>	Place a <b>lighted splint</b> at the <b>mouth of the test tube</b> . A ' <b>pop</b> ' sound is heard.  [Award ecf based on (b)(i)]	<b>1</b> <b>1</b>
<b>B6biii</b>	Magnesium + hydrochloric acid → salt + hydrogen	<b>1</b>
<b>B6biv</b>	Neutralization	<b>1</b>

## Section C [40M]

Qn	Answer	Mark									
<b>C1a</b>	As temperature of water increases, solubility of salt increases. [Any reasonable hypothesis]	<b>1</b>									
<b>C1b</b>	The <b>higher</b> the <b>temperature</b> , the <b>higher</b> the <b>solubility</b> of potassium nitrate./ The <b>lower</b> the <b>temperature</b> , the <b>lower</b> the <b>solubility</b> of the potassium nitrate.	<b>1</b>									
<b>C1c</b>	<table border="1"> <thead> <tr> <th>temperature / °C</th> <th>most soluble</th> <th>least soluble</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>sodium chloride</td> <td>copper sulfate</td> </tr> <tr> <td>100</td> <td>potassium nitrate</td> <td>sodium chloride</td> </tr> </tbody> </table>	temperature / °C	most soluble	least soluble	20	sodium chloride	copper sulfate	100	potassium nitrate	sodium chloride	<b>2</b>
temperature / °C	most soluble	least soluble									
20	sodium chloride	copper sulfate									
100	potassium nitrate	sodium chloride									
<b>C1d</b>	Most affected by temperature: <b>potassium nitrate</b> Least affected by temperature: <b>sodium chloride</b>	<b>1</b> <b>1</b>									
<b>C1e</b>	Volume of water	<b>1</b>									
<b>C1f</b>	Beaker <b>A</b> Smaller sugar crystals have <b>larger surface area</b> to volume ratio and <b>stirring increases rate of dissolving</b> .	<b>1</b> <b>1</b> <b>1</b>									

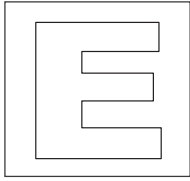


C2a	Oxidation.	1
C2bi	Phosphoric acid.	1
C2bii	It is <u>acidic/an acid</u> and <u>reacts</u> with the rust, hence removing rust	1
C2biii	The Universal <u>turned red/orange/yellow.</u>	1
C2ci	lemon juice + baking soda → salt + water + carbon dioxide OR acid + carbonate → salt + water + carbon dioxide	1
C2cii	<u>Bubble</u> the <u>gas into limewater.</u> A <u>white precipitate</u> is formed.	1 1
C2d	Dip <u>blue and red litmus paper</u> into <u>both bottles.</u>  For the bottle containing <u>sulfuric acid</u> , the <u>blue litmus paper will turn red</u> and <u>red litmus paper will remain red</u>  For the bottle containing <u>water</u> , blue litmus paper <u>remains blue</u> and red litmus paper <u>remains red.</u>	1 1 1
C3a	Primary consumers: <u>freshwater shrimps/ water beetle/ snail</u> Secondary consumers: <u>small fish/ frog</u>	1 1
C3b	0.1%	1
C3c	There is 90% <u>energy loss</u> at each trophic level. It is <u>not energy-efficient</u> for the food web to exceed four	1 1
C3d	The increase in freshwater shrimp would cause a <u>decrease in the population of algae</u> as the freshwater shrimp feeds on the algae.  This would cause a <u>decrease in the population of water beetles</u> as there would be <u>less food/algae</u> for the water beetles.	1 1 1
C3ei	Decomposers <u>break down complex nutrients in faeces and dead organisms.</u>	1
C3eii	<u>Carbon dioxide and soluble mineral salts</u> are produced from decomposition	1

<b>C4a</b>	<b>Brand Y</b> is the <b>better fertilizer compared to the rest</b> / <b>Brand Y</b> is the <b>best fertiliser</b> .	<b>1</b>
<b>C4b</b>	The type of soil used	<b>1</b>
<b>C4c</b>	Not a fair experiment She <b>did not use the same amount of fertilizer / the same type of plants</b>	<b>1</b> <b>1</b>
<b>C4d</b>	The temperature of the surrounding/ The amount of water given to the plants/ The amount of sunlight the plants are exposed to/ The amount of air the plants are exposed to <b>* Answer should be of a different point mentioned in part (c)</b>	<b>Any 1 – 1</b>
<b>C4ei</b>	Independent variable: volume of oxygen  Dependent variable: rate of decomposition	<b>1</b>  <b>1</b>
<b>C4eii</b>	Independent variable: <b>mass of catalyst</b>  Dependent variable: <b>volume of oxygen</b>  Controlled variable: <b>volume of hydrogen peroxide</b>	<b>1</b>  <b>1</b>  <b>1</b>
<b>C5ai</b>	Similarity: They are both <b>plants that produces seeds</b> . [Reject: they are both plants]  Difference: The <b>orchid plant is a flowering plant</b> but the <b>pine tree is a non-flowering plant</b> .	<b>1</b>  <b>1</b>
<b>C5aii</b>	X below orchid plant	<b>1</b>

C5aiii	<div style="text-align: center;"> <pre> graph TD     A[organisms] --&gt; B[non-carnivorous]     A --&gt; C[carnivorous]     B --&gt; D[truffle]     C --&gt; E[hair]     C --&gt; F[no hair]     E --&gt; G[Venus fly trap]     F --&gt; H[pitcher plant]           </pre> </div> <p>[Any suitable description based on question ]</p>	<p style="text-align: center;"><b>3</b> (1 for each correct plant)</p>
C5bi	It provides <b><u>food / medicine / raw materials</u></b>	<b>1</b>
C5bii	<p><b><u>Spreading of diseases</u></b> will causes the species to <b><u>weaken and die out</u></b>.</p> <p><b><u>Overhunting of animals for meat and fur</u></b> will cause decrease in population.</p> <p><b><u>Loss/change of habitat</u></b> will lead to animals to <b><u>lose their source of food and homes</u></b>.</p> <p><b><u>Introduction of Invasive species</u></b> will lead to <b><u>competition and/or predation of local species</u></b>.</p>	<p style="text-align: center;"><b>threat – 1</b></p> <p style="text-align: center;"><b>Corr expln – 1</b></p>
C5biii	<p>Volunteering with wildlife conservation groups/ Limiting use of natural resources/ Stop introduction of invasive species.</p> <p>[Any reasonable answer]</p>	<b>Any 1 – 1M</b>





**GAN ENG SENG SCHOOL**  
**Mid-Year Examination 2018**



**CANDIDATE  
 NAME**

**CLASS**

**INDEX  
 NUMBER**

**SCIENCE**

Paper 1 Multiple Choice

**08 May 2018**  
**Papers 1 & 2: 2 hours**

**Sec 1 Express**

Additional Materials: OTAS

Calculators are allowed in the examination

**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, class and index number on the OTAS.

There are **thirty** questions in Section A. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the answer you consider correct and record your choice in soft pencil on the separate OTAS.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Read the instructions on the OTAS very carefully.

A copy of the periodic table is inserted on page 12.

**You may proceed to answer Paper 2 as soon as you have completed Paper 1.**

Any rough working should be done in this booklet.

<b>Total marks</b>
<b>30</b>

This paper consists of **12** printed pages including of the cover page

## 2

Answer **all** the questions with the most suitable option **A, B, C** or **D**.

- 1 As a scientist, which of the following steps should you take when the experimental results do not support your hypothesis?
- A Repeat the experiment.
  - B Discard the experimental results.
  - C Refine the hypothesis and test it again.
  - D Change the experimental results to explain the original hypothesis.

- 2 In the laboratory, David sees a substance in a bottle with the following symbol:



What is a safety precaution that he should take when handling this substance?

- A Wear rubber gloves
  - B Wear safety goggles
  - C Keep away from open flames
  - D Avoid breathing in vapours produced by the substance
- 3 Which of the following is a suitable hypothesis for a scientific experiment?
- A Which tastes better, Pepsi or Coke?
  - B Will adding fertilizer cause plants to grow taller?
  - C Atomic bombs are bad because they kill people.
  - D Plants which are exposed to more sunlight will grow taller.

## 3

- 4 In a research project on plant fertilisers, Samantha conducted an experiment to determine which brand of plant fertiliser would cause plants to grow the tallest in a certain period of time.

Which of the following is the dependent variable in Samantha's experiment?

- A The mass of the plants
- B The height of the plants
- C The amount of time taken
- D The brand of plant fertiliser

- 5 Which part of the Bunsen burner is adjusted to open or close the air hole?

- A Base
- B Barrel
- C Collar
- D Gas tap

- 6 Which of the following apparatus is the most suitable for measuring the depth of a test tube?

- A Pipette
- B Burette
- C Metre rule
- D Vernier calipers

- 7 Many apparatus used in a laboratory are made of glass.

Which property of glass does **not** explain why it is used to make laboratory apparatus?

- A It is brittle.
- B It is transparent.
- C It is resistant to corrosion.
- D It has a high melting point.

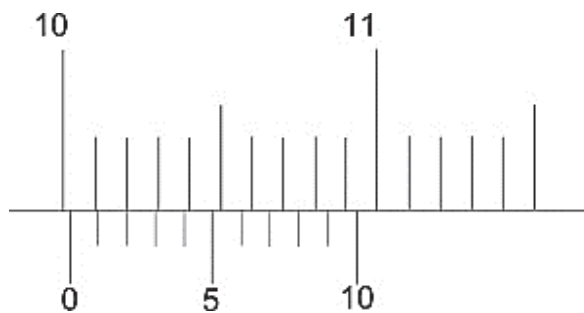
- 8 Which of the following shows the correct SI units for length, mass and temperature?

	Length	Mass	Temperature
A	m	g	°C
B	m	kg	K
C	cm	g	°C
D	cm	kg	K

- 9 Two blocks of the same size were made of ebony wood and pine wood respectively. The block of ebony wood had a mass of 10 g while the block of pine wood had a mass of 5 g.

Which of the following statements is **true**?

- A Pine wood is half as dense as ebony wood.  
 B Pine wood has the same density as ebony wood.  
 C Pine wood is two times as dense as ebony wood.  
 D Pine wood is four times as dense as ebony wood.
- 10 A section of a Vernier calipers is shown below.

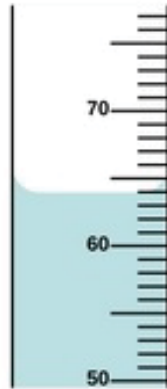


What is the reading shown on the Vernier calipers?

- A 10.20 cm  
 B 10.02 cm  
 C 11.20 cm  
 D 11.02 cm

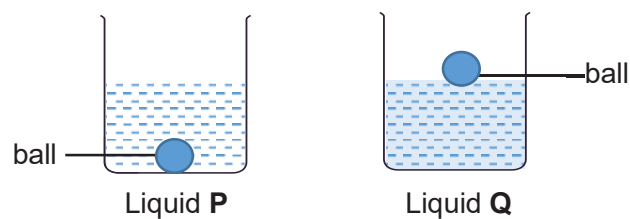


- 11 A section of a measuring cylinder containing water is shown below.



What is the volume of water in this measuring cylinder?

- A 64.0 cm<sup>3</sup>  
 B 65.0 cm<sup>3</sup>  
 C 75.0 cm<sup>3</sup>  
 D 76.0 cm<sup>3</sup>
- 12 The same ball of density 1.3 g/cm<sup>3</sup> was placed in beakers containing liquids **P** and **Q** as shown below.



Which of the following statements about liquids **P** and **Q** can be deduced?

- A Liquid **P** is water.  
 B Density of **P** is less than **Q**.  
 C They have the same density.  
 D Density of **P** is twice that of **Q**.

## 6

13 Which of the following best describes an organ?

- A Similar cells working together
- B Similar tissues working together
- C Different tissues working together
- D Different systems working together

14 The information below shows how a multicellular organism is formed.

Cell → X → Organ → Y → Organism

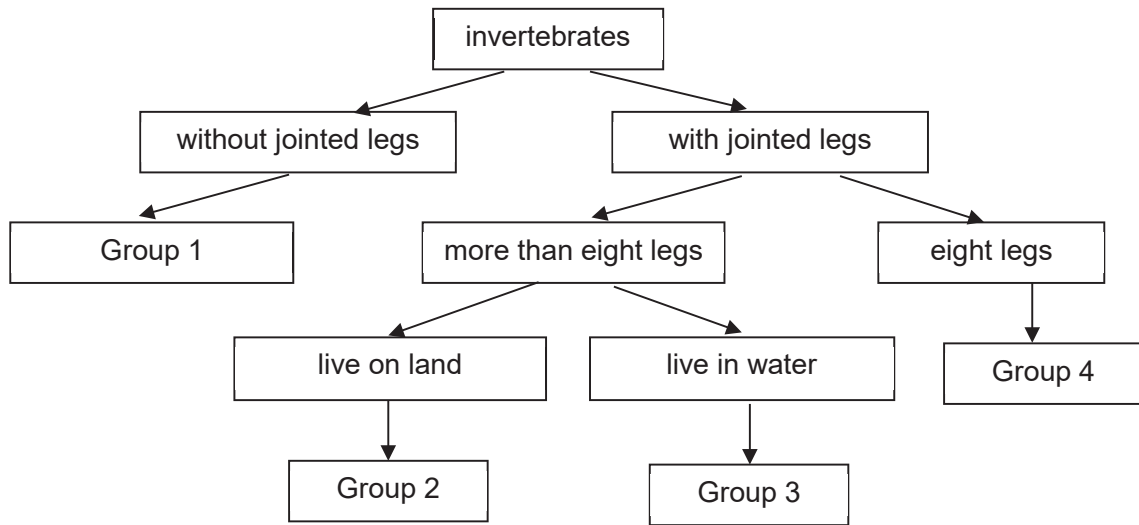
Which of the following pairs would be the best examples of X and Y?

- |   | X       | Y                  |
|---|---------|--------------------|
| A | Blood   | Circulatory system |
| B | Heart   | Circulatory system |
| C | Skin    | Digestive system   |
| D | Stomach | Digestive system   |

15 Which organelle is responsible for plants having the ability to make their own food?

- A Leaf
- B Vacuole
- C Nucleus
- D Chloroplast

Refer to the dichotomous key below for Questions 16 and 17.



16 Which group would a shrimp fall under?

- A Group 1
- B Group 2
- C Group 3
- D Group 4

17 Which of the following invertebrates does not fall under any of the above groups?

- A Ants
- B Spiders
- C Scorpions
- D Earthworms

18 Reptiles and amphibians are two distantly related groups of animals.

Which of the following statements is **not** true?

- A Both reptiles and amphibians are cold blooded.
- B Both reptiles and amphibians reproduce by laying eggs.
- C Reptiles have dry, scaly skin while amphibians have moist skin.
- D Reptiles breathe through lungs while amphibians breathe through gills.

19 Which of the following substances is made of up four elements?

- A  $P_4$
- B  $CH_3Cl$
- C  $NH_4NO_3$
- D  $NaH_2PO_4$

20 When a strip of magnesium ribbon was heated in air, it burned brightly to form a white powder.

Which statement is **true**?

- A The white powder is a mixture.
- B The white powder is a compound.
- C The white powder is a new element.
- D The white powder has similar properties to magnesium.

21 Which of the following is **not** a mixture?

- A Air
- B Steel
- C Salt water
- D Carbon dioxide

- 22 The diagram below shows the outline of the Periodic Table.

	P																		
					R														
	Q																		
																			T

Which pair of elements belongs in the same Period?

- A P and Q  
 B P and R  
 C P and S  
 D S and T
- 23 Which of the following correctly describes a change in properties going from left to right across the Periodic Table?
- A The elements change from solid to gas.  
 B The reactivity of the elements decreases.  
 C The elements change from metals to non-metals.  
 D The electrical conductivity of the elements increases.
- 24 Which of the following statements about solutions and suspensions is true?
- A Suspensions are homogenous mixtures.  
 B Suspensions do not allow light to pass through.  
 C Suspensions cannot be separated into their components by filtration.  
 D Solutions can only be separated into their components by chemical methods.

25 Which of the following is **not** a property of most metals?

- A They are shiny.
- B They are brittle.
- C They have high melting and boiling points.
- D They are good conductors of heat and electricity.

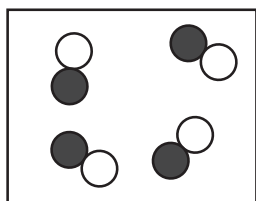
26 In an experiment to determine the solubility of different substances in 100 cm<sup>3</sup> of water, the following results were obtained.

Substance	P	Q	R	S
Mass dissolved in 100 cm <sup>3</sup> of water / g	2	6	5	9

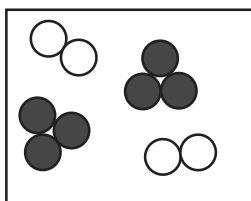
What is the arrangement of the substances in order of increasing solubility in water?

- A P, R, Q, S
- B R, P, Q, S
- C Q, P, S, R
- D S, Q, P, R

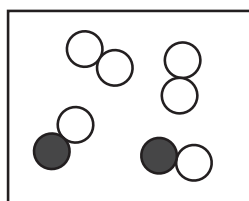
27 Which of the following diagrams represents a mixture of two elements?



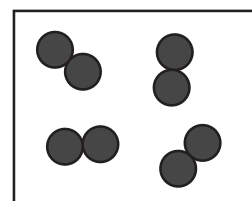
A



B

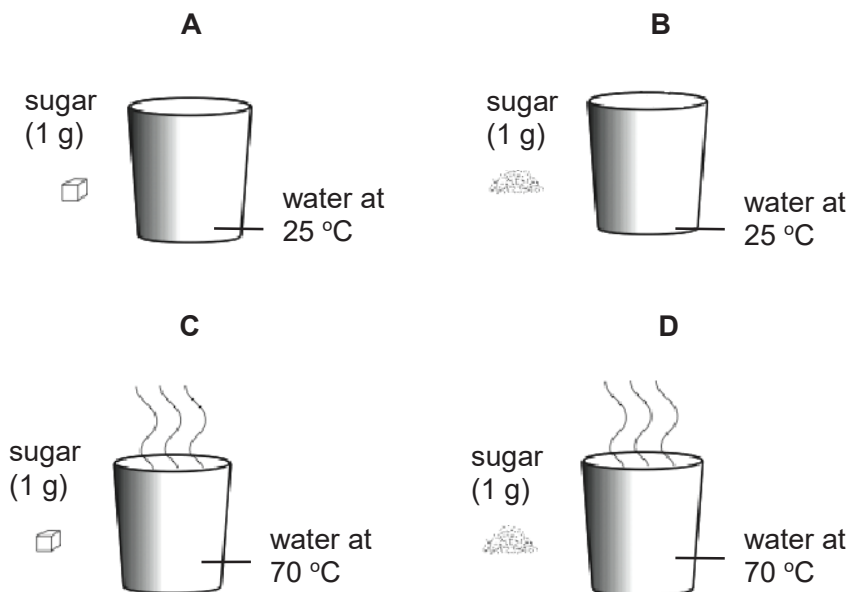


C



D

28 In which of the following set-ups will 1 g of sugar take the longest time to dissolve?



29 Iodine was dissolved in water.

Which of the following correctly identifies the solute, solvent and the solution?

	<b>Solute</b>	<b>Solvent</b>	<b>Solution</b>
<b>A</b>	Iodine	Iodine and water	Water
<b>B</b>	Water	Iodine	Iodine and water
<b>C</b>	Iodine and water	Water	Iodine
<b>D</b>	Iodine	Water	Iodine and water

30 Which property of a solid shows that it is a pure substance?

- A** It sinks in oil.
- B** It is a white powder.
- C** It melts at exactly 308 °C.
- D** It dissolves completely in water.

**END OF PAPER**

### The Periodic Table of Elements

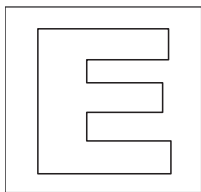
		Group																																																																															
I	II	III	IV	V	VI	VII	0																																																																										
3 Li lithium 7	4 Be beryllium 9	11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Mc moscovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganeson -

**Key**  
proton (atomic) number  
atomic symbol  
name  
relative atomic mass

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).





**GAN ENG SENG SCHOOL**  
Mid-Year Examination 2018



**CANDIDATE  
NAME**

**CLASS**

**INDEX  
NUMBER**

**SCIENCE**

Paper 2

**08 May 2018**  
**Papers 1 & 2: 2 hours**

**Sec 1 Express**

Candidates answer on the Question Paper.  
Calculators are allowed in the examination

**READ THESE INSTRUCTIONS FIRST**

Write your class, index number and name on all the work you hand in.  
Write in dark blue or black pen on both sides of the paper.  
You may use a soft pencil for any diagrams or graphs.  
Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

**Section A**

Answer **all** questions.

**Section B**

Answer question **8** and **three other** questions.

In calculations, you should show all the steps in your working,  
giving your answer at each stage.

Enter the numbers of the Section B questions you have answered  
on the dotted lines in the grid on the right.

At the end of the examination, hand in your answers to Paper 1  
and Paper 2 separately.

The number of marks is given in brackets [ ] at the end of each  
question or part question.

A copy of the periodic table is inserted on page 16.

For Examiner's Use	
<b>Section A</b>	<b>30</b>
<b>Section B</b>	<b>40</b>
<b>Q8</b>	
<b>Q: .....</b>	
<b>Q: .....</b>	
<b>Q: .....</b>	
<b>Total</b>	<b>70</b>

This paper consists of **16** printed pages including of the cover page

**SECTION A (30 marks)**

Answer **all** the questions in this section.

- 1** Matt and his classmate Cassie were conducting an experiment which required them to heat a substance in a test tube during a science practical lesson.

- (a)** Matt was heating the test tube over the Bunsen burner when the hot test tube burned his hand.

Suggest what he should have done instead to carry out the experiment safely. [1]

.....

.....

- (b)** Cassie, on the other hand, was observing her test tube carefully during the experiment and noticed that the bottom of the test tube was covered in a layer of black powder after some time.

State and explain the type of flame that she was using to heat the test tube. [2]

.....

.....

- 2** Convert the following values into the units specified.

**(a)** 8460 mm = ..... m [1]

**(b)** 3060 s = ..... hours [1]

**(c)** 750 cm<sup>3</sup> = ..... m<sup>3</sup> [1]

**(d)** 580 kg/m<sup>3</sup> = ..... g/cm<sup>3</sup> [1]

3 Xavier conducted an experiment to test his hypothesis that sugar dissolves better in water than in oil.

(a) State the independent variable of this experiment. [1]

.....

(b) State the dependent variable. [1]

.....

(c) State **two** variables which should be kept constant in this experiment. [2]

.....

4 The four solid materials below were tested for hardness using the 'scratch test'.

Copper      Wood      Plastic      Steel

The results of the test were as follows:

- Copper scratched all the other materials except steel.
- Steel scratched all the other materials.
- Plastic scratched the wood, but not the copper.
- Wood would not scratch any of the other materials.

(a) Explain which of the four materials is the hardest. [1]

.....

.....

(b) Rank the four materials in order of increasing hardness. [1]

.....

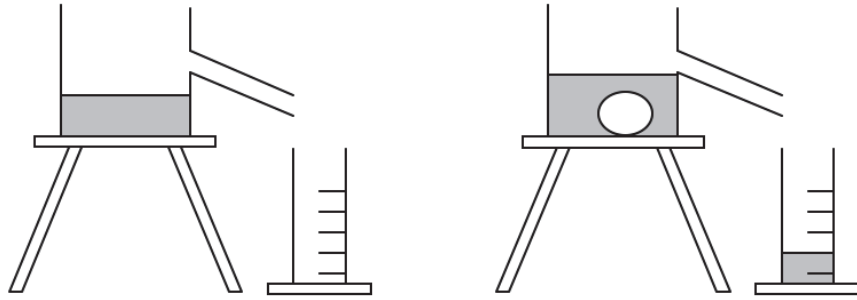
5 Andrea wanted to find the density of a paperweight.

(a) First, she measured the mass of the paperweight.

Name the instrument that she used to find its mass. [1]

.....

(b) Next, she used a displacement can to measure its volume as shown below.



Set-up **before** the object was placed in the displacement can

Set-up **after** the object was placed in the displacement can

Identify one error with her experimental set-up and state how it would affect the volume measured. [2]

.....  
 .....  
 .....

(c) Andrea then tried to measure the density of a block of Styrofoam.

Explain whether the same method used in (b) would work. [2]

.....  
 .....  
 .....

(d) Name the part of a Vernier calipers which could be used to measure the thickness of a block of Styrofoam. [1]

.....

- 6 The diagrams below show labels found on two bottles of vitamin supplements.

Vitamin A	900 mcg
Vitamin C	90 mg
Vitamin D	20 mcg (800 IU)
Vitamin E	15 mg
Thiamin	1.2 mg
Riboflavin	1.3 mg
Niacin	16 mg
Vitamin B6	1.7 mg
Folate	680 mcg DFE (400 mcg folic acid)
Vitamin B12	2.4 mcg
Biotin	30 mcg
Pantothenic Acid	5 mg
Choline	550 mg
Fluoride	20 mg

Vitamin A (50% as beta carotene)	3500 IU
Vitamin C	60 mg
Vitamin D	400 IU
Vitamin E	30 IU
Thiamin	1.5 mg
Riboflavin	1.7 mg
Niacin	20 mg
Vitamin B6	2 mg
Folic Acid	400 mcg
Vitamin B12	6 mcg
Biotin	30 mcg
Pantothenic Acid	10 mg

- (a) Explain whether vitamin supplements are a pure substance or a mixture. [1]

.....

.....

- (b) Describe one method to prove whether the vitamin supplements in a bottle are a pure substance. [2]

.....

.....

.....

- (c) Biotin has the chemical formula  $C_{10}H_{16}N_2O_3S$ .

- (i) State and explain whether it is an element, compound or a mixture. [3]

.....

.....

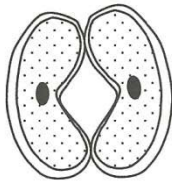
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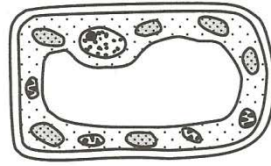
- (ii) Calculate the total number of atoms in one molecule of biotin. [1]

.....

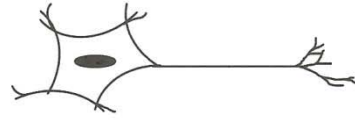
7 The following diagrams show 6 different types of cells.



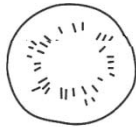
**A**



**B**



**C**



**D**



**E**

Using the letters **A** to **E**, answer the following questions. You may use each letter once, more than once, or not at all.

(a) Identify the cell(s) which do(es) not have a nucleus. [1]

.....

(b) Identify the cell(s) which belong(s) to the nervous system. [1]

.....

(c) Identify the cell(s) which can be found in all human beings. [1]

.....

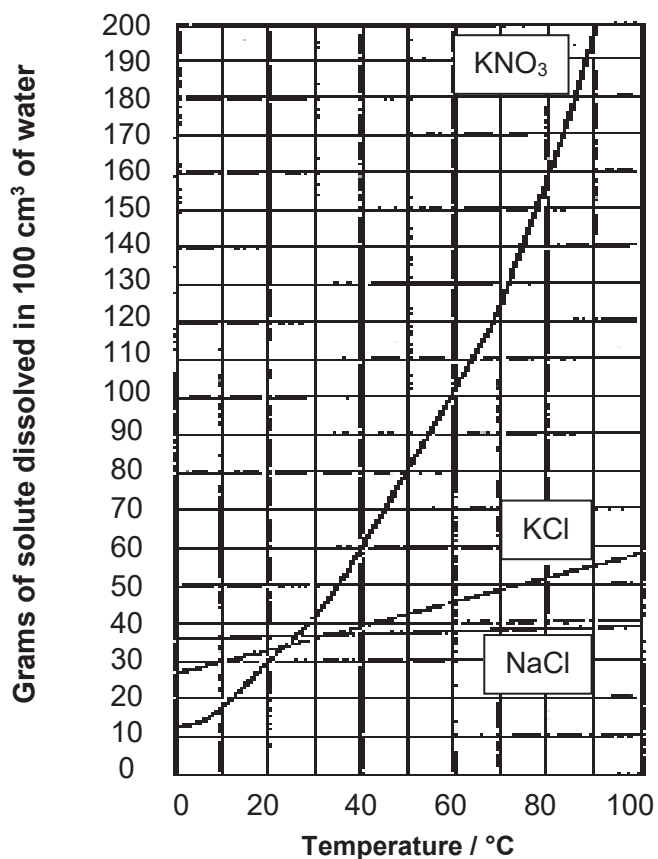
(d) Identify a cell that can be found in more than one organ system in the human body. [1]

.....

## SECTION B (40 marks)

Answer **Q8** and any **3 other questions** in this section.

- 8 The graph below shows the solubility of some substances in water.



- (a) Describe the general relationship between the solubility of solids and the temperature of water, as shown in the graph. [1]
- .....
- (b) Identify the substance which has the highest solubility at 70 °C, and state the mass of the substance that can be dissolved in 100 cm<sup>3</sup> of water at 70 °C. [2]
- .....
- .....
- (c) State the temperature at which all three solids have approximately the same solubility. [1]
- .....

- 8 (d) Potassium chloride ( $KCl$ ) is gradually added to hot water at  $80\text{ }^{\circ}\text{C}$  until no more dissolves.

Describe what would be observed if the resulting solution is then allowed to cool to  $30\text{ }^{\circ}\text{C}$ .

[1]

- (e) Rachel measured  $150\text{ cm}^3$  of water into a beaker at  $20\text{ }^{\circ}\text{C}$  and stirred  $100\text{ g}$  of potassium nitrate ( $KNO_3$ ) into it. She observed that the mixture was cloudy.

Calculate the volume of water that she would need to add, without changing the temperature, to ensure that the mixture becomes clear.

[3]

- (f) Two students made the following statements about the solubility of sodium chloride ( $NaCl$ ).

State and explain whether they are correct.

- (i) Joanne: "Increasing the volume of the solvent will not increase the solubility of sodium chloride."

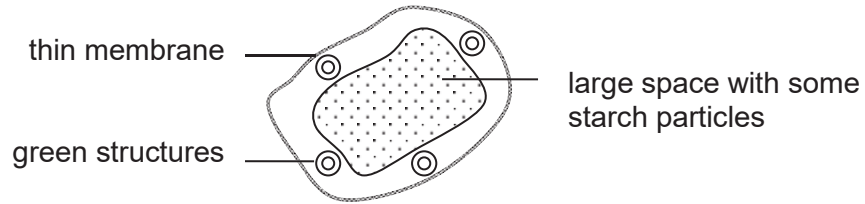
[1]

- (ii) Satish: "Stirring faster will cause sodium chloride to become more soluble."

[1]



- 9 (a) The diagram below shows a newly discovered cell. A biologist is asked to classify it either as a plant cell or an animal cell.



- (i) Give **two** reasons why this cell might be classified as a plant cell. [2]

.....

.....

- (ii) Explain why this cell is unlikely to be a unicellular organism. [2]

.....

.....

- (b) In an experiment, red blood cells and leaf cells were placed on two different glass slides with distilled water. After some time, they were observed under a microscope. The red blood cells were found to have burst, while the leaf cells remained intact.

- (i) State and explain which feature of a leaf cell allowed it to remain intact. [2]

.....

.....

- (ii) Predict what would happen if the cell in (a) was placed in distilled water for some time. [1]

.....

.....

- (c) (i) A root hair cell is a type of specialised plant cell.

State and explain which feature of a typical plant cell might be absent in a root hair cell. [1]

.....

.....

- (ii) Describe and explain how a root hair cell is adapted to perform its function. [2]

.....

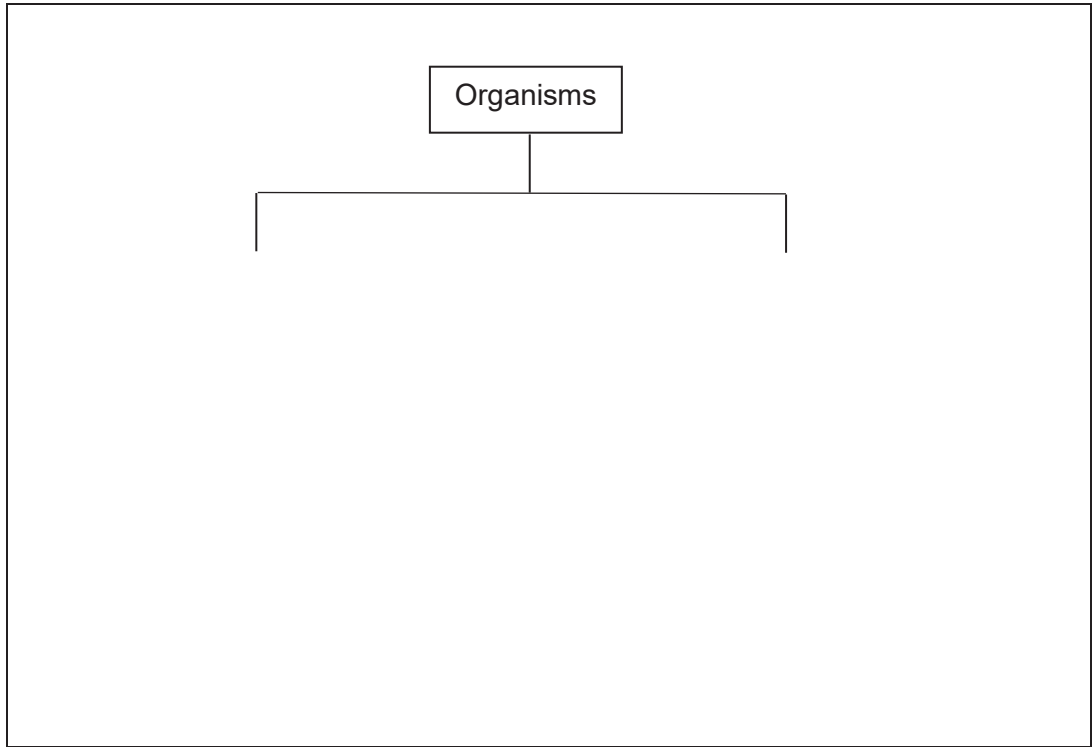
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.....

10 Dichotomous keys are often used to classify things or organisms into groups.

(a) Complete the dichotomous key in the space below by classifying the following organisms: [5]

- Ostrich                      Seagull                      Hibiscus
- Oak fern                      Koala                      Platypus



(b) Describe one difference between ferns and mosses. [1]

.....

.....

(c) Describe two similarities between fish and reptiles. [2]

.....

.....

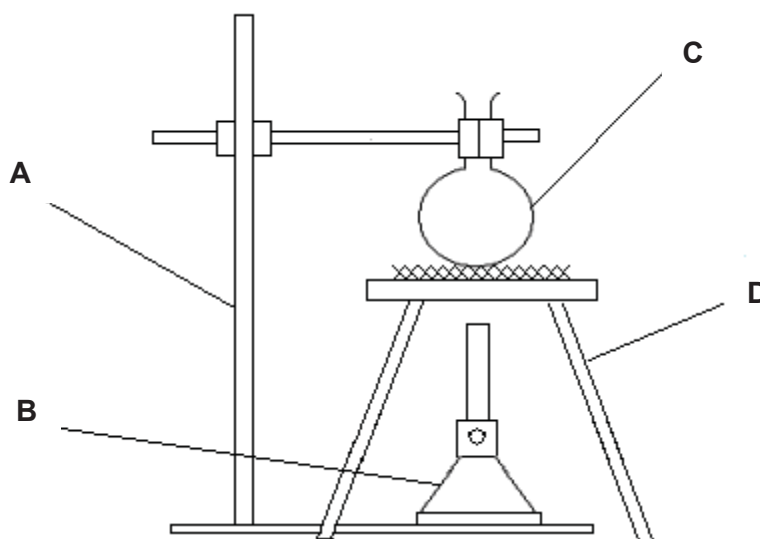
(d) Multicellular organisms have different types of specialised cells. Explain the importance of division of labour in a multicellular organism. [2]

.....

.....

.....

- 11 (a) Name the apparatus used in the diagram below. [2]



A .....

B .....

C .....

D .....

- (b) State and explain the type of flame that should be used to remove water from a salt solution. [2]

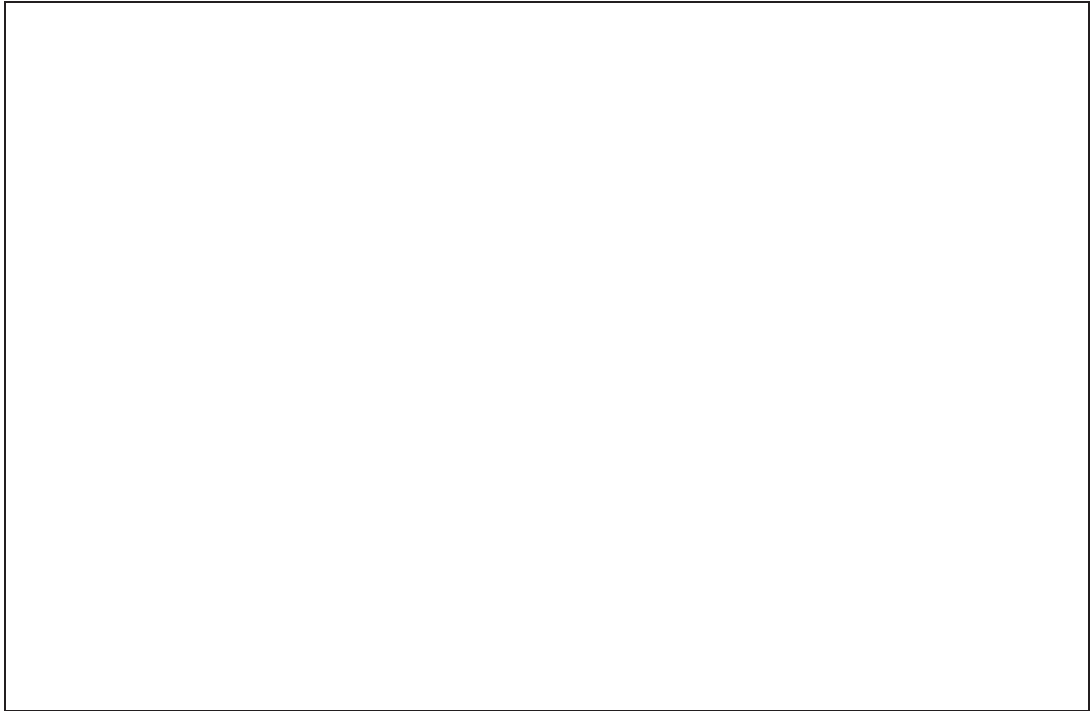
.....  
 .....

- (c) Donovan used the set-up above to heat a salt solution. After some time when all the water had boiled off, he noticed that a white solid remaining in apparatus C.

Explain whether the properties of the white solid would be similar to that of the salt solution. [1]

.....  
 .....

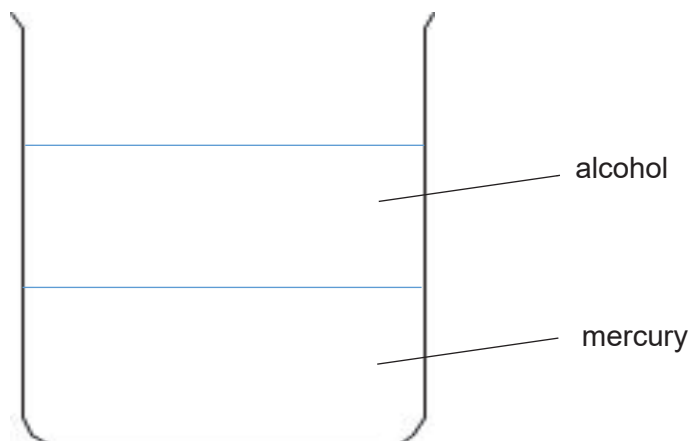
- 11 (d) In the space below, draw and label an experimental set-up to separate a mixture of sand and water. [5]



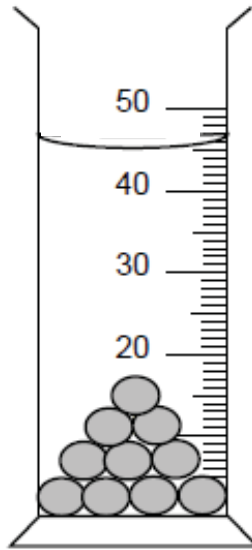
- 12 (a) The table shows the densities of some substances at room temperature

substance	density / g/cm <sup>3</sup>
mercury	13.6
gold	19.3
copper	8.9
teak wood	0.8
alcohol	0.79

Using  to represent the solid objects gold, copper and teak wood, complete and label the diagram below showing the positions of the substances as they are mixed and allowed to settle in a beaker containing alcohol and mercury. [3]



- 12 (b) Ten identical glass marbles of equal volume were immersed in a measuring cylinder containing 30 cm<sup>3</sup> of water as shown.



- (i) Calculate the volume of one marble, showing all necessary working. [2]

- (ii) The average mass of one marble is found to be 5.2 g. Calculate the density of the glass used to make the marbles. [1]

- (iii) Explain why the volume of ten marbles is measured instead of one marble. [1]

.....  
 .....

- (c) Another pack of ten marbles was measured, and the density of the marbles in the second pack was found to be 3.85 g/cm<sup>3</sup>.

Suggest whether these marbles are likely to be from the same manufacturer as the marbles in (b). [1]

.....  
 .....

12 (d) Glass can also be moulded into different shapes. Glass is used in the making of optical fibers, which are used to transmit data in the form of light signals over long distances in telecommunications.

(i) Suggest one property of optical fibers which is not typical of glass. [1]

.....

(ii) Optical fibers can replace copper wire for the transmission of light signals, but not in applications such as the wires for electrical appliances.

Suggest why this is so. [1]

.....

.....

**END OF PAPER**

# The Periodic Table of Elements

		Group																																																																						
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		Key		1 H hydrogen 1		proton (atomic) number		atomic symbol		name		relative atomic mass																																																												
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**QAnswers for Secondary 1 Express Science MYE P1 2018**

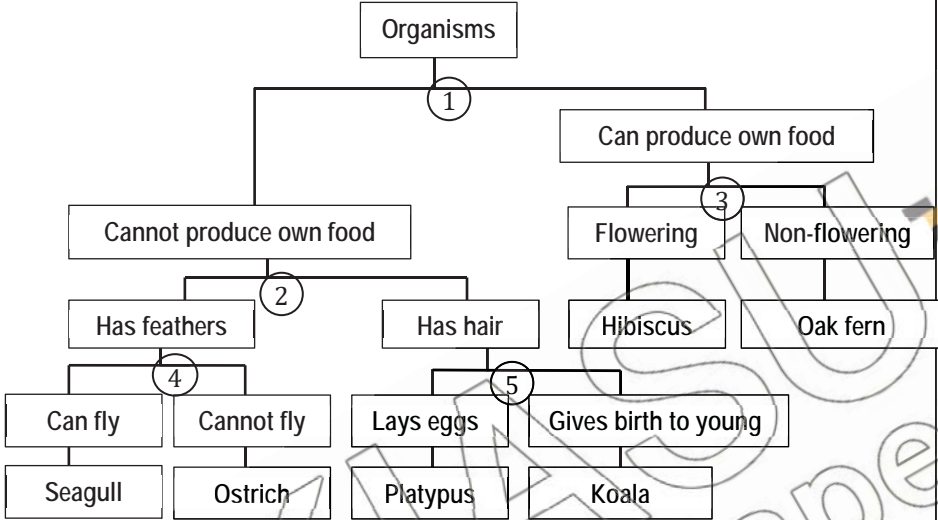

- |       |       |       |
|-------|-------|-------|
| 1. C  | 11. A | 21. D |
| 2. C  | 12. B | 22. C |
| 3. D  | 13. C | 23. C |
| 4. B  | 14. A | 24. B |
| 5. C  | 15. D | 25. B |
| 6. D  | 16. C | 26. A |
| 7. A  | 17. A | 27. B |
| 8. B  | 18. D | 28. A |
| 9. A  | 19. D | 29. D |
| 10. B | 20. B | 30. C |


**Answers for Secondary 1 Express Science MYE P1 2017**

Section A			Remarks
<b>A1</b>	(a) (b)	He should have used a test tube holder to hold the test tube over the flame. Luminous flame. [1] A luminous flame produces soot. [1]	[1] [2]
<b>A2</b>	(a) (b) (c) (d)	8.46 m 0.850 h 0.000750 m <sup>3</sup> 0.580 g/cm <sup>3</sup>	[1] [1] [1] [1]

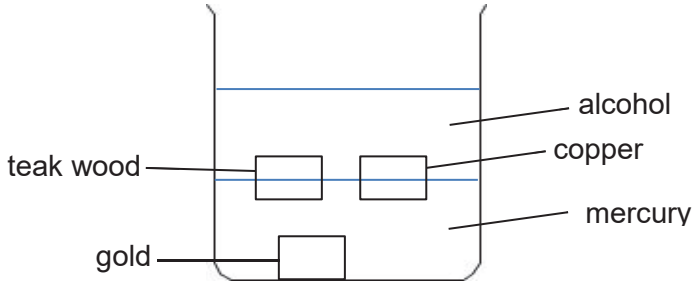

A3	(a)	The type of solvent	[1]	
	(b)	The solubility of sugar / the mass of sugar dissolved in a given/fixed volume	[1]	
	(c)	Temperature / Volume of solvent	[2]	
A4	(a)	Steel as it scratched all the other materials.	[1]	
	(b)	Wood, plastic, copper, steel	[1]	
A5	(a)	Electronic balance / beam balance	[1]	
	(b)	The displacement can was not filled up to the spout; [1] This would cause the volume measured to be lower. [1]	[2]	
	(c)	The method would not work as <b>Styrofoam has a lower density than water;</b> [1] Styrofoam would <b>float/not be fully submerged</b> in the water. [1]	[2]	
	(d)	The outside jaws	[1]	
A6	(a)	Vitamin supplements are a <b>mixture/not a pure substance</b> as they <b>do not have a fixed composition.</b>	[1]	
	(b)	Carry out paper chromatography on a sample of the vitamin supplement; [1] A pure substance would produce only one spot on the chromatogram / a mixture would produce more than one spot. [1]	[2]	
	(c)(i)	It is a compound.; [1] It consists of <b>more than one element</b> ; [1] It has a <b>fixed composition.</b> [1]	[3]	
	(ii)	$10+16+2+3+1 = 32$ atoms.	[1]	
A7	(a)	D	[1]	
	(b)	C	[1]	
	(c)	C, D, and E	[1]	
	(d)	E	[1]	

Section B		Remarks
B8	(a)	The higher the temperature, the greater the solubility of the solids. (or vice versa) [1]
	(b)	$\text{KNO}_3$ [1]; 125 g. [1] [2]
	(c)	25-30 °C [1]
	(d)	<b>Solid would form</b> and settle at the bottom of the mixture. [1]
	(e)	Mass of $\text{KNO}_3$ dissolved in 100 cm <sup>3</sup> of water at 20 °C = 30 g (from graph) [1] Total volume of water needed to dissolve 100 g of $\text{KNO}_3$ at 20 °C = $100 \times \frac{100}{30} = 333 \text{ cm}^3$ [1] Volume of water needed to be added = $333 - 150 = 183 \text{ cm}^3$ [1] [3]
	(f) (i)	Increasing the volume of the solvent will increase the total mass of sodium chloride that can be dissolved. However, the solubility will remain the same, hence she is correct. [1]
	(ii)	Stirring faster may increase the rate of dissolving. [1] However, the solubility of sodium chloride will still remain the same, hence he is wrong. [1]
B9	(a) (i)	It has green structures, which are <b>chloroplasts</b> . [1] [2] It also has a <b>single large vacuole</b> , which is shown in the diagram as a large space containing starch particles. [1]
	(ii)	It does not have a nucleus.; [1] [2] This means that it is <b>unable to reproduce</b> itself, and all living things must be able to reproduce. [1]
	(b) (i)	The cell wall [1]; it enables the cell to <b>maintain its regular shape</b> . [1] [2]
	(ii)	It would burst. [1]
	(c) (i)	Chloroplasts; root hair cells are not exposed to sunlight and <b>do not need to photosynthesise</b> . [1]

<p>(ii)</p>	<p>It has an <b>elongated shape</b>. [1]; This <b>increases</b> its <b>total surface area / surface area to volume ratio</b> allowing it to better <b>absorb water and mineral salts</b>.</p>	<p>[2]</p>	
<p>B10 (a)</p>	 <p>1. For classifying “organisms” into “can/cannot produce own food”</p> <p>2. For classifying “cannot produce own food” into “has feathers” and “has hair”</p> <p>3. For classifying “can produce own food” into “flowering” and “non-flowering” – Hibiscus and oak fern</p> <p>4. For classifying “has feathers” into “can fly” and “cannot fly” – seagull and ostrich</p> <p>5. For classifying “has hair” into “Lays eggs” and “gives birth to young” – platypus and koala</p> <p>Accept other reasonable characteristics</p>	<p>[5]</p>	

	<p>(b) Ferns have true roots while mosses do not.</p> <p>(c) Fish and reptiles both reproduce by laying eggs; Fish and reptiles are both cold-blooded.</p> <p>(d) In a multicellular organism, specialised cells are adapted for their <b><u>specific/different functions</u></b>; This allows the organism as a whole to <b><u>function effectively and efficiently</u></b>./ This allows different functions to be <b><u>carried out at the same time</u></b>.</p>	<p>[1]</p> <p>[2]</p> <p>[2]</p>	
<p>B11 (a)</p>	<p>A – retort stand B – Bunsen burner C – round-bottom flask D – tripod stand</p> <p>(b) A non-luminous flame; It burns with a <b><u>hotter flame</u></b> and thus is better for heating.</p> <p>(c) The properties would be similar, as the properties of a mixture are similar to those of its components.</p> <p>(d)</p>  <p>Residue</p> <p>Filtrate</p> <p>Filter paper</p> <p>Filter funnel</p> <p>Beaker</p>	<p>[2]</p> <p>[2]</p> <p>[1]</p> <p>[5]</p>	<p>1m for every 2 correct</p> <p>[1 mark for all diagrams drawn correctly] [1 mark for each correctly drawn and labelled apparatus: 1) filter funnel, 2) filter paper, 3) beaker] [1 mark for labelling residue and filtrate]</p>



<p><b>B12 (a)</b></p>	 <p>alcohol</p> <p>teak wood</p> <p>copper</p> <p>mercury</p> <p>gold</p> <p>(b) (i) Total volume of ten marbles = <math>45 - 30 = 15 \text{ cm}^3</math> [1]  Volume of one marble = <math>15 \div 10 = 1.5 \text{ cm}^3</math> [1]  (ii) Density = <math>5.2 / 1.5 = 3.47 \text{ g/cm}^3</math> (to 3 s.f.) [1]  (iii) This would minimise errors and increase reliability. [1]  (c) No, they are not likely to be from the same manufacturer, as the density of the glass used is different. [1]  (d) (i) They are flexible. [1]  (ii) The cables for household appliances must be able to conduct electricity. Copper is a metal and is a good conductor of electricity, while <b>glass</b> is a <b>poor conductor of electricity</b>. [1]</p>	<p>[3]</p> <p>[2]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p>	 <p>Islandwide Delivery   Whatsapp Only 88660031</p>
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**SCIENCE (CHEMISTRY/BIOLOGY)**  
**PAPER 1**

**11 May 2018**  
**Papers 1, 2 and 3: 2 hours**

Additional Material(s): OTAS

**READ THESE INSTRUCTIONS FIRST**

There are **thirty** questions in this section.

Answer **all** the questions.

For each question, there are four possible answers, **A, B, C and D**.

Choose the one you consider correct and record your choice **in soft pencil** on the **OTAS**.

**Read the instructions on the OTAS very carefully.**

**Hand in the Objective Test Answer Sheet separately.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

The total number of marks for this paper is 30.

A copy of the Periodic Table is printed on page **15**.

<b>For Examiner's Use</b>
<b>30</b>
<b>Parent's Signature</b>

This document consists of **15** printed pages, including the cover page.

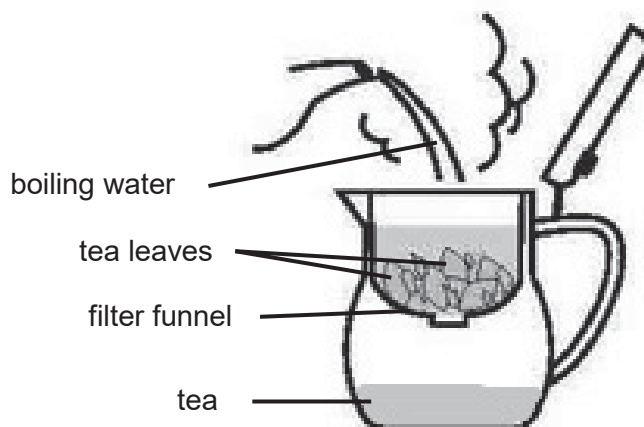
- 1 What should **not** be done in a Science laboratory?
- A begin an experiment without instructions and permission from the teacher
  - B refrain from eating or drinking in the Science laboratory
  - C wash your hands and clean up your work area after an experiment
  - D wear goggles when heating or mixing chemicals
- 2 Which one of the following describes the safest way of heating water in a test tube?
- A fill the test tube halfway and hold the test tube at 45° angle
  - B fill the test tube halfway and hold the test tube upright
  - C fill up the whole test tube and hold the test tube at 45° angle
  - D fill up the whole test tube and move it in and out of the flame
- 3 Arrange the following steps in the correct order to light a Bunsen burner.
- 1 Close the air-hole.
  - 2 Open the air-hole.
  - 3 Place the lighter above the barrel.
  - 4 Turn on the gas tap and light up the Bunsen burner.
- A 1, 4, 3, 2
  - B 1, 3, 4, 2
  - C 2, 3, 4, 1
  - D 2, 4, 3, 1
- 4 Which of the following mixtures can be separated by adding water, stirring and filtering?
- A copper and zinc
  - B salt and sugar
  - C salt and sand
  - D sand and chalk

- 5 A N95 respirator uses a special filter to protect the wearer from 95 % of airborne particles when worn correctly.

Which statement best explains why the N95 respirator is **not** 100 % effective?

- A Some particles are not solid substances and cannot be filtered.  
 B Some particles are small enough to pass through the filter.  
 C Some particles may still enter the respiratory system from other parts of the body.  
 D The mask is designed to only filter 95 % of the particles and hence the name N95.
- 6 Which of the following methods can be used to separate a mixture of powdered iron and sand?
- A filtration  
 B distillation  
 C magnetic attraction  
 D chromatography

- 7 The diagram shows a separation technique used to obtain tea.

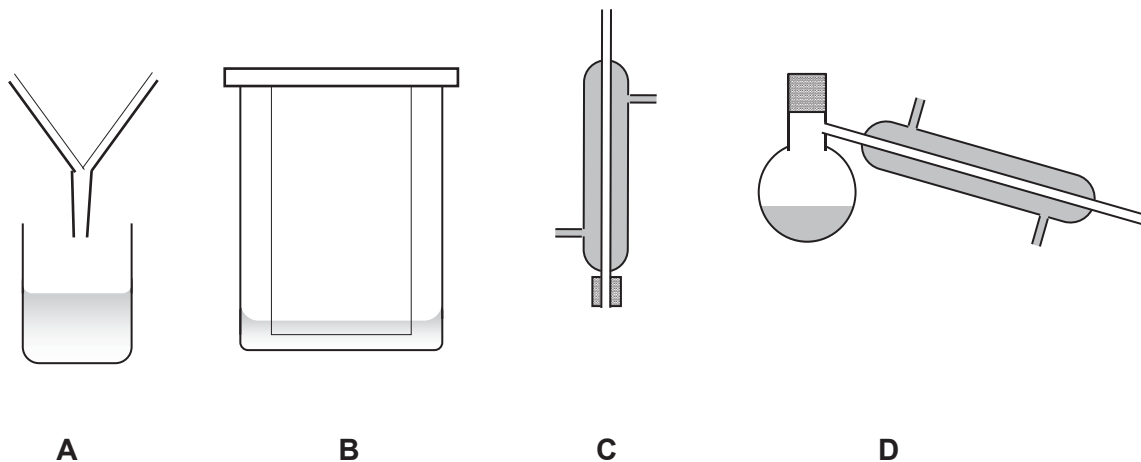


Which one of the following is correct?

	tea	tea leaves	boiling water
<b>A</b>	filtrate	residue	solution
<b>B</b>	filtrate	residue	solvent
<b>C</b>	residue	solution	solvent
<b>D</b>	solution	solute	solvent

- 8 Compound Q melts at 78 °C and boils at 124 °C and is insoluble in water.

Which apparatus can be used to obtain pure Q from a mixture of Q and water?



- 9 Which of the following shows an element, a compound and a mixture?

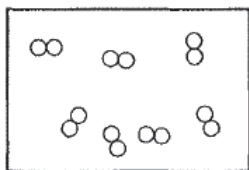
	element	compound	mixture
<b>A</b>	carbon monoxide	magnesium oxide	milk
<b>B</b>	boron	bronze	copper
<b>C</b>	nitrogen gas	water	fizzy drink
<b>D</b>	sodium	air	water

- 10 Which one of the following substances contains the least number of elements?

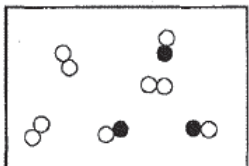
- A**  $\text{CH}_3\text{COOH}$   
**B**  $\text{C}_{80}$   
**C**  $\text{NaHCO}_3$   
**D**  $\text{NaBr}$

11 Which of the following represents a mixture of two elements?

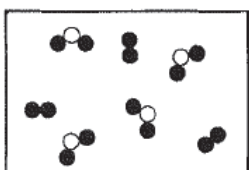
A



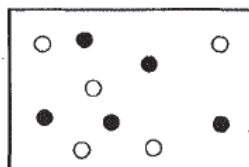
B



C



D



12 A hydrocarbon is a compound that contains hydrogen and carbon atoms only.

Which of the following statements about a hydrocarbon is true?

- A A hydrocarbon cannot be separated by physical methods.
- B A hydrocarbon cannot be decomposed by strong heating in air.
- C Hydrogen and carbon atoms in hydrocarbons are present in variable proportions.
- D Hydrogen and carbon atoms in hydrocarbons are not chemically combined together.

13 Which of the following statements best supports the idea that matter is made up of small particles at constant random motion?

- A Gases are usually lighter than liquids.
- B If a bottle of perfume is opened, the smell spreads quickly.
- C Metal expands when heated.
- D Water molecules always fill the space available to it.

- 14 Which of the following arrangements identifies correctly the energy levels of the particles in the three states of matter?

	most energy	→	least energy
<b>A</b>	solid		gas
<b>B</b>	liquid		gas
<b>C</b>	gas		liquid
<b>D</b>	gas		solid

- 15 Dry ice sublimates at room temperature.

Which statement describes the change in state when dry ice sublimates?

- A** Dry ice changes from gaseous to solid state.
- B** Dry ice changes from liquid to gaseous state.
- C** Dry ice changes from solid to gaseous state.
- D** Dry ice changes from solid to liquid to gaseous state.



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**SCIENCE (CHEMISTRY)**  
**PAPER 2**

**11 May 2018**  
**Papers 1, 2 and 3: 2 hours**

No Additional Material

**READ THESE INSTRUCTIONS FIRST**

Write your name, class and index number on all the work you hand in.

Write in dark blue or black pen.

You may use a HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions. Write your answers in the spaces provided in the question paper.

The number of marks is given in brackets [ ] at the end of each question or part question.

The total number of marks for this paper is 35.

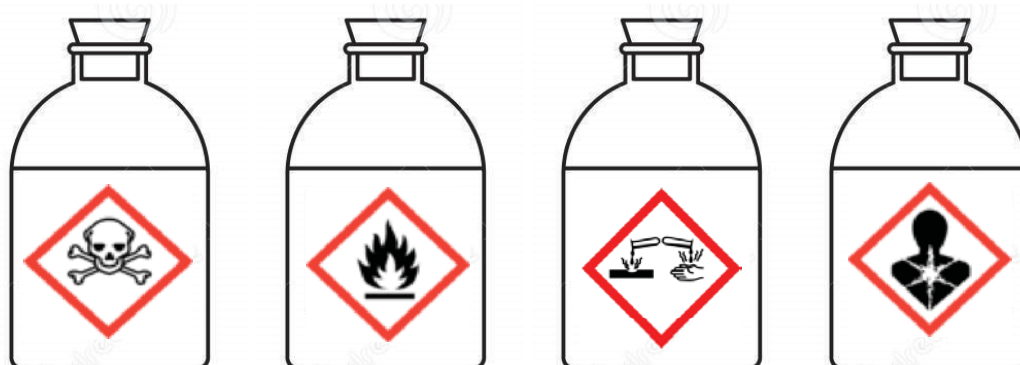
A copy of the Periodic Table is printed on page 10.

<b>For Examiner's Use</b>
<b>35</b>
<b>Parent's Signature</b>

This document consists of **10** printed pages.

**Section A [15 marks]**

- 1 The diagrams below show labelled bottles containing substances found in the Science laboratory.



bottle **A**

bottle **B**

bottle **C**

bottle **D**

- (a) Which bottle needs to be kept away from any open heat source?

..... [1]

- (b) Describe the nature of the hazardous substance in

(i) bottle **A**: ..... [1]

(ii) bottle **D**: ..... [1]

- (c) If the substance in bottle **C** comes into contact with your hand, what should you do?

.....  
 ..... [1]

- (d) Explain why unused chemicals should not be poured back into the bottles.

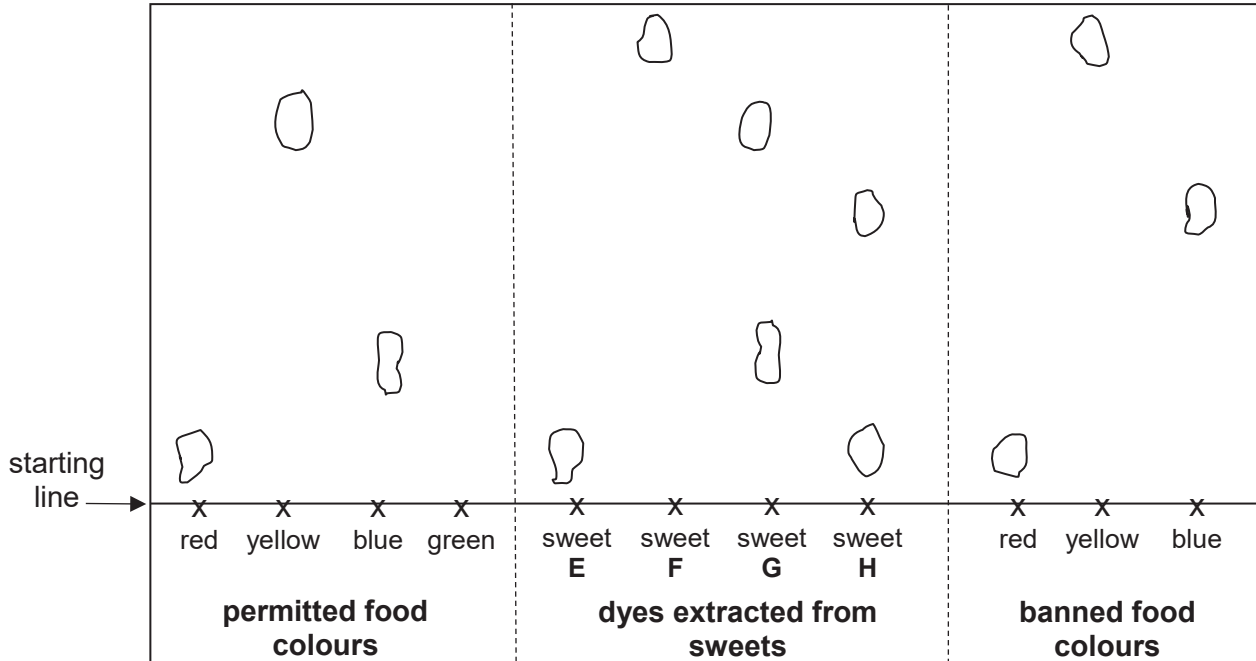
.....  
 ..... [1]

[total: 5 marks]



- 2 The police investigated a case of food poisoning caused by a particular brand of coloured sweets. The local food inspector made chromatograms of the food colourings in the sweets to test for the presence of banned food colourings, which were suspected to be a likely cause of food poisoning.

The results of the chromatography are shown below.



(a) Using the results in the chromatogram,

- (i) which coloured sweets appear to contain only a single food colouring?

..... [1]

- (ii) what food colours are present in sweet G?

..... [1]

- (iii) which coloured sweets **definitely** contain banned food colouring?

..... [1]

**(b)** The experiment did not give any useful information about the sweet **E**.

Explain why.

.....  
.....

[1]

**(c)** The starting line must be drawn in pencil.  
Is the statement above correct? Explain your answer with a reason.

.....  
.....

[1]

**(d)** The green permitted food colouring remained undeveloped.

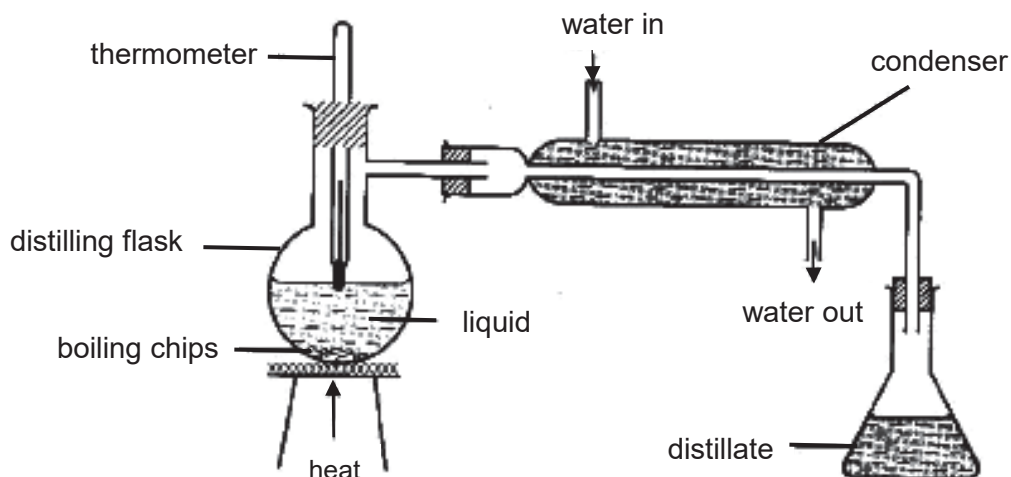
Suggest a reason why.

.....  
.....

[1]

[total: 6 marks]

3 The diagram below shows the experimental set-up for the process of simple distillation.



(a) Identify three errors in the experimental set-up of the simple distillation process in the diagram above.

1. ....
2. ....
3. ....

[3]

(b) Describe how you would test for the purity of the distillate collected.

.....  
 .....

[total: 4 marks] [1]

**Section B [20 marks]**

- 4 The table below shows the colour and solubility in water of three solids, **X**, **Y** and **Z**.

solid	colour	solubility in water
<b>X</b>	white	insoluble
<b>Y</b>	blue	soluble
<b>Z</b>	blue	insoluble

- (a) Describe the procedure to obtain a **pure dry** sample of solid **X** from a mixture of **X** and **Y**.

.....

.....

.....

.....

[3]

- (b) Solution **Y** is heated until saturated, then cooled to form solid **Y**.

- (i) Identify this method used to obtain solid **Y**.

.....

[1]

- (ii) Suggest a reason why solution **Y** cannot be heated until dryness.

.....

[1]

- (iii) Draw and label the apparatus required to heat a solution of **Y**.

[2]

- (iv) Provide **two** reasons why a non-luminous flame is preferred over a luminous flame for heating.

.....

.....

..... [2]

- (v) How is a non-luminous flame obtained?

..... [1]

[total: 10 marks]

- 5 (a) In the table below, tick the **appropriate boxes** that best describes the arrangement of particles in a solid, liquid and gas.

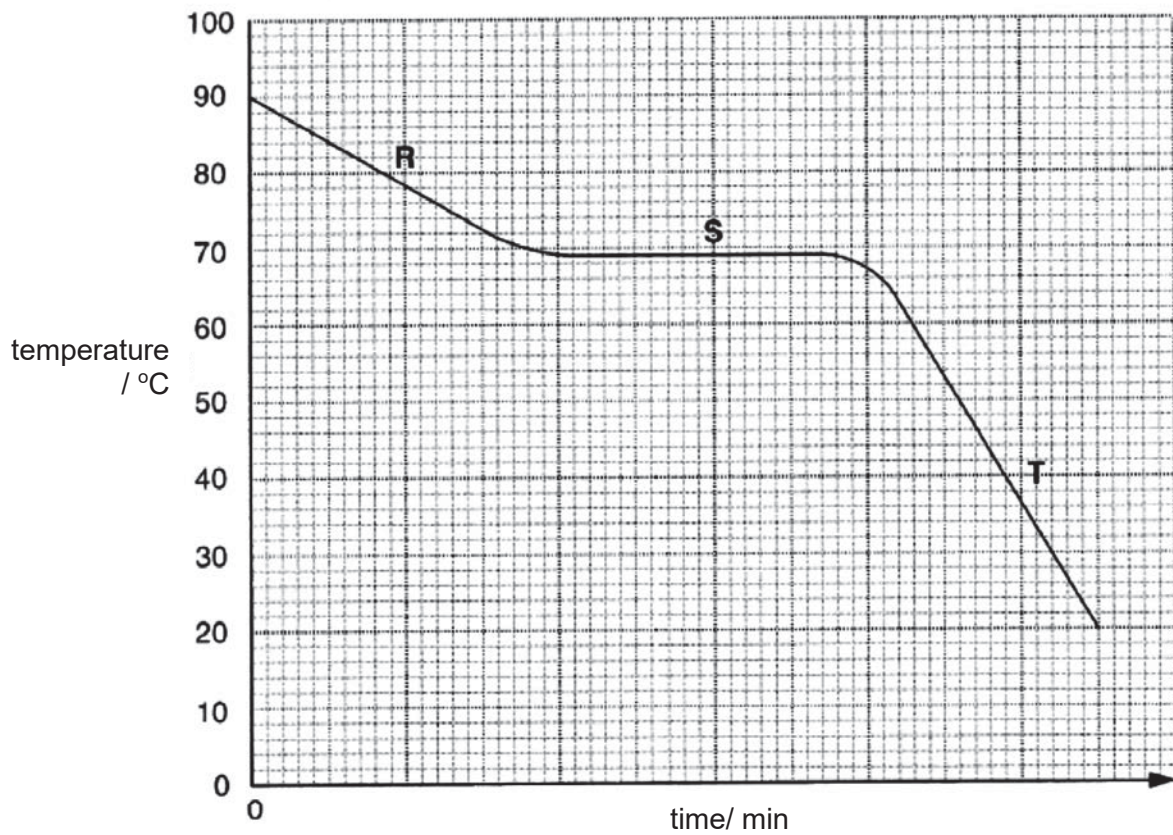
You may tick more than one box for each physical state.

arrangement of particles	solid	liquid	gas
close together			
far apart			
in a regular arrangement			
random arrangement			

[3]

(b) A sample of liquid stearic acid is cooled from 90 °C to 20 °C.

The graph shows the results obtained when liquid stearic acid is cooled to 20 °C.



(i) What is the freezing point of stearic acid?

..... [1]

(ii) Describe the movement of particles at 90 °C.

.....  
 ..... [1]

(iii) Identify in which section of the graph, **R**, **S** or **T**, is the stearic acid a mixture of liquid and solid state.

section ..... [1]

(iv) In the box below, draw the arrangement of the particles in section **T** of the graph.



[1]

(c) Using kinetic particle theory, explain the following statements.

(i) A gas, at room temperature and pressure, can be compressed but not a solid.

.....  
.....  
.....

[2]

(ii) A solid has a fixed shape.

.....  
.....

[1]

[total: 10 marks]





- 16** Alexander Fleming discovered the antibiotic penicillin by accident. While studying the common cold virus, he observed that mould had grown on a plate that is used for growing bacteria. He found that the mould had created an area around itself that was free of bacteria. He was inspired to further experiment and found that the mould prevented the growth of bacteria, even when diluted many times. He named the active substance in the mould penicillin.

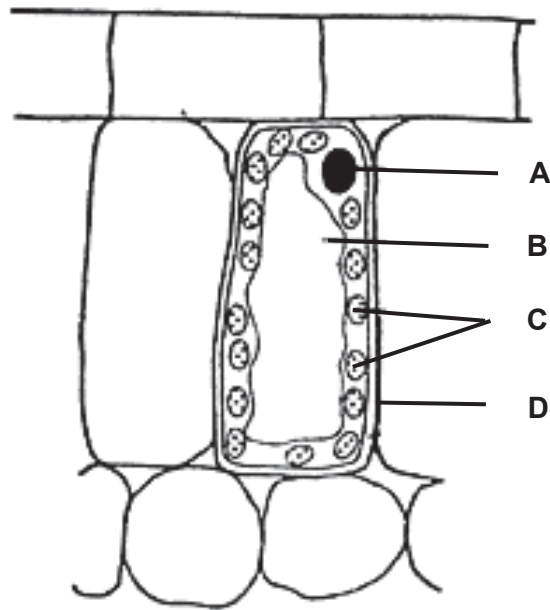
Which qualities of a good scientist did Alexander Fleming show?

- I open-mindedness
  - II curiosity
  - III integrity
  - IV perseverance
- A** I and II only
- B** II and III only
- C** III and IV only
- D** All of the above
- 17** Which of the following is **not** a good attitude in learning science?
- A** Refusing to believe everything you read from the internet.
- B** Being able to accept other ideas.
- C** Letting your opinions affect your work.
- D** Showing care and concern for living things and the environment.
- 18** The human body is made up of organs, tissues and cells.

Which of the following correctly describes the sperm, blood and brain?

- |          |        |        |        |
|----------|--------|--------|--------|
|          | sperm  | blood  | brain  |
| <b>A</b> | cell   | organ  | tissue |
| <b>B</b> | cell   | tissue | organ  |
| <b>C</b> | organ  | tissue | cell   |
| <b>D</b> | tissue | organ  | cell   |

- 19 A plant cell is shown below.



Which structure is also present in an animal cell?

- 20 Which of the following statements regarding the division of labour is accurate?
- I Cell organelles carry out specific jobs.
  - II In multicellular organisms, different types of cells perform different functions.
  - III In multicellular organisms, different types of cells perform the same functions.
  - IV The nucleus carries out all the specific jobs within the cell.
- A I only
- B I and II
- C II and III
- D All of the above
- 21 Which of the following systems work together to allow a person to move, walk and run?
- A Digestive and muscular
  - B Excretory and respiratory
  - C Muscular and skeletal
  - D Reproductive and nervous

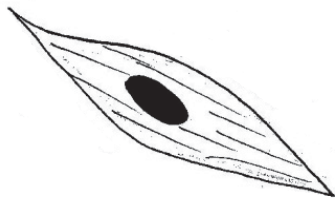
**22** The shape of the cell is determined by the work the cell does.

Which of these cells is part of the nervous system? (cells not drawn to scale)

**A**



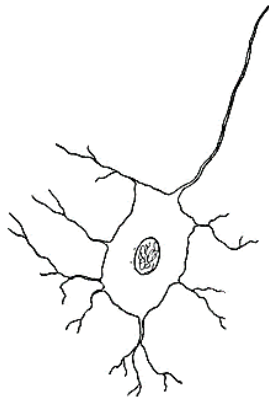
**B**



**C**



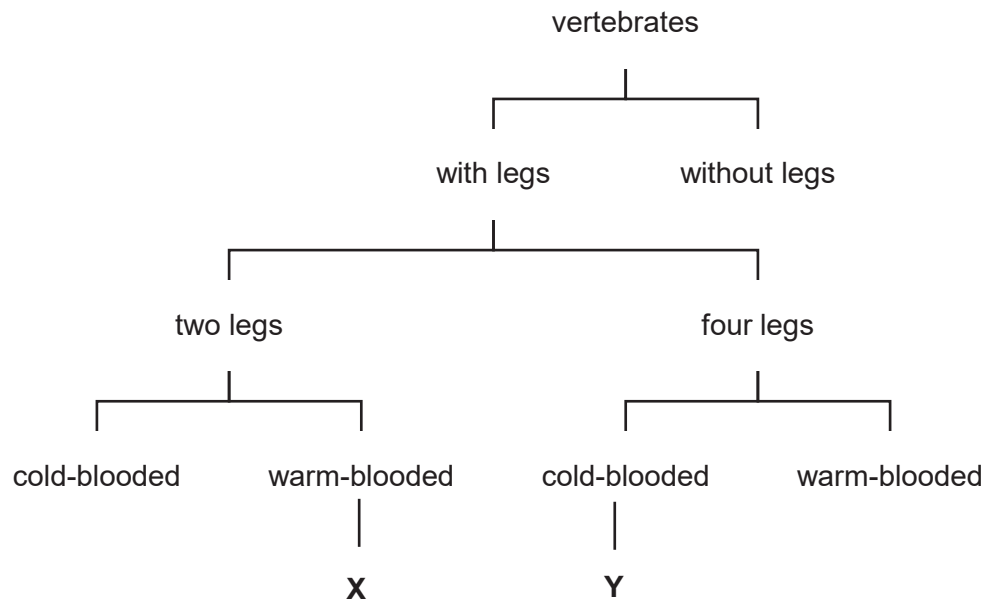
**D**



**23** A dichotomous key classifies an organism by dividing a group into

- A** two smaller groups each time.
- B** three smaller groups each time.
- C** four smaller groups each time.
- D** any number of groups each time.

24 Study the dichotomous key below.

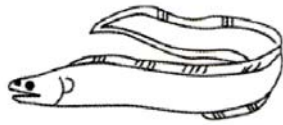


Which would most likely be the identities of **X** and **Y**?

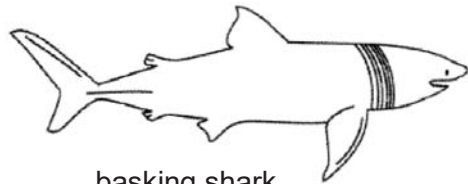
	<b>X</b>	<b>Y</b>
<b>A</b>	chimpanzee	snake
<b>B</b>	fish	spider
<b>C</b>	ostrich	cat
<b>D</b>	orang utan	tortoise

Use the information below to answer Questions **25** and **26**.

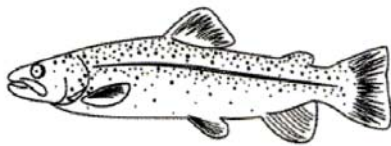
The drawings, not drawn to scale, show six fishes.



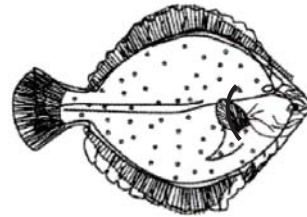
eel



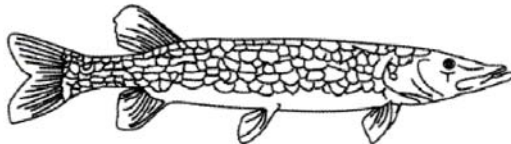
basking shark



trout



plaice



pike



stickleback

A dichotomous key to identify these six fishes is shown below.

- |    |  |                        |
|----|--|------------------------|
| 1. | Gills covered with a gill flap.<br>Gills not covered with a gill flap. | Go to 2.<br><b>I</b>   |
| 2. | Has a tail fin.<br>Does not have a tail fin.                           | Go to 3.<br><b>II</b>  |
| 3. | Has spines on its back.<br>Does not have spines on its back.           | <b>III</b><br>Go to 4. |
| 4. | Has a flat body.<br>Has a round body.                                  | <b>IV</b><br>Go to 5.  |
| 5. | Has spots on its back.<br>Does not have spots on its back.             | <b>V</b><br><b>VI</b>  |

25 Which option best describes the basking shark?

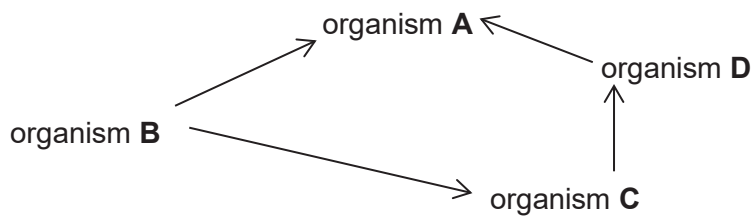
- A I
- B II
- C III
- D IV

26 Which option best describes the plaice fish?

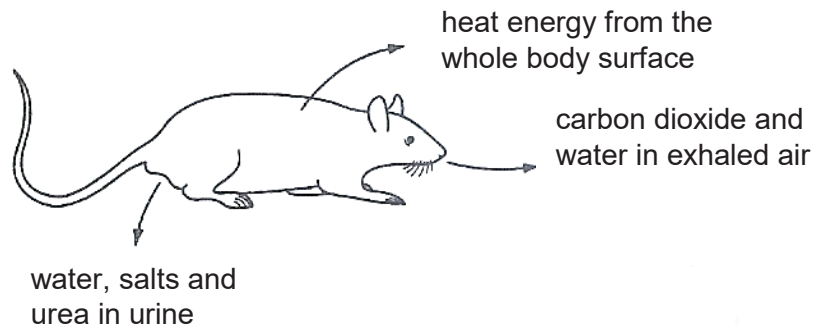
- A II
- B III
- C IV
- D V

27 The diagram shows the flow of energy in a simple food web.

Which organism is the apex predator?

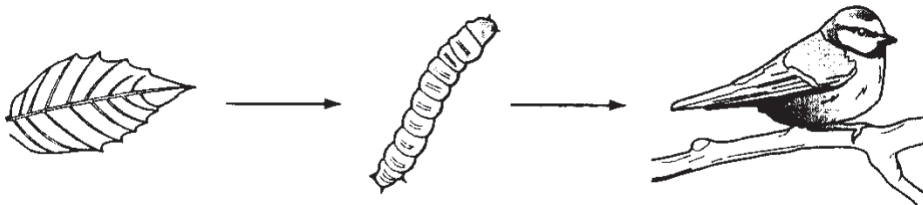


- 28 The diagram shows losses from a rat to the environment.



What will **not** be returned to the ecosystem and be recycled?

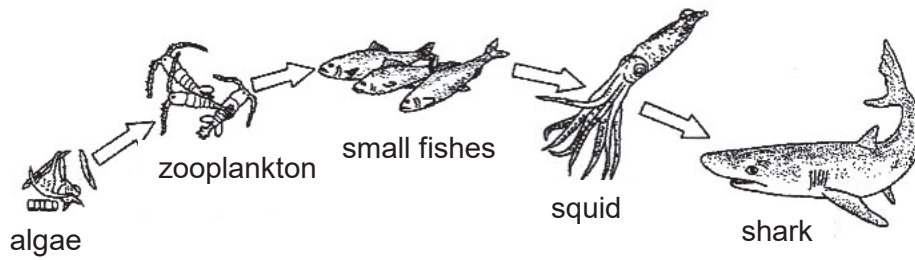
- A urea
  - B heat energy
  - C salts
  - D carbon dioxide
- 29 The diagram shows a simple food chain.



What is the source of energy for this food chain?

- A carbon dioxide
- B minerals
- C sun
- D water

30 The diagram below represents a food chain.



The arrows in the diagram indicate the

- A order of importance of various organisms.
- B return of chemical substances to the environment.
- C direction in which organisms move in the environment.
- D direction of energy flow through a series of organisms.





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## Science (Biology)

PAPER 3

11 May 2018

Papers 1, 2 and 3: 2 hours

### READ THESE INSTRUCTIONS FIRST

Write your candidate name, class and index number on all the work you hand in.  
Write in dark blue or black pen.  
You may use an HB pencil for any diagrams or graphs.  
Do not use staples, paper clips, glue or correction fluid.

#### Section A (15 marks)

Answer **all** the questions. Write your answers in the spaces provided in the question paper.

#### Section B (20 marks)

Answer **all** the questions. Write your answers in the spaces provided in the question paper.

The number of marks is given in brackets [ ] at the end of each question or part question.  
The total number of marks for this paper is 35.

<b>For Examiner's Use</b>
35
<b>Parent's Signature</b>

This document consists of 8 printed pages.

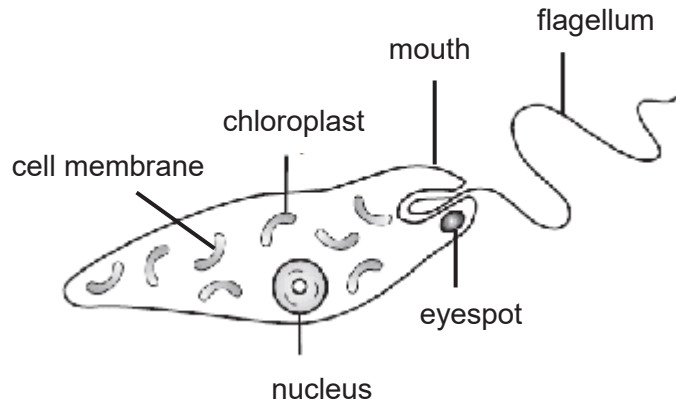
Page 1 of 8

[Turn over

**SECTION A [15 Marks]**

Answer **all** questions. Write your answers in the spaces provided.

- 1 **Fig. 1** shows the unicellular organism, *Euglena*.



**Fig. 1**

Some scientists classify this organism as a plant while others classify it as an animal.

- (a) State one feature in the diagram that suggests why scientists classify it as a plant.

..... [1]

- (b) Name **two** structures of a plant cell that are **not** present in the *Euglena*.

.....  
 ..... [2]

[total marks: 3]

- 2 Over the past century, science and technology has greatly changed the way humans live and survive on this planet.

- (a) Describe one example of how science and technology has improved our lives. Explain your answer.

..... [1]

- (b) Give one example of how science and technology has been harmful to man and/or the environment.

.....  
 ..... [1]

[total marks: 2]

3 (a) Fig. 3 shows the sea anemone interacting with a clownfish.

Identify the relationship between the two organisms shown and describe how they interact with each other.

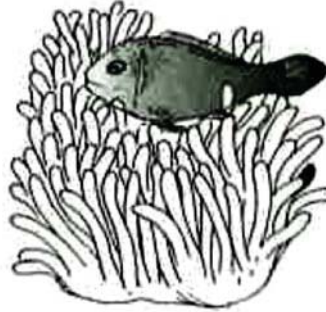


Fig. 3

relationship: .....

interaction: .....

..... [2]

(b) (i) Study the statements given below.

- Caterpillars and grasshoppers eat green plants.
- Small birds eat grains, flower buds, caterpillars and grasshoppers.
- Lizards and toads eat grasshoppers.
- Snakes eat toads, lizards and small birds.
- Hawks eat lizards, toads and snakes.

Construct a food web based on all the statements above.

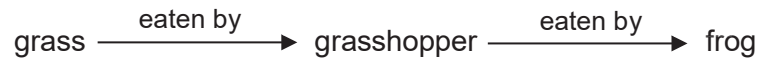
[3]

(ii) Identify a primary consumer from the food web in (i).  
..... [1]

(iii) If the snake population suddenly decreases drastically, predict what will happen to the grasshopper population. Explain your answer with a reason.  
prediction: .....  
.....  
reason: .....  
..... [2]

(c) Explain the importance of plants in a food web.  
.....  
..... [1]

(d) A food chain is shown below.

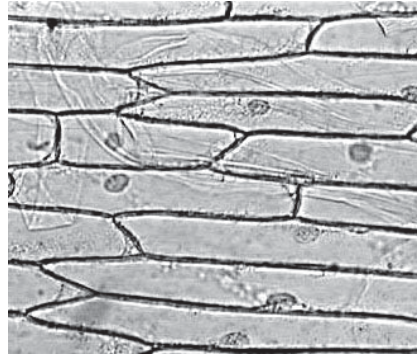


In this food chain, for every 10 grasshoppers, there is only 1 frog.  
Explain why the number of organisms decreases as we go down a food chain.  
.....  
..... [1]  
[total marks: 10]

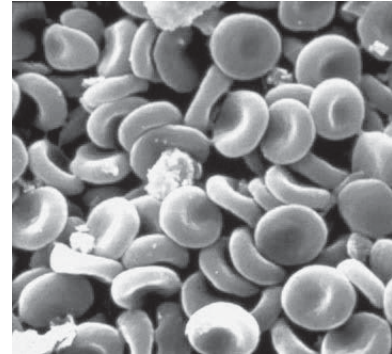
**SECTION B [20 Marks]**

Answer **all** questions. Write your answers in the spaces provided.

- 4 (a) **Fig. 4.1** shows photomicrographs of onion cells and red blood cells.



onion cells



red blood cells

**Fig. 4.1**

- (i) State **two** differences between onion cells and red blood cells.

.....  
 ..... [2]

- (ii) Describe the function of the red blood cell.

..... [1]

- (iii) The red blood cell has special structural features to help it carry out its function effectively.

Describe **two** structural features of the red blood cell and explain how these features help it to carry out its function.

1. feature: .....

    explanation: .....

.....

2. feature: .....

    explanation: .....

..... [4]

- (iv) Using the human circulatory system as an example, explain how division of labour takes place in a multicellular organism.

.....  
 ..... [2]

(b) Fig. 4.2 shows an organ system in the human body.

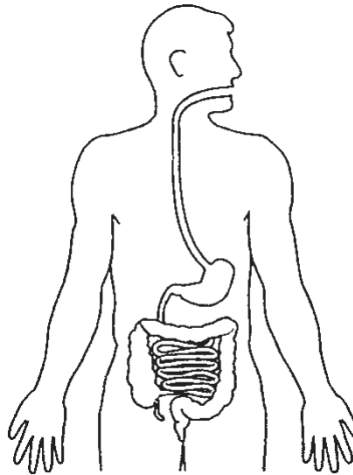


Fig. 4.2

(i) Identify the organ system shown in Fig. 4.2.

..... [1]

(ii) List **three** organs found in this organ system.

1. ....

2. ....

3. ....

[2]

(iii) Describe the function of this organ system.

..... [1]

[total marks: 13]

- 5 A student conducted an experiment to investigate how light intensity affects the rate of photosynthesis in a plant. Placing the lamp at different distances from the plant, she counted the number of bubbles produced by the plant per minute.

Fig. 5 shows the experimental set up of the investigation.

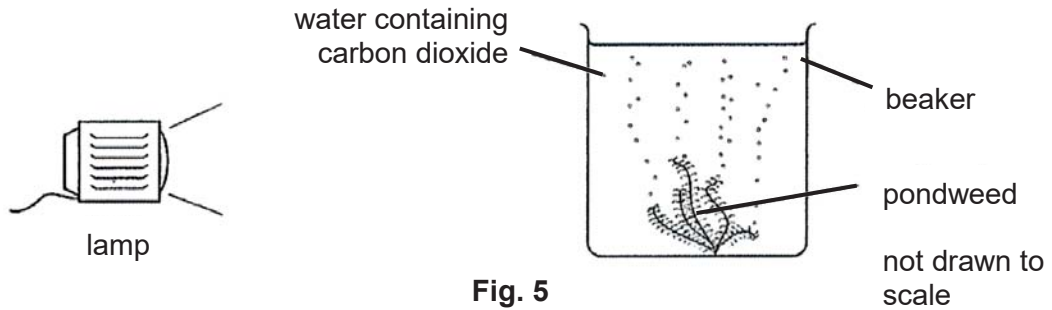


Fig. 5

- (a) By placing the lamp at different distances from the plant, the student was able to vary the light intensity.

Predict the possible hypothesis that the student was trying to investigate.

.....  
 ..... [1]

- (b) Identify **two** variables to be kept constant in this experiment.

1. .... [2]  
 2. .... [2]

- (c) What variable was measured in this experiment?

..... [1]  
 [total marks: 4]

- 6 **Fig. 6** shows a polluted river. The pollution in the river has caused harm to the aquatic life.



**Fig. 6**

- (a) Explain the importance of conservation of water bodies such as rivers, lakes and seas.

.....  
.....

[1]

- (b) The dumping of chemicals into rivers and deforestation are examples of how activities of man has caused harm to the environment.

Suggest **two** ways in which man can conserve the environment to prevent further harm to the world and organisms living in it.

1. ....  
.....  
2. ....  
.....

[2]

[total marks: 3]

☞ end of paper ☞





**Mid-Year Exam 2018**  
**LSS CHEMISTRY Secondary One Express**  
**Answer Scheme**

**Paper 1 MCQ (15 marks)**

1	2	3	4	5	6	7	8	9	10
A	A	B	C	B	C	B	A	C	B

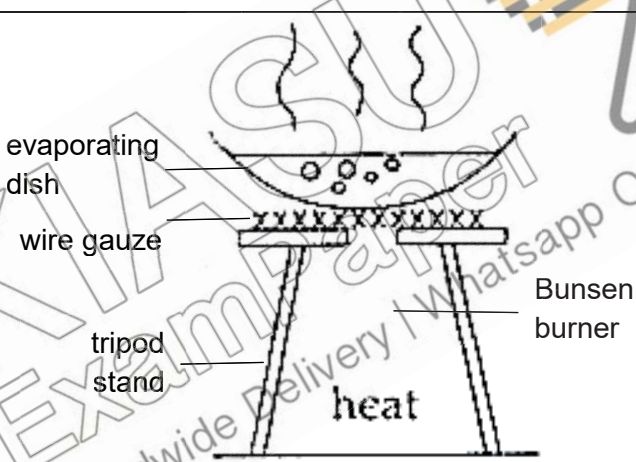
11	12	13	14	15
D	A	B	D	C

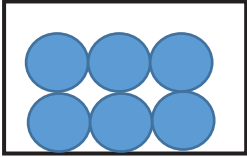
**Paper 2 Section A (15 marks)**

Question	Answers	Marks	
1	a	bottle <b>B</b>	1
	b	(i) bottle <b>A</b> : <u>toxic/ poisonous</u> (ii) bottle <b>D</b> : <u>carcinogenic / cause cancer</u>	1 1
	c	wash with plenty of water	1
	d	to prevent contamination	1
			[total: 5 marks]
2	a	(i) sweet <b>E</b> and <b>F</b> (ii) blue and yellow (iii) sweet <b>F</b> and <b>H</b> <i>reject: one missing/incorrect (both must be correct)</i>	1 1 1
	b	The <u>red permitted colouring and banned colouring</u> are at the <u>same position/ height</u> on the chromatogram. Thus, we cannot tell if the sweet contains the permitted or the banned red colouring.	1
	c	correct, as <u>pencil is insoluble</u> in most solvents	1
	d	the green colouring may be <u>insoluble in the solvent used</u> . <i>reject: insoluble in water</i>	1
			[total: 6 marks]
3	a	1. the <u>thermometer position</u> should be at the mouth of the condenser.	1
			1

		<p>2. the <u>position of 'water in' and 'water out' of the condenser should be reversed.</u></p> <p>3. the conical flask <u>should not be closed.</u></p> <p>accept: condenser should be tilted slightly downwards</p>	1
	b	<p>Check the boiling point of the distillate.</p> <p>Pure liquids will <u>boil at a fixed/constant temperature.</u></p> <p><i>reject: <u>melt at fixed temperature</u></i></p>	1 [total: 4 marks]

**Paper 2 Section B (20 marks)**

4	a	<ul style="list-style-type: none"> <li>- <u>Add water and stir well</u></li> <li>- <u>filter</u>, collect the <u>residue</u>, residue: X, filtrate: Y solution</li> <li>- <u>wash residue with distilled water</u>, <u>dry</u> between sheets of filter paper / air-dry.</li> </ul>	1 1 1																
	b	<p>(i) crystallization</p> <p>(ii) It will <u>decompose</u> upon heating</p>	1 1																
	b (iii)		1 – correct apparatus drawn 1 – correct labels																
	(iv)	<ul style="list-style-type: none"> <li>- non-luminous flame is cleaner, does not give out soot</li> <li>- non-luminous flame is hotter</li> <li>- non-luminous flame is steady, whereas a luminous flame is unsteady</li> </ul>	any 2																
	(v)	once the flame is obtained, turn the collar <u>to open the air-hole</u>	1 [total: 10 marks]																
5	a	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">arrangement of particles</th> <th style="width: 15%;">solid</th> <th style="width: 15%;">liquid</th> <th style="width: 15%;">gas</th> </tr> </thead> <tbody> <tr> <td>close together</td> <td style="text-align: center;">✓</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>far apart</td> <td></td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>in a regular arrangement</td> <td style="text-align: center;">✓</td> <td></td> <td></td> </tr> </tbody> </table>	arrangement of particles	solid	liquid	gas	close together	✓	✓		far apart			✓	in a regular arrangement	✓			1 mark for each state max [3]
arrangement of particles	solid	liquid	gas																
close together	✓	✓																	
far apart			✓																
in a regular arrangement	✓																		

		random arrangement	✓	✓	
b(i)	69 °C				1
(ii)	the particles are sliding over each other				1
(iii)	a mixture of liquid and solid state: <u>S</u>				1
(iv)					1
c(i)	<p>particles in a gas are <u>spread far apart</u>, OR  there is <u>more space between the particles</u> therefore,  the particles <u>can move closer together</u>.</p> <p>particles in a solid are <u>very closely packed</u>, OR  there is <u>very little space between the particles</u>, thus,  solid particles <u>cannot move closer together</u>.</p>				either one 1  1  either one 1  1
(ii)	particles in a solid are arranged <u>in fixed positions</u> / <u>vibrate about fixed position</u> . <i>Reject: closely-packed (liquids also)</i>				1  [total: 10 marks]



**Mid-Year Exam 2018**  
**LSS Bio Secondary One Express**  
**Answer Scheme**

**Paper 1 MCQ (15 marks)**

16	17	18	19	20	21	22	23	24	25
A	C	B	A	B	C	D	A	D	A

26	27	28	29	30
C	A	B	C	D

**Paper 2 Section A (15 marks)**

Question	Answers	Marks
1	a	Chloroplasts are present
	b	cell wall large central vacuole <i>Reject: vacuole/ cell sap</i>
		1 1 [total: 3 marks]
2	a	- medicines such as antibiotics help cure diseases. - advancement in healthcare technology have helped detect and cure diseases such as cancer. - farms can mass produce food using machines - genetic engineering can create pest-resistant and disease resistant food crops ANY OTHER RELEVANT ANSWER
	b	- use of antibiotics give rise to 'superbugs' - CFC gases have eroded/ destroyed the ozone layer - plastics/ styrofoam cause land pollution as it is non-biodegradable, also cause water pollution and harm to the aquatic animals - automobiles release gases that cause air pollution / global warming ANY OTHER RELEVANT ANSWER
		1 [total: 2 marks]

3	a	<p>relationship: <u>mutualism / symbiosis</u></p> <p>interaction:</p> <p>the sea anemone <u>provides protection</u>;</p> <p>the clownfish <u>cleans the anemone from parasites / lures fishes to the sea anemone</u></p>	<p>1</p> <p>1</p>
	b(i)	<pre> graph TD     Grains[grains] --&gt; SmallBird[small bird]     FlowerBuds[flower buds] --&gt; SmallBird     GreenPlants[green plants] --&gt; Caterpillar[caterpillar]     GreenPlants --&gt; Grasshopper[grass hopper]     Caterpillar --&gt; SmallBird     Grasshopper --&gt; SmallBird     Grasshopper --&gt; Lizard[lizard]     Grasshopper --&gt; Toad[toad]     Lizard --&gt; Snake[snake]     Toad --&gt; Hawk[hawk]     SmallBird --&gt; Snake     Snake --&gt; Hawk     </pre>	<p>1 – at least one correct food chain</p> <p>2 – one or two mistakes</p> <p>3 – no mistakes at all, all links correct</p>
	b(ii)	caterpillar OR grasshopper	1 (either one)
	b(iii)	<p>prediction: <u>the grasshopper population will decrease</u></p> <p>reason: <u>the population of toads, lizards and small birds will increase as they are no longer preyed on by the snake.</u></p>	<p>1</p> <p>1</p>
	c	<p><u>Plants trap energy from the sun to make food through photosynthesis.</u></p> <p>The sun is the ultimate source of energy on this earth, and only plants are able to convert this energy into food molecules.</p> <p><i>Reject: plants are producers – need to elaborate/ plants are main source of energy</i></p>	1 – both correct
	d	<p>energy is lost at every level of a food chain (through heat loss, excretion)</p> <p>OR only about 10% of energy is transferred to the next trophic level</p>	<p>1</p> <p>[total: 10 marks]</p>



**Paper 2 Section B (20 marks)**

4	a (i)	Onion cells have nucleus / cell wall while red blood cells do not.  onion cells have one large vacuole while red blood cells have multiple small vacuoles.	any two, 1 mark each  [2]
	(ii)	to transport oxygen around the body	1
	(iii)	1. <u>biconcave shape</u> explanation: increases <u>surface area</u> for the cell to <u>take in and release oxygen faster</u>  2. <u>no nucleus</u> explanation: to contain <u>more haemoglobin</u> , so cell can carry more oxygen  3. <u>haemoglobin present / contains haemoglobin</u> explanation: <u>binds to oxygen</u> and transports it around the body  4. <u>elastic and flexible membrane</u> explanation: to <u>squeeze through</u> tiny blood vessels	any two,  1 mark for feature, 1 mark for explanation  max [4]
	(iv)	heart – pumps blood to all parts of the body; while blood vessels – transports blood to and from the heart red blood cells – transports oxygen around the body	1  1
	b(i)	digestive system	1
	(ii)	mouth ; oesophagus; stomach; small intestines; large intestines; rectum ; anus	3 correct – 2 marks  1 or 2 correct – 1 mark [2]
	(iii)	to digest food ( <u>into simpler substances to be absorbed into the blood</u> )	1  [total: 13 marks]
5	a	The greater the light intensity, the faster the rate of photosynthesis; OR  The greater the light intensity, the more number of bubbles will be observed/produced.	1



	b	<ul style="list-style-type: none"> <li>- concentration of carbon dioxide</li> <li>- type of lamp</li> <li>- duration / time</li> <li>- type of plant</li> <li>- amount of plant used</li> <li>- volume of water (<i>Reject: amount of water</i>)</li> <li>- type of apparatus used</li> </ul>	any two reasons, 1 mark each  [2]
	c	<u>number of bubbles produced by the plant per minute</u>	1  [total: 4 marks]
6	a	They provide drinking water.  they provide source of food (seafood)	either one  [1]
	b	<ul style="list-style-type: none"> <li>- recycle materials that can be recycled like paper, plastic, metal and glass</li> <li>- use renewable energy such wind, water, solar power e.g. install solar panels in our homes, use electric cars</li> <li>- take public transport or cycle instead of drive</li> <li>- dispose of chemical waste in a responsible manner</li> <li>- farmers should use organic fertilizers instead of chemical pesticides</li> </ul> <p>ANY OTHER RELEVANT ANSWER</p> <p><i>Reject:</i></p> <ul style="list-style-type: none"> <li>- <i>Do not dump chemicals into rivers</i></li> <li>- <i>Reforestation (without elaboration)</i></li> <li>- <i>Too similar to example given in Qn</i></li> </ul>	any two ,  [2]  [total: 3 marks]



NAME		REG. NO.		CLASS	
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## SERANGOON GARDEN SECONDARY SCHOOL MID-YEAR EXAMINATION 2018

SUBJECT: LOWER SECONDARY SCIENCE (CHEMISTRY)  
 LEVEL: SECONDARY 1 EXPRESS  
 DATE: 11 MAY 2018 (FRIDAY)  
 TIME: 0815 – 1015 HOURS  
 DURATION: 2 HOURS (TOGETHER WITH LSS(BIOLOGY))

### READ THESE INSTRUCTIONS FIRST

Write your name, class register number and class in the spaces provided on the cover page.

You may use an HB pencil for any diagrams, graphs, tables or rough working.

Write in dark blue or black pen.

Do not use staples, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.

You may lose marks if you do not show your working or if you do not use appropriate units.

### Section A [10 marks]

Answer **all** questions.

For each question, there are four possible answers **A, B, C** and **D**. Choose the **one** you consider correct and record your choice on the Answer Sheet provided on page 5.

### Section B [20 marks]

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

### Section C [20 marks]

Answer any **two** questions.

Write your answers in the spaces provided on the question paper.

A Periodic Table has been provided on page 15 for your reference.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

<p>_____</p> <p>Name/Signature of Parent/Guardian                      Date</p>	<p><b>FOR MARKER'S USE</b></p> <hr style="border: none; border-top: 1px solid black;"/> <div style="text-align: right; font-size: 2em; font-weight: bold;">50</div>
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This question paper consists of 14 printed pages and 2 blank pages.

Setter: Mr Joshua Chen

Vetter: Ms Koh Li Min

[Turn Over

# BLANK PAGE

## Section A

For each question, there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice on the Answer Sheet provided on page 5.

1 Which of the following is/are attitude(s) of a good scientist?

- I perseveres despite failures
- II ignores observations that are unexpected
- III shows curiosity and asks questions
- IV makes conclusions quickly

- A** I and III only
- B** I, II and III only
- C** I, III and IV only
- D** III and IV only

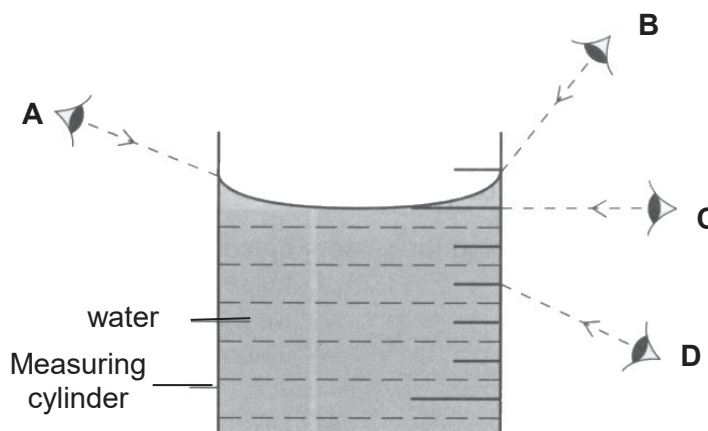
2 Which part of the Bunsen burner controls the rate of gas flow into the jet?

- A** air-hole
- B** barrel
- C** collar
- D** gas tap

3 What should be done when excess chemicals are poured out for an experiment?

- A** Discard the excess chemicals.
- B** Inform the teacher.
- C** Pour the unused chemicals back into the original container.
- D** Use the excess chemicals in the experiment to avoid wastage.

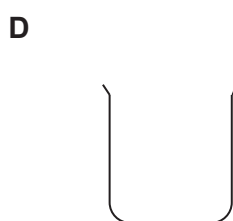
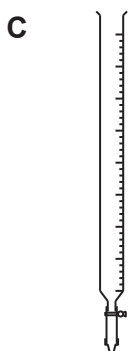
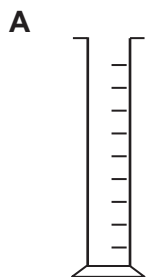
4 The following diagram shows possible positions whereby the meniscus can be read. Identify the correct position to read the meniscus.



- 5 What is the reading shown on the stopwatch below?



- A 8 seconds  
 B 8 minutes  
 C 9 minutes  
 D 60 minutes 8 seconds
- 6 A student wants to measure **accurately**  $23.5 \text{ cm}^3$  of oil into a beaker. Which apparatus would be the most suitable?



- 7 A substance cannot be broken down into simpler substances despite being passed through electricity and heat. This substance is most likely to be \_\_\_\_\_.
- A brass  
 B iron  
 C muddy water  
 D water

8 Which physical property of helium makes it suitable to be used in weather balloons?

- A colourless
- B low density
- C non-conductor of heat
- D poor conductor of electricity

9 Which Group and Period can Magnesium be found in the Periodic Table?

	Group	Period
A	1	II
B	2	III
C	I	2
D	II	3

10 Some table salt has been mixed with sand. What is the correct order of techniques needed to obtain the pure salt from the mixture?

- A dissolving → evaporating → filtering
- B dissolving → filtering → evaporation
- C evaporating → dissolving → filtration
- D filtration → evaporating → dissolving

**Question No.**      **Student's Answer**

- 1 .....  
 2 .....  
 3 .....  
 4 .....  
 5 .....  
 6 .....  
 7 .....  
 8 .....  
 9 .....  
 10 .....

**Section B**

Answer **all** questions in the spaces provided.

- 1 A student is told to heat a test tube half-filled with a certain chemical. State two precautions he should take while heating the test tube.

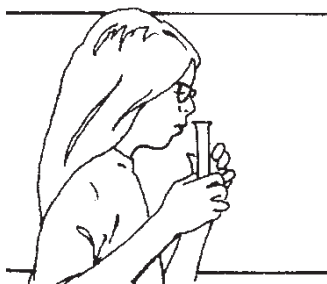
.....

.....

.....

[2]

- 2 The following picture shows a student carrying out an experiment in a dangerous manner. State what is wrong with her actions and describe what should be done instead.






.....

.....

.....

[2]

- 3 (a) State the nature of the following hazard symbols and an example of a substance that exhibits the nature of the corresponding hazard.

	hazard symbol	nature of hazard	example
(i)			acid
(ii)			flash powder
(iii)			

[2]



- (b) A student accidentally spilled some acid onto his hand. What is the first action he should take to treat the skin?

..... [1]

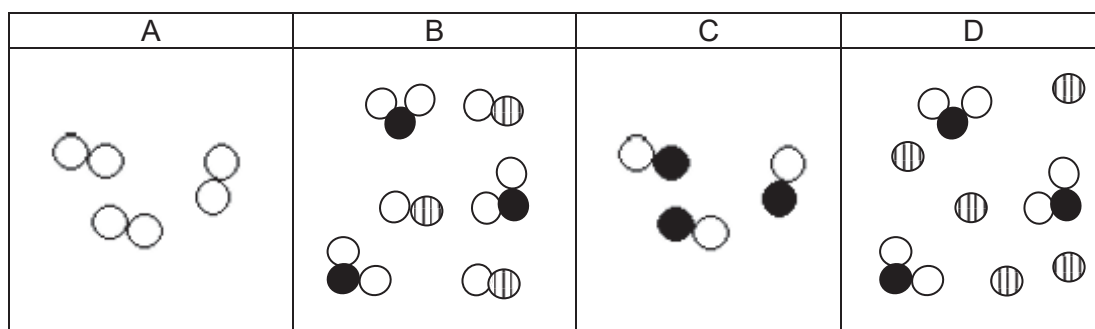
- 4 In the space below, draw a clearly labelled diagram of the set-up you would use to separate a mixture of iron powder and salt water. Identify the residue and the filtrate.

Residue: .....

Filtrate: .....

[3]

- 5 The diagram below shows the particles in four different substances. Identify whether the substances A to D are element(s), compound(s), mixture of elements, mixture of compounds or mixture of element(s) and compound(s).



A: .....

B: .....

C: .....

D: .....

[2]

6 (a) Information about solids A, B and C are provided below.

<p>Solid A A melt between 2000°C to 2002°C.</p>
---

<p>Solid B B is white. It is formed by burning magnesium in oxygen.</p>
---

<p>Solid C C is speckled blue and white. The blue particles dissolve in water but the white particles do not.</p>
---

Classify each of the solids as either an element or a compound or a mixture and complete the table below by placing a tick (✓) in one box in each row.

solid	element	compound	mixture
A			
B			
C			

[3]

(b) Substance D is a compound.

(i) Define 'compound'.

.....  
 ..... [1]

(ii) State an example of a substance that is a compound.

..... [1]

7 State the separation technique required to separate the following substances:

(a) Removing iron and steel from other materials in a junkyard. ....

(b) Obtaining salt from salt water. ....

(c) Separating the components in ink ..... [3]

**Section C**

Answer any **two** questions in the spaces provided.

1 (a) All solutions and suspensions are mixtures.

(i) State whether each of the following substances is a solution or a suspension.

Vinegar .....

Calamine lotion .....

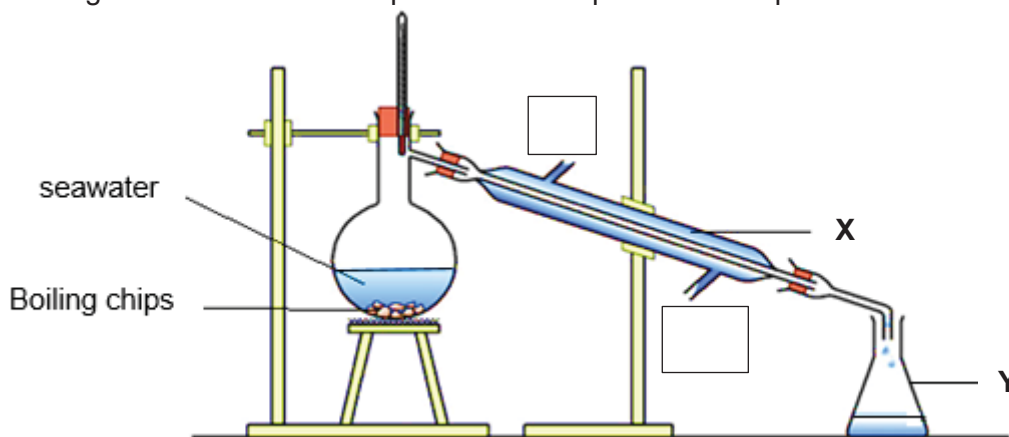
[1]

(ii) Describe two differences between vinegar and calamine lotion.

.....  
 .....  
 .....

[2]

(b) Fig 1.1 below shows a separation technique used to separate seawater.



**Fig 1.1**

(i) State the separation technique.

.....

[1]

(ii) Explain the function of apparatus X in this separation technique.

.....

[1]

(iii) Water flows in and out of apparatus X. Indicate in the given boxes, the direction of the water flow with arrows '→'.

[1]

(iv) State the term used to describe the pure water collected in apparatus Y.

.....

[1]

- (c) The figure below shows a simplified form of the Periodic Table. Use the elements shown to answer the questions.


- (i) State whether Mg and F is a metal or non-metal.

Mg: .....

F: .....

[1]

- (ii) Describe two differences between the physical properties of Mg and F.

.....  
 .....  
 .....

[2]

- 2 (a) Meldonium and morphine are both drugs that are banned for use by athletes. Fig 2.1 shows a chromatogram for meldonium and morphine and the urine samples from four athletes.

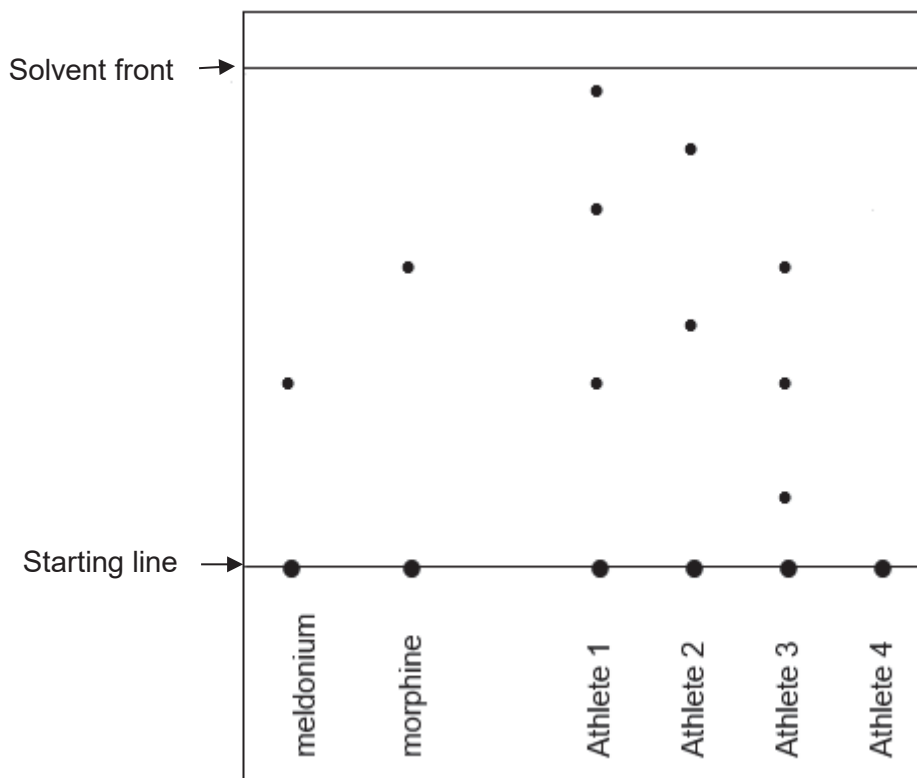


Fig 2.1

- (i) Which athlete(s) had taken meldonium?

..... [1]

- (ii) Which drug has a higher solubility in the solvent? Explain your answer.

.....  
 .....  
 ..... [2]

- (iii) Is morphine a pure substance or a mixture? Explain your answer.

.....  
 ..... [1]

(iv) Explain the need for the starting line to be drawn in pencil.

.....  
 ..... [1]

(v) Explain the need for the starting line to be drawn above the solvent level.

.....  
 ..... [1]

(vi) Suggest a reason why the reading for athlete 4 did not appear on the chromatogram.

.....  
 ..... [1]

(b) (i) Classify the following substances either as compounds or mixtures.

*Air*                      *Alloy*                      *Carbon dioxide*                      *Water*

Compound .....  
 Mixture ..... [2]

(ii) State one difference between a compound and a mixture.

.....  
 ..... [1]

- 3 (a) Table 3.1 below shows the amount of three solids **X**, **Y** and **Z** which have different solubilities in three different liquids, **A**, **B** and **C**.

**Table 3.1**

liquid	mass of solid dissolved (g)		
	<b>X</b>	<b>Y</b>	<b>Z</b>
<b>A</b>	10	0	8
<b>B</b>	3	7	4
<b>C</b>	0	0	2

(i) Which liquid is solid **Z** most soluble in?  
 ..... [1]

(ii) Suggest one way to increase the rate of dissolving of solid **Y** in liquid **B**.  
 ..... [1]

(iii) What can you conclude about solids **X** and **Y** in liquid **C**?  
 ..... [1]

(iv) Solids **X** and **Y** are accidentally mixed together. State which liquid could be used to separate them. Briefly describe how this separation could be carried out.  
 ..... [3]

(b) A student was trying to heat 100 ml of water in a beaker over a Bunsen flame. However, the water took a long time to boil and the bottom of the beaker was turning black.

(i) State the type of flame the student was using.  
 ..... [1]

(ii) What should the student do differently to get the correct type of flame that is used for heating substances?  
 ..... [1]

- (iii) Describe two differences between a luminous and non-luminous flame of a Bunsen Burner.

.....

.....

.....

.....

[2]

**END OF PAPER**



# The Periodic Table of Elements

		Group																																																																															
I	II	III	IV	V	VI	VII	0																																																																										
3 Li lithium 7	4 Be beryllium 9	11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids actinoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Mc moscovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganesson -

1  
H  
hydrogen  
1

**Key**  
proton (atomic) number  
atomic symbol  
name  
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).



NAME		REG. NO.		CLASS	
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## SERANGOON GARDEN SECONDARY SCHOOL MID-YEAR EXAMINATION 2018

SUBJECT: LOWER SECONDARY SCIENCE (BIOLOGY)  
 LEVEL: SECONDARY 1 EXPRESS  
 DATE: 11 MAY 2018 (FRIDAY)  
 TIME: 0815 – 1015 HOURS  
 DURATION: 2 HOURS (TOGETHER WITH LSS(CHEMISTRY))

### READ THESE INSTRUCTIONS FIRST

Write your name, class register number and class in the spaces provided on the cover page.

You may use an HB pencil for any diagrams, graphs, tables or rough working.

Write in dark blue or black pen.

Do not use staples, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.

You may lose marks if you do not show your working or if you do not use appropriate units.

### Section A [10 marks]

Answer **all** questions.

For each question, there are four possible answers **A, B, C** and **D**. Choose the **one** you consider correct and record your choice on the Answer Sheet provided on page 5.

### Section B [20 marks]

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

### Section C [20 marks]

Answer any **two** questions.

Write your answers in the spaces provided on the question paper.

The number of marks is given in brackets [ ] at the end of each question or part question.

<p>_____ Name/Signature of Parent/Guardian</p> <p>_____ Date</p>	<p><b>FOR MARKER'S USE</b></p> <hr/> <p style="font-size: 2em; font-weight: bold;">50</p>
--	---

This question paper consists of 14 printed pages and 2 blank pages.

Setter: Mr Joshua Chen

Vetter: Mr Dominique Loh

[Turn Over

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### Section A

For each question, there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice on the Answer Sheet provided on page 5.

- 1 Which statement about biodiversity is correct?
- A** Biodiversity is the existence of different animals on earth.  
**B** Biodiversity is the existence of different human race on earth.  
**C** Biodiversity is the existence of different organisms on earth.  
**D** Biodiversity is the existence of different plants on earth.
- 2 Which method is not how biodiversity keeps the natural environment stable?
- A** Prevention of natural disasters occurring  
**B** Resistance to diseases.  
**C** Removal of dead matter.  
**D** Stability of the atmosphere.

- 3 Which characteristics corresponds to the frog, goldfish and snake?

	frog	goldfish	snake
<b>A</b>	gives birth	has lungs	has moist skin
<b>B</b>	has gills	is warm-blooded	has lungs
<b>C</b>	has scales	has fur	is cold-blooded
<b>D</b>	lays eggs	has gills	has dry skin

- 4 Study the given food chain.

grass → grasshopper → mouse → owl

Which organism is/are a carnivore(s)?

- A** grasshopper  
**B** grasshopper and mouse  
**C** mouse and owl  
**D** owl
- 5 Which statement describes an organism's structural adaptation to its environment?
- A** Cactus has a thick stem to store water.  
**B** Leopard hunting at dawn and dusk so as to stay unseen by its prey.  
**C** Rabbits living in groups with a well organised social structure for their safety.  
**D** Whales migrating to the Antarctic to feed during winter.

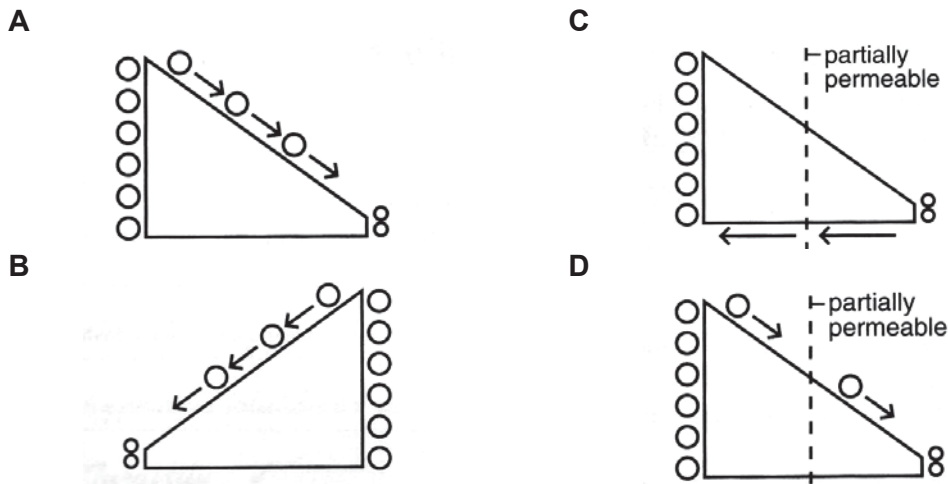
6 Which option shows the correct interaction between the organisms in the table?

	lion and zebra	honey bee and flower
<b>A</b>	parasitism	mutualism
<b>B</b>	parasitism	predator-prey
<b>C</b>	predator-prey	mutualism
<b>D</b>	predator-prey	predator-prey

7 What is the benefit of having division of labour in a multi-cellular organism?

- A** It enables better immunity to bacteria.
- B** It enables different processes to function efficiently together.
- C** It reduces the energy requirement.
- D** It reduces the waste products produced.

8 Which diagram shows the process of osmosis?



9 A girl leaned close to a flower, took a breath and smelled its scent. How did the scent of the flower reach her?

- A** Active transport
- B** Diffusion
- C** Osmosis
- D** Wind



10 The diagram shows a white blood cell.



What is the function of this cell?

- A Helps in blood clotting.
- B Fights and kills bacteria and viruses.
- C Transport nutrients to cells.
- D Transport oxygen around the body.

Question No.	Student's Answer
1	.....
2	.....
3	.....
4	.....
5	.....
6	.....
7	.....
8	.....
9	.....
10	.....

**Section B**

Answer **all** questions in the spaces provided.

- 1 The classification key shown below is used to study some animals in a research project.

The animals are:

Passenger pigeon	Parrot	Texas red wolf	Antler	Oregon bison
Tilapia	Clownfish	Palestinian painted frog	Domed tortoise	Cobra

1	a	Is warm-blooded	Go to 2
	b	Is cold-blooded	Go to 6
2	a	Has feathers	Go to 3
	b	Has hair or fur	Go to 4
3	a	Has narrow, straight beak	Passenger pigeon
	b	Has a hook beak	Parrot
4	a	Has horns	Go to 5
	b	Has no horns	Texas red wolf
5	a	Horns may have many branches	Antler
	b	Horns have no branches	Oregon bison
6	a	Breathes with gills	Go to 7
	b	Breathes with lungs	Go to 8
7	a	Has pelvic fins	Tilapia
	b	Has orange pectoral fins	Clownfish
8	a	Has scaly skin	Go to 9
	b	Has smooth skin	Palestinian painted frog
9	a	Has front and hind legs	Domed tortoise
	b	Has no legs	Cobra

Complete the table below by classifying the **ten** animals in the above key, according to the type of animal group they belong to.

amphibian	bird	fish	mammal	reptile

[5]



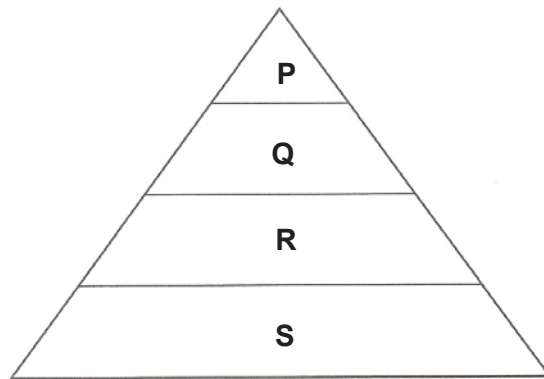
2 Study the given food chain to answer the following questions.

plant → mouse → snake → eagle

(a) Define the term 'food chain'.

.....  
 ..... [1]

(b) The food chain can also be represented in the form of the following pyramid of energy.



Using the four organisms from the given food chain, place them suitably into positions **P** to **S**, in the pyramid of energy.

**P** ..... **Q** .....  
**R** ..... **S** ..... [2]

(c) By making reference to the food chain, where does the producer obtain its energy from?

..... [1]

(d) In a food chain, 90% of energy is lost each time when energy is transferred from one trophic level to the next.

Fill in the boxes provided to indicate the energy unit in each trophic level.



3 Fig 3.1 shows a cell.

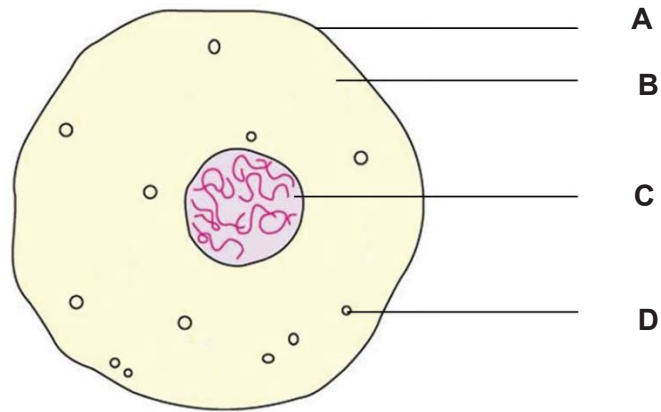


Fig 3.1

(a) Label parts **A**, **B**, **C** and **D**.

(i) **A** - .....

(ii) **B** - .....

(iii) **C** - .....

(iv) **D** - .....

[2]

(b) State the function of parts **A**, **B** and **C**.

(i) **A** - .....

.....

[1]

(ii) **B** - .....

.....

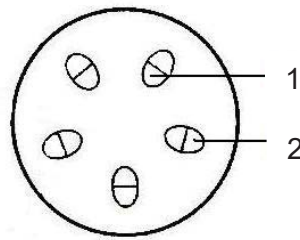
[1]

(iii) **C** - .....

.....

[1]

4 Fig 4.1 shows a section through a plant stem.



**Fig 4.1**

(a) Identify parts 1 and 2 and state their functions.

1: Name - ..... [1]

Function - ..... [1]

2: Name - ..... [1]

Function - ..... [1]

(b) The stem was placed in a beaker containing blue coloured dye solution for a few hours. State the process in which the blue coloured dye moved up the stem.

..... [1]

**Section C**

Answer any **two** questions in the spaces provided.

1 (a) Bacteria are microorganisms that benefit us as well as cause harm to us.

(i) How are bacteria beneficial to human beings?

.....  
.....

[2]

(ii) How are bacteria harmful to human beings?

.....  
.....

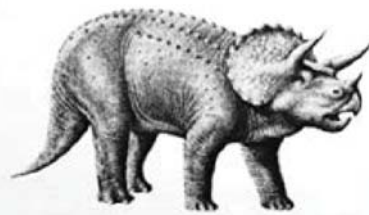
[1]

(b) Fig 1.1a and 1.1b show two animals that have become extinct due to reasons such as hunting or natural disasters. Both these animals are vertebrates and they lay eggs.



**Dodo**

**Fig 1.1a**



**Triceratops**

**Fig 1.1b**

From the list below, state the category of vertebrates that each animal belongs to and explain your choice.

- Fish**
- Mammal**
- Bird**
- Reptile**
- Amphibian**

Dodo:

.....  
.....

Triceratops:

.....  
.....

[3]

(c) Fig 1.2 shows a grassland habitat.

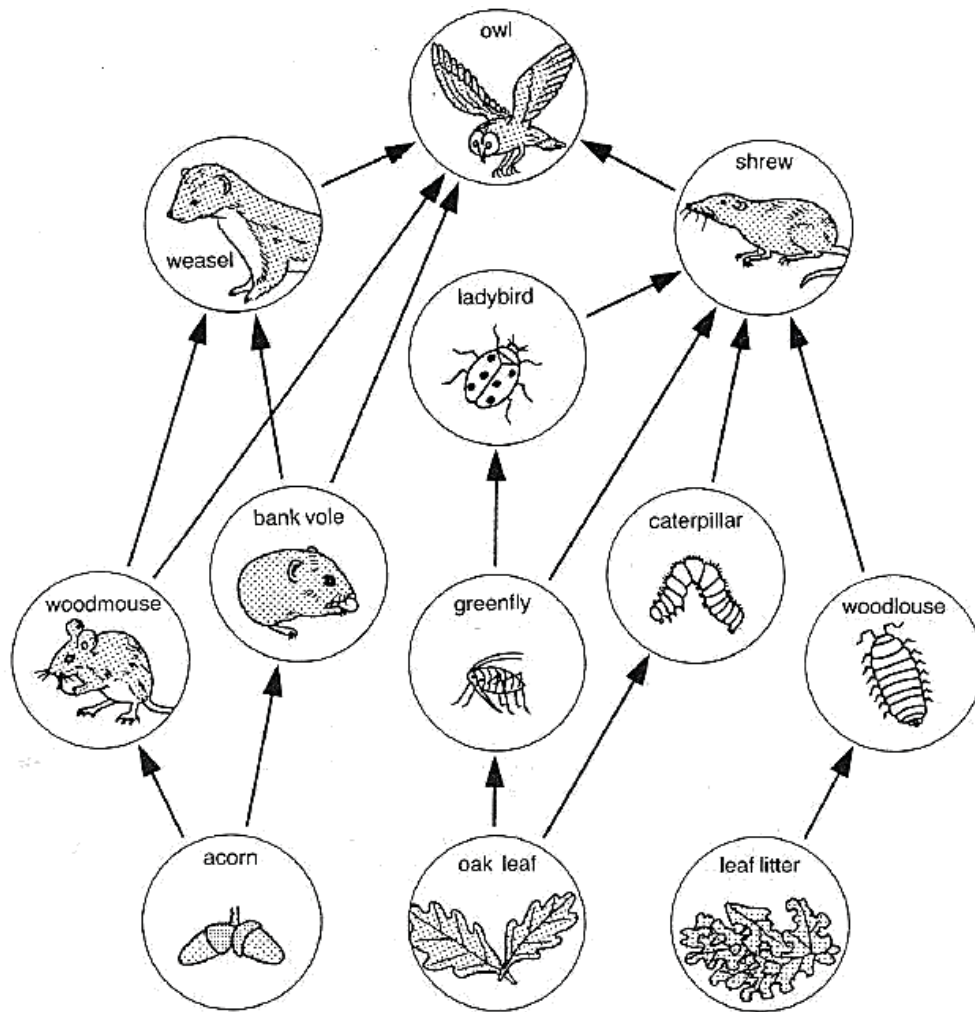


Fig 1.2

(i) What do the arrows in the food web indicate?

..... [1]

(ii) By making reference to the food web, state a food chain with 4 food links.

..... [1]

(iii) State and explain the immediate effects on the other organisms due to the shrew's extinction.

.....  
 .....  
 ..... [2]

2 (a) Fig 2.1 shows some red blood cells.

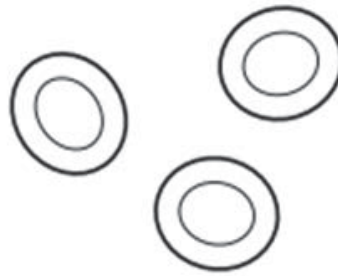


Fig 2.1

(i) State the function of red blood cells.

..... [1]

(ii) Describe and explain how the structure of red blood cells is adapted to its function.

.....  
.....  
..... [2]

(b) Fig 2.2 shows cell Y.

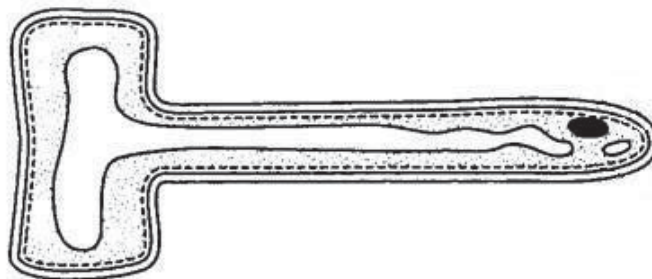


Fig 2.2

(i) Identify cell Y.

..... [1]

(ii) State the function of cell Y.

..... [1]

(iii) Describe how the structure of cell Y is adapted to its function.

.....  
.....  
..... [2]

(c) Describe three differences between a plant cell and an animal cell.

.....  
.....  
.....  
.....  
.....  
.....  
.....

[3]

3 (a) Arteries and veins are part of the human circulatory system.

(i) State the function of arteries.

..... [1]

(ii) State the function of veins.

..... [1]

(b) Fig 3.1 shows a plant cell that has been placed in pure water.

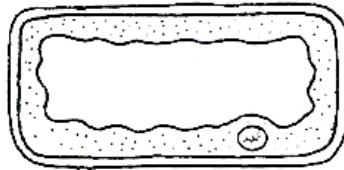


Fig 3.1

(i) State the process that has taken place.

..... [1]

(ii) Explain why the plant cell is turgid.

.....  
.....  
..... [2]

(iii) Would the plant cell burst? Explain your answer.

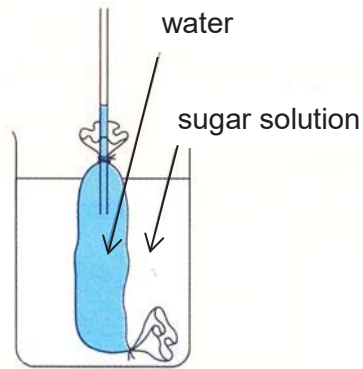
.....  
..... [1]

(iv) Suggest what would happen if an animal cell is placed in pure water instead.

..... [1]



(c) Fig 3.2 shows a Visking tubing filled with water and placed in a beaker of sugar solution.



**Fig 3.2**

Predict if the water level in the Visking tubing would rise or fall. Explain your answer.

.....

.....

.....

.....

.....

[3]

**END OF PAPER**










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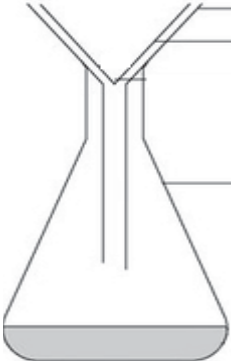
Serangoon Garden Secondary School  
1E Lower Sec Science (Chemistry)  
MYE 2018  
Mark Scheme

## Section A – 10 marks

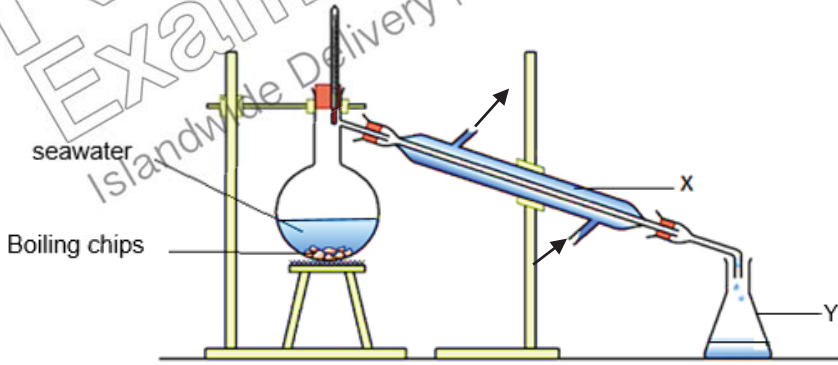
1	A	6	C
2	D	7	B
3	A	8	B
4	C	9	D
5	A	10	B

## Section B – 20 marks

Qn No	Answer	Mark allocated	Total marks																
1	<ul style="list-style-type: none"> <li>Do not place flammable substances near the Bunsen burner</li> <li>Use a test tube holder to hold the test tube at an angle of 45°</li> <li>Point the test tube away from anyone during heating</li> <li>Wear safety goggles during heating</li> <li>Tie up long hair</li> </ul>	2	2																
	(Any 2) (Do not accept wear eye protection, wear safety spectacles, standing too close to the Bunsen burner)		2																
2	Wrong action: Smelling the vapours <b>directly</b> from the test tube	1																	
	What should be done instead: Waft the vapour to her nose instead of smelling the vapour directly / use your hands to wave the vapour to the nose	1																	
3	<table border="1"> <thead> <tr> <th></th> <th>hazard symbol</th> <th>nature of hazard</th> <th>example</th> </tr> </thead> <tbody> <tr> <td>(i)</td> <td></td> <td><b>Corrosive</b></td> <td>Acid</td> </tr> <tr> <td>(ii)</td> <td></td> <td><b>Explosive</b></td> <td>Flash powder</td> </tr> <tr> <td>(iii)</td> <td></td> <td><b>Toxic</b></td> <td><b>Mercury / Chloroform or other suitable substance</b></td> </tr> </tbody> </table>		hazard symbol	nature of hazard	example	(i)		<b>Corrosive</b>	Acid	(ii)		<b>Explosive</b>	Flash powder	(iii)		<b>Toxic</b>	<b>Mercury / Chloroform or other suitable substance</b>	2 (1 mark for every 2 correct answer)	3
		hazard symbol	nature of hazard	example															
	(i)		<b>Corrosive</b>	Acid															
	(ii)		<b>Explosive</b>	Flash powder															
(iii)		<b>Toxic</b>	<b>Mercury / Chloroform or other suitable substance</b>																
(b)	Wash the skin with plenty of water.	1	3																

4	 <p>Filter funnel (must draw and label) Filter paper (must draw and label) Conical flask</p> <p>Residue: Iron powder; Filtrate: Salt water.</p>	Drawing: 1m  Labelling: 1m	2																
5	A: Elements B: Mixture of compounds C: Compounds D: Mixture of elements and compounds	2	5																
6	(a) <table border="1"> <thead> <tr> <th>solid</th> <th>element</th> <th>compound</th> <th>mixture</th> </tr> </thead> <tbody> <tr> <td>A</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>B</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>C</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>	solid	element	compound	mixture	A			✓	B		✓		C			✓	3	3
solid	element	compound	mixture																
A			✓																
B		✓																	
C			✓																
	(bi) A compound is a substance where <b>2 or more different elements/atoms are chemically combined together.</b>	1																	
	(bii) Sodium chloride, magnesium chloride or any other names of compound.	1																	
7	(a) Magnetic attraction (Do not accept magnetism and magnet)	1																	
	(b) Evaporation (Do not accept evaporate)	1																	
	(c) Paper chromatography (Do not accept chromatography, chromatogram)	1																	

## Section C – 20 marks

Qn No	Answer	Mark allocated	Total marks
1	(ai) Vinegar <b>Solution</b> Calamine lotion <b>Suspension</b>	1	10
	(aii) Vinegar is homogenous but calamine lotion is non-homogenous.  Vinegar has no residue after filtration but calamine lotion has residue after filtration  Vinegar allows light to pass through but calamine lotion does not allow light to pass through / vinegar is <b>clear</b> but calamine lotion is <b>cloudy</b> (do not accept not clear)  In vinegar solute and solvent does not separate when left to stand but in calamine lotion, solute and solvent separates when left to stand.  (Any 2) – Allow error carry forward	2	
	(bi) Distillation	1	
	(bii) <b>Cools and condenses</b> the hot vapour to liquid.	1	
	(biii) 	1	
	(biv) Distillate	1	
	(ci) Mg: Metal; F: Non-metal	1	
	(cii) <ul style="list-style-type: none"> <li>• Magnesium has high density but fluorine has low density</li> <li>• Magnesium is a good conductor of heat but fluorine is a poor conductor of heat</li> <li>• Magnesium is a good conductor of electricity but fluorine is a poor conductor of electricity.</li> <li>• Magnesium has high melting/boiling point but fluorine has low melting/boiling point</li> <li>• Magnesium is malleable but fluorine is brittle</li> </ul> (Any 2)	2	

2	(ai)	Athlete 1 and 3	1	10
	(aii)	Morphine is more soluble in the solvent The spot for morphine <b>further from the starting line</b>	1 1	
	(aiii)	Pure substance. There is <b>only 1 spot</b> on the chromatogram for morphine.	1	
	(aiv)	If the starting line is drawn in ink, the ink might dissolve in the solvent and affect the results of the experiment <b>OR</b> Pencil lead is an element and cannot be separated by solvent.	1	
	(av)	To prevent the sample from dissolving into the solvent.	1	
	(avi)	The substances in Athlete 4 urine is <b>not soluble in the solvent.</b>	1	
	(bi)	Compound: Carbon dioxide and water Mixture: Air and alloy	2	
	(bii)	<ul style="list-style-type: none"> <li>A compound has fixed melting and boiling point but a mixture has variable melting and boiling point.</li> <li>A compound can be separated by chemical methods but a mixture can be separated only by physical methods.</li> <li>A compound has fixed composition by mass but a mixture has variable composition by mass.</li> <li>A chemical reaction takes place when a compound is formed but no chemical reaction takes place when a mixture is formed</li> </ul> (Any 1)	1	
3	(ai)	Liquid A	1	10
	(aii)	<ul style="list-style-type: none"> <li><b>Stir</b> the mixture <b>faster</b></li> <li><b>Increase the temperature</b> of liquid B</li> <li>Crush Solid Y to <b>smaller pieces</b> to increase surface area</li> </ul> (Any 1)	1	
	(aiii)	Solid X and Y is insoluble / cannot dissolve in Liquid C.	1	
	(aiv)	Liquid A. <b>Add liquid A</b> to the mixture of X and Y to <b>dissolve X</b> . <b>Filter</b> the mixture to obtain X as the filtrate and Y as the residue.	1 1 1	
	(bi)	Luminous flame	1	
	(bii)	He should <b>open</b> the air-hole.	1	
	(biv)	<ul style="list-style-type: none"> <li>Luminous flame produces a lot of soot but a non-luminous flame does not produce soot.</li> <li>Luminous flame is unsteady but a non-luminous flame is steady.</li> <li>Luminous flame is less hot compared to a non-luminous flame</li> <li>Luminous flame is formed when the air-hole is closed but a non-luminous flame is formed when the air-hole is open.</li> <li>Luminous flame is orange in colour but non-luminous flame is blue in colour.</li> </ul> (Any 2)	2	

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Serangoon Garden Secondary School  
1E Lower Sec Science (Biology)  
MYE 2018  
Mark Scheme

## Section A - 10 marks

1	C	6	C
2	A	7	B
3	D	8	D
4	C	9	B
5	A	10	B

## Section B – 20 marks

Qn No	Answer					Mark allocated	Total marks	
1	<b>amphibian</b>	<b>bird</b>	<b>fish</b>	<b>mammal</b>	<b>reptile</b>	5 (Every 2 correct answers – 1m)	5	
	Palestinian painted frog	Passenger pigeon  Parrot	Clownfish  Tilapia	Texas red wolf  Antler  Oregon bison	Domed tortoise  Cobra			
2	(a)	A food chain is a <b>series of organisms</b> which <b>energy is transferred</b> in the form of food OR <b>transfer of energy from one organism to another.</b>					1	5
	(b)	P: Eagle; Q: Snake; R: Mouse; S: Plant					2	
	(c)	Sunlight / Sun (Light energy not accepted)					1	
	(d)	Mouse: 10 Snake: 1 Eagle: 0.1					1	
3	(a)	A: cell membrane B: cytoplasm C: nucleus D: vacuole (do not accept ribosomes)					2	5
	(b)	A: <b>Controls</b> the <b>movement</b> of substances into and out of the cell / Allow <b>certain substances</b> to enter and leave the cell. B: Site where most <b>chemical reactions</b> take place C: Controls <b>all activities</b> in the cell / contains <b>genetic information/ materials</b> (Do not accept brain of the cell / control movement of cell)					1 1 1	
4	(a)	1: Xylem Function: Transport <b>water and mineral salts</b> from the roots to the stem and leaves					1 1	5
		2: Phloem Function: Transport <b>sugars/food/glucose</b> made in leaves to all parts of the plant					1 1	
	(b)	Diffusion					1	



## Section C – 20 marks

Qn No	Answer	Mark allocated	Total marks
1	(ai) Bacteria help in <ul style="list-style-type: none"> <li>• food production (e.g. yoghurt)</li> <li>• digestion</li> <li>• waste management</li> <li>• make <b>medicine/vaccines</b></li> </ul> (Any 2) (Do not accept fight disease, kill bad bacteria, virus, decompose dead body, boosting immune system)	2	10
	(aii) Bacteria causes diseases, sickness, acne, bad breath. (Any 1) (Do not accept the word virus)	1	
	(b) Dodo: Bird. → Reason: It has <b>feathers</b> . →  Triceratops: Reptile → Reason: It has dry, <b>scaly</b> skin. → <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 20px;">             1 mark for category of animal (2 correct to obtain 1 mark)           </div>	1 (Reason)	
		1 (Reason)	
	(ci) The <b>transfer of energy</b> from one organism to another (Do not accept movement/transportation of energy)	1	
	(cii) leaf litter → woodlouse → shrew → owl oak leaf → caterpillar → shrew → owl acorn → bankvole → weasel → owl acorn → woodmouse → weasel → owl (Any 1)	1	
	(ciii) In the case of a shrew extinction, population of <b><u>ladybird, caterpillar and woodlouse</u></b> (any 2) will <b>increase</b> , causing population of <b><u>greenfly, oak leaf and leaf litter</u></b> (any 2) to <b>decrease</b> . (Answer must show 2 levels of impact)	1  1	
2	(ai) Transport <b>oxygen</b> from the lungs to all parts of the body. (Do not accept carbon dioxide, nutrients and waste substances)	1	10
	(aii) <ul style="list-style-type: none"> <li>• Contains <b>haemoglobin</b> to <b>transport oxygen more effectively</b>.</li> <li>• <b>Biconcave</b> shape to <b>increase surface area</b> for <b>faster diffusion of oxygen</b>/ transport oxygen faster.</li> <li>• <b>No nucleus</b> to contain <b>more haemoglobin</b></li> </ul> (1 mark for structure and 1 mark for function) (Any 1)	2	
	(bi) Root hair cell	1	
	(bii) <b>Absorb water and mineral salts</b> from the soil into the plant.	1	
	(biii) It has a <b>long and narrow extension / elongated</b> structure to <b>increase surface area</b> to absorb water and mineral salts <b>faster</b> .	1 1	
	(c) <ul style="list-style-type: none"> <li>• An animal cell does not contain chloroplast but a plant cell contains chloroplast</li> <li>• An animal cell does not contain a cell wall but a plant cell contains a cell wall</li> <li>• An animal cell has numerous small vacuoles but a plant cell has a large centralised vacuole.</li> </ul>	3	

		<ul style="list-style-type: none"> <li>An animal cell does not have a regular shape but a plant cell has a regular shape</li> <li>In an animal cell, the cytoplasm fills in whole cell but in a plant cell, the cytoplasm is reduced to a thin lining.</li> </ul>		
		<b>(Any 3)</b>		

<b>3</b>	<b>(ai)</b>	Arteries transport blood <b>from the heart</b> to the rest of the body	1	10
	<b>(aii)</b>	Veins transport blood <b>to the heart</b> from the rest of the body	1	
	<b>(bi)</b>	Osmosis	1	
	<b>(bii)</b>	<b>Higher water potential / water concentration in the pure water</b> as compared to the plant cell. Water molecule would <b>enter the plant cell by osmosis</b> . Thus, the plant cell increase in size and become turgid.	1 1	
	<b>(biii)</b>	No. Plant cell has a <b>cell wall</b> to prevent the plant cell from bursting.	1	
	<b>(biv)</b>	The animal cell will <b>burst</b> .	1	
	<b>(c)</b>	The water level will <b>fall</b> .  There is <b>higher water potential/concentration in the visking tubing</b> as compared to the sugar solution. Water molecules would <b>leave the visking tubing by osmosis</b> . Thus, the water level will drop.	1 1 1	


  
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**ZHONGHUA SECONDARY SCHOOL**  
**MID-YEAR EXAMINATION 2018**  
**SECONDARY 1E**

Candidate's Name	Class	Register Number

## SCIENCE

14 May 2018  
2 hours

Additional Materials:      OTAS                      Graph paper

### READ THESE INSTRUCTIONS FIRST

Write your name, index number and class in the spaces at the top of this page and on all separate answer paper used.

Write in dark blue or black pen.

You may use a pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

#### Section A

There are **thirty** questions on this paper. Answer all questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the one you consider correct and record your choice in soft pencil on the separate OTAS.

#### Section B

Answer **all** questions.

Write your answers in the spaces provided on the Question paper

#### Section C

Answer **all** questions. Write your answers in the spaces provided on the Question paper.

For Examiner's Use	
Section A	30
Section B	30
Section C	30
Total	90

The number of marks is given in brackets [ ] at the end of each question or part question.

All essential working must be shown clearly.

A copy of the Periodic Table is printed on page 23.

Setter: Mr Kelvin Lee, Mr Desmond Chong and Mr Ong Kai Kun

Vetter: Mr Desmond Chong and Mr Ong Kai Kun

This document consists of **23** printed pages, including this cover page.

**Section A**

Answer **all** the questions.

- 1 Which of the following is not a school laboratory safety rule?
- A No consuming of foods and drinks in the laboratory.
  - B Never taste or smell chemicals without the teacher's permission.
  - C Wear goggles when heating chemicals.
  - D Not going to the toilet during an experiment.

- 2 The diagram shows a hazard symbol on a chemical bottle.



What can be the harmful effect if the person does not handle the substance properly?

- A The chemical can cause harm to the environment.
  - B The chemical can irritate a person's skin, eyes and respiratory tract.
  - C The chemical can cause a person's death when it comes into contact with the skin
  - D The chemical can catch fire easily when placed near a flame.
- 3 Five identical titanium balls, each of mass 27 g, are immersed in a measuring cylinder containing 20 cm<sup>3</sup> of water.

The reading of the water level rises to 50 cm<sup>3</sup>.

What is the density of the titanium?

- A 0.9 g/cm<sup>3</sup>
- B 2.7 g/cm<sup>3</sup>
- C 4.5 g/cm<sup>3</sup>
- D 6.75 g/cm<sup>3</sup>

- 4 Which of the following statements about accuracy and precision is correct?
- A A set of precise readings are always accurate.
  - B A precise reading is one which is close to the true value.
  - C A precise set of readings is where the readings are close to each other.
  - D An accurate set of readings is where the readings are close to each other.
- 5 Darius took a block of plasticine of mass 200 g and shaped it to a sphere. Which of the following statements about the plasticine is true?
- A Its mass and density remain the same.
  - B Its mass and density have increased.
  - C Its mass and density have decreased.
  - D Its mass remains the same but its density has changed.

- 6 A student did an experiment using a metre ruler and a digital stopwatch. She then wrote her data in a table as shown below.

length of string / cm	10.00	15.00	20.00
time taken / s	21.5	42.3	55.2

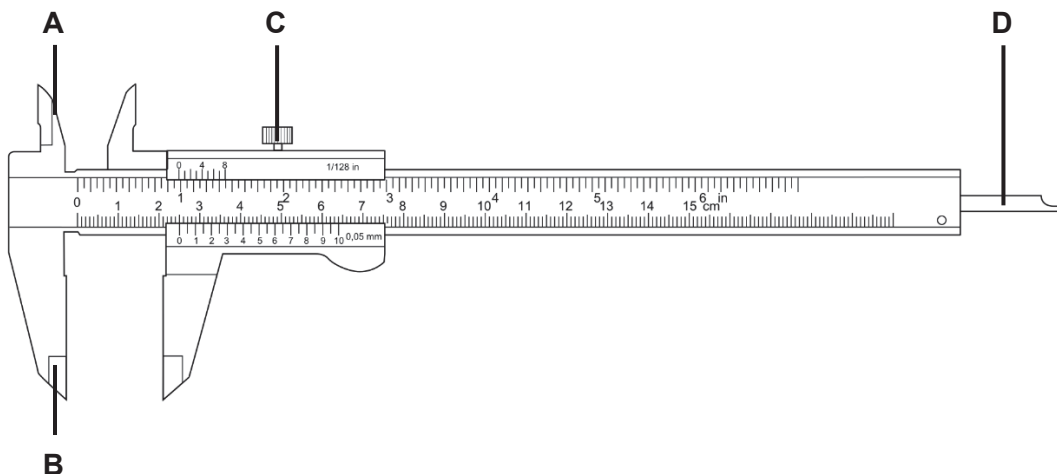
What is the mistake made by the student?

- A The length of the string should be measured in “m” instead of “cm”.
- B Time taken should be measured in “h” instead of “s”.
- C The precision for length of string should not have any decimal places.
- D The precision for length of string should only have 1 decimal place.

- 7 What is the SI unit for current?

- A ampere
- B voltage
- C ohm
- D watt

8 The figure below shows a pair of vernier caliper.



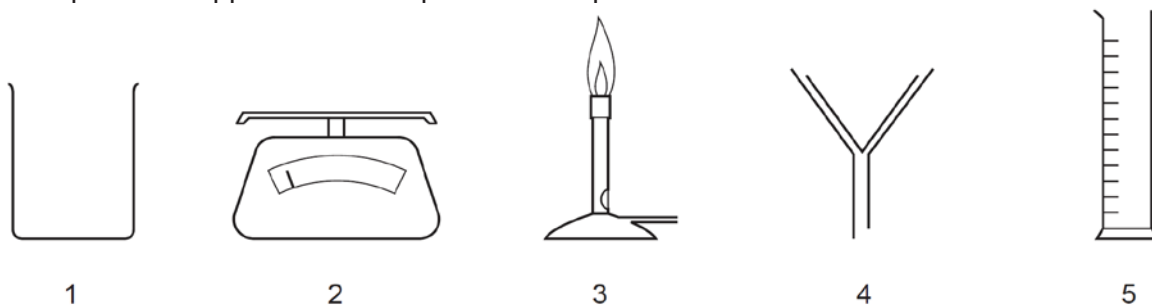
Which part of the vernier caliper is used to measure the internal diameter of a steel pipe?

9 Which of the following apparatus is not used for heating substances?

- A beaker
- B crucible
- C round-bottom flask
- D pipette

10 An insoluble salt can be produced by mixing  $20\text{ cm}^3$  of solution A and  $20\text{ cm}^3$  of solution B. The insoluble salt can then be separated from the remaining solution by a separation technique.

Which pieces of apparatus are required for the procedure mentioned above?

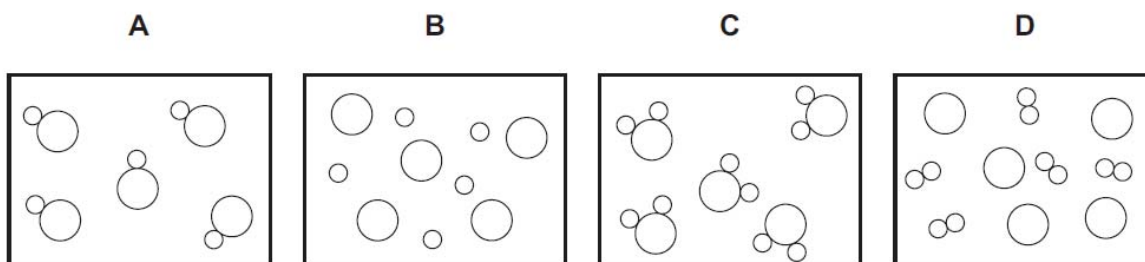


- A 1, 2 and 4
- B 1, 3 and 5
- C 1, 4 and 5
- D 3, 4 and 5

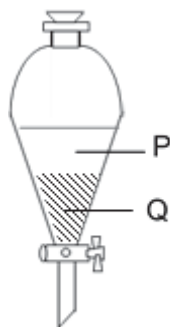
- 11 What is the purpose of processing a substance with a mortar and pestle?
- A Grind solid substances into powder form.
  - B Mix substances together.
  - C Measures the mass of a substance.
  - D Makes measurements more precise.
- 12 When a 'strike back' occurs, we should
- A close the air-hole
  - B increase the gas supply
  - C lower the gas supply
  - D turn off the gas supply completely
- 13 Which of the following describes the flame of the Bunsen burner when the air-hole is fully opened?
- A flickering and blue in colour
  - B flickering and yellow in colour
  - C steady and blue in colour
  - D steady and yellow in colour
- 14 When you are heating some water in a test tube, you should
- 1 slant the test tube at an angle of  $45^\circ$ .
  - 2 fill the test tube to the brim with water.
  - 3 use a stopper to cover the mouth of the test tube.
  - 4 point the mouth of the test tube away from yourself and your friends.
  - 5 use a test tube holder to hold the test tube.
- A 1 and 5 only
  - B 2 and 3 only
  - C 1, 2 and 4 only
  - D 1, 4 and 5 only



- 15** Which question would be the best scientific inquiry question?
- A** Does the mass of salt in water affect the temperature at which it boils?
- B** How many giraffes live in Africa?
- C** Who made the first microscope?
- D** How long ago did dinosaurs live on the Earth?
- 16** Which of the following is the correct working sequence in carrying out the study of science?
- 1 Making a hypothesis.
  - 2 Record the findings.
  - 3 Planning and carrying out the experiment.
  - 4 Identifying the problem.
- A** 3 → 4 → 1 → 2
- B** 4 → 3 → 1 → 2
- C** 1 → 4 → 3 → 2
- D** 4 → 1 → 3 → 2
- 17** Which of the following is not a correct pair of an element and its chemical symbol?
- A** copper - Cu
- B** chlorine - Ch
- C** cobalt - Co
- D** calcium - Ca
- 18** In the diagrams, circles of different sizes represent atoms of different elements. Which diagram can represent water vapour?



- 19 Two liquids, P and Q, are placed in a separating funnel. Two layers are formed as shown in the diagram below.



P boils at 80 °C while Q boils at 150 °C and both can form simpler substances upon strong heating.

Which one of the following statements of P and Q is correct?

- A** P and Q are elements that form a compound when placed together in the separating funnel.
- B** P and Q are compounds that form a mixture when placed together in the separating funnel.
- C** P and Q are compounds that form a different compound when placed together in the separating funnel.
- D** P and Q are mixture that form a different mixture when place together in the separating funnel.
- 20 Which list shows an element, a compound and a mixture?
- A** carbon, water, ammonia                      **B** nitrogen, carbon dioxide, seawater
- C** oil, bronze, methane                          **D** oxygen, sodium, brass
- 21 Urea acid is a compound with the chemical formula,  $\text{CO}(\text{NH}_2)_2$ .

Which of the following shows the correct information about one molecule of urea acid?

	number of elements	number of atoms
<b>A</b>	3	7
<b>B</b>	3	8
<b>C</b>	4	7
<b>D</b>	4	8

- 22 Which of the following factors affects both solubility and rate of dissolving?
- A** particle size of solute                      **B** nature of solute
- C** nature of solvent                              **D** temperature

- 23** Which one of the following statements is not true of a solution?
- A** It is a type of homogeneous mixture.
  - B** The solute particles are large and cannot pass through a filter paper.
  - C** The solute particles do not settle to the bottom.
  - D** The solute particles do not scatter light.
- 24** A solution that cannot hold any more solute at room temperature is a
- A** concentrated solution
  - B** dilute solution
  - C** saturated solution
  - D** weak solution
- 25** Which of the following can be separated using a filter funnel?
- A** two miscible liquids
  - B** two immiscible liquids
  - C** a soluble solid and a solution
  - D** an insoluble solid and a solution
- 26** Which method is used to obtain pure water from sugar solution?
- A** crystallisation
  - B** filtration
  - C** simple distillation
  - D** sublimation

27 A student separates salt from a mixture of salt and sand.

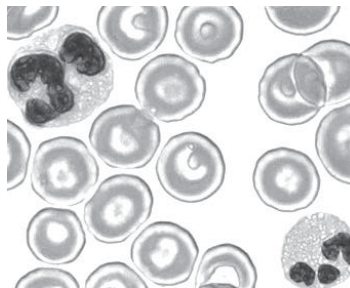
What is the correct order of steps for the student to take?

- A filter → evaporate → shake with water
- B filter → shake with water → evaporate
- C shake with water → evaporate → filter
- D shake with water → filter → evaporate

28 Which observations provides the best evidence that a solid is a pure solid?

- A It is soluble in pure water
- B It has a crystalline structure
- C It has only one colour
- D It melts at a fixed temperature

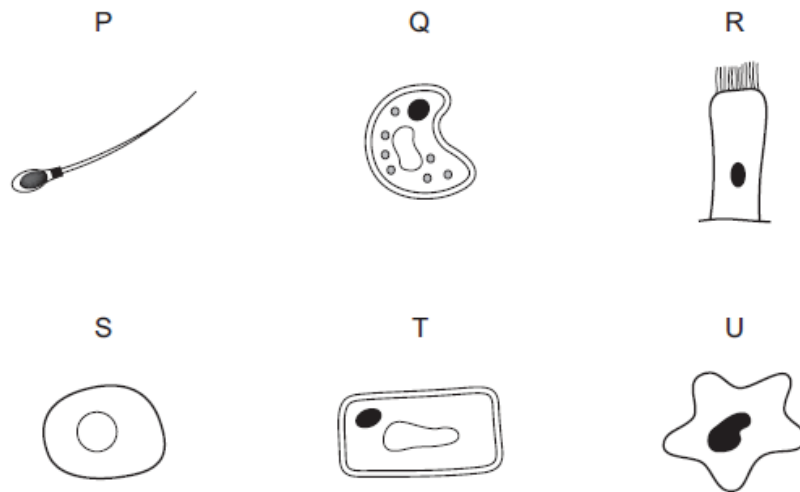
29 The diagram below shows a segment of a drop of blood that is obtained from a human being. The different cells in the blood allows it to perform many functions to ensure that the human body can work well.



Which of the following best describes blood?

- A cell
- B organ
- C system
- D tissue

30 The diagram below shows six cells.



Which are plant cells and which are animal cells?

	plant cells	animal cells
<b>A</b>	P, R, S and U	Q and T
<b>B</b>	P, R, S, T and U	T only
<b>C</b>	T only	P, R, S, T and U
<b>D</b>	Q and T	P, R, S and U

Zhonghua Secondary School  
Mid-Year Examination 2018  
Secondary 1 Express

NAME: \_\_\_\_\_ ( )

CLASS: \_\_\_\_\_

For Examiner's Use	
Section B	30
Section C	30
Total	

### Section B

Answer **all** the questions.

Write your answers in the spaces provided on the question paper.

**B1** Convert the following physical quantities.

(a) 0.33 kg = ..... g

(b) 54 min = ..... h

(c) 1.2A = ..... mA

[3]

**B2** A student wants to check the purity of a small mickey figurine made of silver as seen in Fig 2.1. He decides to measure its density and found that it is  $7.9 \text{ g/cm}^3$ .



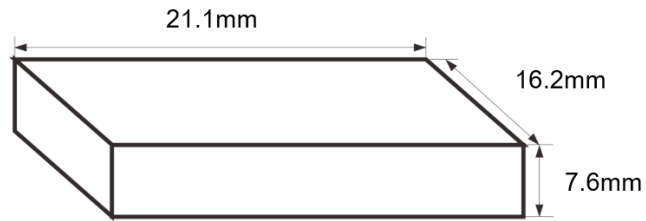
**Fig 2.1**

(a) Name two apparatus that are used to measure the volume of the mickey figurine.

1 .....

2 ..... [2]

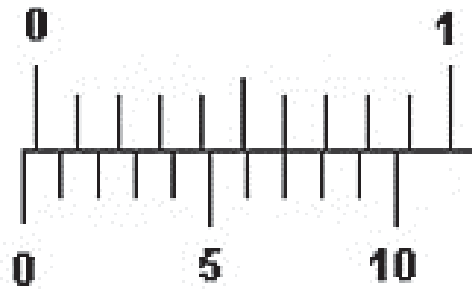
- (b) The student has a small, uniform block of pure silver and he measures the dimensions of the block. The values are shown in Fig. 2.2.



**Fig 2.2**

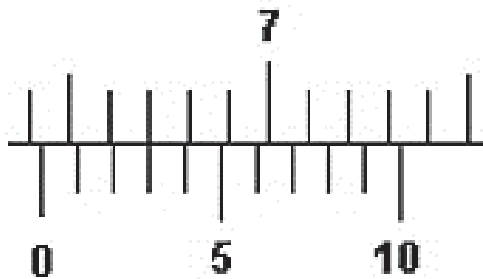
- (i) State the precision of the apparatus used to measure the height of the silver block.  
 ..... [1]
- (ii) The mass of the silver block is measured to be 27.2 g.  
 Calculate the density of the silver block. Give your answer in  $\text{g/cm}^3$   
 ..... [2]
- (iii) State and explain whether the mickey figurine is made of pure silver.  
 ..... [1]

**B3** Fig. 3.1 shows the reading of a pair of Vernier calipers when its jaws are totally closed.



**Fig 3.1**

Fig. 3.2 shows the reading of the same pair of Vernier calipers when it measures the diameter of a steel rod.



**Fig 3.2**

(a) Determine the zero error on the Vernier calipers.

..... [1]

(b) Determine the corrected reading of the diameter of the steel rod.

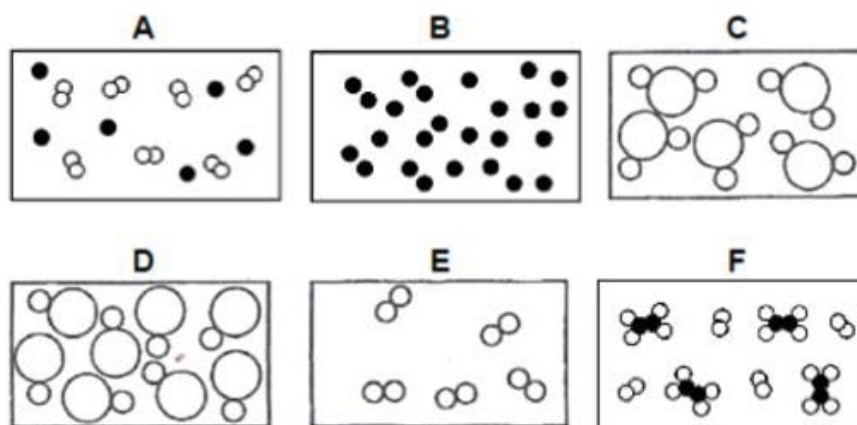
[1]

(c) Describe how the accuracy of the measurement can be improved using the same apparatus.

.....  
 ..... [1]



**B4** Fig. 4.1 shows the particles in six different substances at room temperature and pressure.



**Fig 4.1**

Complete Table 4.1 by putting **A** to **F** into each of the following classification.

**Table 4.1**

substance	pure element	pure compound	mixture of elements	mixture of element and compound
diagram				

[4]

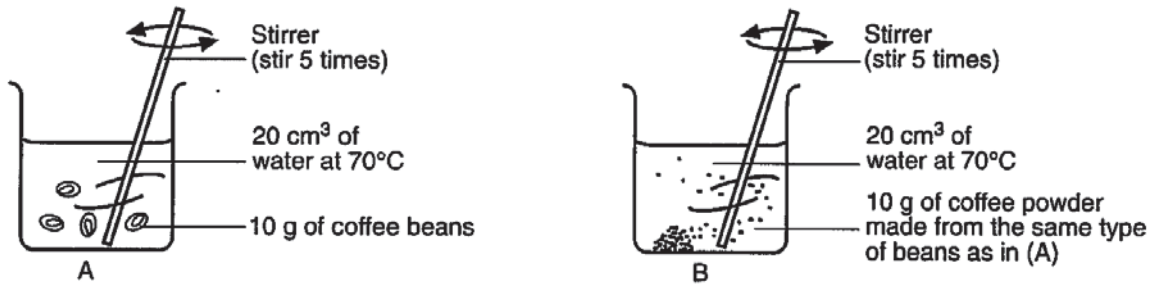
**B5** Complete Table 5.1 by placing a tick (✓) in the appropriate column to identify whether each of the following substance is an element, mixture or compound.

**Table 5.1**

	description	element	compound	mixture
(a)	No energy change took place when substance <b>P</b> is produced by melting two different metals together.			
(b)	Substance <b>Q</b> is a black solid that can be separated into two different substances through magnetic attraction.			
(c)	Substance <b>R</b> is a white solid, has atoms combined in fixed ratio and decomposes into two simpler substances on heating.			
(d)	Substance <b>S</b> has a fixed boiling point and cannot be separated into simpler substances.			

[4]

**B6** A student conducted an experiment on solubility as shown in Fig 6.1.



**Fig. 6.1**

(a) State a possible hypothesis of the student's experiment.

.....  
 ..... [1]

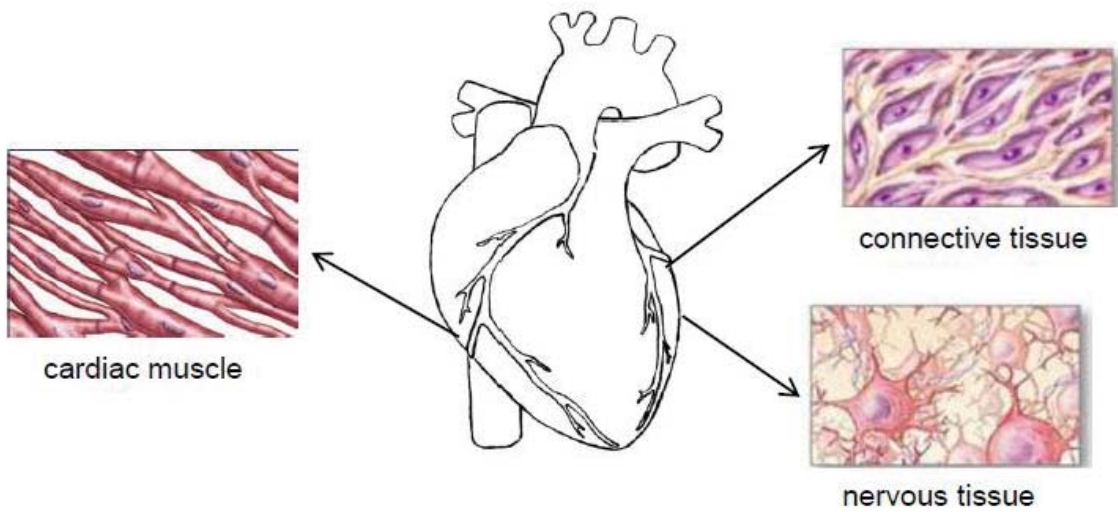
(b) Suggest two other methods of increasing the rate of solubility of coffee beans.

.....  
 ..... [2]

(c) Describe a separation technique that the student can carry out to determine whether the coffee drink is a solution or suspension.

.....  
 .....  
 ..... [2]

**B7** Fig 7.1 shows the human heart.



**Fig 7.1**

**(a)** State the level of organisation for the human heart.

..... [1]

**(b)** Explain your answer in **(a)**.

.....  
 .....  
 ..... [2]

**(c)** A heart is an example of an organ found in multicellular organism having a division of labour. Explain why it is important for a multicellular organism to have a division of labour

.....  
 ..... [1]

**(d)** Suggest a difference in division of labour for a unicellular organism and a multicellular organism.

..... [1]

## Section C

Answer **all** the questions.

Write your answers in the spaces provided on the question paper.

- C8** Peter carries out an experiment to study the relationship between the extension of a spring and the mass attached to the spring. The experimental set up is shown in Fig. 8.1.

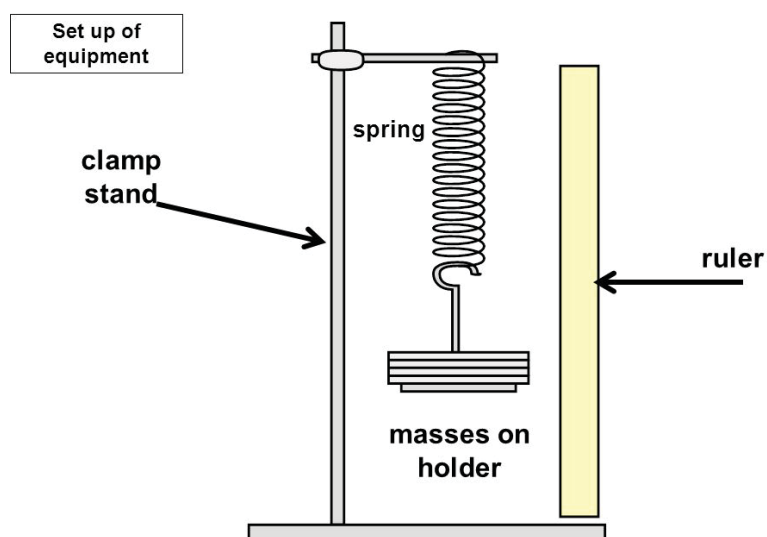


Fig 8.1

The readings taken by the student are shown in Table 8.1 below.

Table 8.1

mass / g	extension of spring / cm
10.0	3.0
20.0	6.0
30.0	9.0
40.0	12.0
60.0	18.0

- (a) Identify the independent variable and dependent variable in this experiment.

independent variable .....

dependent variable .....

[2]

(b) On a piece of graph paper, plot a graph of extension of spring against mass. [4]

(c) From the graph, if a mass of 50.0 g is placed on the spring, what is the length of the extension? Show your working on the graph. [1]

..... [1]

(d) From the graph, state the relationship between mass and extension of spring. [1]

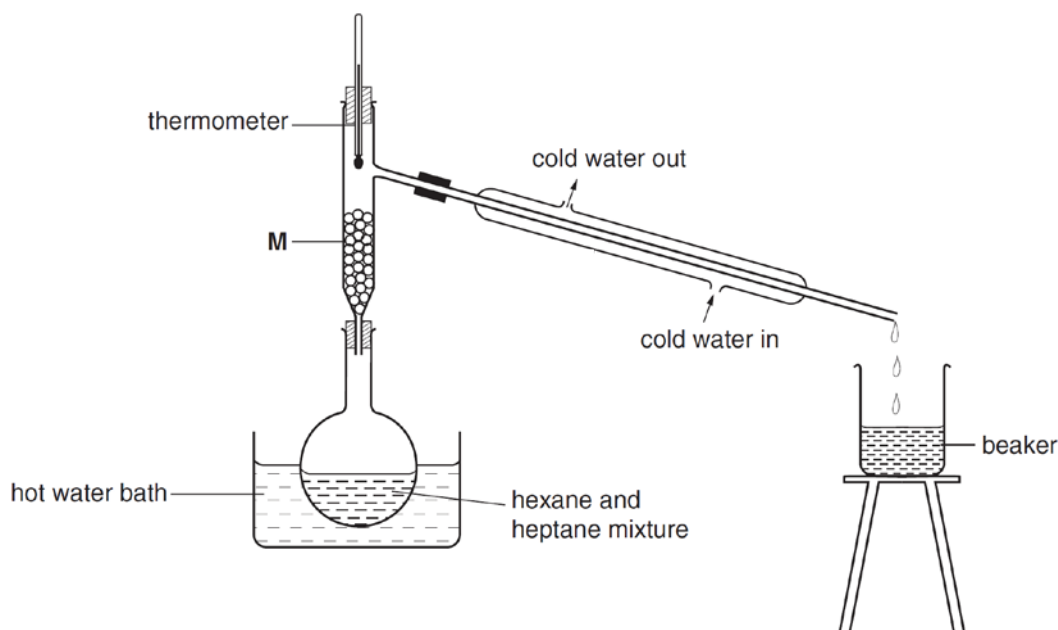
..... [1]

(e) Suggest two ways in which the experiment must be carried out to ensure accuracy of the readings.

1 .....

2 ..... [2]

**C9** (a) A student separated two alkanes, hexane (boiling point 69 °C) and heptane (boiling point 98 °C), using the apparatus shown in Fig 9.1.



**Fig 9.1**

(i) Name and state the function of the piece of apparatus labelled **M**. [2]

..... [2]

- (ii) Explain why a hot water bath can be used instead of a heating source such as a Bunsen burner.

.....  
 ..... [1]

- (iii) What was the reading on the thermometer when the first few drops of distillate appeared in the beaker? Name the distillate collected.

.....  
 ..... [2]

- (iv) How will the student know when all the first alkane had distilled over?

.....  
 ..... [1]

- (b) A student performed paper chromatography on two different inks (ink 1 and ink 2) and five colour dyes (red, blue, green, yellow and orange) using water as a solvent. The results can be seen on the chromatogram on Fig 9.2 below.

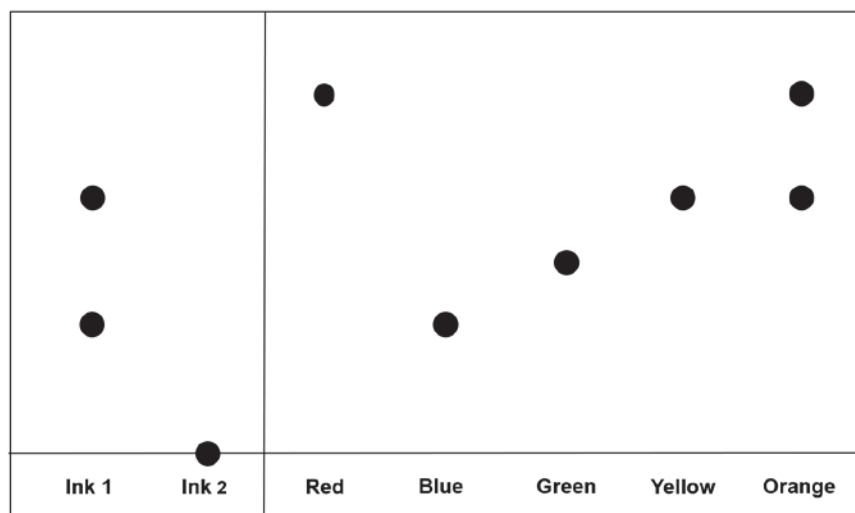


Fig 9.2

- (i) State the colour(s) present in ink 1.

..... [1]

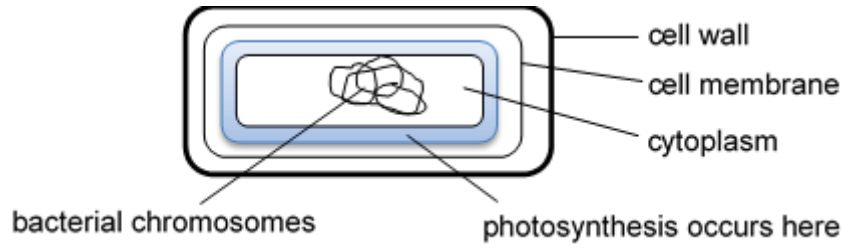
- (ii) Give one possible reason for the result for ink 2.

..... [1]

- (iii) Which of the colour dye is the most soluble? Give a reason for your answer.

.....  
 ..... [2]

**C10** Fig. 10.1 shows the structure of a unicellular bacterium.



**Fig. 10.1**

**(a)** Describe two ways in which this cell is different from a typical plant cell.

- 1** .....
- .....
- .....
- 2** .....
- .....
- ..... [2]

**(b)** Suggest a reason for a bacterium cell to be surrounded by a cell wall.

- .....
- ..... [1]

**(c)** Explain how this bacterium cell is able to photosynthesis.

- .....
- ..... [2]

(d) Fig 10.2 shows the two main types of white blood cells – phagocytes and lymphocytes.

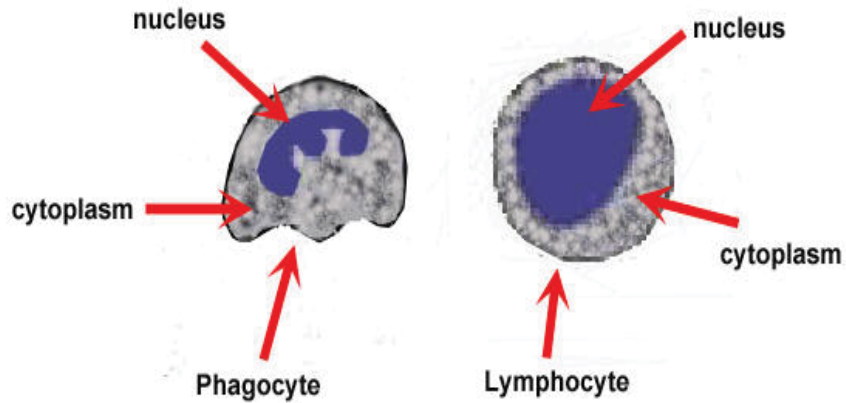


Fig. 10.2

White blood cells are a key part of the human body's organ system for defending itself against infection (this system is called the immune system). They are found together with red blood cells in the bloodstream and can move in and out of the bloodstream to reach tissues that are affected by bacteria or viruses.

(i) Define the term *organ system*.

.....

..... [1]

Phagocytes travel along the walls of blood vessels to fight infections by covering the bacteria or viruses and releasing a protein chemical called enzymes to digest them. Fig 10.3 shows how a phagocyte undergoes this process called phagocytosis.

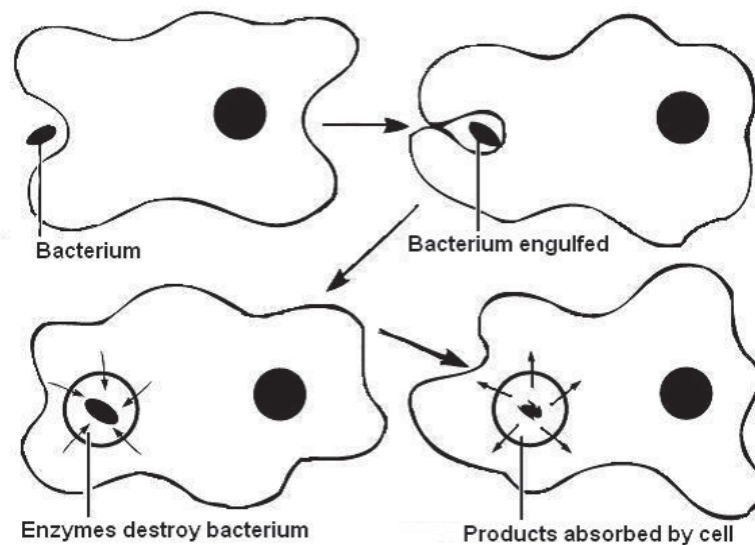


Fig. 10.3



Other white blood cells make antibodies, which are special proteins that recognise foreign materials and help the body destroy or neutralize them. These white blood cells are called lymphocytes.

- (ii) Using the information above, complete Table 10.1 below showing how the various structural adaptations allows the white blood cells to perform its function.

**Table 10.1**

structure	adaptation	reason
cell membrane	flexible	
mitochondria		To provide energy for it to move along bloodstream.
	large	To control the cell to produce large amount of protein.
small vacuoles	numerous and contains enzymes	

[4]

## The Periodic Table of Elements

I		Group										VII	0										
II												VI	V	IV	III	II	I						
3 Li lithium 7	4 Be beryllium 9	<div style="border: 1px solid black; padding: 5px; display: inline-block;">           1 H hydrogen 1         </div>										8 O oxygen 16	7 N nitrogen 14	6 C carbon 12	5 B boron 11							9 F fluorine 19	2 He helium 4
11 Na sodium 23	12 Mg magnesium 24	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>Key</b>            proton (atomic) number            atomic symbol            name            relative atomic mass         </div>										16 S sulfur 32	15 P phosphorus 31	14 Si silicon 28	13 Al aluminium 27							17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84						
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131						
55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -						
87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Mc moscovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganeson -						

lanthanoids

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

actinoids

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).



## 1E LSS MYE 2018 ANSWERS

## Section A

1	D	7	A	13	C	19	B	25	D
2	B	8	A	14	D	20	B	26	C
3	C	9	D	15	A	21	D	27	D
4	C	10	C	16	D	22	D	28	D
5	A	11	A	17	B	23	B	29	D
6	D	12	D	18	C	24	C	30	D

## Section B

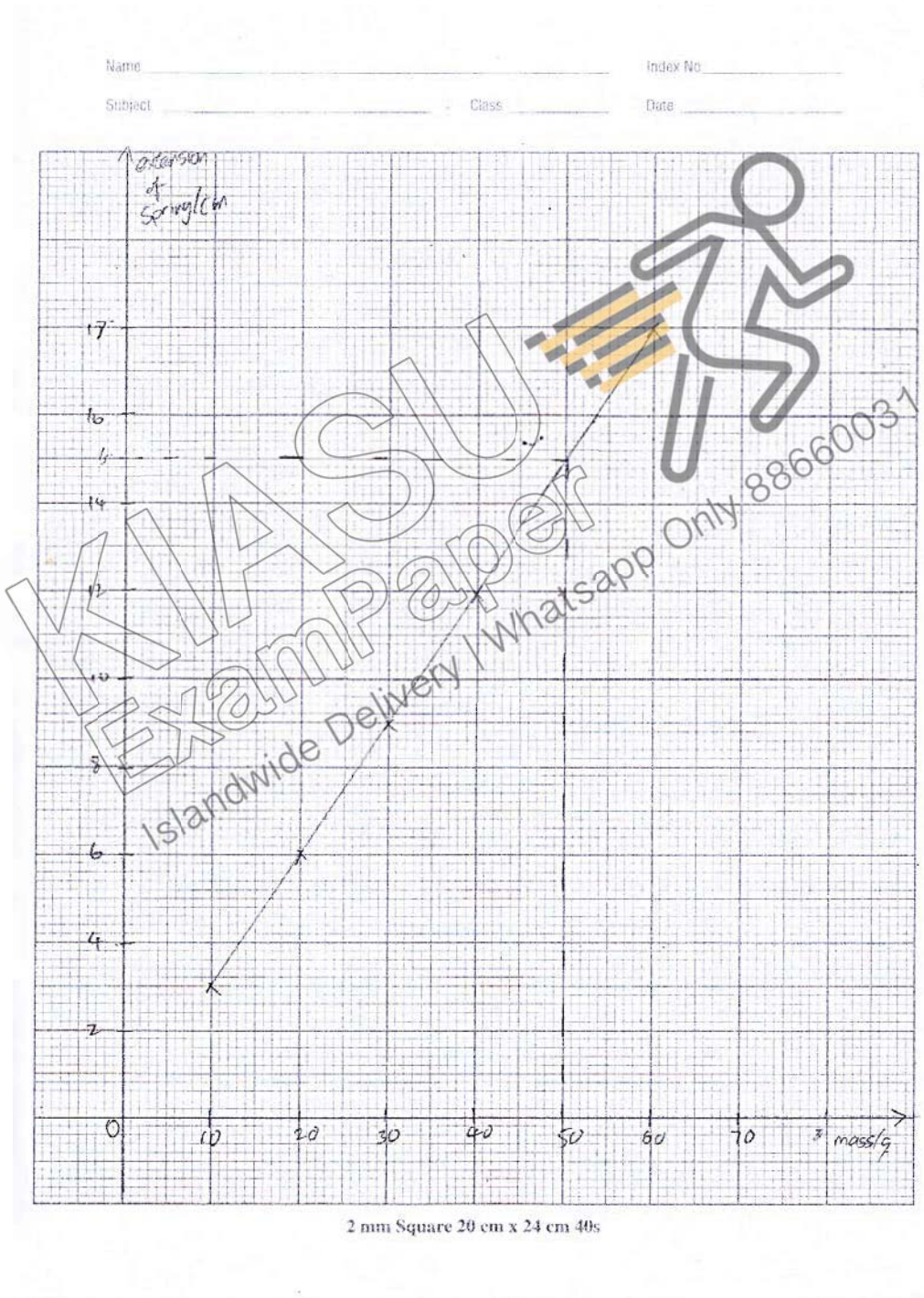
B1	(a)	330							1
	(b)	0.9							1
	(c)	1200							1
		[answers in fraction: 0m]							
B2	(a)	Displacement can/eureka can Measuring cylinder							1 1
	(b)	(i) 0.1 mm / 0.01cm [no units: 0m]							1
		(ii) volume of silver block = $2.11 \times 1.62 \times 0.76$ = $2.598 \text{ cm}^3$ Density of silver block = $27.2/2.598$ = $10.5 \text{ g/cm}^3$ (3.s.f.)							1 1
		(iii) No, it is not made of pure silver as the density of pure silver is greater than that of the mickey figurine.							1
B3	(a)	- 0.03 cm							1
	(b)	Corrected reading = $6.43 - (-0.03)$ = 6.46 cm							1
		[no units for part (a) and/or (b): -1m]							
	(c)	<ul style="list-style-type: none"> <li>Measure the rod at three different positions and calculate the average of the three readings.</li> <li>Avoid parallax error by reading at eye level</li> </ul>							1
B4		substance	pure element	pure compound	mixture of elements	mixture of element and compound			
		diagram	<b>B, E</b>	<b>C, D</b>	<b>A</b>	<b>F</b>			4

B5		description	element	compound	mixture	
	(a)	No energy change took place when substance <b>P</b> is produced by melting two different metals together.			<input type="checkbox"/> ✓	
	(b)	Substance <b>Q</b> is a black solid that can be separated into two different substances through magnetic attraction.			✓	
	(c)	Substance <b>R</b> is a white solid, has atoms combined in fixed ratio and decomposes into two simpler substances on heating.		✓		
	(d)	Substance <b>S</b> has a fixed boiling point and cannot be separated into simpler substances.	✓			4
B6	(a)	As the surface area of coffee solute increases, the rate of solubility of the coffee solute increases				1
	(b)	Stir more (than 5) times				1
		Heat the water to a higher temperature (more than 70 °C)				1
	(c)	Filter the coffee drink				1
		if there is residue on filter paper, it is a suspension.				1
		If there is no residue, it is a solution				
B7	(a)	organ				1
	(b)	It is made up of three different tissues that help it to perform a specific function				1
		Name the three tissues (cardiac muscle, nervous tissue, connective tissue)				1
	(c)	Multicellular organism is larger and more complex				1
	(d)	Unicellular organism division of labour involves organelles while Multicellular organism division of labour involves organs				1



Section C

C8	(a)	Independent variable – mass Dependent variable – extension of spring	2
	(b)	<b>Axes</b> (label axes with variable and units / correct x & y-axis) – 1m <b>Scale</b> (>50% of graph paper + marking on every 2 cm) – 1m <b>Data points</b> (all 5 points correctly plotted) – 1m <b>Line</b> drawn smoothly – 1m	4



	(c)	15.0 cm [no units: 0m]	1
	(d)	As the mass placed on the spring increases, the extension of the length of the spring increases linearly.	1
	(e)	Ensure the eye is level with the reading the length of the spring. (Prevent parallex error) Ensure that the spring does not oscillate when the reading is being taken.	2
C9	(a)(i)	Fractionating column	1
		To allow liquid of higher boiling point to condense / liquid of the lower boiling point to pass through the fractionating column	1
	(ii)	The boiling points of the two liquids are lower than the boiling point of water / 100°C	1
	(iii)	69 °C. hexane	2
	(iv)	When the temperature reading on the thermometer rise above 69 °C	1
	(b)(i)	Blue and yellow	1
	(ii)	Ink 2 is not soluble in water	1
	(iii)	red	1
		The spot travels the furthest up the chromatogram [fastest: 0m]	1
C10	(a)	The chromosomes are not enclosed in a nucleus / There is a lack of nucleus There is a lack of large central vacuole The cell has bacterial chromosomes There cytoplasm is located at the central portion of the cell	Any 2
	(b)	The cell wall is present to protect the bacterium from external injury as it is a unicellular organism. [shape: 0m]	1
	(c)	It will contain chlorophyll that will allow it to photosynthesis and make its own food in the presence of sunlight	1 1
	(d)	Several related organs working together to carry out a specific function	1

(e)		structure	adaptation	reason	1
		cell membrane	flexible	To allow the cell to change its shape to engulf / cover the bacterium	
mitochondria	Large amount / many / numerous	To provide energy for it to move along bloodstream.	1		
nucleus	large	To control the cell to produce large amount of protein.	1		
small vacuoles	numerous and contains enzymes	To digest / destroy the engulfed bacterium	1		

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# AHMAD IBRAHIM SECONDARY SCHOOL

## END OF YEAR EXAMINATION 2018

### GENERAL SCIENCE

Secondary One Express

Date: 8 Oct 2018

Duration: 2 hours

Name: ..... (       )       Class: .....

### INSTRUCTIONS TO CANDIDATES

Do not turn over this paper until you are told to do so. Write your name, class and register number in the spaces at the top of this page.

1. This paper consists of two sections:

Section A – 30 marks

Section B – 70 marks

2. Answer **ALL** questions in Section A on the Optical Answer Sheet (OAS) provided.
3. Answer **ALL** questions in Section B in the spaces provided in the Answer Booklet.
4. All relevant working must be shown clearly.
5. The use of calculator is allowed.
6. Hand in Section A (Optical Answer Sheet), Answer Booklets 1 and 2 **SEPARATELY**.
7. A copy of the Periodic Table is printed on the last page of Answer Booklet 1.

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This question paper consists of 30 printed pages.

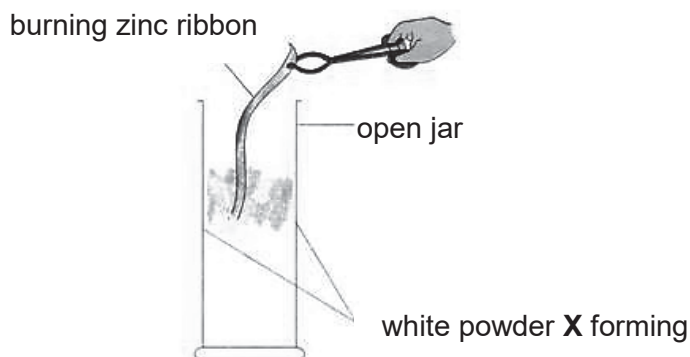
**Section A (30 marks)**

Choose the most appropriate answer and shade your answer on the OAS provided.

- 1 Which of the following consists of an element, a compound and a mixture?
- A** carbon, oxygen, water  
**B** carbon dioxide, chlorine, water  
**C** nitrogen, seawater, steel  
**D** oxygen, steel, water vapour
- 2 Which is a property of all metals?
- A** They are solids at room temperature.  
**B** They are magnetic.  
**C** They conduct electricity.  
**D** They have low melting points.

Refer to the figure below for Questions 3 and 4.

A white powder, **X**, is formed when zinc is completely burnt in air.



- 3 Which of the following describe, **X**, zinc and air?

	<b>X</b>	zinc	air
<b>A</b>	compound	element	mixture
<b>B</b>	compound	mixture	element
<b>C</b>	element	compound	mixture
<b>D</b>	mixture	element	compound

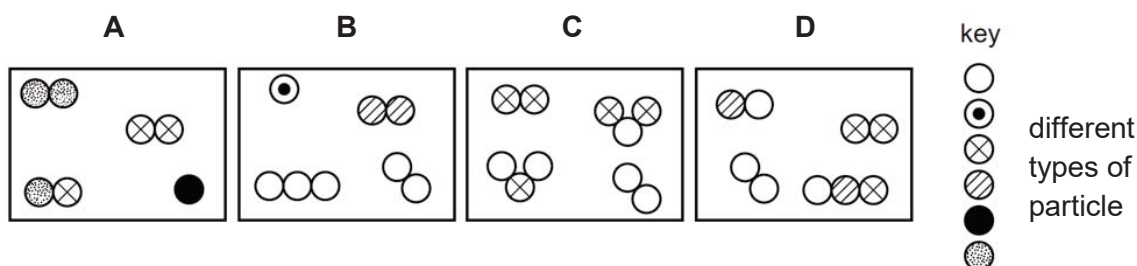
4 Which of the following statements about the reaction above is **not** true?

- A Heat energy is not involved in the reaction.
- B Light energy is given off by the reaction.
- C The white powder formed is not a metal.
- D Zinc ribbon is grey in colour.

5 Which element is **not** found in Group II of the Periodic Table?

- A beryllium
- B calcium
- C strontium
- D titanium

6 Four different mixtures of gases are shown.  
Which diagram represents a mixture containing only elements?



Refer to the figure below for Questions 7, 8 and 9.

The figure shows rock sugar.



7 Paul adds 8 pieces of rock sugar to 500 cm<sup>3</sup> of water in the pot.  
Under which conditions will the rock sugar dissolve the fastest?

- A Cold water with stirring
- B Tap water without stirring
- C Hot water with stirring
- D Hot water without stirring

- 8 Which of the following best describes the observations after the rock sugar dissolves completely in water?
- A The mixture leaves no residue after filtration.
  - B The mixture is heterogeneous.
  - C The rock sugar settles at the bottom after some time.
  - D The rock sugar is the solvent.

- 9 The hot sugar solution was heated till a saturated solution was obtained. The solution was left to cool to room temperature overnight. Some sugar crystals appeared in the solution the next day.

Which of the following is **not** true?

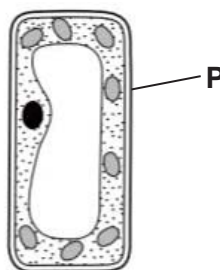
- A More sugar crystals can be obtained by heating the solution to dryness.
  - B The sugar crystals appeared due to crystallisation.
  - C The sugar crystals can be separated from the solution by filtration.
  - D There are some sugar crystals found in the solution on the second day.
- 10 Three substances, **A**, **B** and **C** were dissolved in equal volumes of three different solvents, **X**, **Y** and **Z** to test their solubility. The results are reflected in the table below.

Solvent	Substance dissolved in grams / g		
	<b>A</b>	<b>B</b>	<b>C</b>
<b>X</b>	30	19	11
<b>Y</b>	24	13	7
<b>Z</b>	9	10	12

Which of the following is true?

- A **A** is the most soluble solute for all three solvents.
  - B **A**, **B** and **C** are best dissolved in solvent **Y**.
  - C **B** is least soluble in solvent **X** compared to **A** and **C**.
  - D **C** is more soluble than **B** in solvent **Z**.
- 11 Which of the following does **not** involve filtration?
- A Obtaining water from seawater
  - B Pouring hot water over tea leaves contained in a sieve
  - C Purifying the air using air-conditioner
  - D Purifying the drinking water using water dispenser

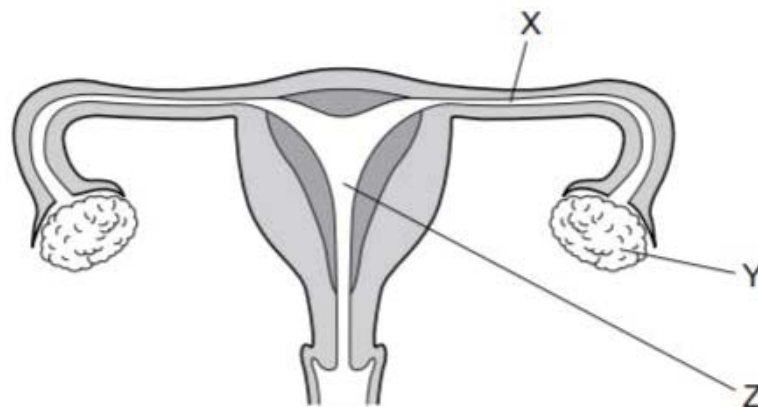
- 12 What are the step(s) to separate a solid-solid mixture of iron, sand and copper(II) sulfate solids?
- A Add water → filter → do simple distillation  
 B Add water → filter → heat to saturation → crystallisation  
 C Use a magnet → add water → filter → heat to saturation → crystallisation  
 D Use a magnet → add water → filter → heat to dryness
- 13 Which statement correctly describes all cells in living organisms?
- A A cell is the basic building unit of all living things.  
 B A cell is the smallest component of all living things.  
 C All cells contain nucleus which provide energy.  
 D All cells contain chloroplasts which carry out photosynthesis.
- 14 The diagram shows a plant cell.



Which of the following about structure **P** is/are correct?

- I It is made up of cellulose.  
 II It supports the cell.  
 III It is fully permeable.
- A I only  
 B I and II only  
 C II and III only  
 D All of the above.
- 15 Which of the following occur in both girls and boys during puberty?
- A Facial hair starts to grow  
 B Menstruation starts  
 C Production of sex cells  
 D Voice deepens

- 16 Which of the following about sperm cell or egg cell is **incorrect**?
- A Both sperm cell and egg cell contains DNA.
  - B Both sperm cell and egg cell are released in large quantities at once.
  - C Both sperm cell and egg cell are produced when males and females hit puberty respectively.
  - D Both sperm cell and egg cell are needed for fertilisation to occur.
- 17 What is the result of cutting the sperm ducts in a man?
- A Sperms are unable to pass through to the urethra.
  - B Sperms will die.
  - C The man is unable to pass urine.
  - D The man is unable to produce sperms.
- 18 The diagram shows a section of the female reproductive system.

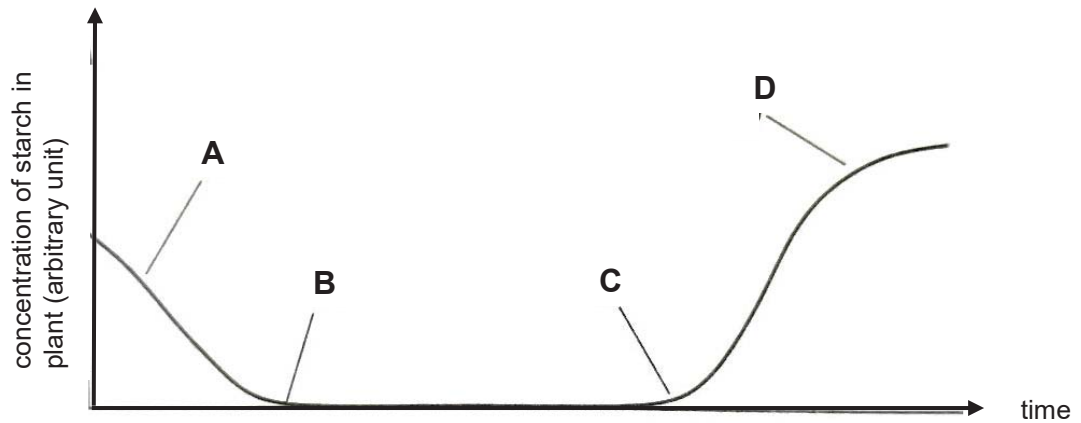


Which of the following statements is true?

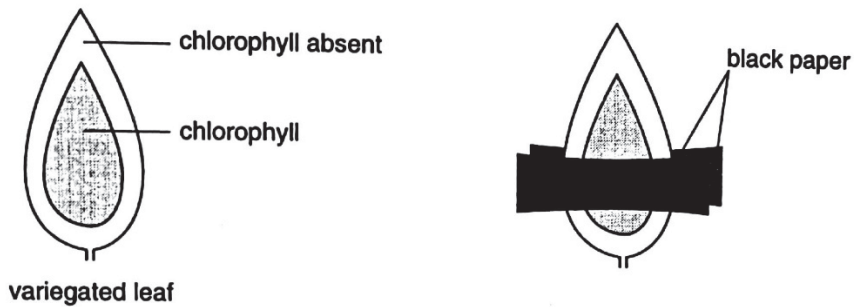
- A Structure **X** is a muscular organ where sperms are deposited during sexual intercourse.
- B Mature sperm cells are produced by structure **Y**.
- C Fertilisation takes place at structure **Z**.
- D After fertilisation, the embryo is implanted in structure **Z** for growth and development.

- 19 Which of the following hormone(s) leads to the thickening of the uterine lining right after menstruation?
- A oestrogen
  - B progesterone
  - C testosterone
  - D oestrogen and progesterone

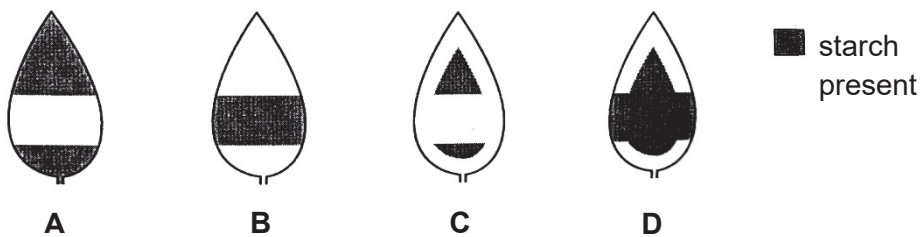
- 20 The graph shows changes of starch concentration in a plant. At which point does sunlight start to become available again?



- 21 A variegated plant is destarched. One leaf is then partly covered with a black paper strip on both sides and exposed to sunlight for several hours.

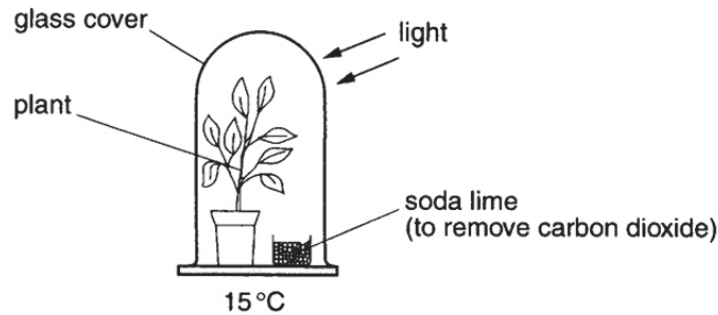


The leaf is then tested for starch. What is the result?

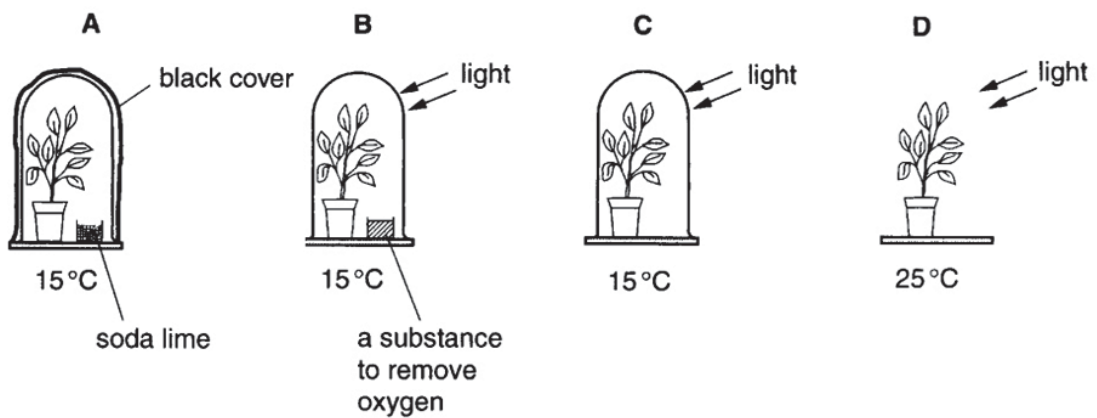




- 22 The diagram shows an experiment to find out whether carbon dioxide is needed for photosynthesis.



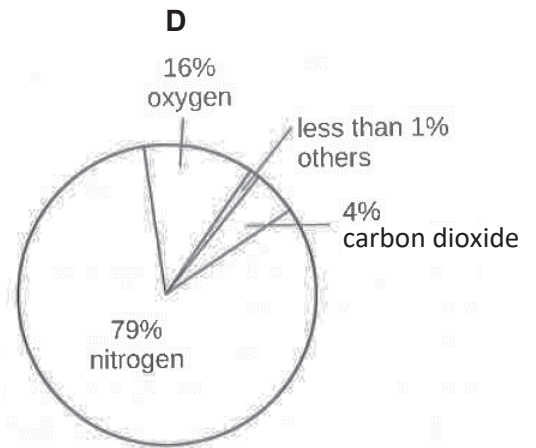
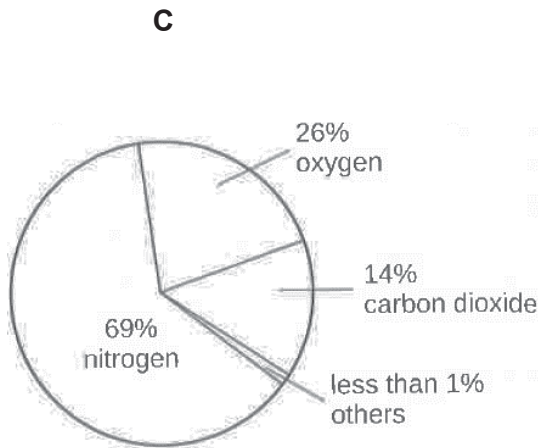
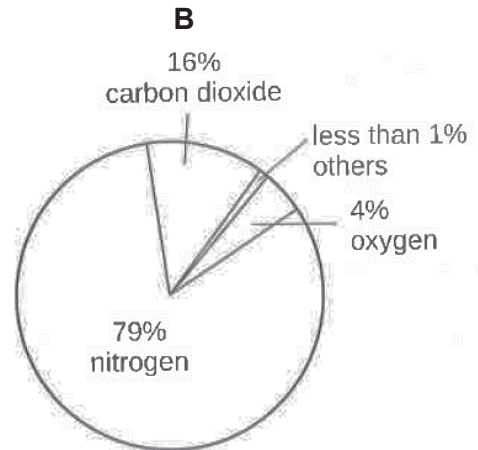
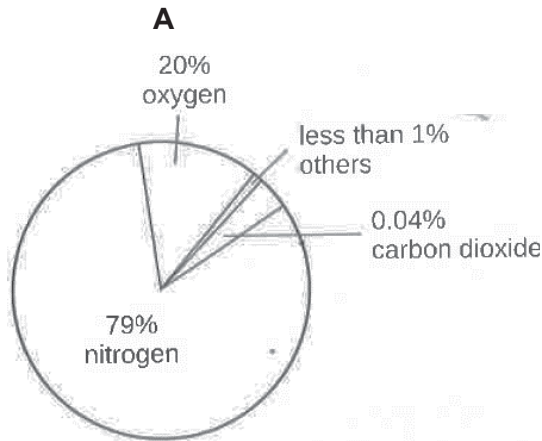
Which of the following is the most suitable control for this experiment?



- 23 Which statement about respiration and breathing is **incorrect**?

- A Breathing takes place outside the cells while respiration takes place inside the cell.
- B Breathing and respiration are chemical processes as new substances such as carbon dioxide are formed.
- C Breathing is the action of getting air in and out of the lungs while respiration is the chemical reaction that provides energy to the living organism.
- D Energy is released during respiration but not released during breathing.

24 Which of the following best represents the composition in a sample of exhaled air?



25 Which of the following shows the correct information related to force?

	<b>instrument to measure force</b>	<b>SI unit for force</b>
<b>A</b>	beam balance	kilogram
<b>B</b>	electronic balance	joule
<b>C</b>	weighing scale	pascal
<b>D</b>	spring balance	newton

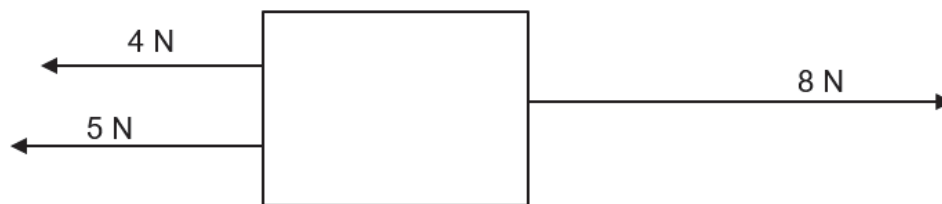
- 26 A parachutist jumps out of an aeroplane and flies vertically downwards. The parachutist opens his parachute at 40 s.

The table below shows the changes in his speed from 0 s to 60 s.

time	speed
0 s to 20 s	increases from 0 m/s to 180 m/s
20 s to 40 s	remains constant at 180 m/s
40 s to 50 s	decreases from 180 m/s to 30 m/s
50 s to 60 s	remains constant at 30 m/s

During which duration is the resultant force on the parachutist **downwards**?

- A From  $t = 0$  s to 20 s  
 B From  $t = 20$  s to 40 s  
 C From  $t = 40$  s to 50 s  
 D From  $t = 50$  s to 60 s
- 27 What is the resultant force acting on the object in the diagram below?



- A 1 N to the left  
 B 7 N to the left  
 C 11 N to the right  
 D 17 N to the right
- 28 Which of the following shows the correct formula for work done?
- A work done = force  $\div$  area  
 B work done = force  $\times$  distance moved in the direction of the force  
 C work done = force  $\times$  perpendicular distance from the pivot to the line of action of the force  
 D work done = mass  $\div$  volume

- 29** A car of mass  $m = 1500$  kg is travelling at a constant speed of 4.0 m/s. As the car approaches a traffic light, the driver applies the brakes and the car slowly comes to a halt.

How much kinetic energy is converted to thermal energy?

- A** 3 000 J
- B** 6 000 J
- C** 12 000 J
- D** 24 000 J

- 30** Which of the following shows the change in the speed of the particles and the spacing between each particle during freezing?

	speed of particles	distance between particles
<b>A</b>	faster	further apart
<b>B</b>	faster	closer together
<b>C</b>	slower	further apart
<b>D</b>	slower	closer together

~ End of Section A ~

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**AHMAD IBRAHIM SECONDARY SCHOOL  
END OF YEAR EXAMINATION 2018**

**GENERAL SCIENCE**

**Secondary One Express**

**Date: 8 Oct 2018**

**Section B (CHEMISTRY/BIOLOGY)**

**ANSWER BOOKLET 1**

<b>Name:</b>	( )
<b>Class:</b>	

<b>FOR EXAMINER'S USE</b>	
<b>Section A</b>	<b>/ 30</b>
<b>Section B (Booklet 1)</b>	<b>/ 56</b>
<b>Section B (Booklet 2)</b>	<b>/ 14</b>
<b>Total</b>	<b>/ 100</b>

**Section B – Booklet 1 (Chemistry/ Biology)**

Answer **all** the questions in this section in the spaces provided.

- 1 Fig. 1.1 below shows part of the Periodic Table.  
The location of the six elements **P**, **Q**, **R**, **S**, **T** and **U** on the Periodic Table are labelled as shown below.


**Fig. 1.1**

- (a) Using the letters in Fig. 1.1,
- (i) identify two elements with similar chemical properties; [1]
- .....
- (ii) identify one element with properties of both metals and non-metals; [1]
- .....
- (iii) identify two elements that belong to the same period. [1]
- .....
- (b) With reference to the Periodic Table, state the group number of the element that exist in greatest amount in air. [1]
- .....
- (c) State the period number of the element that chemically combines with hydrogen to form water. [1]
- .....

[Total: 5 marks]

**2** A blue solid, **Z** is a compound which is made up of two elements, **X** and **Y**.

At 25 °C, **X** exists as a reddish-brown solid which is not magnetic but conducts electricity and heat well.

At 25 °C, **Y** exists as a yellow-green gas which is not magnetic and does not conduct electricity and heat.

At 25 °C, **Z** is not magnetic and does not conduct electricity at solid state.

**(a) (i)** Define the term 'element'. [1]

.....  
.....

**(ii)** Is **X** a metal or non-metal?  
Using the information given above, explain your answer. [2]

.....  
.....  
.....  
.....

**(iii)** With reference to the information provided above, give two reasons to explain why **Z** is a compound. [2]

.....  
.....  
.....  
.....



- (b) The physical properties of **X**, **Y**, **Z** and an unknown substance, **A**, are shown in Table 2.1 below.

Table 2.1

Physical property	Unknown <b>A</b>	<b>X</b>	<b>Y</b>	<b>Z</b>
colour and state	reddish-brown and blue solids	reddish-brown solid	yellow-green gas	blue solid
melting point / °C	cannot be determined	1085	- 101.5	498
soluble in water	blue solids dissolved, leaving reddish-brown solids behind	no	no	yes

- (i) Using the information given in Table 2.1, give one evidence that **A** is a mixture of **X** and **Z**. [1]

.....  
 .....

- (ii) After adding water to substance **A**, which separation technique may be used to obtain the reddish-brown solids? [1]

.....

[Total: 7 marks]

- 3 (a) For each of the following, state the most suitable method of separation. [2]

(i) separate steel from the rubbish in junkyard .....

(ii) separate copper(II) carbonate from water .....

- (b) Three dye mixtures, **J**, **K** and **L**, were spotted onto a piece of chromatography paper. Three pure dyes, **X**, **Y** and **Z**, were also spotted onto the same piece of paper.

Fig. 3.1 shows the results of this chromatography.

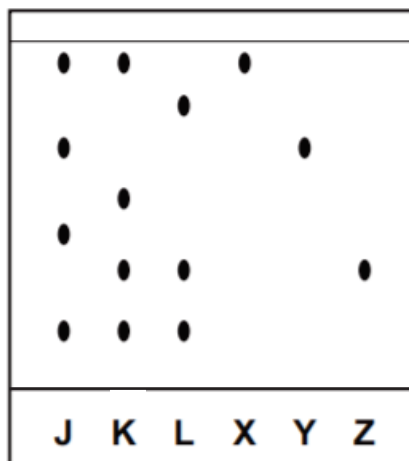


Fig. 3.1

- (i) Suggest why the base line was drawn in pencil and **not** in ink. [1]

.....  
 .....

- (ii) Which dye mixture, **J**, **K** or **L**, contains **both** dyes **X** and **Y**? [1]

.....

- (iii) Which dye mixture, **J**, **K** or **L**, does **not** contain dye **Z**? [1]

.....

- (iv) Another dye mixture **M** was spotted onto a piece of chromatography paper. Fig. 3.2 shows the results of this chromatography.



**Fig. 3.2**

Explain why dye mixture **M** did not move up the chromatography paper. [1]

.....

.....

[Total: 6 marks]

- 4 (a) Define the term 'solubility'. [1]

.....

.....

(b) Fig. 4.1 shows the solubility of different substances at various temperatures.

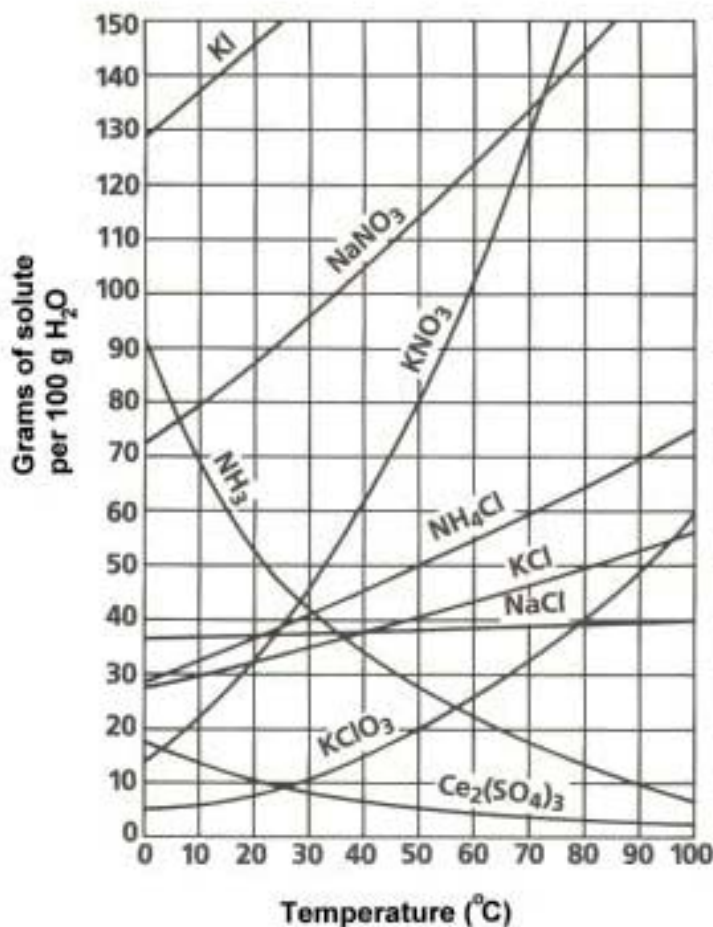


Fig. 4.1

(i) State the mass of potassium chloride, KCl, that dissolves in 100 cm<sup>3</sup> of water at 80 °C. [1]

.....

(ii) 500 g of potassium nitrate, KNO<sub>3</sub>, crystals is mixed with 500 g of water at 50 °C.  
 Will the potassium nitrate crystals dissolve completely?  
 Using the information from the graph and suitable calculations, explain your answer. [2]

.....  
 .....  
 .....

[Total: 4 marks]

5 The apparatus shown in Fig. 5.1 can be used to separate pure water from seawater.

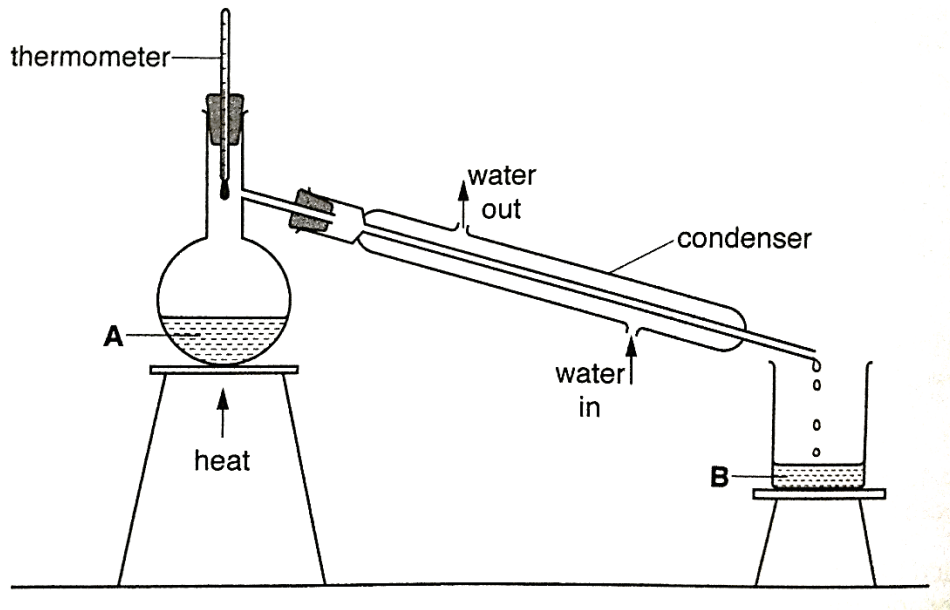


Fig. 5.1

- (a) Name this method of separation. [1]  
.....
- (b) Predict the reading on the thermometer during the separation. [1]  
..... °C
- (c) Explain why water is pumped in at the end of the condenser. [1]  
.....
- (d) Two samples are taken, one at point **A** and another at point **B**. Each sample is placed in separate evaporating dish and heated to dryness. The sample at **A** left a white residue while the sample at **B** left no residue.
  - (i) Identify the residue at **A**. [1]  
.....
  - (ii) Explain why the sample at **A** left a residue while the sample at **B** left no residue. [2]  
.....  
.....  
.....

[Total: 6 marks]

6 Fig. 6.1 shows two types of cells under the light microscope.

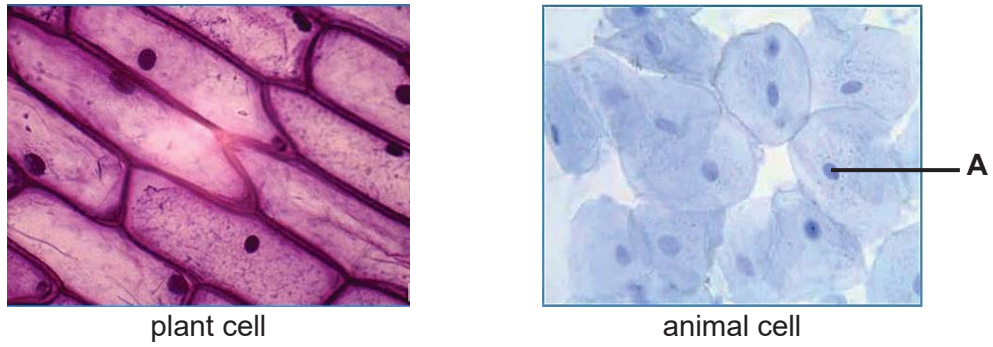


Fig. 6.1

(a) (i) Name structure **A** and state its function. [2]

Structure .....

Function

.....  
 .....

(ii) With reference to Fig. 6.1, describe two ways a plant cell is different from an animal cell. [4]

.....  
 .....  
 .....  
 .....

(b) It was later found out that the plant cell was an onion cell.  
 One structure required for photosynthesis was not found in the onion cell.

Name the structure and suggest one reason why the structure was not found in the cell. [2]

Structure .....

Reason

.....  
 .....

[Total: 8 marks]

- 7 Fig. 7.1 shows a calendar in which a woman has made some markings in August. 19 August is the eleventh day of her menstrual cycle.

August						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19 <b>X</b>	20 <b>X</b>	21 <b>X</b>	22 <b>X</b>	23 <b>X</b>	24 <b>X</b>	25
26	27	28	29	30	31	

Fig. 7.1

- (a) (i) Define 'menstruation'. [1]

.....  
 .....

- (ii) Suggest the possible date for the last day of menstruation of this menstrual cycle. [1]

.....

- (b) The woman avoids sexual activities during the day, marked out in Fig. 7.1.

- (i) What is the name given to this period of the month? [1]

.....

- (ii) Suggest a reason why the woman avoids sexual activities during this period. [1]

.....  
 .....

- (c) Describe and explain what happens to the uterine lining after ovulation. [2]

.....  
 .....  
 .....  
 .....

- (d) Describe what happens to the egg after it fuses with a sperm and before an embryo is developed into a fetus. [2]

.....

.....

.....

.....

[Total: 8 marks]

- 8 The element carbon can be found in all living organisms. It is recycled through various processes, such as photosynthesis and respiration in the carbon cycle.

Fig. 8.1 shows part of the carbon cycle and the arrows show the different pathways carbon moves between plants, animals and air.

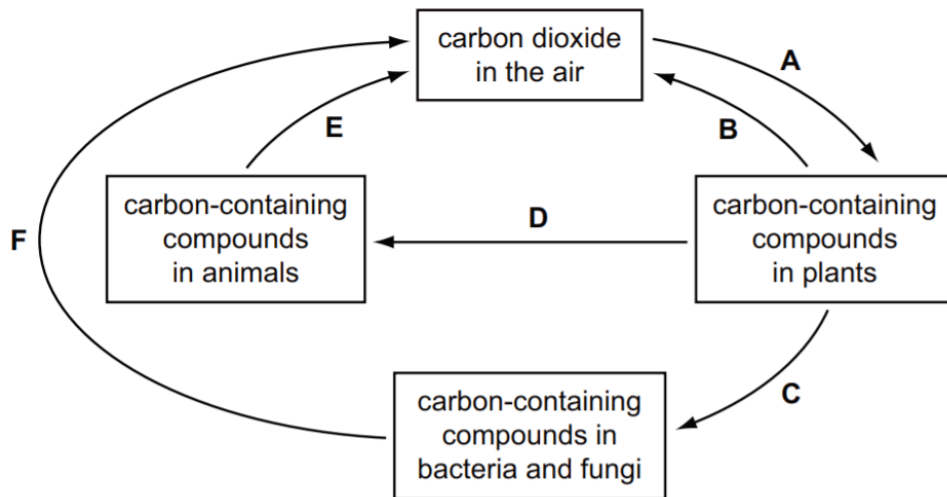


Fig. 8.1

- (a) (i) State the letter that represents photosynthesis in Fig. 8.1. .... [1]
- (ii) State the three letters that represent respiration in Fig. 8.1. [2]

....., ..... and .....

- (b) Name a carbon-containing compound in plants that is produced during photosynthesis. [1]

.....

- (c) Write the word equation for respiration. [1]

.....

[Total: 5 marks]



- 9 A student uses the apparatus shown in Fig. 9.1 to investigate the effect of changing light intensity on the rate of photosynthesis on a breed of pondweed (pondweed **A**). The brightness of the lamp is kept constant.

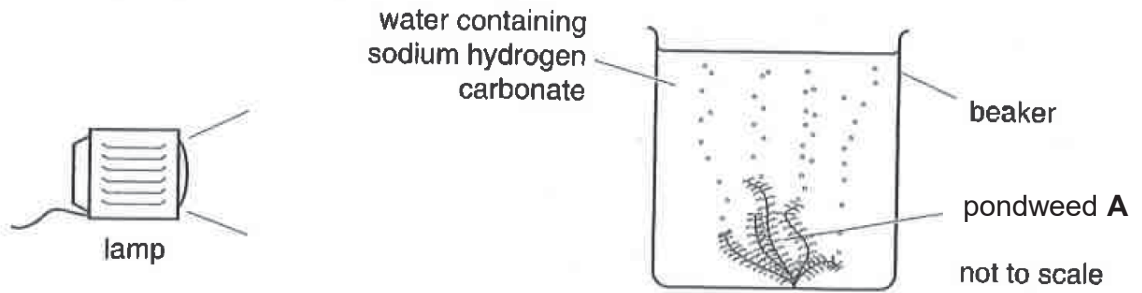


Fig. 9.1

- (a) (i) Besides the brightness of the lamp, state one other variable that should be kept constant in this investigation. [1]

.....

- (ii) Describe how the distance between the lamp and the pondweed **A** affect the rate of bubble production. [1]

.....

.....

- (iii) Explain your answer. [2]

.....

.....

.....

- (b) Using the apparatus shown in Fig. 9.1, the student repeated the experiment on another breed of pondweed (pondweed **B**).

At the same light intensity of 90 lux, pondweed **A** produced 72 bubbles per minute while pondweed **B** produced 60 bubbles per minute.

- (i) State, with a reason, which pondweed, **A** or **B**, would grow best in shady conditions? [2]

.....

.....

.....

.....

(c) In what form is the product of photosynthesis stored as? [1]

.....

[Total: 7 marks]

**End of Booklet 1**

Setter: Ms Agnes Lim

# The Periodic Table of Elements

		Group															
I	II	III	IV	V	VI	VII	0										
3 Li lithium 7	4 Be beryllium 9	1 H hydrogen 1	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20									
11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40										
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -
87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	114 Fl flerovium -	116 Lv livermorium -	118 Og oganeson -	119 Uue unbinilium -	120 Uuo unbinilium -	121 Uuq unbinilium -

**Key**  
proton (atomic) number  
atomic symbol  
name  
relative atomic mass

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

lanthanoids

actinoids

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

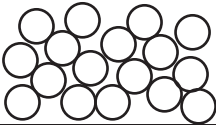
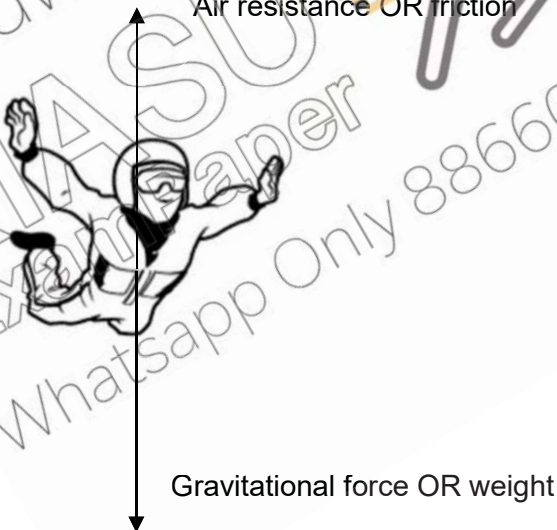


**Answers for Sec 1 Express LSS (Physics) SA2 2018****Section A**

Qn	25	26	27	28	29	30
Ans	<b>D</b>	<b>A</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>

1 mark each

**Section B**

1a		B1
1b	Vibrate about fixed positions	B1
2a	When the particles are heated, they <u>gain energy</u> and they <u>vibrate more vigorously</u> . This <u>increases the distance between the particles</u> , so the tracks expand.	} B1 each } Any 2 } Maximum 2 marks
2b	The tracks will bend / become out of shape / distorted.	B1
3a	0 N	B1
3b		B1 B1 (for each arrow)
3c	Close up his body / Get into a streamline shape / Dive head first	B1
4a	Kinetic energy is converted to gravitational potential energy and thermal energy (+ sound energy optional)	B1
4b	$KE = \frac{1}{2} mv^2$ $16.0 = \frac{1}{2} (0.50)v^2$ $64.0 = v^2$ $v = 8.0 \text{ m/s}$	M1 A1
4c	$GPE = mgh$ $12.5 = (0.50)(10)h$ $h = 2.5 \text{ m}$	M1 A1



NAME: \_\_\_\_\_ (    )

CLASS: 1 \_\_\_\_\_

**HOUGANG SECONDARY SCHOOL****SEMESTRAL ASSESSMENT 2 / 2018****GENERAL SCIENCE****PAPER 1 Multiple Choice****SECONDARY ONE EXPRESS****Wednesday, 10 Oct 2018****Total Duration for Paper 1 and 2:  
1 hour 45 min**

MAKE THE DIFFERENCE RESPECT OURSELVES RESPECT OTHERS MAKE THE DIFFERENCE RESPECT OURSELVES RESPECT OTHERS MAKE THE DIFFERENCE  
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**READ THESE INSTRUCTIONS FIRST**

Write your name, register number and class in the spaces at the top of this page and OTAS.

There are **twenty-five** questions on this paper. Answer **all** questions.

For each question there are four possible answers **A, B, C** and **D**. Choose the **one** you consider correct and record your choice in **soft pencil** on the separate OTAS.

A copy of the Periodic Table is printed on page **9** in this paper.

The use of an approved scientific calculator is expected, where appropriate.

You are advised to spend not more than 35 minutes on Paper 1.

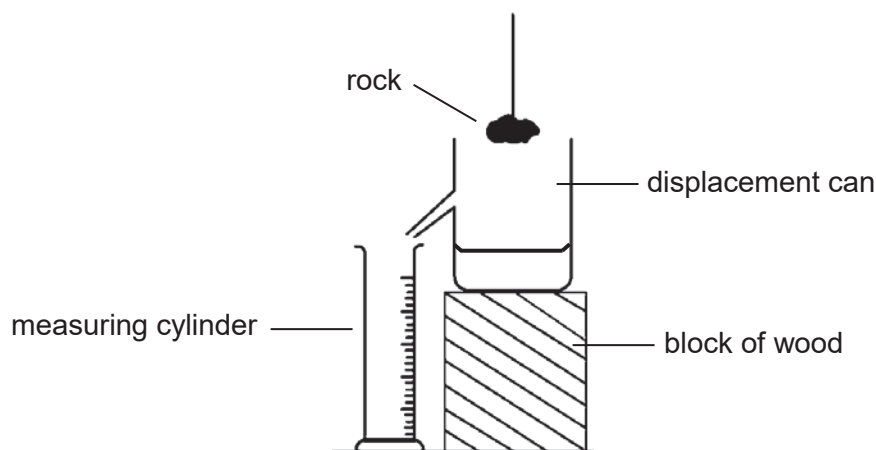
Hand in Paper 1, OTAS and Paper 2 **separately**.

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This document consists of **9** printed pages (including this cover page).

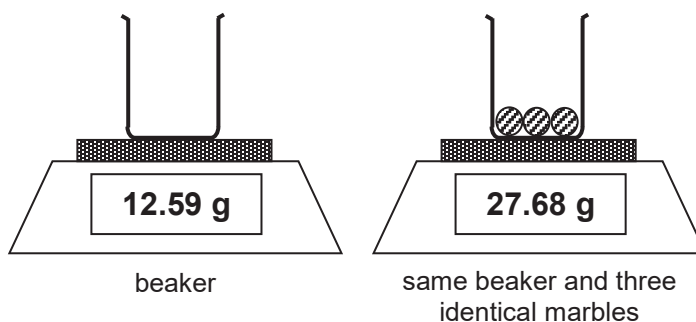
[Turn over

- 1 Which of the following statements about a luminous flame is true?
- A** It is hotter than a non-luminous flame.  
**B** It is not steady.  
**C** It is obtained when the air-hole is open.  
**D** It is purple in colour.
- 2 Amy wanted to measure the volume of a rock that she found. She set up the apparatus as shown to carry out her experiment but she was unable to obtain the volume of the rock.



What adjustment should be made so that her experiment can be successful?

- A** The block of wood should be lowered.  
**B** The measuring cylinder should be replaced by a beaker.  
**C** The rock should be broken down into smaller pieces.  
**D** There should be more water in the displacement can.
- 3 The following diagram shows the readings on an electronic balance at two instances.



What is the mass of one marble?

- A** 5.03 g  
**B** 9.23 g  
**C** 15.09 g  
**D** 27.68 g



4 Material **P** has the following physical properties:

- poor conductor of heat and electricity
- high melting point
- brittle
- opaque

What is material **P**?

- A** ceramic
- B** glass
- C** metal
- D** plastic

5 Which of the following statements is **not** correct?

- A** A compound can be formed when an element chemically combines with another element.
- B** Air contains a mixture of elements and compounds.
- C** Elements can be broken down into simpler substances by chemical methods.
- D** There are more than 110 types of elements known to scientist presently.

6 Which of the following element is a liquid at room temperature and pressure?

- A** bromine
- B** chlorine
- C** fluorine
- D** iodine

7 Slag is a substance used in the making of roads. It contains a compound with the following chemical formula,  $\text{CaSiO}_3$ . What are the elements that make up the compound?

- A** calcium, silicon, oxygen
- B** calcium, sulfur, iodine, oxygen
- C** carbon, silicon, oxygen
- D** carbon, sulfur, iodine, oxygen

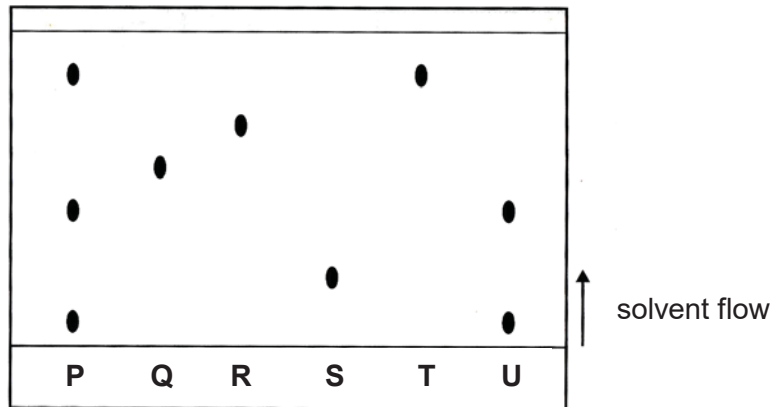
8 Which of the following does not make sugar cubes dissolve faster in water?

- A** adding more water
- B** crushing the sugar cubes
- C** stirring the solution with a spoon
- D** using hotter water

9 Which of the following mixture can be separated by distillation?

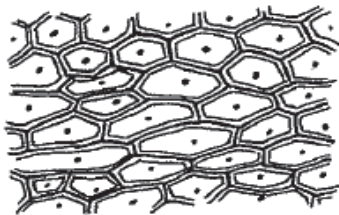
- A** calcium carbonate and water
- B** oil and water
- C** iron filings and sulfur powder
- D** salt and water

- 10 The diagram below shows a chromatogram of six different ink samples, **P** to **U**, produced by a company using different combination of dyes.



Which of the dyes can be used to create ink sample **P**?

- A R and U
  - B Q, R and S
  - C Q, S and T
  - D T and U
- 11 Meghan is examining two types of cells, onion cells and human cheek cells under a microscope.



onion cells



human cheek cells

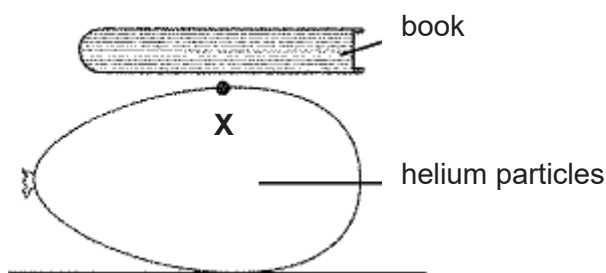
What structures will she see in both cells?

- I cell membrane
  - II cell wall
  - III chloroplast
  - IV nucleus
- A I and IV only
  - B I, II and III only
  - C II and IV only
  - D I, II and IV only

- 12 The liver is an organ because

- A it is made of different types of cells performing the same job.
- B it is made of different types of organelles performing the same job.
- C it is made of several systems working together to perform a function.
- D it is made of several tissues working together to perform a function.

- 13 Which of the following statements about the division of labour is incorrect?
- A** It allows various functions to be carried out more efficiently.  
**B** It enables cells that are far away from the external environment to receive nutrients.  
**C** It ensures that multiple functions can be performed at the same time.  
**D** It is used by all living organisms.
- 14 Which of the statements below describe the particulate model of matter?
- I** All matter is made up of small particles.  
**II** All particles are in constant motion.  
**III** The motion of all particles are random.  
**IV** Particles of a pure substance are identical.
- A** I, II and III  
**B** I, II and IV  
**C** II, III and IV  
**D** All of the above
- 15 The diagram below shows a book placed on top of a balloon at position **X**.

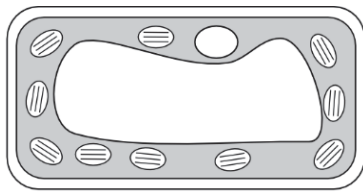


- What change can be observed in the balloon when the book is balanced at the position **X**?
- A** the distance between helium particles decreases  
**B** the mass of helium particles decreases  
**C** the size of helium particles decreases  
**D** the speed of helium particles decreases
- 16 Which of the following changes occur when a solid at 50.0 °C becomes a liquid at 120 °C?

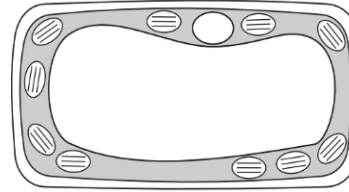
	attractive force between particles	distance between particles	energy of particles
<b>A</b>	decreases	decreases	increases
<b>B</b>	decreases	increases	increases
<b>C</b>	increases	decreases	decreases
<b>D</b>	increases	increases	decreases

- 17 Which of the following is an example of osmosis in a plant?
- A** carbon dioxide from the air moving into a photosynthesizing leaf  
**B** mineral salts in the xylem moving from roots to leaves  
**C** sugars in the phloem moving from leaves to roots  
**D** water in the plant cells moving across the membrane

- 18 The diagram shows the results of an experiment, where two plant cells were placed in solutions **X** and **Y** respectively for 30 minutes.



solution **X**



solution **Y**

Which process took place in the experiment and what was the relative water potentials of Solutions **X** and **Y**?

	<b>process</b>	<b>water potential</b>
<b>A</b>	diffusion	solution <b>X</b> has higher water potential than solution <b>Y</b>
<b>B</b>	diffusion	solution <b>X</b> has lower water potential than solution <b>Y</b>
<b>C</b>	osmosis	solution <b>X</b> has higher water potential than solution <b>Y</b>
<b>D</b>	osmosis	solution <b>X</b> has lower water potential than solution <b>Y</b>

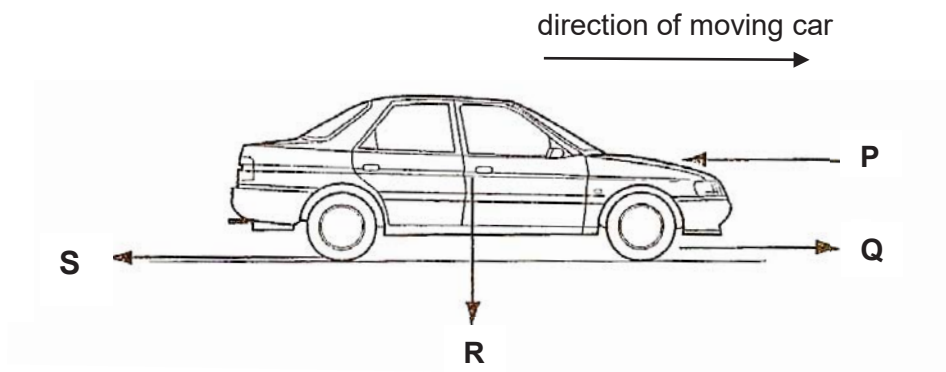
- 19 Which of the following is the force that causes high and low tides?

- A** electrostatic force
- B** frictional force
- C** gravitational force
- D** magnetic force

- 20 The mass and weight of a ball are measured on Earth. The gravitational field strength on Earth is 10 N/kg and the gravitational field strength on Moon is 1.6 N/kg. What will be the mass and weight of the ball when it is measured on the Moon?

	<b>mass on the Moon</b>	<b>weight on the Moon</b>
<b>A</b>	decreases	decreases
<b>B</b>	decreases	same
<b>C</b>	same	decreases
<b>D</b>	same	same

- 21 The diagram below shows four forces **P**, **Q**, **R** and **S** acting on a moving car.



Which of the following would cause the car to move faster?

- A** an increase in **P**  
**B** an increase in **Q**  
**C** an increase in **R**  
**D** an increase in **S**
- 22 If Harry cycles a distance of 3.25 km in 15.0 min, what is his cycling speed?
- A** 0.217 km/h  
**B** 0.361 km/h  
**C** 3.61 m/s  
**D** 48.75 m/s
- 23 What of the following statement shows an useful application of high pressure?
- A** A bulldozer uses its caterpillar tracks to move on the soil ground.  
**B** A lady wears high heels shoes to complete a walkathon.  
**C** A man uses ski to move on the snow.  
**D** A woman uses a sharp needle to sew a cloth.
- 24 James rides his motorcycle to work every weekday mornings. The total distance from his home and his office is 45.0 km.  
 On Monday, he left his house at 8.00 am, He had to seek shelter from 8.15 am to 8.30 am due to a heavy downpour before finally reaching his office at 8.45 am.
- Calculate the average speed of his journey on Monday.
- A** 1.00 km/h  
**B** 1.50 km/h  
**C** 60.0 km/h  
**D** 90.0 km/h

- 25 The diagram shows the Mars space rover. It has an estimated mass of 1060 kg.



Given that the gravitational field strength on Mars is 3.70 N/kg, what is the weight of the Mars space rover on Mars?

- A 3.49 N
- B 286.5 N
- C 3490 N
- D 3922 N

**END OF PAPER 1**

# The Periodic Table of Elements

		Group																																																																															
I	II	III	IV	V	VI	VII						0																																																																					
3 Li lithium 7	4 Be beryllium 9	11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Mc moscovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganeson -

1  
H  
hydrogen  
1

**Key**  
proton (atomic) number  
atomic symbol  
name  
relative atomic mass

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

lanthanoids

actinoids

NAME: \_\_\_\_\_ (    )

CLASS: 1 \_\_\_\_\_



**HOUGANG SECONDARY SCHOOL**  
**SEMESTRAL ASSESSMENT 2 / 2018**  
**GENERAL SCIENCE**  
**PAPER 2**  
**SECONDARY ONE EXPRESS**

Wednesday, 10 Oct 2018

Total Duration for Paper 1 and 2:  
**1 hour 45 min**

MAKE THE DIFFERENCE RESPECT OURSELVES RESPECT OTHERS MAKE THE DIFFERENCE RESPECT OURSELVES RESPECT OTHERS MAKE THE DIFFERENCE  
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**READ THESE INSTRUCTIONS FIRST**

Write your name, register number and class in the spaces at the top of this page.

You may use an HB pencil for any diagrams, graphs, tables or rough working.

Write in dark blue or black pen.

Do not use staples, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.

You may lose marks if you do not show your working or if you do not use appropriate units.

**Section A**

Answer **all** questions.

Write your answers in the spaces provided on this paper.

**Section B**

Answer any **two** questions.

Write your answers in the spaces provided on this paper.

FOR EXAMINER'S USE	
<b>Paper 1</b>	/ 25
<b>Paper 2: Section A</b>	/ 40
<b>Paper 2: Section B</b>	/ 20
<b>Total</b>	/ 85

The number of marks is given in brackets [ ] at the end of each question or part question.

A copy of the Periodic Table is printed on page **16** of this paper.

Hand in Paper 1, OTAS and Paper 2 **separately**.

This document consists of **16** printed pages (including this cover page).

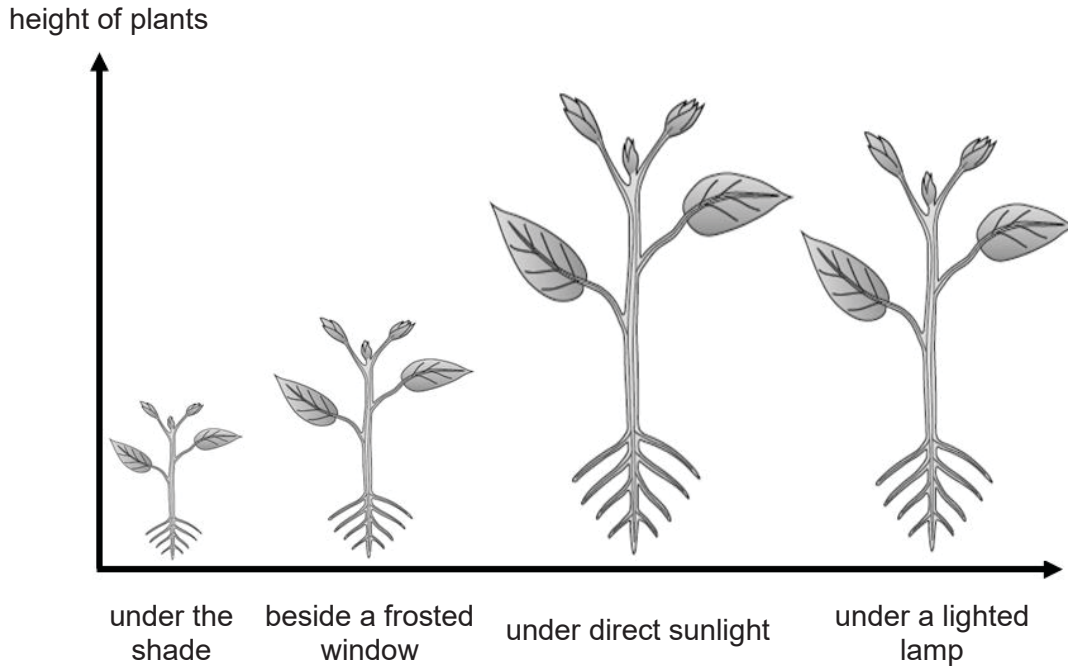
[Turn over



**Section A: 40 marks**

Answer **all** questions. Write your answers in the spaces provided on this paper.

1 Jamie completed an experiment and her results are shown in Fig 1.1 below.



**Fig 1.1**

(a) Suggest a suitable hypothesis for Jamie's experiment.

.....  
 ..... [1]

(b) Based on the results shown, give a suitable conclusion for Jamie's experiment.

.....  
 ..... [1]

(c) The following gives a list of variables in Jamie's experiment.

Identify the type of variable (controlled, dependent or independent) stated.





- (i) amount of sunlight received by plants .....
- (ii) volume of water received by plants .....
- (iii) final height of plants .....
- (iv) initial height of plants ..... [2]

- 2 Table 2.1 gives a brief description of four unknown substances found in the chemistry laboratory.

substance	description
<b>W</b>	colourless liquid, catches fire easily and burns with a blue flame
<b>X</b>	colourless solution, severely burns the skin when in contact
<b>Y</b>	colourless solution, causes some itchiness with prolonged contact
<b>Z</b>	silver liquid, poisonous when the vapour is inhaled

- (a) Indicate which substance (**W**, **X**, **Y** or **Z**) should have the following hazard warning symbol on their reagent bottle.

Each substance (**W**, **X**, **Y** or **Z**) can only be used once.

hazard warning symbol		
substance		
hazard warning symbol		
substance		

[2]

- (b) When a sample of substance **W** had to be heated up, Sam suggested two different set-ups as shown in Fig 2.1.

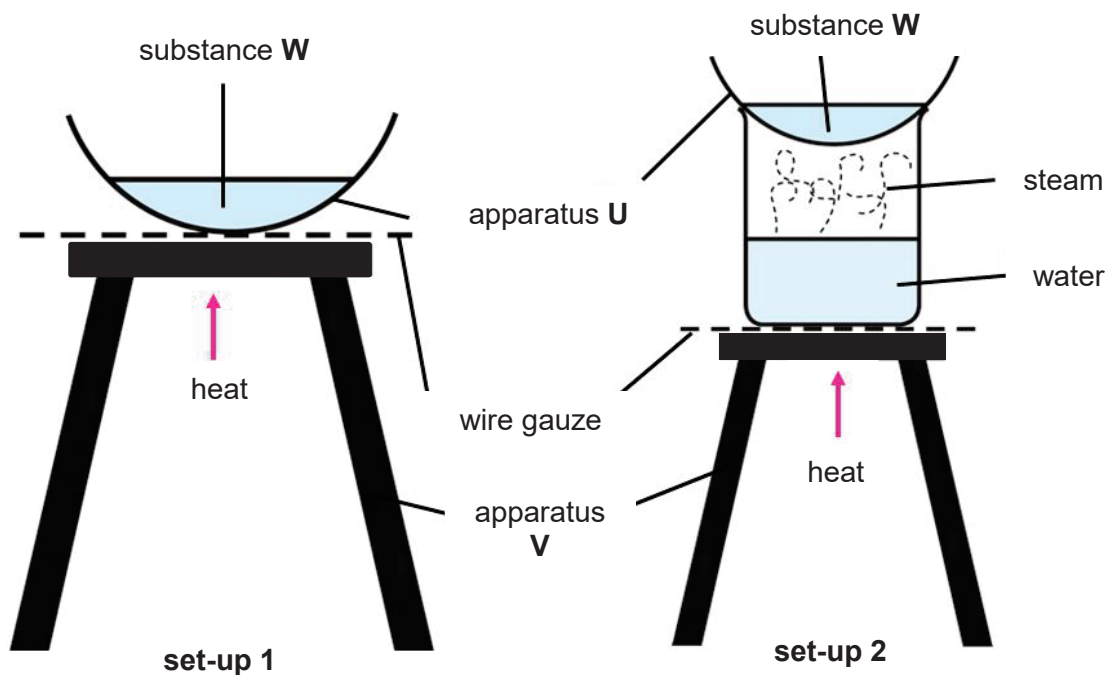


Fig 2.1

- (i) Name the following apparatus and state their functions.

	name	function
<b>U</b>		
<b>V</b>		

[4]

- (ii) With reference to all the information provided, suggest which set-up (1 or 2) would be more suitable for heating up substance **W** and give a reason for your choice.

.....  
 ..... [1]

3 Classify the following substances into elements, compounds or mixtures.

*aluminium, calcium carbonate, milk, water*

	element	compound	mixture
substance			

[4]

4 Jackson wants to obtain a sample of clear water from a suspension of muddy water. Fig 4.1 shows the diagram of the set-up that can be used to obtain a sample of clear water.

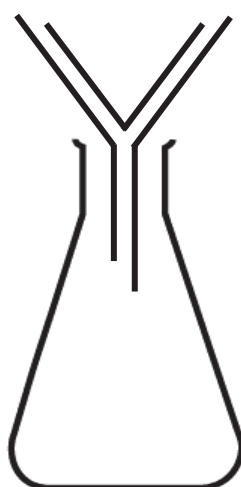


Fig 4.1

(a) In Fig 4.1, label and/or draw:

(i) where clear water will be collected [1]

(ii) the residue and the filtrate [1]

(b) What is the name of this separation technique?

..... [1]

(c) Is the sample of clear water obtained safe for drinking? Explain your answer.

.....  
 ..... [2]

5 Fig 5.1 shows the structure of a type of bacterium.

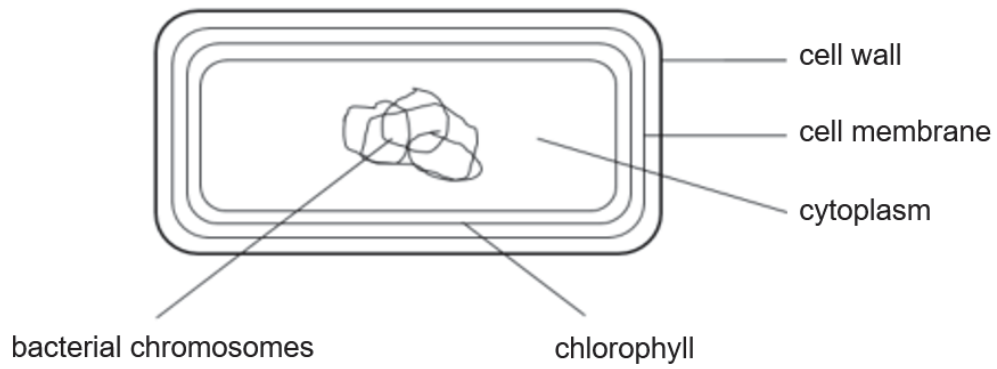


Fig 5.1

(a) Identify two similarities between a typical plant cell and the bacterium.

.....  
.....  
.....

[2]

(b) Identify two differences between a typical plant cell and the bacterium.

.....  
.....  
.....

[2]

(c) Suggest how it is able to obtain food for survival.

.....

[1]

- 6 William conducted an experiment on a bottle of drink to observe the expansion of gases as shown in Fig 6.1.

He recorded his experiment in the following steps:

Step 1: Place a sealed bottle of drink on the table without shaking its contents.

Step 2: Place the sealed bottle of drink slowly into a basin of hot water.

Step 3: Open the sealed bottle and quickly put a balloon on the mouth of the bottle as shown in the below.

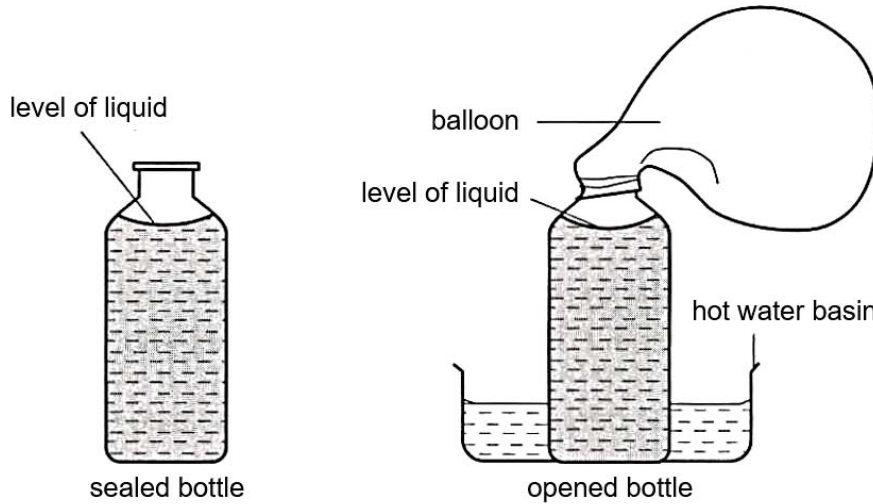


Fig 6.1

- (a) William noticed that the balloon slowly got bigger after Step 3. Explain why the balloon increased in size.

.....  
 .....  
 .....

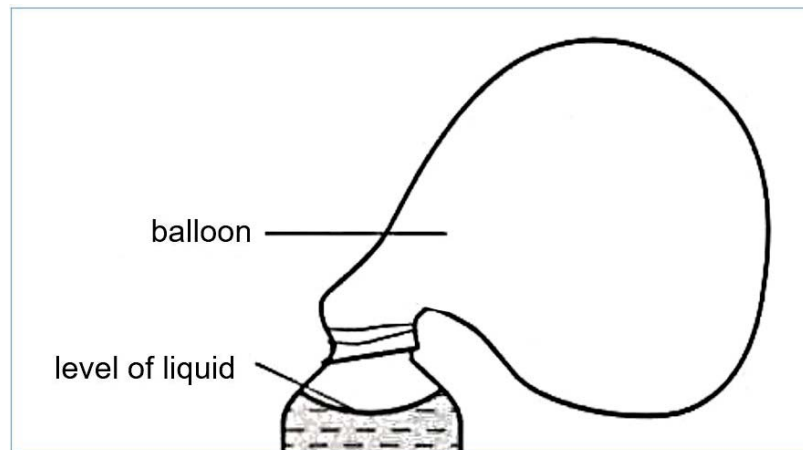
[2]

- (b) According to the Particulate Nature of Matter, describe the arrangement and the movement of the particles in the balloon.

.....  
 .....  
 .....

[2]

- (c) Draw the arrangement of particles in the balloon.



[1]

- (d) State the physical property of the balloon which remained unchanged throughout the experiment.

.....

[1]

7 Fig 7.1 below shows the blood flow in a blood vessel, **X** and some living body cells found near it. The arrows represent exchange of gases **Y** and **Z** between living body cells and blood vessel.

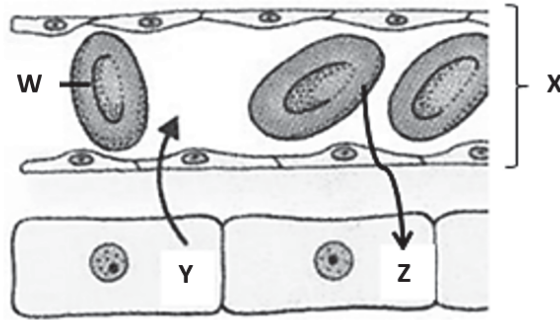


Fig 7.1

(a) Identify cell **W** in the blood and gases **Y** and **Z**.

- cell **W** ..... [1]
- gas **Y** ..... [1]
- gas **Z** ..... [1]

(b) Identify blood vessel **X**.

- ..... [1]

(c) State and explain how the structure of blood vessel **X** makes it well-suited for its function.

- .....
- ..... [2]

(d) Name one other type of blood vessel present in the body.

- ..... [1]

(e) Describe the adaptation of the blood vessel mentioned in (d) in relation to its function.

- .....
- ..... [2]



**Section B: 20 marks**

Answer any **two** questions. Write your answers in the spaces provided on this paper.

**8** The following shows a list of physical properties.

<i>boiling point,</i>	<i>density,</i>	<i>electrical conductivity,</i>	<i>flexibility,</i>
<i>hardness,</i>	<i>melting point,</i>	<i>strength,</i>	<i>thermal conductivity.</i>

**(a)** Indicate the physical property that is being described in the following statements. Each physical property can only be used once or not at all.

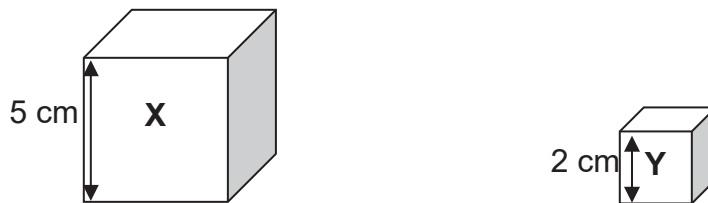
**(i)** an archer pulls her bowstring back before releasing the arrow .....

**(ii)** a baker uses thick gloves to hold a tray of muffin from the oven .....

**(iii)** a nylon rope can take the weight of three mountain climbers without snapping .....

**(iv)** the casing of wires and switches are usually made of plastic ..... [4]

**(b)** Two cubes made of different materials are shown in Fig 8.1. The mass of cube **X** and **Y** are 16.0 g and 20.0 g respectively.



**Fig 8.1**

A model was made by joining three cubes of **X** and five cubes of **Y**.

**(i)** Calculate the volume of the model.

volume = ..... cm<sup>3</sup> [1]

(ii) Calculate the mass of the model.

mass = ..... g [1]

(iii) Calculate the density of the model.

mass = ..... g/cm<sup>3</sup> [2]

(iv) The model is placed in a beaker of water. State and explain whether the model will float or sink in water. (density of water = 1.00 g/cm<sup>3</sup>)

.....

.....

..... [2]

9 (a) State two main differences between osmosis and diffusion.

.....

.....

.....

..... [4]

(b) Fig 9.1 below shows an experimental set-up using Visking tubing X and Y.

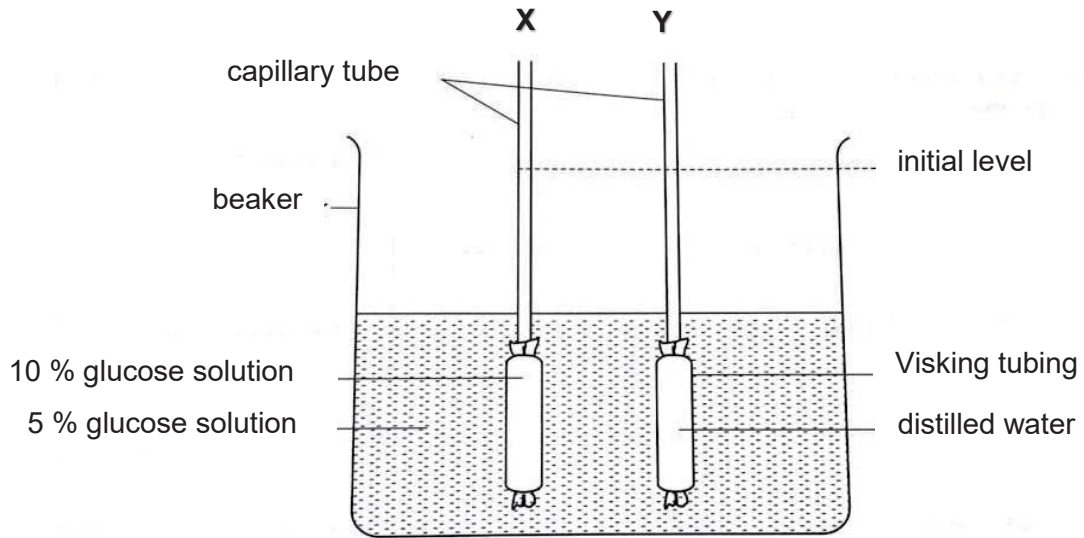


Fig 9.1

Visking tubing X contains 10 % starch solution and Visking tubing Y contains distilled water. They are both placed in 5 % starch solution for 12 hours.

(i) State and explain what would happen to the solution level in the capillary tube of Visking tubing Y.

.....

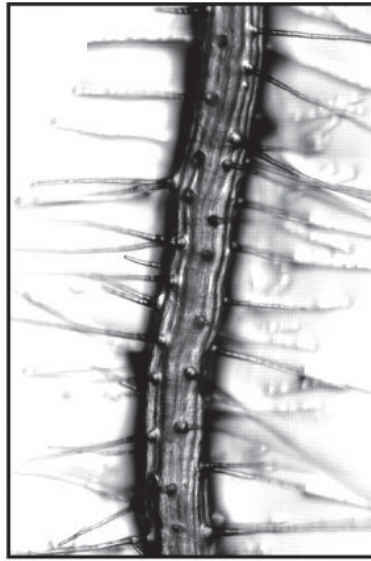
.....

.....

.....

..... [3]

- (c) Fig 9.2 below shows root hairs, which are specialised cells. They have structural adaptations which increases the rate of absorption of water and dissolved mineral salts into the plant system.



**Fig 9.2**

- (i) State the structural adaptations that root hair cells have.

..... [1]

- (ii) Name one another specialised cell and state its structural adaptation.

.....  
.....  
..... [2]

10 Fig 10.1 shows two different types of excavators of the same mass.

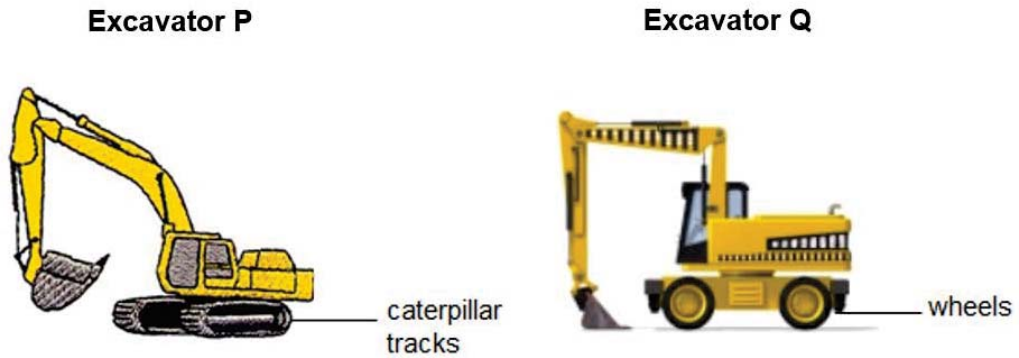


Fig 10.1

(a) State which excavator is more suitable for operating on soft, muddy ground.

Explain your answer using the concept of pressure.

.....

.....

.....

.....

[3]

(b) Fig 10.2 below shows a fork-lift truck with a mass of 2275 kg transporting a load.

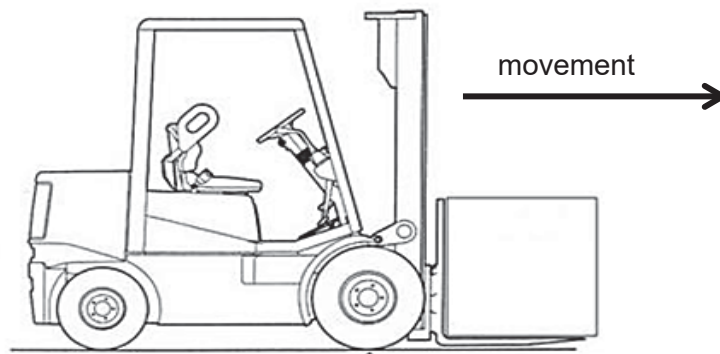


Fig 10.2

(i) Draw and label a force, other than weight, acting on the **fork-lift truck** in Fig 10.2 when it moves in the direction shown.

[2]

- (ii) Calculate the weight of the fork-lift, given that gravitational field strength is 10.0 N/kg.

weight = ..... N [2]

- (iii) The total contact area of all the wheels of the fork-lift with the ground is 3.20 m<sup>2</sup>.

Calculate the pressure exerted on the ground by the fork-lift **with its load** given that the fork-lift truck has four wheels and the load weighs 2400 N.

pressure = ..... Pa [3]

**END OF PAPER 2**

# The Periodic Table of Elements

		Group																																																																															
I	II	III	IV	V	VI	VII						0																																																																					
3 Li lithium 7	4 Be beryllium 9	11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Mc moscovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganeson -

1  
H  
hydrogen  
1

**Key**  
proton (atomic) number  
atomic symbol  
name  
relative atomic mass

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

lanthanoids













actinoids

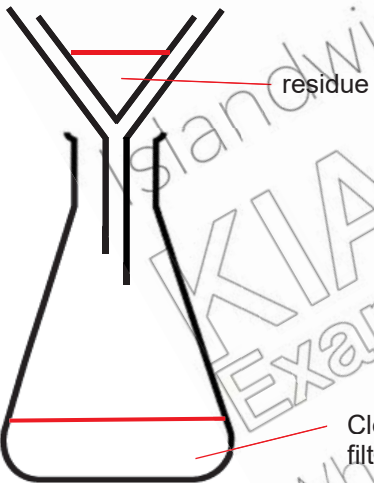


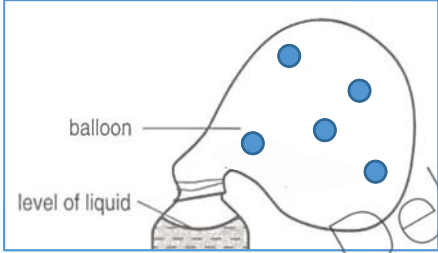


**Answer Scheme**  
**Sec 1E SA 2 General Science 2018**

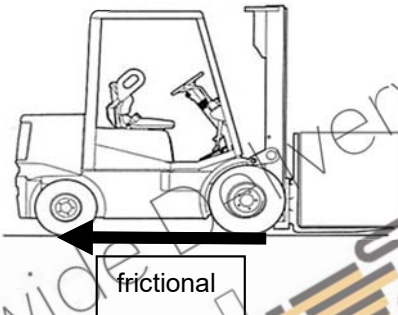
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
B	D	A	A	C	A	A	A	D	D
<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
A	D	D	D	A	B	D	D	C	C
<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>					
B	C	D	C	D					

Qn	Answer	Marks	Remark												
<b>1</b>															
<b>a</b>	She was trying to investigate <u>how well plants grow</u> when exposed to <u>different amounts of light</u> / <u>any prediction given accepted</u> but students must <b>focus on the intensity/amount of light instead of type/source of light</b>	1	No question format acceptable												
<b>b</b>	Plants grow <u>better</u> under <u>higher</u> amounts of light / <u>the greater the amount of light, the taller the plant will grow</u> / <u>grow best under direct (greater amount) light</u>	1	Relationship must be given; i.e greater amount of light = greater growth												
<b>ci</b>	Independent	1 for any two correct ans, total 2 marks													
<b>cii</b>	Controlled														
<b>ciii</b>	Dependent														
<b>civ</b>	Controlled														
<b>2</b>															
<b>a</b>	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>hazard warning symbol</td><td></td><td></td></tr> <tr> <td>substance</td><td>Z</td><td>W</td></tr> <tr> <td>hazard warning symbol</td><td></td><td></td></tr> <tr> <td>substance</td><td>X</td><td>Y</td></tr> </table>	hazard warning symbol			substance	Z	W	hazard warning symbol			substance	X	Y	1 for any two correct ans, total 2 marks	
hazard warning symbol															
substance	Z	W													
hazard warning symbol															
substance	X	Y													

bi		name	function	1,1	'Evaporation dish' not accepted	
	U	<u>evaporating dish</u>	To <u>evaporate the liquid/substance</u> in a solution			
	V	<u>tripod stand</u>	For <u>supporting apparatus during heating</u>	1,1		
bii	Set-up 2 As substance W is <u>flammable</u> , it may <u>catch fire</u> if it is close to open flames			1	No mark for only stating correct setup	
3		element	compound	1 each	Total 4 marks	
	substance	<i>aluminium</i>	<i>calcium carbonate water</i>			<i>milk</i>
4	ai aii				1 (clear water) 1 (filtrate, residue)	*must draw a line to indicate clear water level *line for residue is optional
	b	Filtration			1	
	c	No Filtration is only able to <u>separate substances</u> that are <u>not soluble in water/solvent</u> / The water may still <u>contain harmful substances/ bacteria/ virus/ chemicals</u> that are soluble			1 1	No mark for only stating 'No'
5	a	Bacterium has a <u>cell wall / regular shape / fixed shape / an ability to photosynthesize / cytoplasm / cell membrane / chlorophyll</u>			2	Accept any one answer.
	b	Bacterium does not have <u>one large vacuole / chloroplasts / thin layer of cytoplasm / nucleus / mitochondria / ribosome</u>			2	Accept any one answer.

c	It is able to <u>photosynthesize/produce/manufacture/ make its own food</u> .	1	
6	<p>a Heat energy gained by air particles in the balloon <u>caused them to move faster</u>, increasing collisions between them and <u>increasing distance between each particle</u>. Thus, the size of balloon increased.</p> <p>b Gas <u>particles are far apart from one another/ there are large spaces between particles</u> and <u>move rapidly at random/ fast and randomly</u>.</p> <p>c </p> <p>d <u>Mass/amount of substance/number of particles in the balloon remains unchanged</u>.</p>	2 2 1 1	Accept at least three particles with substantial distance between them.
7	<p>a W: red blood cell Y: carbon dioxide Z: oxygen</p> <p>b X: capillary/ capillaries</p> <p>c Capillaries are <u>one-cell thick wall [1]</u> to allow for the <u>exchange of/carry dissolved substances/materials</u> in and out of the cell efficiently through <u>diffusion [1]</u>.</p> <p>d Artery or Vein</p> <p>e Veins have <u>valves [1]</u> to <u>prevent backflow of blood [1]</u>, OR Arteries have <u>thick walls [1]</u> to <u>withstand high blood pressure or strong flow of blood [1]</u>.</p>	1 1 1 1 2 1 2	Allow for ecf if students had given 'artery' or 'vein' as answer for B3b  Accept either of the answers

Qn	Answer	Marks	Remark
<b>8</b>			
<b>ai</b>	Flexibility	1	
<b>aii</b>	Thermal conductivity	1	
<b>aiii</b>	Strength	1	
<b>aiv</b>	Electrical conductivity	1	
<b>bi</b>	Total volume = $5^3 \times 3 + 2^3 \times 5 = 415 \text{ cm}^3$	1	
<b>bii</b>	Total mass = $16 \times 3 + 20 \times 5 = 148 \text{ g}$	1	
<b>biii</b>	Overall density = mass/volume = $148/415$ = $0.357 \text{ g/cm}^3$	FS-1 AU-1	
<b>biv</b>	Float As the density of the model is lower than water.	1 1	
<b>9</b>			
<b>a</b>	Osmosis requires a <u>partially permeable membrane</u> whereas diffusion can occur <u>with or without a membrane</u> . Osmosis is a transport process which occurs for <u>water molecules only</u> whereas diffusion occurs to <u>all other types of molecules</u> .	2 2	
<b>bi</b>	Water level in Visking tubing Y will <u>decrease</u> [1]. <u>Water potential inside the Visking tubing is lower than outside the Visking tubing</u> [1]. <u>Water molecules will move out of Visking tubing Y through osmosis</u> [1].	3	Penalise 1m for any missing phrases that are underlined
<b>ci</b>	<u>Long and narrow extension</u> .	1	
<b>cii</b>	Red blood cell; biconcave shape/ no nucleus/contains haemoglobin Xylem cell; hollow/continuous column/walls supported by lignin Sperm cell; tail for mobility/ tail to swim	2	
<b>10</b>			
<b>a</b>	Excavator P. Using caterpillar tracks, <u>the contact area increases</u> [1]. This <u>reduces the pressure</u> [1] acting on the ground and hence <u>delay the sinking / prevents them from sinking in soft, muddy ground</u> [1].	1 1 1	

<p><b>b</b></p>	 <p style="text-align: center;">frictional</p>	<p>2</p>	<p>1m – contact force drawing 1m - label</p>
<p><b>c</b></p>	<p>Weight = Mass x Gravitational Field Strength              = 2275 x 10              = 22750              = 22800 N (3 s.f)</p> <p>Pressure = force / area              = 22750 + 2400 N / (3.2)              = 25150 / 3.2              = 7859.375 Pa              = 7860 Pa (3 s.f)</p>	<p>1  1  1  1</p>	<p>F + S  A + U (Allow for ecf)  F + S  A + U (Allow for ecf)</p>



Class	Full Name	Index Number
-------	-----------	--------------



## END OF YEAR EXAMINATION 2018

# O

*I believe, therefore I am*

### SCIENCE

Secondary 1 Express

**5 Oct 2018**

**2 hours**

**Additional Material: OTAS Sheet**

### READ THESE INSTRUCTIONS FIRST

Write your name and index number on all the work you hand in.  
Write in dark blue or black pen.  
You may use a soft pencil for any diagrams, graphs or rough working.  
Do not use staples, paper clips, highlighters, glue or correction fluid.

#### **Section A (Multiple-Choice Questions)**

There are **thirty** questions in this section. Answer **all** questions.  
For each question there are four possible answers, **A, B, C** and **D**.  
Choose the **one** you consider correct and record your choice on the **OTAS** provided.

#### **Section B (Structured Questions)**

Answer **all** questions in the spaces provided.

#### **Section C (Free-Response Questions)**

Answer **all** questions in the spaces provided.

The number of marks is given in brackets [ ] at the end of each question or part question.

In calculations, you should show all steps in your working, giving your answer at each stage.

At the end of the examination, fasten all your work securely together.

The total number of marks for this paper is **100**.

**DO NOT OPEN THIS PAPER UNTIL  
YOU ARE TOLD TO DO SO.**

<i>For Examiner's Use</i>	
Section A	30
Section B	50
Section C	20
Total	100

This document consists of **31** printed pages including Periodic Table.

Setter: Mr Habib

**Section A**Answer **all** questions.

The total mark for this section is 30.

Choose the **one** you consider correct and record your choice in the OTAS provided.

- 1 Which of the following describes the luminous flame and the state of the corresponding air hole of a Bunsen burner?

	colour of flame	air hole of Bunsen burner
A	blue	closed
B	blue	open
C	orange	closed
D	orange	open

- 2 The following statement is written by a student who has just measured the heights of two potted plants which are placed at different locations.  
*"When a plant receives sufficient sunlight, it grows to be taller than a plant that does not receive sufficient sunlight."*

At which stage is the student carrying out the scientific method?

- A asking a question  
 B constructing a hypothesis  
 C drawing a conclusion  
 D making an observation
- 3 Which of the following matches the apparatus to its function correctly?

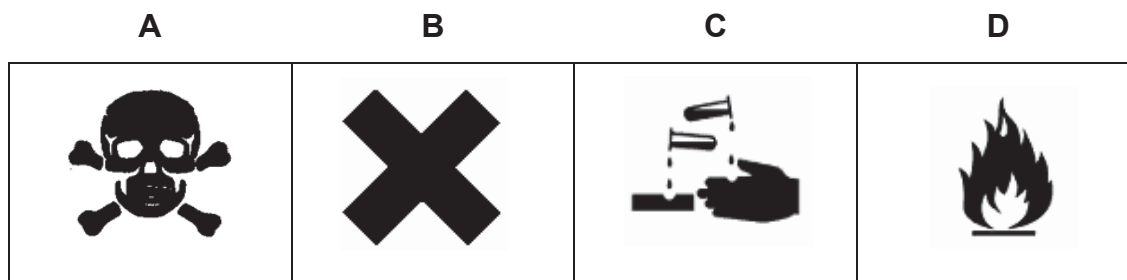
	apparatus	function
I	beaker	to contains chemicals or collect liquids
II	filter funnel	to separate different types of liquids
III	bell jar	to separate the set-up of an experiment from its surroundings

- A I and II only  
 B I and III only  
 C II and III only  
 D All of the above

**[Turn over**



4 Which label should be on a bottle of concentrated sulfuric acid?



5 In which of the following situations can parallax error occur?

- I Using an electronic balance to measure the mass of a beaker.
- II Reading the volume of a liquid from a measuring cylinder.
- III Estimating the area of an irregular shaped figure by counting the squares.
- IV Using a metre rule to measure the length of a cloth for making curtains.

- A I and III
- B II and IV
- C I, II and IV
- D IV only

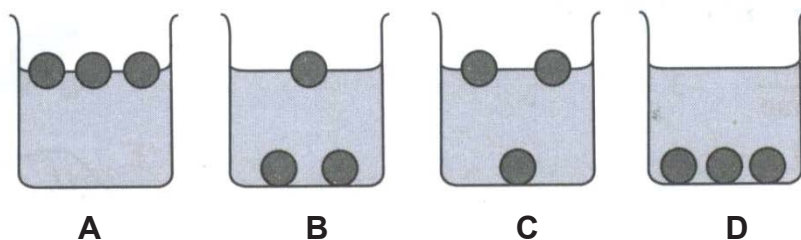
6 The table shows the properties of four different materials. Which material is possibly a metal?

	<b>Density</b>	<b>Electrical conductivity</b>	<b>Appearance</b>
<b>A</b>	low	poor	yellow
<b>B</b>	low	good	black
<b>C</b>	high	poor	colourless
<b>D</b>	high	good	shiny

[Turn over

- 7 Three balls have densities of  $0.8 \text{ g/cm}^3$ ,  $1.0 \text{ g/cm}^3$  and  $1.4 \text{ g/cm}^3$  respectively. They are immersed in four beakers carrying different liquids.

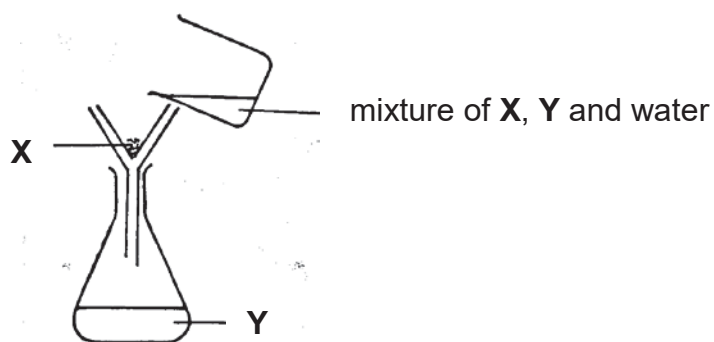
Which of these beakers holds a liquid of density  $1.1 \text{ g/cm}^3$ ?



- 8 The chemical formula for the compound calcium carbonate is  $\text{CaCO}_3$ . Which of the following correctly identifies the elements found in calcium carbonate?
- A calcium and carbon dioxide only  
 B calcium and cobalt only  
 C calcium, carbon and oxygen only  
 D calcium, copper and oxygen only
- 9 Vitamins A and E are soluble in fats. Fats act as ..... in the mixture.
- A a solute  
 B a solution  
 C a solvent  
 D a suspension
- 10 Joe wanted to obtain sugar from sugar solution by evaporating the solution through heating. Which of the following is the reason why he should **not** do it?
- A Evaporation forms impure sugar.  
 B Sugar decomposes on heating.  
 C Sugar has a high melting point.  
 D Sugar is a mixture, not a compound.

[Turn over

- 11 The following apparatus were set up as shown below.



Which of the following could be **X** and **Y**?

	<b>X</b>	<b>Y</b>
<b>A</b>	sand	chalk
<b>B</b>	sand	seawater
<b>C</b>	sugar	water
<b>D</b>	water	oil

- 12 The table below shows some information about the solubilities of three solids.

<b>solid</b>	<b>solubility in water</b>	<b>solubility in ethanol</b>
<b>M</b>	insoluble	soluble
<b>N</b>	insoluble	insoluble
<b>O</b>	soluble	insoluble

The following steps could be carried out to obtain pure **O** from a mixture of **M**, **N** and **O**.

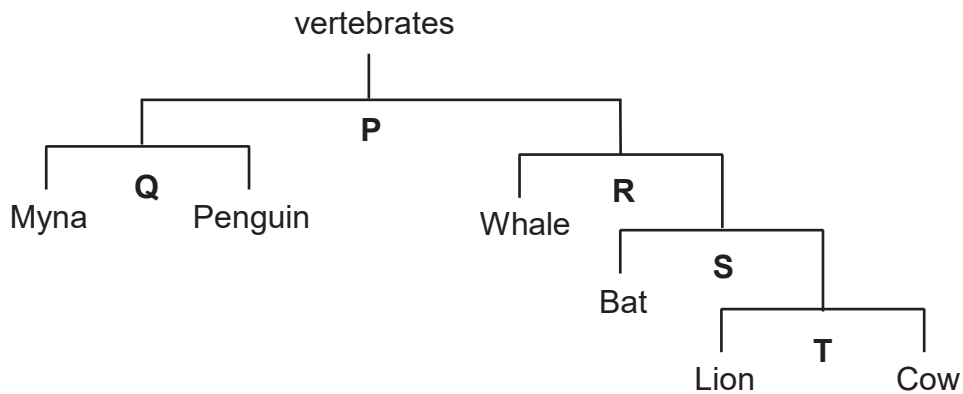
- I** add ethanol                      **III** filter  
**II** add water                        **IV** evaporate filtrate to dryness

Which of the following sequence shows the correct order?

- A** I → II → III → IV  
**B** II → I → IV → III  
**C** II → III → IV (exclude I)  
**D** I → III → IV (exclude II)

[Turn over

Refer to the following classification key for questions 13 and 14.

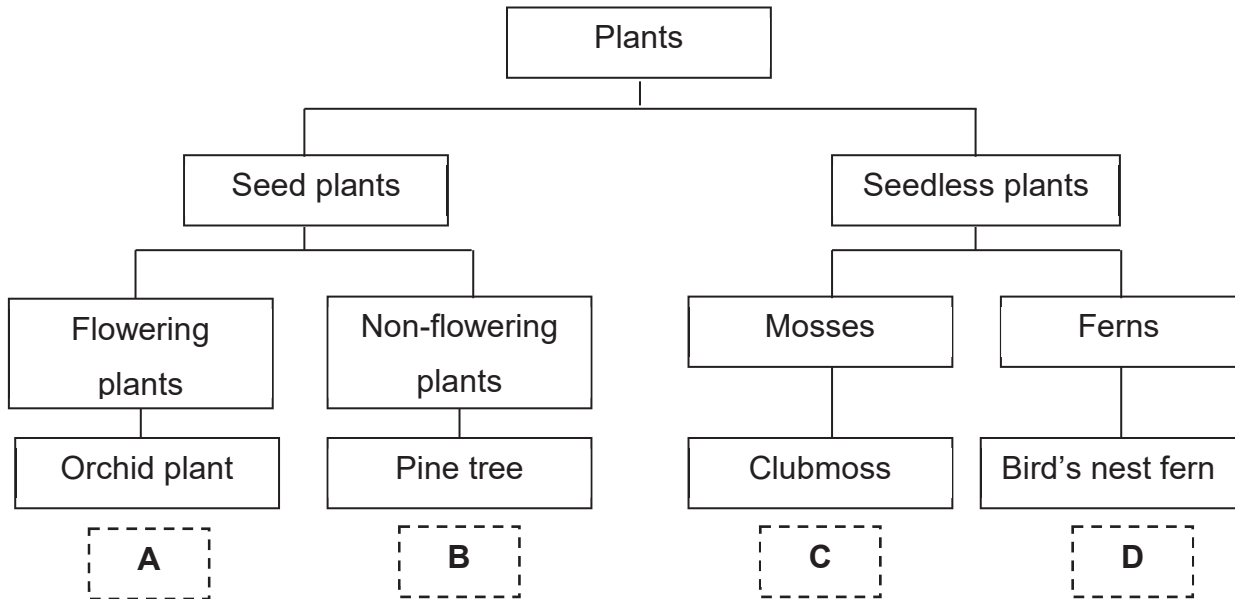


- 13 At which interval does division of vertebrates into mammals and birds occur?
- A P  
B Q  
C S  
D T
- 14 Which of the following shows the correct division at interval R?
- A Those that are big in size and those that are small in size.  
B Those that fly and those that do not fly  
C Those that lay eggs and those that give birth to their young alive.  
D Those that live in water and those that live on land.

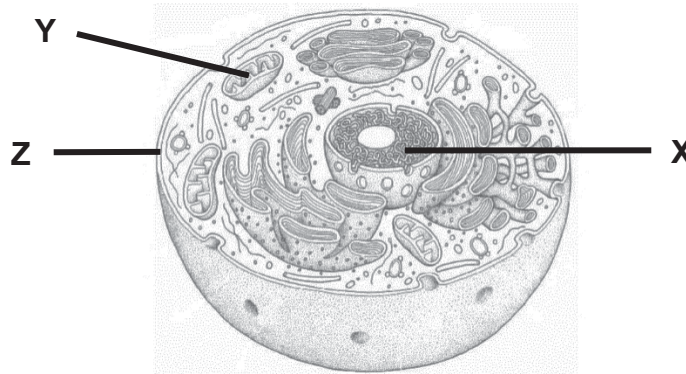
[Turn over

15 The following diagram shows a classification of plants.

In which of the following can a plant which has a bright yellow star-shaped flowers and berry-like fruits with seeds be classified under?



16 The diagram below shows a 3-dimensional (3D) image of an animal cell.



- I X controls all cellular activities.
- II Y controls the movement of substances in and out of the cell.
- III Z is partially permeable.

- A I and II only
- B I and III only
- C II and III only
- D All of the above

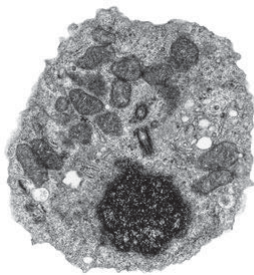
[Turn over

**17** Which of the following statements describes what will happen if a group of cells with a single function is damaged and can no longer do its work?

- A** An existing different group of cells will take over the function of the damaged cells.
- B** The body would produce another new type of cells to replace the damaged cells.
- C** The organ will continue to function normally.
- D** The organ will not function efficiently.

**18** Which of the following organization level does **not** correctly matches the diagram?

**A** **cell**



**C**

**organ**

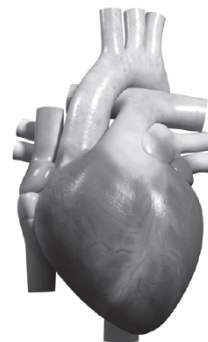


**B** **system**



**D**

**tissue**



**[Turn over**

- 19** When a liquid evaporates, some molecules escape from it and its temperature changes.

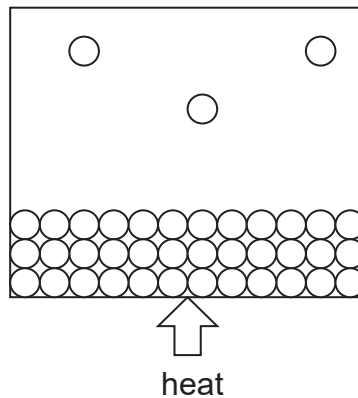
Where do the molecules escape from and what is the effect on the temperature of the liquid?

	<b>molecules escape from</b>	<b>temperature of liquid</b>
<b>A</b>	all parts of the liquid	decreases
<b>B</b>	all parts of the liquid	increases
<b>C</b>	surface of the liquid	decreases
<b>D</b>	surface of the liquid	increases

- 20** Which one of the following substances contains particles that move the fastest at room temperature?

- A** air
- B** margarine
- C** petrol
- D** water

- 21** The diagram below shows a change of state.

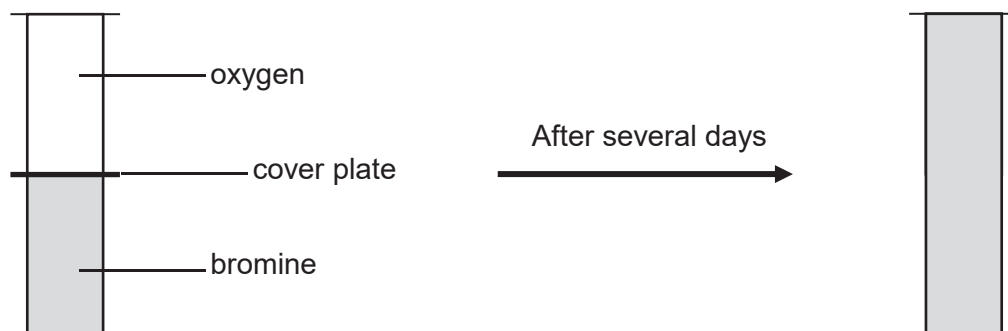


Which of the following refers to the process?

- A** boiling
- B** condensation
- C** evaporation
- D** sublimation

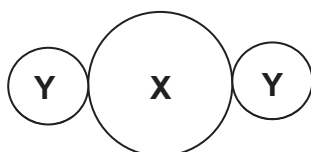
**[Turn over**

- 22 The cover plate was removed from the gas jar as shown in the diagram below. After several days, the colour of the gas was the same in both jars.



Which of the following statements explains this change?

- A Equal volumes of oxygen and bromine contain equal number of molecules.  
 B Oxygen and bromine gases have the different density.  
 C Oxygen and bromine molecules are in constant random motion.  
 D Oxygen and bromine molecules reacted and produced a new substance.
- 23 The diagram below represents a molecule. What would its chemical formula be?



What would be its chemical formula be?

- A XY  
 B X<sub>2</sub>Y  
 C XY<sub>2</sub>  
 D X<sub>2</sub>Y<sub>2</sub>

[Turn over



**24** An atom of element X has 6 protons and an atomic mass of 14.

- I** It is in Group IV of the Periodic Table.
- II** It is in Period 1 of the Periodic Table.
- III** The number of neutrons is 8.
- IV** The total number of protons and electrons is 14.

Which statements about an atom of X is correct?

- A** I and II only
- B** I and III only
- C** I, II and III only
- D** I, II, III and IV

**25** The chemical formula of ammonia is  $\text{NH}_3$ .

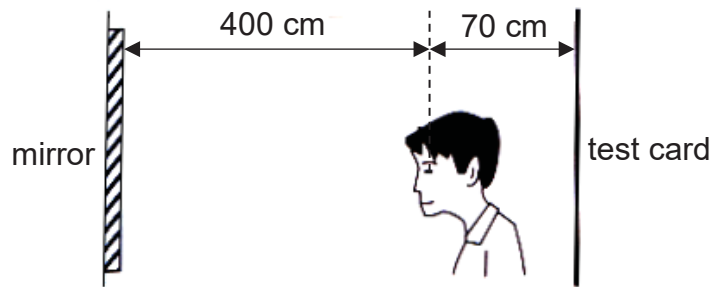
Which of the following has/have the same number of atoms as ammonia?

- |           |                 |            |                |
|-----------|-----------------|------------|----------------|
| <b>I</b>  | $\text{CO}_2$   | <b>III</b> | $\text{KNO}_2$ |
| <b>II</b> | $\text{PbCl}_2$ | <b>IV</b>  | $\text{SiO}_2$ |

- A** III only
- B** IV only
- C** II and III only
- D** I, II and IV only

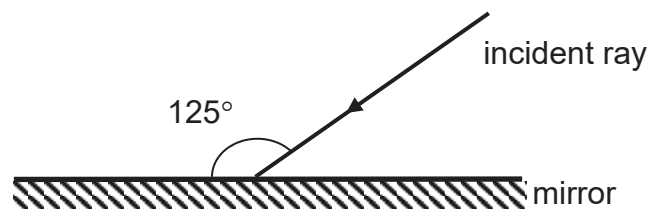
[Turn over

- 26 The diagram below shows a plane mirror placed at a distance of 400 cm in front of a man.



If the doctor's test card is fixed at 70 cm behind the man's eyes, what is the distance of the image of the test card to the man?

- A 470 cm  
 B 800 cm  
 C 870 cm  
 D 940 cm
- 27 The diagram below shows a light ray travelling towards a plane mirror.



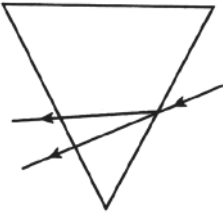
What is the angle of reflection?

- A  $25^\circ$   
 B  $35^\circ$   
 C  $55^\circ$   
 D  $125^\circ$

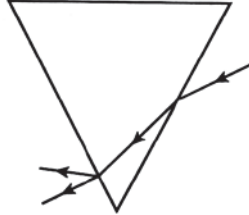
[Turn over

28 Which of the following shows the correct path taken by white light when it passes through a prism?

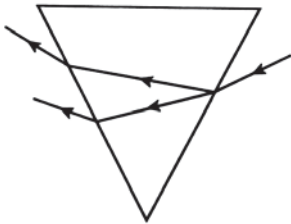
A



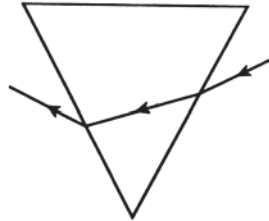
B



C

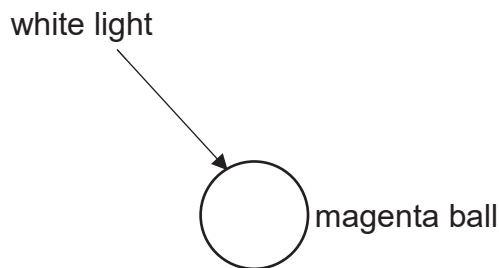


D



Refer to the diagram below to answer questions 29 and 30.

White light is shone onto a ball which is magenta in colour.



29 Which of the following light(s) will the ball reflect?

- A cyan light
- B red and yellow light
- C red and blue light
- D white light

[Turn over

- 30** If a green light is shone instead of the white light, what colour will the ball appear to be?
- A** black
  - B** green
  - C** magenta
  - D** white

**[Turn over**

**Section B**

Answer **all** the questions in this section in the spaces provided.  
The total mark for this section is 50.

*For  
Examiner's  
Use*

**B1** Convert the following physical quantities.

[3]

(a)  $1.2 \text{ l} = \dots\dots\dots \text{ cm}^3$

(b)  $3500 \text{ cm}^2 = \dots\dots\dots \text{ m}^2$

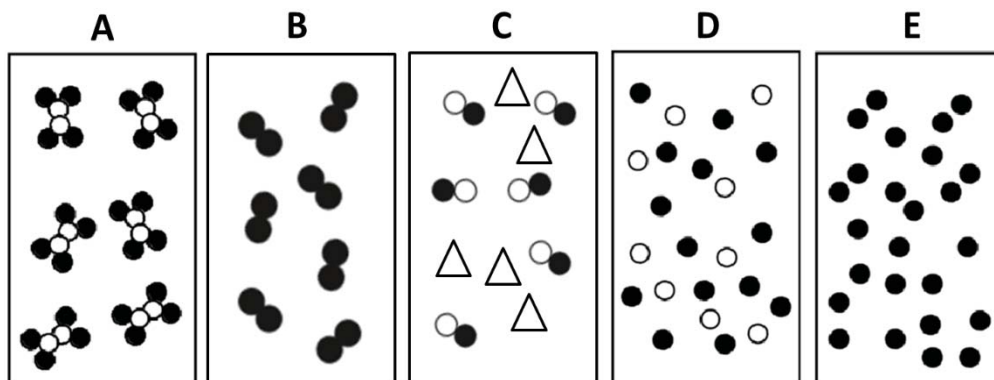
(c)  $72 \text{ km/h} = \dots\dots\dots \text{ m/s}$

[Total: 3 marks]

**[Turn over**

- B2** The diagrams in **Fig 2.1** show five containers, labelled **A** to **E**, filled with different substances. The symbols in the containers represent the particles that make up each substance.

For  
Examiner's  
Use



**Fig 2.1**

Use the letter **A**, **B**, **C**, **D** or **E** to answer the following questions.  
You may use each letter once, more than once or not at all.

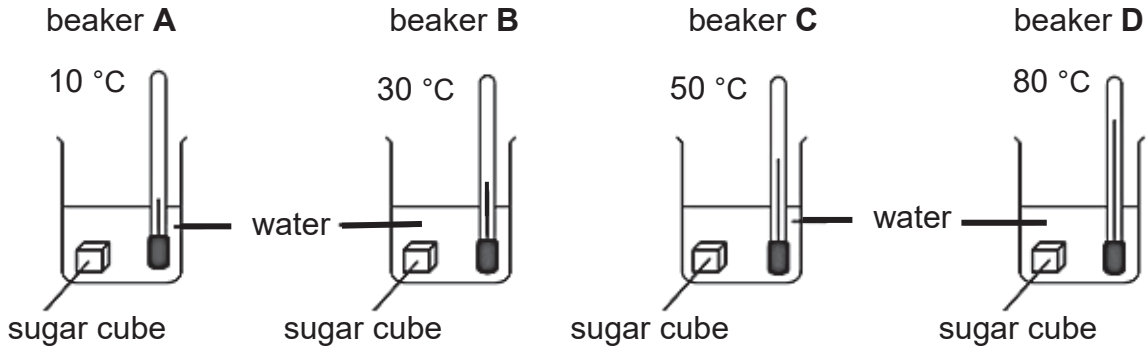
[4]

- (a) Which container(s) contain a mixture of atoms? .....
- (b) Which container(s) contain atoms of a single element? .....
- (c) Which container(s) contain only molecules? .....
- (d) Which container(s) contain only compounds? .....

[Total: 4 marks]

[Turn over

**B3** Mary set up an experiment as shown in **Fig 3.1**. In each of the beakers, she placed an identical sugar cube and poured equal amounts of water but at various temperatures into each beaker. She then measures the time that each sugar cube took to dissolve completely in the water.



**Fig 3.1**

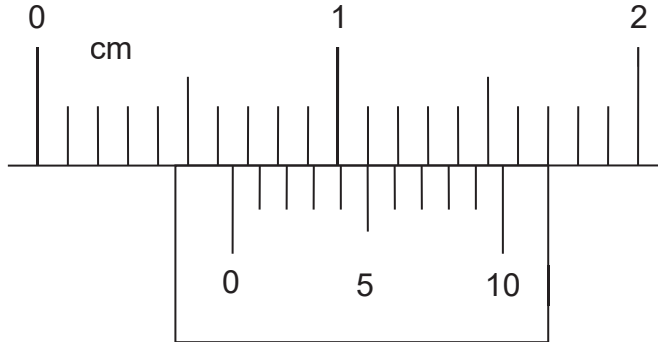
- (a) Suggest a possible hypothesis for this experiment.  
 .....  
 ..... [1]
- (b) Identify 2 controlled variables.  
 ..... [2]
- (c) Identify the independent variable of the experiment.  
 ..... [1]
- (d) Predict in which beaker will the sugar cube dissolve the fastest.  
 ..... [1]
- (e) State two other ways that can be used to shorten the time taken to dissolve the sugar cube in all the four beakers.  
 1. ....  
 2. .... [2]

[Total: 7 marks]

**[Turn over**

**B4** Tom bought a set of furniture. As he was assembling the furniture, he realised that a screw was missing. To replace the missing screw, he had to measure the diameter of the screw head using a pair of Vernier calipers.

(a) **Fig 4.1** shows the reading on the Vernier calipers.

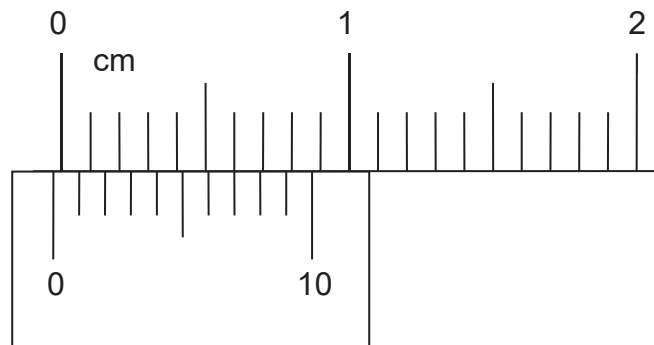


**Fig 4.1**

What is the reading shown on the Vernier calipers?

..... [1]

(b) After obtaining the reading on the Vernier calipers, Tom closed the Vernier calipers and found that there was a zero error. **Fig 4.2** shows when the Vernier calipers when closed.



**Fig 4.2**

(i) State the zero error.

..... [1]

(ii) Find the actual diameter of the screw head. Show your working clearly.

Actual diameter of screw: ..... [1]

[Total: 3 marks]

**[Turn over**



**B5** In **Table 5.1** shows some properties of three unknown materials.

*For  
Examiner's  
Use*

**Table 5.1**

materials	transparency	scratch test	melting point (°C)
<b>A</b>	opaque	Material <b>A</b> scratches material <b>B</b> .	150
<b>B</b>	transparent	Material <b>B</b> cannot scratch material <b>C</b> .	170
<b>C</b>	transparent	Material <b>C</b> scratches material <b>A</b> .	65

By comparing the physical properties of the three materials, state and explain which material is **most suitable** for making the following objects.

**(a)** A scratch-resistant container [2]

Material .....

Reason .....

.....

.....

**(b)** A boiling tube [2]

Material .....

Reason .....

.....

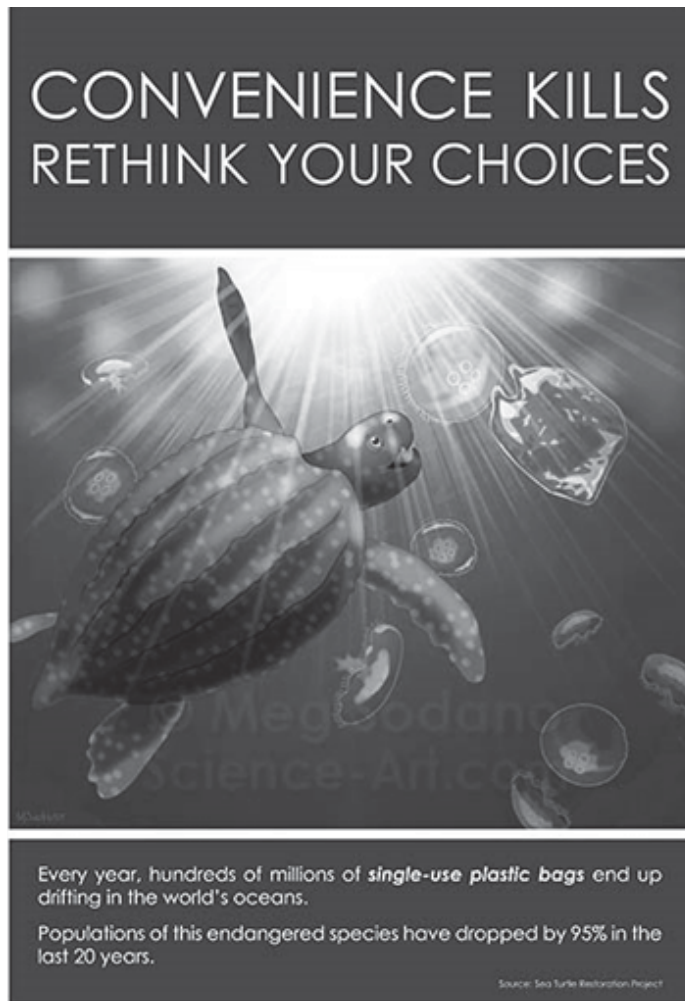
.....

[Total: 4 marks]

**[Turn over**

**B6 (a)** Fig 6.1 shows a poster about sea turtles, an endangered sea animal.

For  
Examiner's  
Use



**Fig 6.1**

(i) State the main threat to the population of sea turtles shown in Fig 7.1.

..... [1]

(ii) With reference to their effects on the ecosystem, explain why it is important to protect the sea turtles.

.....  
.....  
..... [2]

**[Turn over**

(iii) State one way in which the general public can help to improve the situation.

..... [1]

(b) **Fig 6.2** shows a knobby starfish that can be found living near the sandy coasts of Singapore island. The starfish is considered an endangered species in Singapore due to extensive land reclamation activity.



**Fig 6.2**

(i) Suggest how land reclamation in Singapore has negatively affected the knobby starfish that resulted in its decrease in population.

.....  
..... [1]

(ii) Give an example of a species which is endangered due to over-hunting.

..... [1]

[Total: 6 marks]

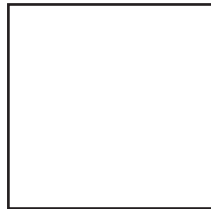
**[Turn over**

- B7 (a)** Susan was learning how to use a light microscope in the Science laboratory. She placed a letter 'R' under the microscope in the manner as shown in **Fig 7.1**.



**Fig 7.1**

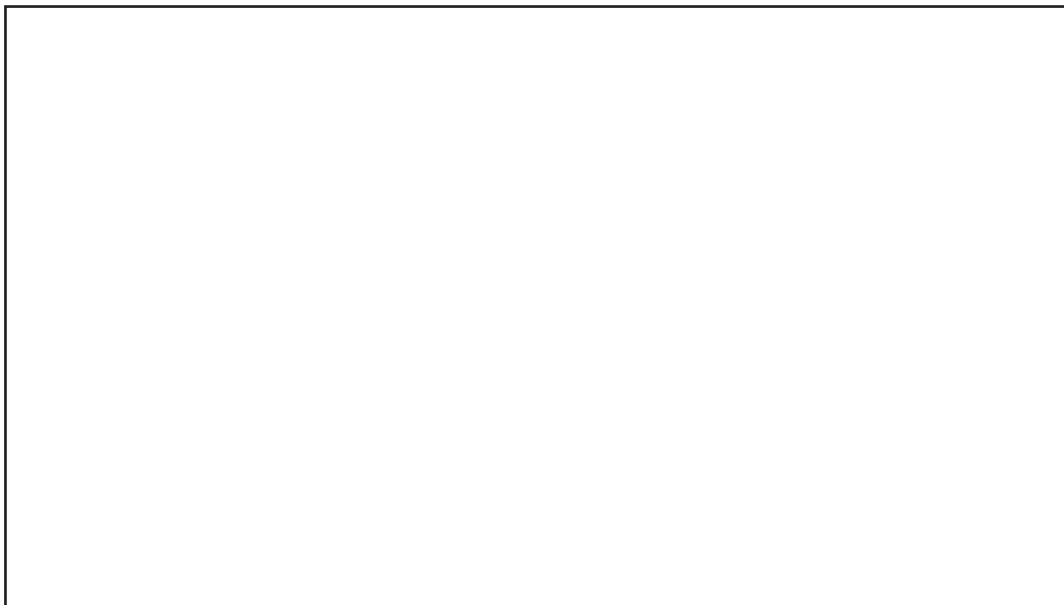
- (i)** Draw the image of the letter when it is placed under the microscope. [1]



- (ii)** When Susan changed the magnification of the lens to enlarge the image look bigger, she was able to see a bigger image. However, the image was blurred. What can Susan do to achieve a clear and sharper image?

.....  
..... [1]

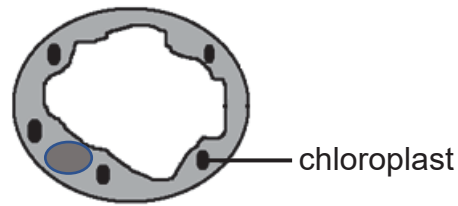
- (b)** Draw and label the image of a typical plant cell. [2]



**[Turn over**

(c) **Fig 7.2** shows a cell of a newly discovered organism, which scientists are not sure how to classify.

*For  
Examiner's  
Use*



**Fig 7.2**

(i) Give two reasons why this might be a plant cell.

Reason 1: .....

.....

Reason 2: .....

..... [2]

(ii) Give one reason why this organism might be an animal cell.

Reason: .....

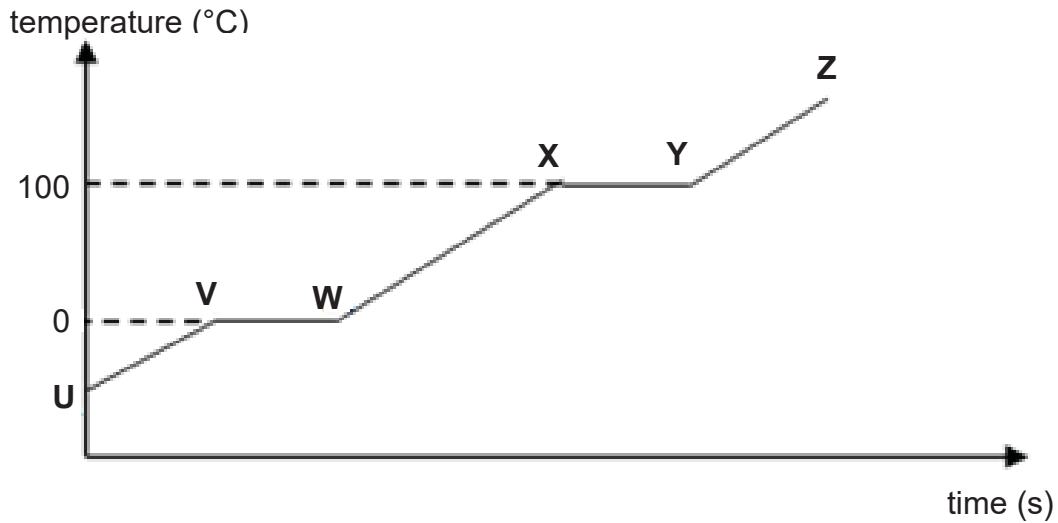
..... [1]

[Total: 7 marks]

**[Turn over**

**B8** Fig 8.1 shows the heating curve for substance P.

*For  
Examiner's  
Use*



**Fig 8.1**

- (a) Using the labels, **U – Z**, in **Fig 8.1**, state the respective points at which melting and boiling begins. [2]

process	point
melting	
boiling	

- (b) Describe using ideas about the particulate nature of matter, explain what is happening to the substance between points **V** to **W**.

.....  
 .....  
 ..... [2]

[Total: 4 marks]

**[Turn over**

**B9** Table 9.1 shows the melting and boiling points of some substances.

**Table 9.1**

substance	melting point / °C	boiling point / °C
<b>P</b>	- 100	- 56
<b>Q</b>	- 12	26
<b>R</b>	18	97
<b>S</b>	56	205

- (a) Indicate the physical states of each of the substances at 27°C by placing the letters **P**, **Q**, **R** and **S** under the correct headings in the table below. [2]

solid	liquid	gas

- (b) Draw the arrangement of particles in substance **P** at - 57 °C and 0 °C respectively. [2]



- 57 °C



0 °C

- (c) Substance **S** was heated from 100 °C to 180 °C. Predict what would happen to the density of substance **S**. Explain your answer, with reference to its mass and volume.

.....  
 ..... [2]

[Total: 6 marks]

[Turn over

**B10** Table 10.1 shows the number of electrons, neutrons and protons in substances A – E.

For  
Examiner's  
Use

**Table 10.1**

substance	number of electrons	number of neutrons	number of protons
<b>A</b>	11	12	11
<b>B</b>	13	14	13
<b>C</b>	15	16	15
<b>D</b>	17	18	17
<b>E</b>	2	4	2

(a) Choose one of the substances (A – E) which best fit(s) the descriptions below and give a reason to justify each of the answers.

(i) A noble gas

.....  
 ..... [2]

(ii) An atom of an element that belongs to Group I of the Periodic table

.....  
 ..... [2]

(b) Draw the electronic structure of substance C in the space provided. [2]

[Total: 6 marks]

**[Turn over**

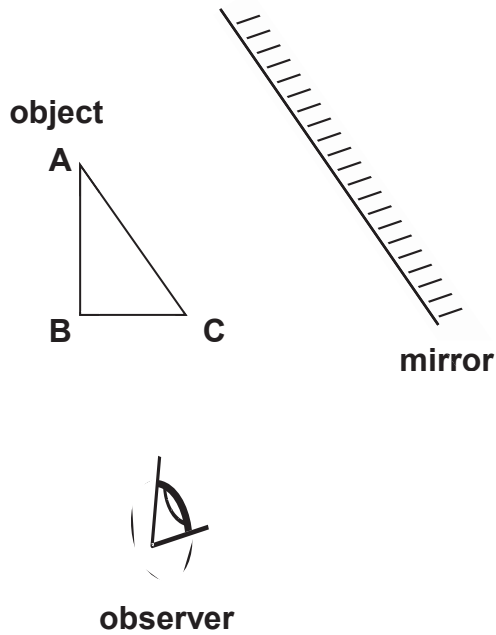


**Section C**

Answer **all** the questions in this section in the spaces provided.  
The total mark for this section is 20.

*For  
Examiner's  
Use*

**C1 (a)** In **Fig 11.1**, a triangular object **ABC** is placed in front of a plane mirror.



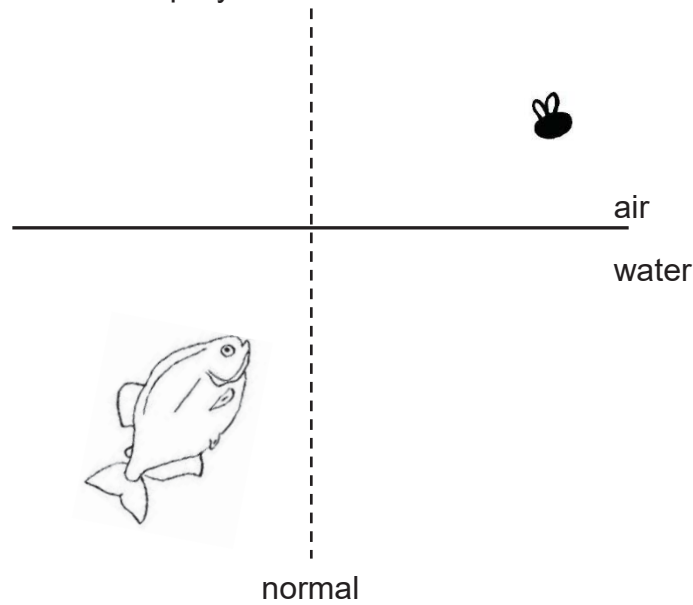
**Fig 11.1**

- (i) Draw the image of triangle **ABC** in the mirror.  
Label the image **A'**, **B'** and **C'** at each of the corresponding points. [1]
- (ii) On the same diagram, draw the paths of 2 light rays from **C** to indicate  
How the eye can see the image. [2]
- (iii) The image of the object is virtual.  
Explain what it meant by 'virtual'.

.....  
..... [1]

**[Turn over**

- (b) An archer fish catches insects above the water by shooting a jet of water to knock down the insects. The prey then falls into the water and is eaten by the fish.



**Fig 11.2**

- (i) On the diagram, draw the path of a ray of light from the insect to the fish. [1]
- (ii) On the same diagram, draw the path from the fish to where the image of the insect would be. [1]
- (iii) Explain, in terms of the refraction of light, why the image of the insect and the position of the insect are different.

..... [2]

.....

.....

- (iv) Explain why it would be a better option for the fish to shoot the jet of water from a position directly beneath the insect.

..... [2]

.....

.....

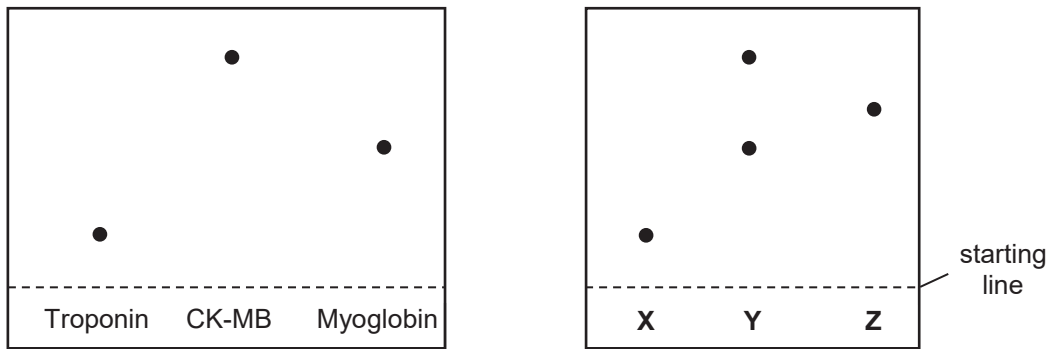
[Total: 10 marks]

**[Turn over**

- C2 (a)** Paper chromatography may be used in the detection of heart disease by detecting substances that are released when muscle cells are damaged or when patients have symptoms of heart diseases.

Troponin, CK-MB and Myoglobin are three substances that can be found in the blood of a patient at risk of a heart disease.

The chromatograms in **Fig 12.1** are those of the three substances, Troponin, CK-MB and Myoglobin and the blood samples of three patients, **X**, **Y** and **Z**.



**Fig 12.1**

- (i) Explain why the line should be drawn in pencil.

.....  
 ..... [1]

- (ii) Two of the patients may have heart disease. Identify the patients and the substance(s) that reveal that they may have heart disease.

Patient ..... → Substance(s) .....  
 Patient ..... → Substance(s) ..... [2]

- (iii) A student claimed that Myoglobin is more soluble than CK-MB in the given solvent. Do you agree with the student? Explain your answer.

.....  
 ..... [2]

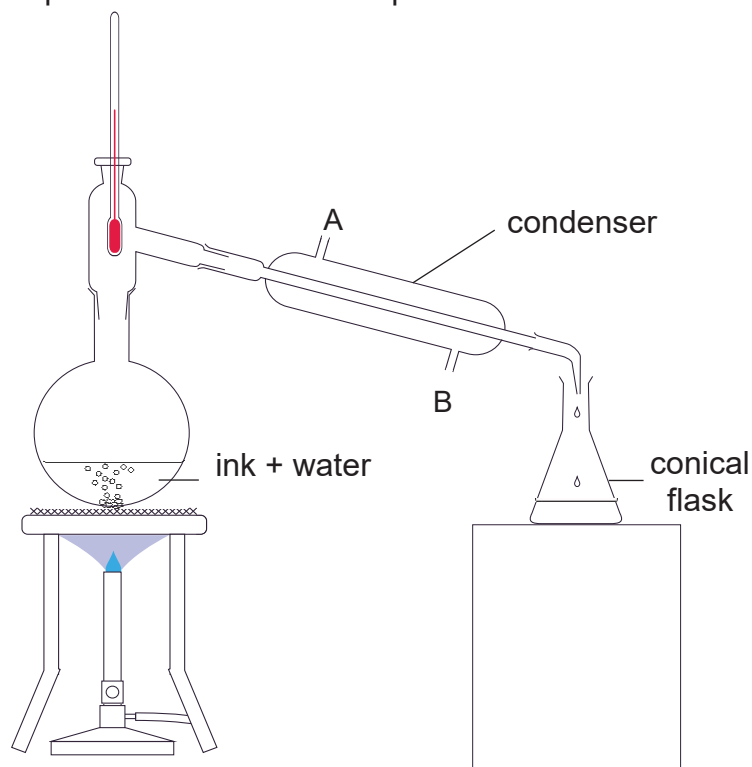
**[Turn over**

- (iv) Vasotec is a drug used to treat heart diseases. It has a chemical formula of  $C_{45}H_{65}N_{13}O_{12}S_2$ .  
Is Vasotec an element, compound or mixture? Explain your answer.

For  
Examiner's  
Use

.....  
..... [2]

- (b) A sample of water contains ink as an impurity. The apparatus in **Fig 12.2** is used to produce pure water from the sample.



**Fig 12.2**

- (i) Name this method of separation.  
..... [1]
- (ii) Water enters and leaves the condenser constantly. On the diagram, circle the location (**A** or **B**) where water enters the condenser. [1]
- (iii) What would be the approximate reading on the thermometer when liquid is starting to collect in the conical flask?  
..... [1]

[Total: 10 marks]

**END OF PAPER**

# The Periodic Table of Elements

		Group																																																																															
I	II	III	IV	V	VI	VII	0																																																																										
3 Li lithium 7	4 Be beryllium 9	11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Mc moscovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganesson -

**Key**

proton (atomic) number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).



## Bowen SS Sec 1 EOY 2018 Answer Scheme

## Section A

1	C	2	C	3	B	4	C	5	B
6	D	7	C	8	C	9	C	10	B
11	B	12	C	13	A	14	D	15	A
16	B	17	D	18	D	19	C	20	A
21	D	22	C	23	C	24	B	25	A
26	C	27	B	28	C	29	C	30	A

Section B				
B1	a		1200 cm <sup>3</sup>	1m
	b		0.35 m <sup>2</sup>	1m
	c		20 m/s	1m

B2	a		D	1m
	b		E	1m
	c		A and B	1m
	d		A	1m
B3	a		The higher the temperature, the faster the sugar cube dissolves.	1m
	b		Mass of sugar cube Amount of water Type of beaker	Any 2 1m each
	c		temperature	1m
	d		Beaker D	1m
	e		1. stir the water 2. break the sugar cube into smaller pieces or (increase surface area)	1m 1m


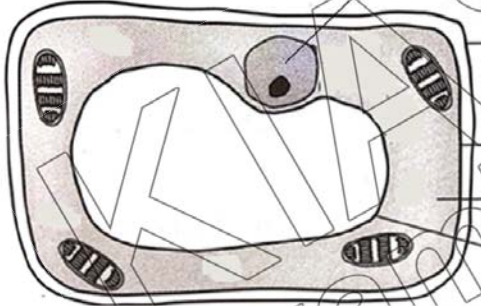


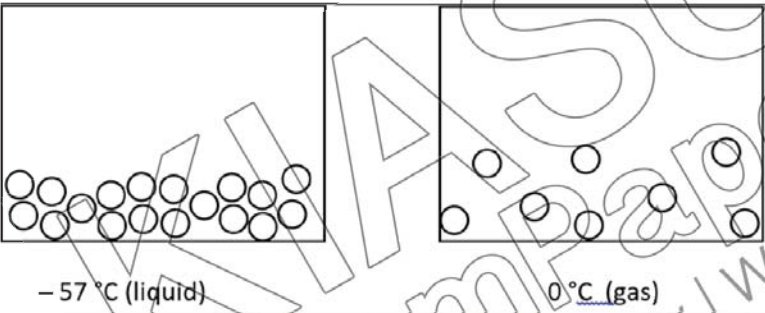
B4	a		0.65 cm	1m
	b	i	- 0.03 cm	1m
		ii	$0.65 - (-0.03) = 0.68$ cm	1m
B5	a		Material C. Material C is the hardest among the 3 materials.	1m 1m
	b		Material B. It has a high melting point and it is transparent.	1m 1m

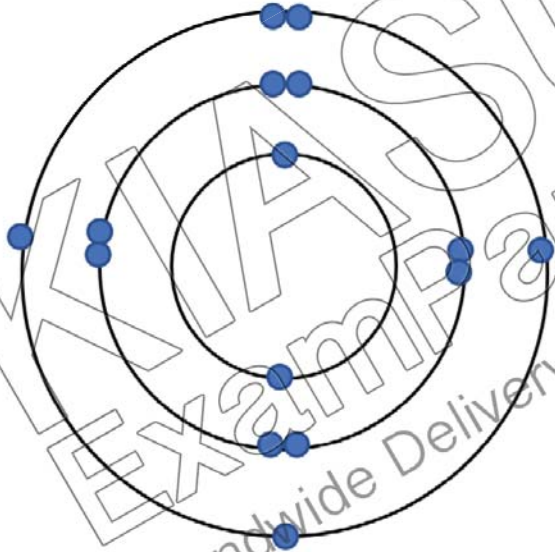
B6	a	i	Pollution (do not accept plastic bags)	1m
		ii	- to maintain the <b>biodiversity</b> for stable system in nature - each species in a system is dependent on one another	1m 1m
		iii	Create awareness/stop polluting the sea or ocean/ any other possible answers	
	b	i	The starfish has lost its habitat due to land reclamation	1m
		ii	Tiger, rhinoceros, any acceptable answer	1m

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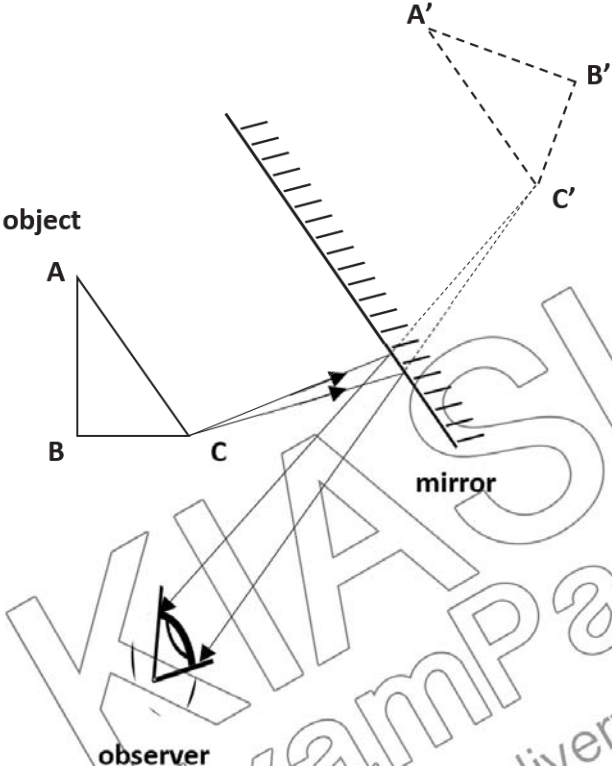


B7	a	i		1m for every 2 correct answers
		ii	Use the fine/coarse adjustment <b>knob</b> to make the image sharp	1m
				1m – cell diagram 1m – <b>6</b> correct labelling
	b	i	Presence of chloroplasts <b>One</b> single <b>large/central vacuole</b> present	1m 1m
		ii	Absence of cell wall	1m

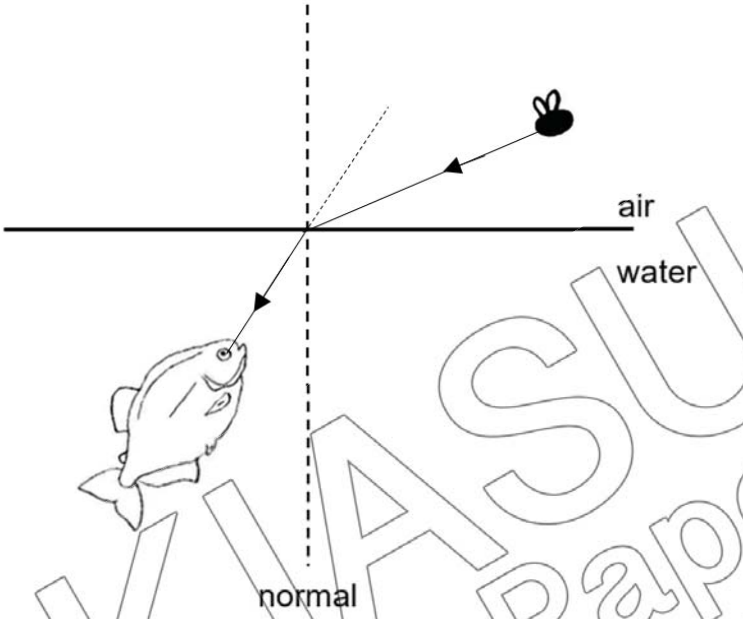
B8	a		Melting V Boiling: X	1m 1m
	b		Gains heat energy to enable particles to <u>overcome the forces the forces of attraction</u>  And the particles <u>move further away</u> from each other.	1m  1m
B9	a		Solid: S Liquid: R Gas: P and Q	1m for every 2 correct answers.
			 <p style="text-align: center;">- 57 °C (liquid)                      0 °C (gas)</p>	1m each  No overlap No diff size of particles
	c		The <u>density</u> of substance S will <u>decrease</u> . When heated from 100 °C to 180 °C, the <u>volume</u> of the substance will <u>increase</u> but the <u>mass</u> will <u>remain unchanged</u> . (if students mention only about the increase in volume, no marks will be awarded)	1m 1m

B10	a	i	Substance E It has complete number of electrons in its outermost shell	1m 1m
		ii	Substance A It has 1 electron in its outermost shell  <b>Penalise [1] if student did not <u>choose one</u> but has the correct answer among his response.</b>	1m 1m
	b			1m -correct number of shells 1m - correct number of electrons

Section C

C1	a	I n ii	 <p>The diagram illustrates a plane mirror experiment. An object, labeled 'object' and consisting of points A, B, and C, is placed in front of a vertical mirror. An observer is positioned to the left of the mirror, looking at the object's reflection. The image, labeled 'image' and consisting of points A', B', and C', is shown as a dotted, laterally inverted triangle behind the mirror. Light rays are shown originating from the object, reflecting off the mirror, and entering the observer's eyes. The mirror is labeled 'mirror'.</p>	<p>i) 1m – correct image (dotted, laterally inverted, equal distant from mirror, label)</p> <p>ii) 1m- 2 rays of light from object to mirror 1m-2 rays of light reflected on mirror and go into the eyes</p>
		iii	Image cannot be captured on a screen	1m



b	I & ii	 <p>The diagram illustrates the refraction of light. A horizontal line separates the 'air' region above from the 'water' region below. A vertical dashed line is labeled 'normal'. A coin is shown on the surface of the water. A solid line with an arrow represents the refracted ray of light traveling from the coin into the air, bending away from the normal. A dotted line represents the straight-line path of light from the coin's apparent position to the fish's eye in the water.</p>	<p>i) 1m – refracted ray of light</p> <p>ii) 1m -straight line, dotted above water</p>
	iii	<p>Light <u>travels slower</u> in water than in air and thus <u>bends towards the normal</u>. Therefore, the image appears at different place.</p>	1m each

		iv	Light rays pass through <u>unrefracted</u> when the rays are parallel to the normal. So fish sees the bug at the <u>correct position</u> .	1m 1m
C2	a	i	If a pen is used, the ink may <u>dissolve</u> in the solvent and <u>affect the result</u> .	1m
		ii	Patient X Substance: Troponin  Substance Y Substances: CK-MB and Myoglobin	1m  1m
		iii	No. CK-MB travelled further on the chromatogram paper compared to Myoglobin, thus CK-MB is more soluble	1m  1m
		iv	It is compound. It is made up of more than one element.	1m 1m



	b	i	Simple distillation	1m
		ii	B	1m
		iii	100°C	1m

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Index Number	Class	Name
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## CHIJ ST JOSEPH'S CONVENT SEMESTRAL ASSESSMENT 2



### SCIENCE (CHEMISTRY)

Secondary 1 Express

Friday, 5 October 2018  
50 minutes

#### READ THESE INSTRUCTIONS FIRST

Write your index number, class and name on all the work you hand in.  
Write in dark blue or black pen.  
Do not use staples, paper clips, highlighters, glue or correction fluid.

#### Section A

There are **ten** questions. Answer **all** questions. For each question there are four possible answers **A, B, C, and D**.

Choose the **one** you consider correct and shade your choice in the Multiple Choice Answer Sheet with a 2B pencil.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

#### Section B

Answer **all** questions in the spaces provided.

The number of marks is given in brackets [ ] at the end of each question or part question.

Show all your working on the same page as the rest of the answer.

Omission of essential working will result in loss of marks.

Electronic calculator may be used in this paper.

The total of the marks for this paper is 40.

A copy of the Periodic Table is printed on page **13**.

FOR EXAMINER'S USE	
A	
B	
Total	<b>40</b>

This document consists of **13** printed pages.

Setter(s) : Mr Tan Keng Chiaw and Ms Izzati Jamil

**Section A (10 marks)**Answer **all** questions.

- 1 “Amy drew a graph using the data she obtained from her experiments.”

Which step in the scientific inquiry process is the statement describing?

- A analyzing results
- B forming a hypothesis
- C designing an experiment
- D conducting an experiment

- 2 An experiment was conducted to investigate how the volume of air affects the colour of the Bunsen burner flame.

Which of the following is the independent variable in this experiment?

- A the volume of air
- B the color of the flame
- C the height of the collar
- D the location of the experiment

- 3 An element is found to have the following properties:

- good electrical conductivity,
- shiny in appearance,
- solid at room temperature.

What is the element most likely to be?

- A boron
- B silicon
- C calcium
- D hydrogen

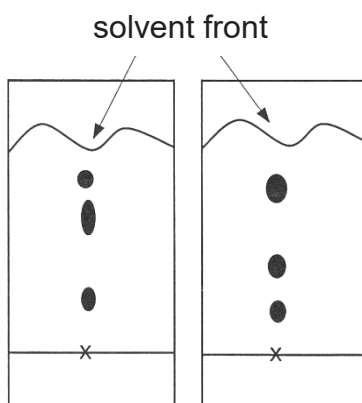
- 4 Which of the following statements best shows that copper(II) sulfate solution is a mixture?

- A Copper(II) sulfate solution is blue in colour.
- B Copper(II) sulfate is made up of different elements.
- C When heated, the water evaporates leaving a blue residue.
- D No heat is released when copper(II) sulfate is dissolved in water.

5 Which of the underlined substance can be obtained through sublimation?

- A salt from salt solution
- B flour from flour suspension
- C iodine from a mixture of iodine and salt
- D water from a mixture of water and alcohol

6 Two students carried out chromatography experiments to examine the dyes in a black ink. The chromatograms obtained by the students are shown below.



They used the same black ink. Why are the chromatograms different?

- A One student did not use enough solvent.
- B The two students used different solvents.
- C The two students used different amount of black ink.
- D The solvent moved up the paper at different speeds.

7 Upon heating, the volume of a substance increases because

- I the size of particles increases.
- II the number of particles increases.
- III the space between particles increases.

- A I only
- B III only
- C II and III only
- D I, II and III

- 8 The table below contains information on various elements.

element	melting point (°C)	boiling point (°C)
fluorine	-220	-188
oxygen	-219	-183
nitrogen	-210	-196
chlorine	-102	-35

Particles of substance **W** slide over one another at  $-185\text{ }^{\circ}\text{C}$ .

Identify substance **W**.

- A fluorine
- B oxygen
- C nitrogen
- D chlorine

- 9 The nuclide notation of a new substance **Z** found is  ${}_{33}^{76}\text{Z}$ .

Determine the number of electrons present in **Z**.

- A 33
- B 43
- C 76
- D 109

- 10 Cobalt(II) acetate has the chemical formula of  $\text{Co}(\text{CH}_3\text{COO})_2$ .

How many atoms are in cobalt(II) acetate?

- A 4
- B 8
- C 15
- D 16

## Section B (30 marks)

Answer **all** questions in the spaces provided.

1 A student conducted an experiment to react magnesium and hydrochloric acid.

For  
Examiner's  
Use

(a) The following diagram shows the hazard symbols found on bottles of magnesium and hydrochloric acid respectively.



*magnesium*



*hydrochloric acid*

Suggest one safety precaution the student should take when handling each of the chemical.

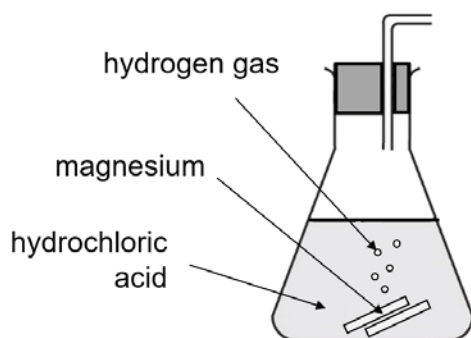
magnesium	
hydrochloric acid	

[2]

(b) Hydrogen gas, which is insoluble in water and less dense than air, is produced during the reaction.

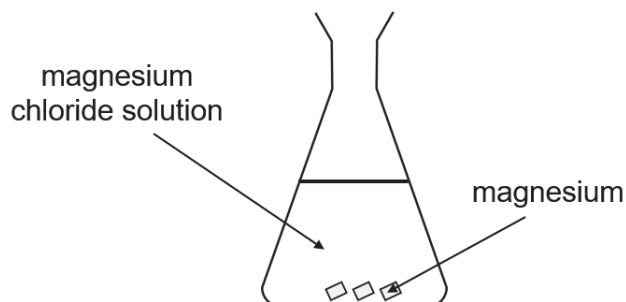
A student wanted to collect the hydrogen gas **but did not have a gas syringe**.

Complete the experimental set-up below (with labels) that the student can use to collect hydrogen gas.



[2]

- (c) The following diagram shows the substances remaining in the conical flask after the reaction.



*For  
Examiner's  
Use*

Describe how a pure and dry sample of magnesium chloride can be obtained.

.....

.....

.....

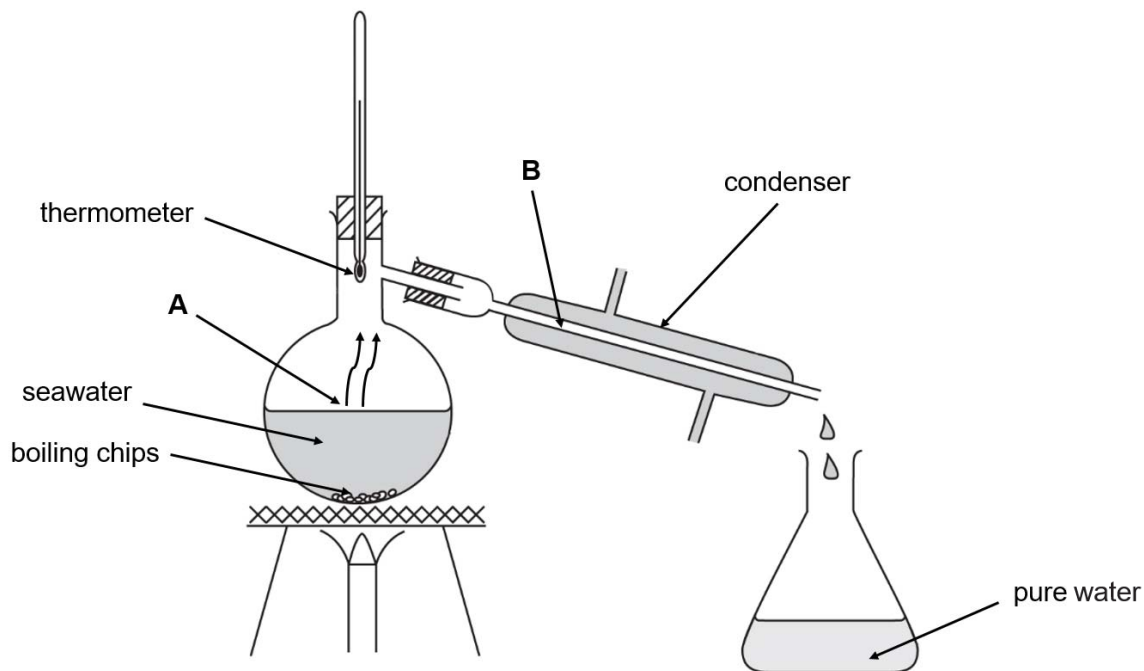
.....

[2]



- 2 The diagram below shows a separation technique used by a student to obtain pure water from seawater.

For  
Examiner's  
Use



- (a) State the separation technique used.

..... [1]

- (b) State and explain how the student can tell if the water collected is pure **during the experiment**.

.....  
 .....  
 ..... [2]

- (c) (i) Name process occurring at **A** and **B**.

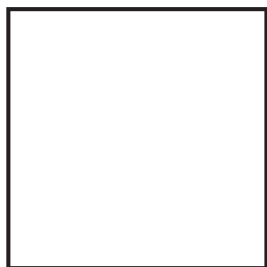
**A:** .....

**B:** .....

[2]

- (ii) Draw the arrangement of water particles before and after process **A** in the boxes provided below.

For  
Examiner's  
Use



*before*



*after*

[2]

- (iii) Using Kinetic Particle Theory, describe the change in movement and arrangement of the water particles in process **B**.

movement: .....

.....

.....

arrangement: .....

.....

.....

[3]

- 3 The following excerpt is taken from a cookbook on how to prepare apple flavoured Konnyaku Jelly.

*For  
Examiner's  
Use*

1. Mix sugar and Konnyaku powder in a small bowl.
2. Pour apple juice in a saucepan and turn on the heat.
3. Slowly add in the sugar and Konnyaku powder mixture into the apple juice.
4. Bring it to a boil and continue to boil for another 5 minutes.
5. The resultant red liquid was poured into the moulds and chilled.

- (a) Identify the solute and solvent in Step 3 used to form the red liquid.

solute: .....

solvent: ..... [2]

- (b) Why was the mixture brought to a boil?

.....

..... [1]

(c)



rock sugar



fine sugar

For  
Examiner's  
Use

A student wanted to compare how the different types of sugar would affect the time taken to prepare the jelly. State the hypothesis of the experiment and outline how the student can check if the hypothesis is true.

hypothesis: .....

.....

procedure: .....

.....

.....

.....

.....

.....

[3]

4 Matter in its simplest form is called an element. The most abundant element in our atmosphere is nitrogen.

(a) Fill in the information in the table below about the sub-atomic particles in nitrogen.

	relative charge	relative mass
protons		1
electrons		
neutrons	0	

[2]

(b) State the nucleon number of nitrogen.

.....

[1]

(c) Write the electronic configuration of nitrogen.

.....

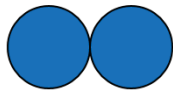
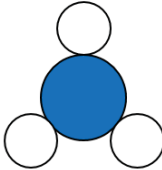
[1]

(d) State the Period in which nitrogen can be found in the Periodic Table.

.....

[1]

(e) The following table shows the diagrams of a *molecule* of nitrogen gas and ammonia gas.

nitrogen	ammonia
	

(i) Define "molecule".

.....

.....

[1]

- (ii) Write down the chemical formula of nitrogen gas and ammonia gas.

nitrogen gas: .....

ammonia gas: .....

[1]

*For  
Examiner's  
Use*

- (iii) Nitrogen gas is a diatomic molecule of an element.

Using the example of nitrogen gas, describe a molecule of ammonia gas.

.....

[1]

**END OF PAPER**

The Periodic Table of Elements

		Group																													
I	II	III	IV	V	VI	VII	0					0																			
3 Li lithium	4 Be beryllium	5 B boron	6 C carbon	7 N nitrogen	8 O oxygen	9 F fluorine	10 Ne neon					2 He helium																			
11 Na sodium	12 Mg magnesium	13 Al aluminium	14 Si silicon	15 P phosphorus	16 S sulfur	17 Cl chlorine	18 Ar argon					4 Kr krypton																			
19 K potassium	20 Ca calcium	21 Sc scandium	22 Ti titanium	23 V vanadium	24 Cr chromium	25 Mn manganese	26 Fe iron	27 Co cobalt	28 Ni nickel	29 Cu copper	30 Zn zinc	31 Ga gallium	32 Ge germanium	33 As arsenic	34 Se selenium	35 Br bromine	36 Kr krypton														
37 Rb rubidium	38 Sr strontium	39 Y yttrium	40 Zr zirconium	41 Nb niobium	42 Mo molybdenum	43 Tc technetium	44 Ru ruthenium	45 Rh rhodium	46 Pd palladium	47 Ag silver	48 Cd cadmium	49 In indium	50 Sn tin	51 Sb antimony	52 Te tellurium	53 I iodine	54 Xe xenon	86 Rn radon													
55 Cs caesium	56 Ba barium	57-71 lanthanoids	72 Hf hafnium	73 Ta tantalum	74 W tungsten	75 Re rhenium	76 Os osmium	77 Ir iridium	78 Pt platinum	79 Au gold	80 Hg mercury	81 Tl thallium	82 Pb lead	83 Bi bismuth	84 Po polonium	85 At astatine	86 Rn radon														
87 Fr francium	88 Ra radium	89-103 actinoids	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium	109 Mt meitnerium	110 Ds darmstadtium	111 Rg roentgenium	112 Cn copernicium	113 Nh nihonium	114 Fl flerovium	115 Mc moscovium	116 Lv livermorium	117 Ts tennessine	118 Og oganeson														
		lanthanoids		actinoids																											
		57 La lanthanum	58 Ce cerium	59 Pr praseodymium	60 Nd neodymium	61 Pm promethium	62 Sm samarium	63 Eu europium	64 Gd gadolinium	65 Tb terbium	66 Dy dysprosium	67 Ho holmium	68 Er erbium	69 Tm thulium	70 Yb ytterbium	71 Lu lutetium	89 Ac actinium	90 Th thorium	91 Pa protactinium	92 U uranium	93 Np neptunium	94 Pu plutonium	95 Am americium	96 Cm curium	97 Bk berkelium	98 Cf californium	99 Es einsteinium	100 Fm fermium	101 Md mendelevium	102 No nobelium	103 Lr lawrencium

Key  
atomic number  
atomic symbol  
name  
relative atomic mass

1  
H  
hydrogen  
1

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.)





Index Number	Class	Name
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# CHIJ ST JOSEPH'S CONVENT SEMESTRAL ASSESSMENT 2



## SCIENCE (BIOLOGY)

Secondary 1 EXPRESS

Friday, 5 October 2018  
50 minutes

Additional Materials: Multiple Choice Answer Sheet

### READ THESE INSTRUCTIONS FIRST

Write your index number, class and name on all the work you hand in.  
Write in dark blue or black pen on both sides of the paper.  
Working in pencil will not be marked.  
You may use an HB pencil for any diagrams or graphs  
Do not use staples, paper clips highlighters, glue or correction fluid.

#### Section A

Answer all questions. For each question there are four possible answers A, B, C and D.  
Choose the one you consider correct and record your choice in soft pencil in the multiple choice answer sheet.

#### Section B

Answer all questions. Write your answers in the spaces provided on the question paper.

FOR EXAMINER'S USE	
Total	<b>40</b>

This document consists of **11** printed pages.

Setter(s) : **Ms Mary Charles**

[Turn over

## 2

**Section A (10 marks)**  
Answer **all** the questions.

- 1 Cells contain structures V, W, X, Y and Z.  
Each structure has a specific function as shown in the table.

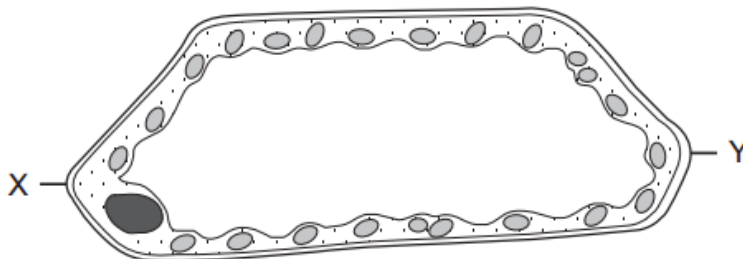
structure	function
V	strengthens and supports the cell
W	absorbs light energy
X	is where chemical reactions take place
Y	controls the activities of the cell
Z	controls what enters and leaves the cell

Which pair of structures are not found in an animal cell?

- A** V and W                      **B** V and Z                      **C** W and X                      **D** X and Y
- 2 Insulin is a hormone that is produced in the pancreas. It is a protein.

Which organelles are present in large numbers in cells that produce insulin?

- A** nuclei and mitochondria  
**B** ribosomes and mitochondria  
**C** rough endoplasmic reticulum and cell walls  
**D** vesicles and nuclei
- 3 The diagram shows a high-power drawing of a plant cell. The distance between X and Y on the diagram below is 80mm. The actual length of the cell between X and Y was 0.16mm. What is the magnification of the cell?



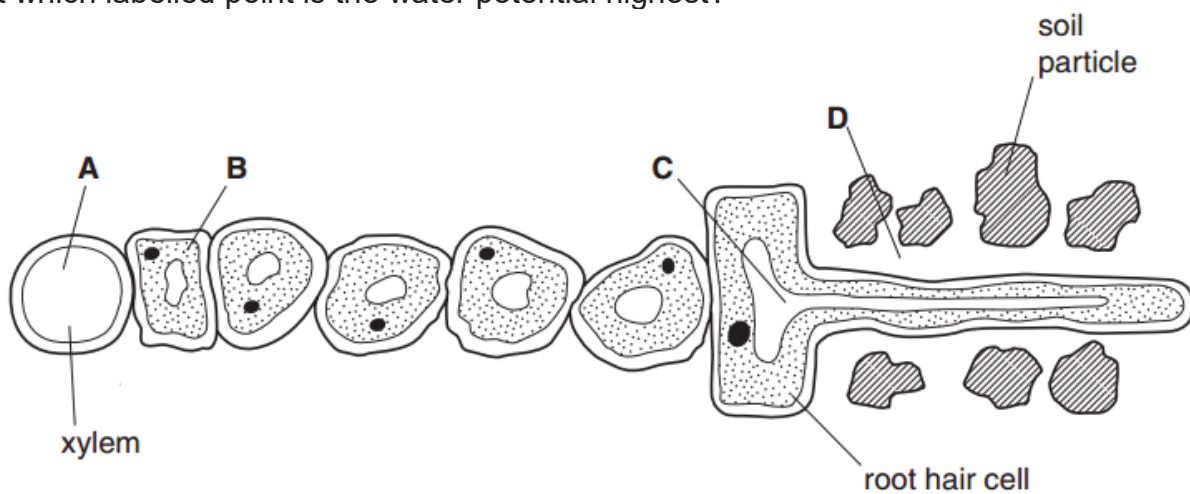
- A**  $\times 50.0$                       **B**  $\times 100.0$                       **C**  $\times 500.0$                       **D**  $\times 1000.0$

## 3

4 A new cell is being examined.  
Which feature would enable you to identify it as a plant cell or an animal cell?

- A The cell contains a single large sap vacuole.
- B The cell contains glucose and amino acids.
- C The cell contains stored fat.
- D The cell surface membrane is partially permeable.

5 The diagram shows part of a plant root in the soil. The root is absorbing water.  
At which labelled point is the water potential highest?



6 Which processes can **only** occur through a membrane?

	active transport	diffusion	osmosis
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	x
<b>C</b>	✓	x	✓
<b>D</b>	x	✓	✓

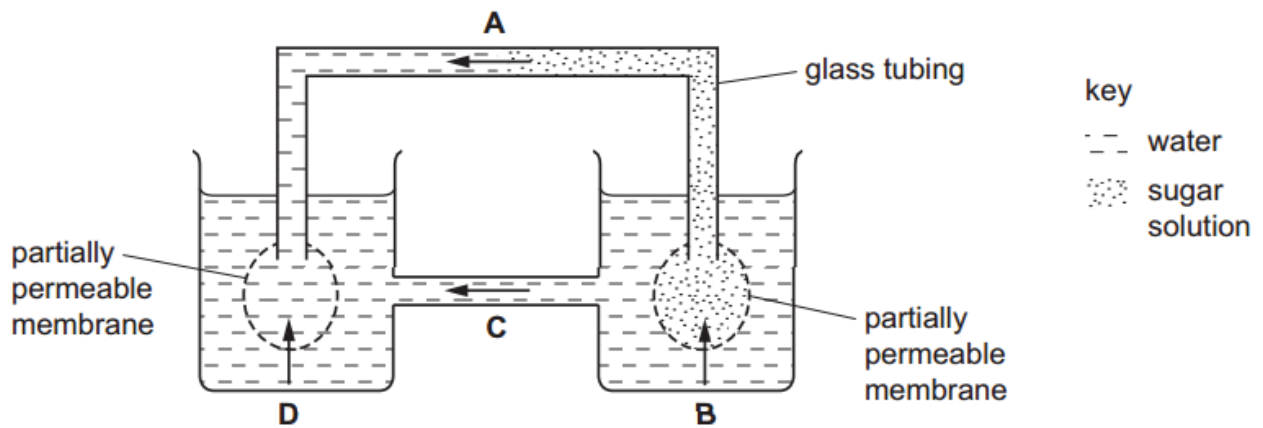
key

✓ = yes

x = no

4

- 7 The diagram shows an experiment on osmosis. Which arrow shows the direction of the net movement of water at the start of the experiment?



- 8 Which two structures are found in all plant epidermal cells?

- A cell wall and nucleus
- B cell wall and chloroplasts
- C chloroplasts and starch grains
- D nucleus and starch grains

- 9 Which row shows the most likely number of chloroplasts in three types of cell in a leaf?

	epidermis	mesophyll	vascular bundle cell
A	0	6	17
B	0	17	0
C	17	6	0
D	17	0	6

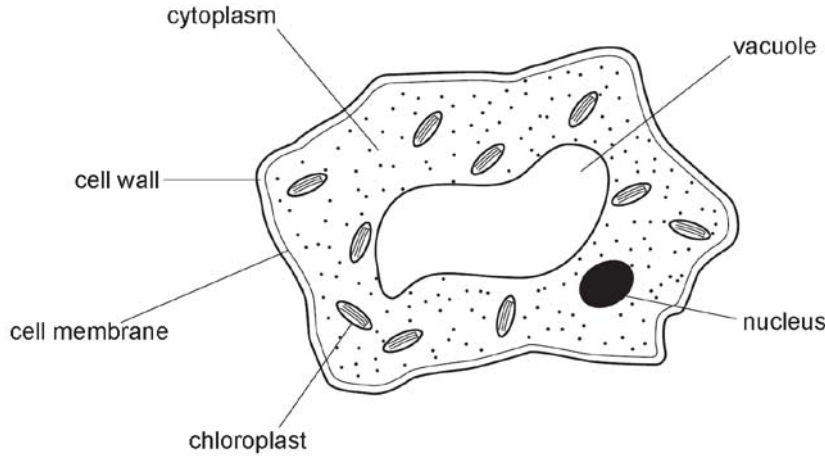
- 10 What is the pathway taken by water as it travels through a plant?

- A mesophyll cells → xylem → root cells → root hair cells
- B root cells → root hair cells → mesophyll cells → xylem
- C root hair cells → root cells → xylem → mesophyll cells
- D xylem cells → mesophyll → root cells → root hair cells

**Section B (30 marks)**  
Answer all questions.

**B1** Fig. 1.1 shows a typical plant cell.

*For  
examiner's  
use*



**Fig. 1.1**

**(a)** Name the part of the cell that

**(i)** controls the movement of substances into and out of the cell,

..... [1]

**(ii)** is needed for cell division.

..... [1]

**(b)** Root hair cells are specialised plant cells.

**(i)** Which part, labelled in Fig. 1.1, is not present in a root hair cell?

..... [1]

**(ii)** Why is this part not needed in a root hair cell?

.....  
..... [1]

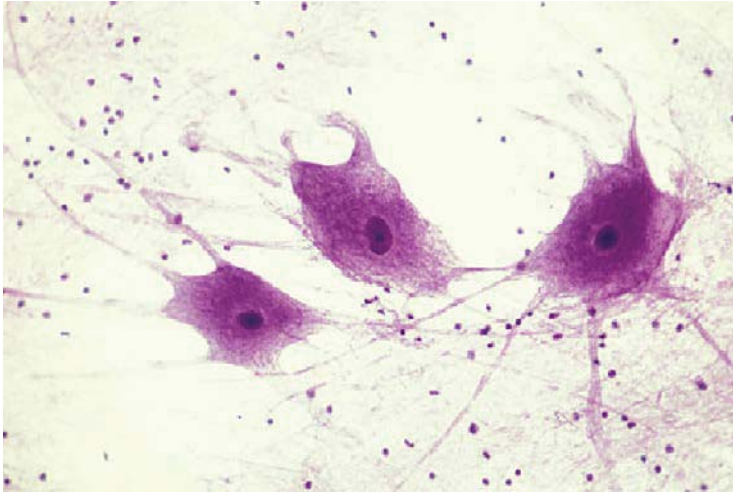
**(iii)** Explain how a root hair cell is adapted to carry out its function.

.....  
..... [2]

6

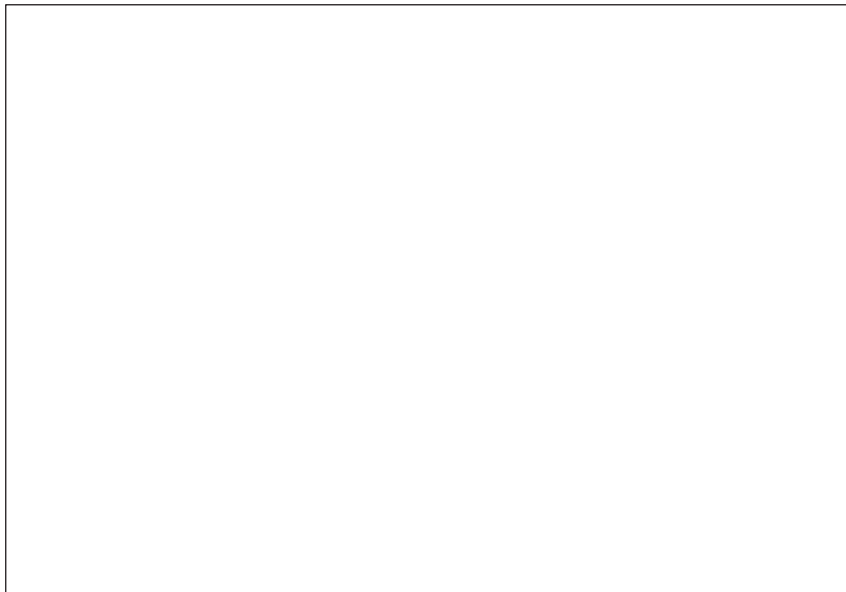
**B2** Fig. 2.1 below shows three nerve cells (neurones) seen under a light microscope.

*For  
examiner's  
use*



**Fig. 2.1**

**(a)** In the space below, make a drawing of **one** of the nerve cells as seen in Fig. 2.1. Label your drawing.



[3]

(b) Fig. 2.2 shows some details about the structure of the stomach.

For  
examiner's  
use

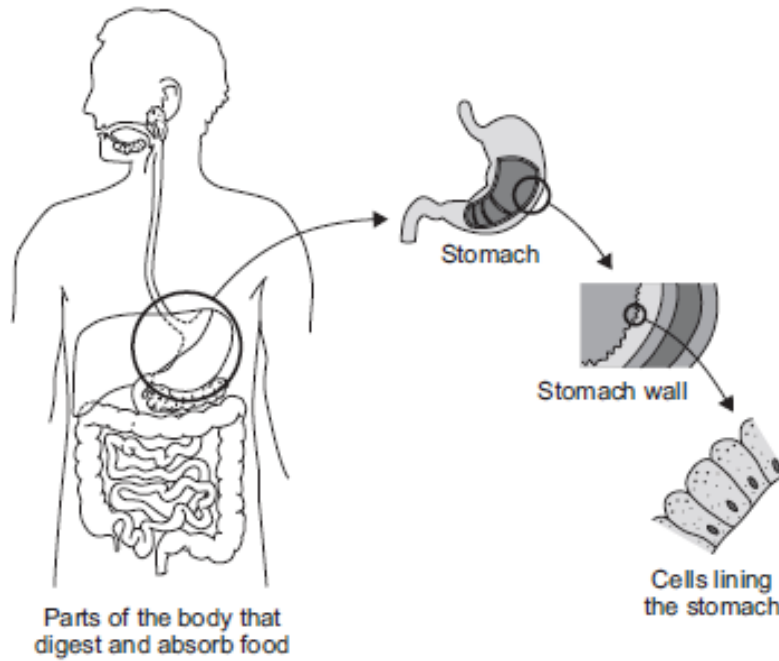


Fig. 2.2

Complete **Table 2** to show whether each structure is an organ, an organ system or a tissue. For each structure, tick (✓) **one** box.

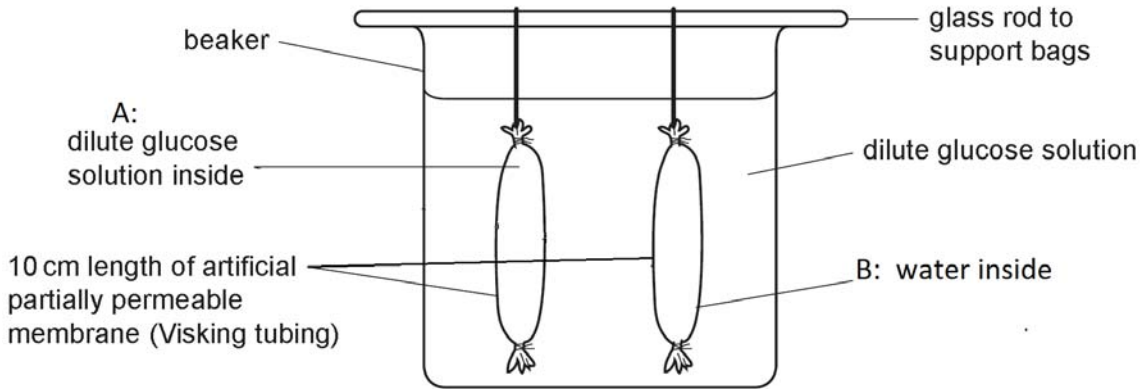
Table 2

structure	organ	organ system	tissue
stomach			
cells lining the stomach			
mouth, oesophagus, stomach, liver, pancreas, small and large intestine			

[3]

**B3** Two leak-proof Visking tubing bags were set up as shown in Fig. 3.1.

- The bags were filled with equal volumes of solution.
- The bags were suspended in the same dilute glucose solution for two hours.



**Fig. 3.1**

(a) After two hours, the volumes of the bags were measured. What results would you expect for tubing **A** and **B**?

tubing **A** .....

tubing **B** ..... [2]

(b) Explain the changes observed in tubing **B**.

.....  
.....  
.....  
..... [3]



**B4** Three samples of human blood **A**, **B** and **C**, are mixed with three salt solutions of different concentrations. The blood samples are then observed under the microscope. The results are shown in Table 4.

(a) Complete Table 4 by drawing the appearance of a red blood cell in blood sample **A** and **B**.

**Table 4**

blood sample	observations	appearance of cells
<b>A</b>	red blood cells are small and wrinkled	
<b>B</b>	red blood cells are normal in size and shape	
<b>C</b>	no cells can be seen	/

[2]

(b) Which blood sample is mixed with the most concentrated salt solution?

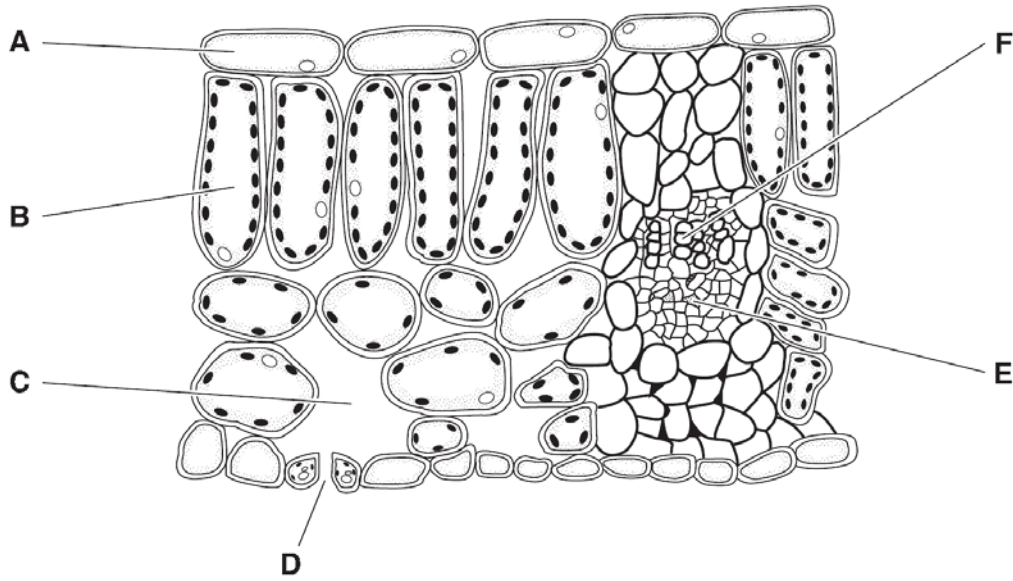
..... [1]

(c) Explain the observation for blood sample **C**.

.....  
 .....  
 ..... [2]

**B5** The diagram in Fig.5.1 shows a section through part of a dicotyledonous leaf.

*For  
examiner's  
use*



**Fig. 5.1**

**(a)** Refer to Fig.5.1 and complete the table below.

label	
	xylem vessel
<b>C</b>	
<b>D</b>	

[3]

For  
examiner's  
use

(b) Describe the functions of the xylem.

.....  
.....  
.....  
.....

[2]

(c) Carbon dioxide moves from the air outside the leaf to the cell marked **B**. Describe the role of the parts labelled **C** and **D** in this movement.

.....  
.....  
.....  
.....

[2]

(d) State the word equation for photosynthesis.

.....

[1]

**End of paper**



## SCIENCE (CHEMISTRY)

### Semestral Assessment 2 - Mark Scheme

Secondary 1 Express SA2 2018

#### Section A (5 marks)

Question	1	2	3	4	5	6	7	8	9	10
Answer	A	A	C	C	C	B	B	B	A	C

#### Section B (20 marks)

Qn	Answers	Marks
1a	magnesium: <b>keep away from open flame/high temperatures</b> hydrochloric acid: <b>wear gloves/avoid contact with chemical</b>	1 1
1b	Downward delivery Delivery tube – label Measuring cylinder – label  OR Water displacement Delivery tube – label Measuring cylinder – label  1m for method, 1m for accurate drawing and labelling	2  2
1c	<b>Filter</b> the mixture. Residue – magnesium, filtrate – magnesium chloride <b>Evaporate filtrate to dryness</b> to obtain magnesium chloride.	1 1
2a	<b>Simple distillation</b> (Reject distillation)	1
2b	Check the thermometer. The <b>thermometer should read 100 °C.</b> <b>Pure water boils at 100 °C.</b>	1 1
2ci	A: <b>boiling</b> B: <b>condensation</b>	1
2cii	before: <b>liquid drawing</b> after: <b>gas drawing</b>	1

<b>2ciii</b>	movement: change from <b><u>moving rapidly, in all directions</u></b> to <b><u>sliding over one another</u></b>	1												
	arrangement: change from <b><u>far apart</u></b> to <b><u>close together</u></b>	1												
	& arrangement: change from <b><u>disorderly manner</u></b> to <b><u>orderly manner</u></b>	1												
<b>3a</b>	Solute: sugar <b>and</b> konnyaku powder Solvent: apple juice	1 1												
<b>b</b>	To <b><u>speed up the dissolving</u></b> of that the solute(named or not).	1												
<b>c</b>	The bigger the sugar crystal the longer the time taken for the jelly to be prepared. <b>OR</b> Rock sugar will increase the time taken for the jelly to be prepared.	1												
	Add 5g(stated amount or equal amounts) of rock sugar into 10ml(stated amount or equal amounts) of apple juice. <b>(mark to be awarded for constant variables)</b>	1												
	Record the time taken for the sugar to dissolve in the apple juice. <b>(mark to be awarded for measurement of dependent variable)</b>	1												
	**there is no need to mention about boiling. If students do mention it, no marks is awarded.													
<b>4</b>	<table border="1"> <thead> <tr> <th></th> <th>relative charge</th> <th>relative mass</th> </tr> </thead> <tbody> <tr> <td>protons</td> <td><b>+1</b></td> <td>1</td> </tr> <tr> <td>electrons</td> <td><b>-1</b></td> <td><b>1/1840</b></td> </tr> <tr> <td>neutrons</td> <td>0</td> <td><b>1</b></td> </tr> </tbody> </table> <p>Every 2 correct – 1m</p>		relative charge	relative mass	protons	<b>+1</b>	1	electrons	<b>-1</b>	<b>1/1840</b>	neutrons	0	<b>1</b>	2
	relative charge	relative mass												
protons	<b>+1</b>	1												
electrons	<b>-1</b>	<b>1/1840</b>												
neutrons	0	<b>1</b>												
<b>b</b>	14	1												
<b>c</b>	2.5	1												
<b>d</b>	Group <b>V</b> , period <b>2</b>	1												
<b>ei</b>	A molecule is made up of <b>two or more atoms chemically combined</b>	1												
<b>eii</b>	Nitrogen: N <sub>2</sub> Ammonia: NH <sub>3</sub>	1												
<b>eiii</b>	<b>Triatomic</b> molecule of a <b>compound</b>	1												

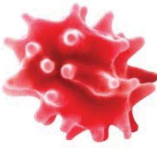

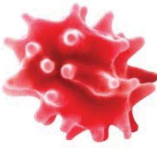

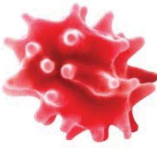



## ANSWERS TO SEC 1 EXP BIOLOGY SA2 2018

1	2	3	4	5
A	B	C	A	D
6	7	8	9	10
C	B	A	B	C

<b>B1</b>	Controls movement - cell membrane For cell division - nucleus	1 1																
	Chloroplasts As root hair cells are found in soil/ underground, cannot photosynthesise	1 1																
	<u>long and narrow cellular extension</u> which greatly increases the <u>surface area to volume ratio</u> of the cell for faster absorption of water and minerals from the soil	1 1																
<b>B2</b>	<b>a</b> Neat, large, clear lines Shape Labels must include nucleus, cell membrane, cytoplasm	1 1 1																
	<b>b</b>																	
	<table border="1"> <thead> <tr> <th>structure</th> <th>organ</th> <th>organ system</th> <th>tissue</th> </tr> </thead> <tbody> <tr> <td>stomach</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>cells lining the stomach</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>mouth, oesophagus, stomach, liver,</td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table>	structure	organ	organ system	tissue	stomach	✓			cells lining the stomach			✓	mouth, oesophagus, stomach, liver,		✓		1 1 1
structure	organ	organ system	tissue															
stomach	✓																	
cells lining the stomach			✓															
mouth, oesophagus, stomach, liver,		✓																
<b>B3</b>	tubing <b>A</b> - no change in volume tubing <b>B</b> - volume will decrease  1 there is a higher water potential in tubing B than in the dilute glucose solution. 2 Osmosis takes place 3 There is a <b>net</b> movement of water molecules down a water pot gradient from the tubing into the beaker 4 through a partially permeable membrane (visking tubing)	1 1  1 mark each  Max =3																



<b>B4</b>	<b>a</b>	<table border="1" style="width: 100%;"> <tr> <td style="width: 20%; text-align: center;">A</td> <td style="text-align: center;"></td> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;"></td> </tr> </table>	A		B		1		
	A								
	B								
	<b>b</b>	Sample A	1						
<b>c</b>	<p>Net movement of water molecules into RBC from a dilute solution through its partially permeable cell membrane / from a higher water potential to lower water potential / from surrounding solution to cell cytoplasm</p> <p>Red blood cells swell and burst.</p>	1 Any one 1							
<b>B5</b>	<b>a</b>	<table border="1" style="width: 100%;"> <tr> <td style="width: 20%; text-align: center;">F</td> <td></td> </tr> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">Intercellular air space</td> </tr> <tr> <td style="text-align: center;">D</td> <td style="text-align: center;">Stomatal pore / stoma</td> </tr> </table>	F		C	Intercellular air space	D	Stomatal pore / stoma	1 1 1
	F								
	C	Intercellular air space							
	D	Stomatal pore / stoma							
<b>b</b>	<p>to carry water and dissolved mineral salts from the roots to the other parts of the plant.</p> <p>to provide mechanical support to the plant</p>	1 1							
<b>c</b>	<p>CO<sub>2</sub> from the atmosphere diffuses through the stomata (1) into the intercellular air spaces (C) in the leaf.</p> <p>Carbon dioxide then dissolves in the film of moisture (2) on the surfaces of the mesophyll cells.</p> <p>The dissolved carbon dioxide diffuses/enters the palisade cells (Cell B) for photosynthesis.</p>	1 1 1 Max =2							
<b>d</b>	<p style="text-align: center;"> <span style="color: red;">carbon dioxide + water</span> <math>\xrightarrow[\text{chlorophyll}]{\text{light}}</math> <span style="color: blue;">glucose + oxygen</span> </p> <p style="text-align: center;">(all correct word equation to award mark )</p>	1							





# Geylang Methodist School (Secondary)

## End-of-Year Examination 2018

Candidate Name			
Class		Index Number	

### LOWER SECONDARY SCIENCE

**Sec 1 Express**

Additional materials : Optical Answer Sheet

**2 hours**

**Setters:** Mr Kelvin Teo  
Mr Jeryl Goh

**10 October 2018**

### READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.  
Write in dark blue or black pen on both sides of the paper.  
Do not use staples, paper clips, highlighters, glue or correction fluid.

#### Section A

There are **twenty** questions in this section. Answer **all** questions. For each question, there are four possible answers, **A, B, C** or **D**. Choose the **one** you consider correct and record your choice in soft pencil on the separate optical answer sheet.

#### Section B

Answer **all** the questions in the spaces provided.

#### Section C

Answer **all** questions in the spaces provided.

The number of marks is given in brackets [ ] at the end of each question or part question.

A copy of the Periodic Table is printed on page 24.

All numerical answers are to be rounded off to 3 significant figures.

For Examiner's Use	
<b>Section A</b>	<b>20</b>
<b>Section B</b>	<b>50</b>
<b>Section C</b>	<b>30</b>
<b>Total</b>	<b>100</b>

This question paper consists of **24** printed pages including the cover page.

**[Turn over]**

## Section A

1 Which of the following describes the typical properties of a metal?

	physical state	density	melting point
<b>A</b>	solid	high	high
<b>B</b>	liquid	high	low
<b>C</b>	solid	low	high
<b>D</b>	solid	high	low

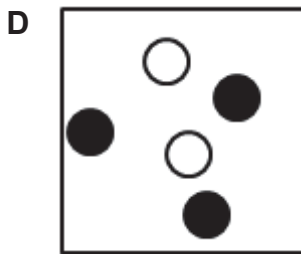
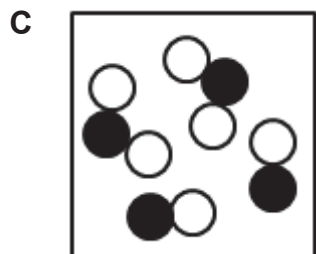
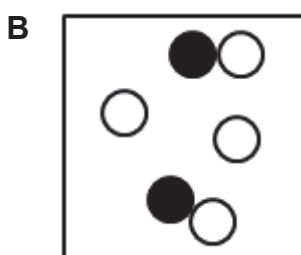
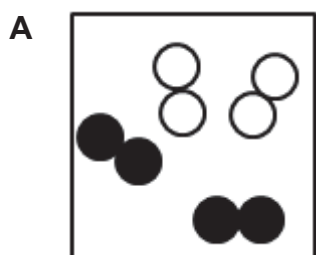
2 Copper(II) oxide is a compound.

Which of the following supports this statement?

- I Copper (II) oxide contains 80% and 20% by mass of copper and oxygen respectively.
- II Copper is a good conductor of electricity while copper (II) oxide is not.
- III Copper (II) oxide can only be broken down by passing electricity through it.
- IV Copper (II) oxide is insoluble in water.

- A** I and II only
- B** II and III only
- C** I, II and III only
- D** I, II, III and IV

3 Which of the following diagrams shows a mixture of 2 different compounds?



4 Which of the following lists an element, a compound and a mixture?

- A salt, steel, iodine
- B water, air, salt
- C fire, sugar, coffee
- D milk, magnesium, copper

5 At 25°C, salt has a solubility of 360 g/l in water.

Which of the following will produce a saturated salt solution without excess salt when mixed?

	salt	water
A	180 g	2000 ml
B	720 g	500 ml
C	180 g	500 ml
D	720 g	3000 ml

6 A procedure for a separation technique is outlined below.

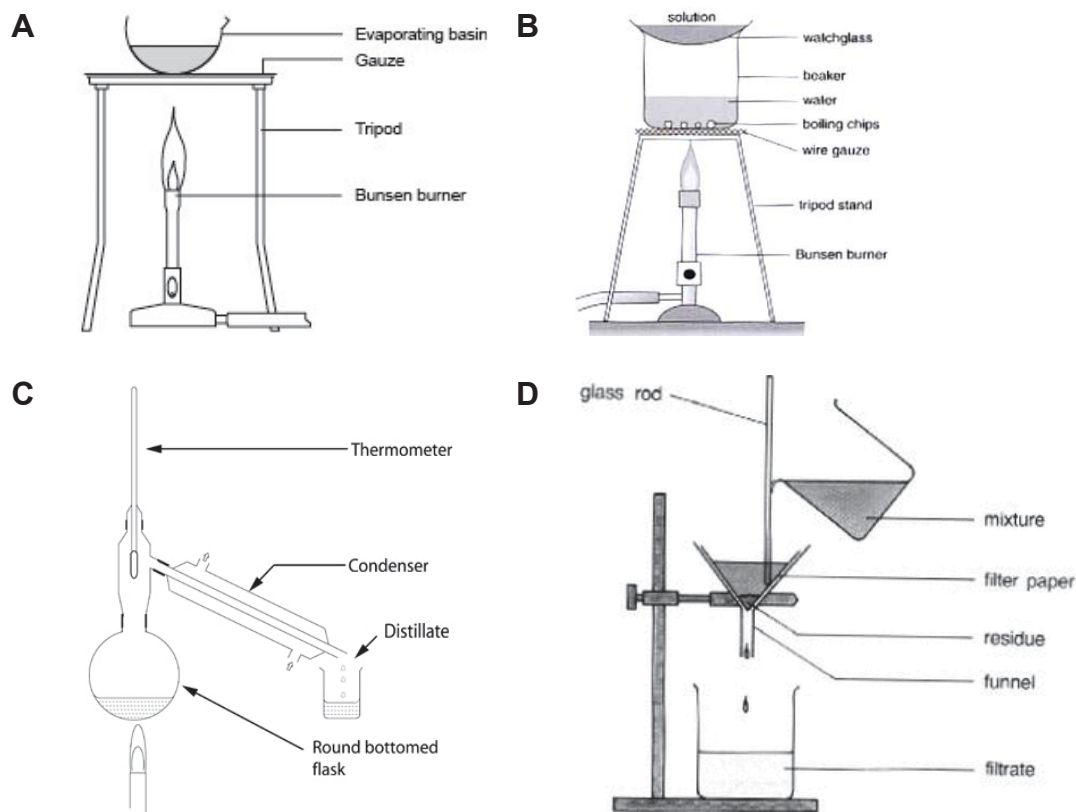
1. Add water and stir with a glass rod.
2. Filter the mixture.

Which of the following underlined substances could be obtained in solid form from its mixture using the above procedure?

- A sugar and salt
- B salt and sand
- C iron filings and chalk
- D copper (II) sulfate and sand

- 7 When heated, copper (II) sulfate decomposes to copper (II) oxide and sulfur dioxide.

Which of the following techniques is most suitable to recover water from copper (II) sulfate solution?



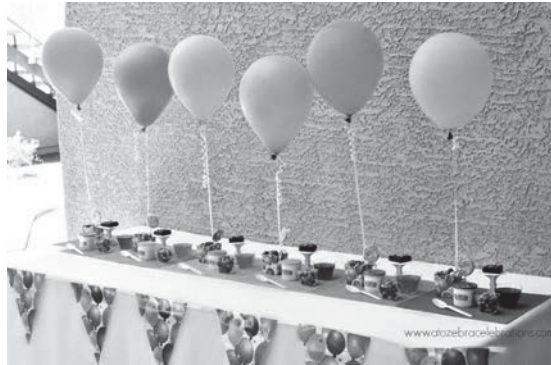
- 8 Substance X is known to melt at  $50^{\circ}\text{C}$ . Which of the following statements must be true about X?

- A At room temperature, X has no fixed volume.
- B At room temperature, X has a fixed shape.
- C At  $100^{\circ}\text{C}$ , X has no fixed volume.
- D At  $100^{\circ}\text{C}$ , X has a fixed shape.

- 9 Which of the following best describes the change when a substance is heated?

	size of particles	number of particles	distance between particles
A	no change	no change	increase
B	increase	no change	increase
C	increase	increase	no change
D	no change	increase	increase

- 10 Some children want to decorate a birthday party with colourful balloons. They wanted balloons to float in the air when tied to a table.



Which property would they need to consider when choosing a gas used to fill the balloons for this party?

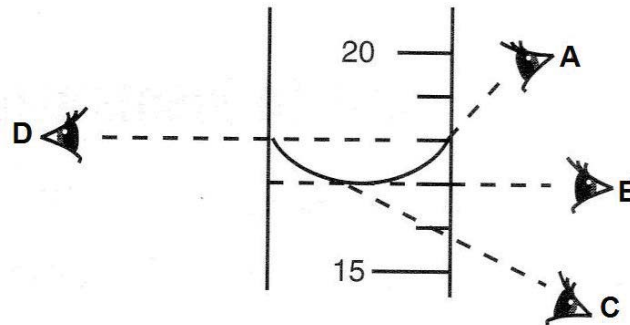
- A melting point
  - B density
  - C colour
  - D mass
- 11 The following diagram shows wooden blocks X, Y and Z placed on levers.



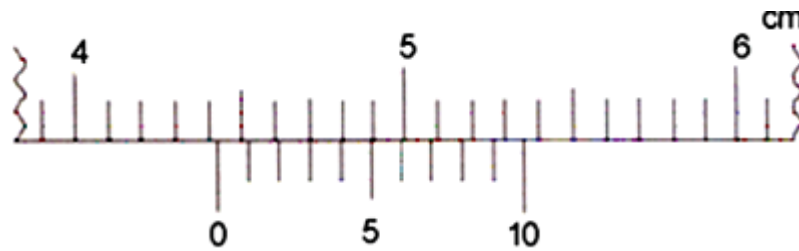
Given that all of the levers are balanced, what is the order of the mass of wooden blocks X, Y and Z?

- |          | <u>Lowest Mass</u> | → | <u>Highest Mass</u> |
|----------|--------------------|---|---------------------|
| <b>A</b> | X                  | Y | Z                   |
| <b>B</b> | X                  | Z | Y                   |
| <b>C</b> | Z                  | Y | X                   |
| <b>D</b> | Y                  | Z | X                   |

- 12 Where should the eye be positioned when taking a reading from a measuring cylinder?



- 13 A student uses a pair of Vernier calipers to measure the thickness of his Science textbook. The figure shows an enlargement of the readings on the Vernier calipers.



What is the thickness of the Science textbook?

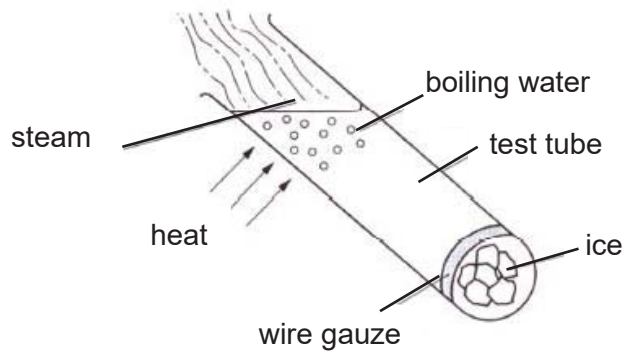
- A 4.04 cm  
 B 4.43 cm  
 C 4.70 cm  
 D 8.07 cm
- 14 The ground below a campfire is hot. What is/are the main mode(s) of heat transfer that make(s) the ground hot?
- (I) radiation  
 (II) convection  
 (III) conduction
- A I and II only  
 B II and III only  
 C I and III only  
 D I, II and III



- 15 Four pieces of metal rods, made of the same material, are put under the sun. Which rod will have the **lowest** surface temperature after 10 minutes?

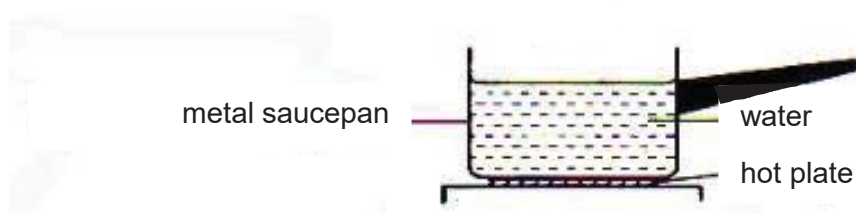
- A dull black rod
- B dull silver rod
- C shiny black rod
- D shiny silver rod

- 16 The upper part of the test tube is heated until the water boils. However, the ice at the bottom of the test tube did not melt.



What does this experiment show?

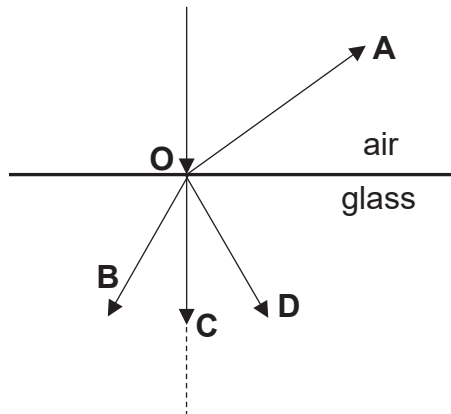
- A Convection occurs in water.
  - B Water is a bad conductor of heat.
  - C The wire gauze is a good reflector of heat.
  - D The wire gauze has a higher density than water.
- 17 The diagram shows a metal saucepan containing water and placed on a hot plate. After some time, the water boils.



What are the main ways by which heat travels from the hot plate through the base of the metal saucepan and through the water?

	through the base of the saucepan	through the water
A	conduction	radiation
B	conduction	convection
C	convection	convection
D	radiation	convection

- 18 A light ray enters a glass block along the normal.  
Which path will the light ray take as it strikes the glass at point O?



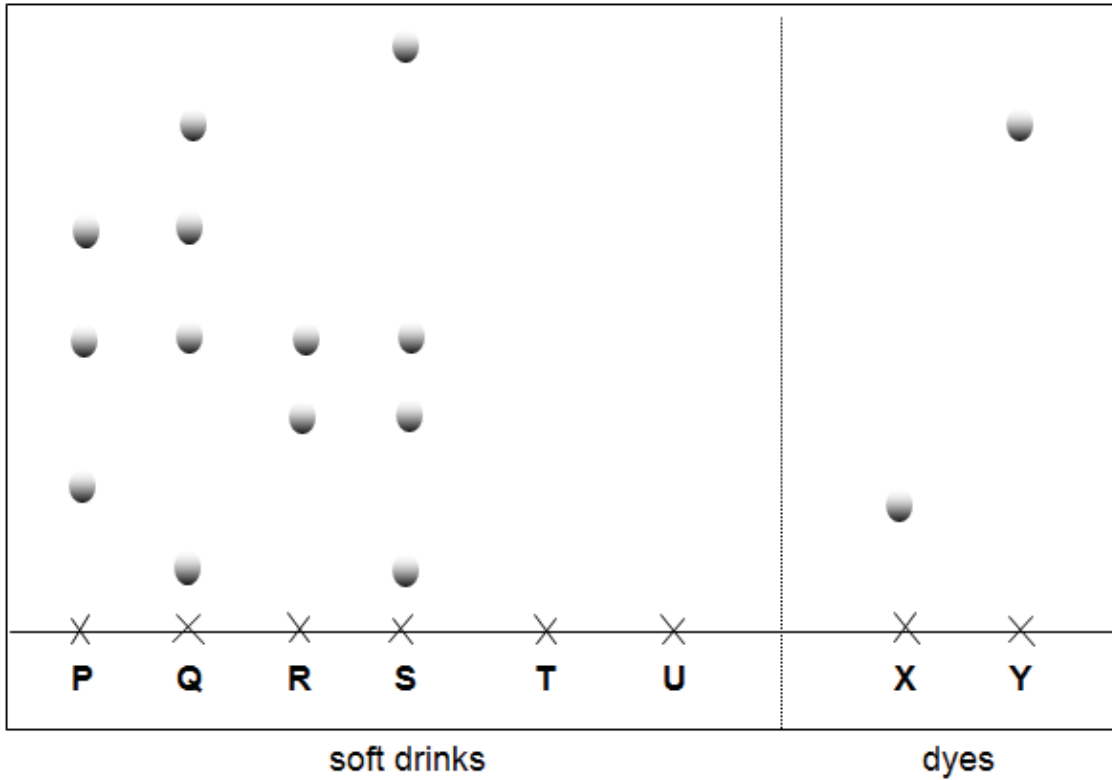
- 19 How fast is the speed of light in vacuum?
- A faster than the speed of light in glass
  - B slower than the speed of light in glass
  - C slower than speed of sound in air
  - D same speed as lightning flashing across the sky
- 20 What is 'irregular reflection' also known as?
- A diffused reflection
  - B diverge reflection
  - C converge reflection
  - D disperse reflection

**End of Section A**

**Section B**

Answer **all** questions in the spaces provided.

- 21 The chromatogram below shows the dyes present in four different soft drinks, **P**, **Q**, **R** and **S**. **X** and **Y** are both harmful dyes.



**Fig 21.1**

- (a) Explain why the starting line is usually drawn in pencil and not in pen.

.....  
 .....  
 ..... [2]

- (b) Suggest a suitable solvent to separate the dyes in the soft drinks.

..... [1]

- (c) Which of the soft drink(s) (**P**, **Q**, **R** or **S**) contain(s) a harmful dye?

..... [1]

- (d) A fifth soft drink, **T**, was tested and found to contain both harmful dyes and another unidentified dye.

Mark on the chromatogram in Fig 21.1 above to show the positions of the components for soft drink **T**. [1]

- (e) Soft drinks **P** and **S** were mixed together to form a liquid mixture **U** and subsequently tested.

Mark on the chromatogram in Fig 21.1 above to show the positions of the components for the liquid mixture **U**. [1]

- (f) Explain how we can use the results of a chromatogram to determine if a substance is pure or impure.

.....  
 .....  
 ..... [2]

22 Table 22.1 below shows the solubility of two substances in water at 30°C.

substance	solubility (g/100 g water)
P	12
Q	188

**Table 22.1**

- (a) Explain why it is important that the temperature at which the solubility data were obtained was stated.

.....  
 .....  
 ..... [2]

- (b) Jenny wants to form two mixtures by mixing water with substance **P** and substance **Q** respectively at 30 °C. She added 5 g of solid **P** and 200 g of solid **Q** in two separate beakers containing 100 g of water and stirred the mixture. She proceeds to shine a torch at each beaker as shown in Fig 22.2 below.

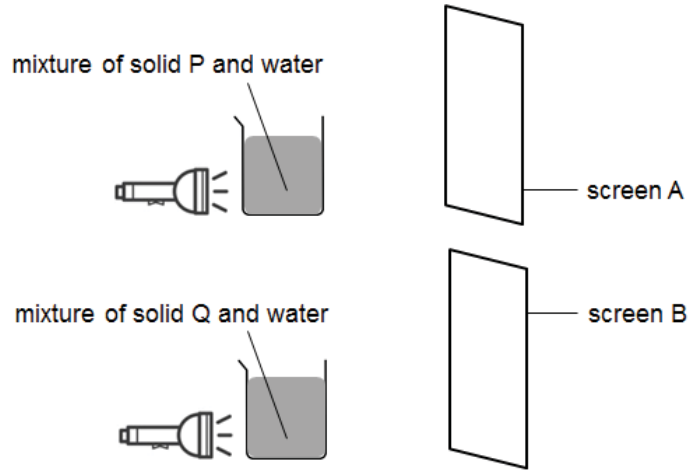


Fig 22.2

- (i) Circle the type of solid-liquid mixture formed from mixing substances **P** and **Q** with water.

**P** with water: solution / suspension [1]

**Q** with water: solution / suspension [1]

- (ii) Describe and explain what Jenny would observe on each screen.

.....

.....

.....

..... [4]

- 23 Table 23.1 below shows the melting and boiling point data of three substances **X**, **Y** and **Z**.

substance	melting point / °C	boiling point / °C
X	10	124
Y	-50	4
Z	86	188

**Table 23.1**

- (a) State the physical states of **X**, **Y** and **Z** at room temperature.

**X**: .....

**Y**: .....

**Z**: .....

[3]

- (b) Arrange the three substances in **decreasing** order of energy of particles at room temperature.

..... [1]

- (c) Describe the movement, arrangement and spacing of particles of substance **Y** at 0°C.

.....

.....

.....

..... [3]

- (d) Explain why substance **X** has a fixed volume at 0°C.

.....

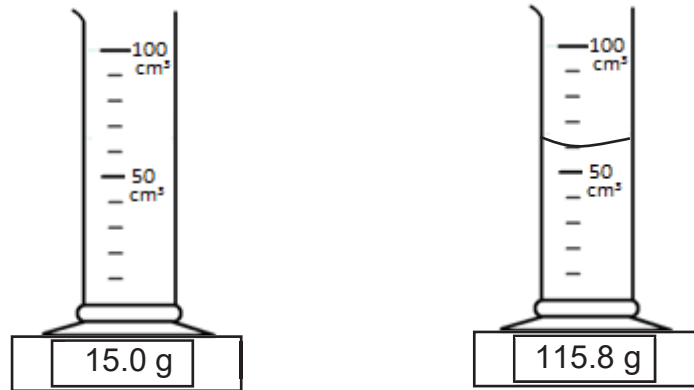
..... [1]

- (e) In the box below, draw a representation of the arrangement of particles of substance **Z** at 189°C.



[1]

24 A source of pure water was suspected to be contaminated. A sample of the water at room temperature and pressure was obtained and investigated. The measuring cylinder was placed on an electronic balance and the readings were recorded.



Before adding water sample      After adding water sample

(a) State the volume of the water sample.

volume = .....cm<sup>3</sup> [1]

(b) Calculate the mass of the water sample.

mass = .....g [1]

(c) Hence, calculate the density of the water sample at room temperature.

density = .....g/cm<sup>3</sup> [2]

(d) The density of pure water is 1.0 g/cm<sup>3</sup>. Hence, using your answer in (c), predict if the water sample is pure or contaminated.

..... [1]

- 25 (a)** To commemorate the 2018 Asian Games in Jakarta, artists were tasked to design and build a trophy for the athletes. The trophy must be made of a material that can withstand scratches.

A simple scratch test was conducted to test the relative hardness of four materials namely **P**, **Q**, **R** and **S**.

It was found out that:

- **S** can scratch **P** but **S** is scratched by **Q**.
- **R** can scratch all other substances.

- (i)** Arrange the four substances in order of **increasing** hardness.

..... [1]

- (ii)** Which of the four substances (**P**, **Q**, **R** and **S**), is **most** suitable for making the trophy?

..... [1]

- (b)** When a space shuttle re-enters the earth's atmosphere, a lot of heat is generated due to friction with air. The material used in **(a) (ii)** was also used to produce the outer shell of the space shuttle shown in Fig 25.1.

List two other characteristics other than hardness, which this material should have to make it suitable for this use.



**Fig. 25.1**

.....  
 ..... [2]



26 Fig 26.1 shows a key used to classify four materials: **ceramics**, **fibres**, **metals**, and **plastics**.

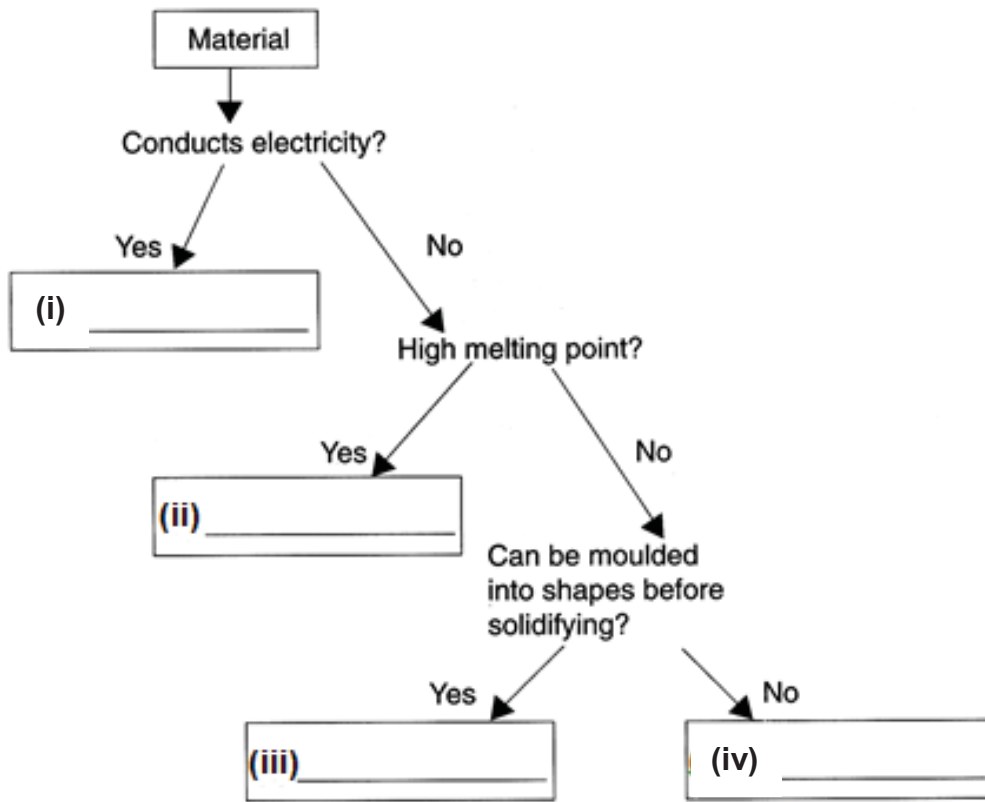


Fig. 26.1

(a) Classify the four materials by filling in the blanks in Fig 26.1. [2]

(b) Describe **one** disadvantage of using ceramics to make vases.

..... [1]

(c) Fibres are used to make cloth.  
State a physical property of fibre and explain why it is suitable for this usage.

..... [2]

27 Fig 27.1 shows two beakers of water, beaker A and beaker B. Each beaker contains a cube of ice at different locations. The ice cube in beaker A is attached to a sinker, which keeps it at the bottom of the beaker at all times.

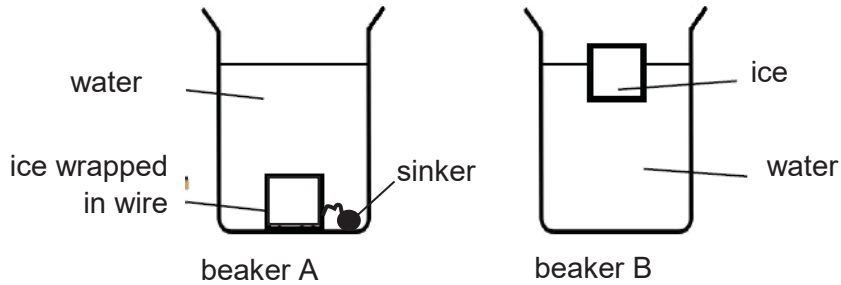


Fig 27.1

(a) Explain why ice, when placed at the bottom of the beaker, does not cool the water as effectively as when it is floating on the water.

.....  
 .....  
 .....

[2]

(b) Fig 27.2 shows two identical metal teapots. One is black on the outside, while the other is white on the outside. The teapots are **not** in contact with each other.



Fig 27.2

Both teapots are filled with the same amount of boiling water. State and explain which teapot will cool faster?

.....  
 .....

[2]

- (c) Carol’s friend complained that the coffee was too hot, so Carol suggested pouring the coffee into a saucer. Explain how this method will help cool the coffee quickly.

.....  
 ..... [2]

- 28 Fig 28.1 shows a ray of light being refracted at point **A** on a semi-circular glass block.

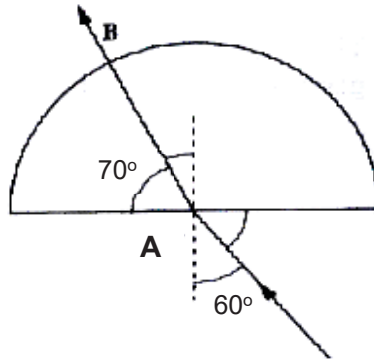


Fig 28.1

- (a) What is refraction?

.....  
 ..... [1]

- (b) State the angle of incidence and angle of refraction at point **A**.

angle of incidence = .....°

angle of refraction = .....° [2]

- (c) What happen to the speed of light as it enters into the semi-circular glass block at point **A**? Circle the correct answer.

slows down / no change / speeds up [1]

- 29 State the law of reflection.

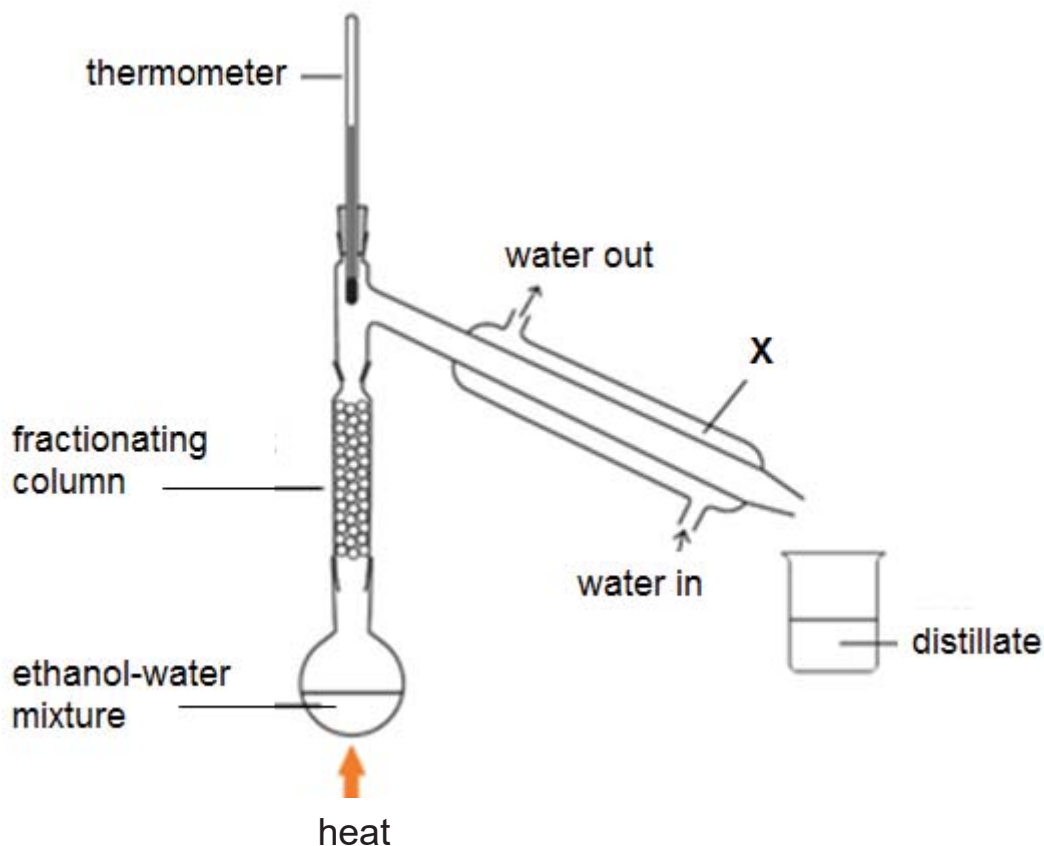
.....  
 ..... [1]

**End of Section B**

**Section C**

Answer **all** questions in the spaces provided.

- 30** Fractional distillation is an advanced version of simple distillation where two liquids of differing boiling points can be better separated. During fractional distillation, the liquid with the lower boiling point (BP) will distill out completely first, followed by the liquid with the higher boiling point. In the set up below, a mixture of water and ethanol (BP=78°C) is being separated by fractional distillation.



**Fig 30.1**

- (a) State the main process occurring in the apparatus labelled X.

..... [1]

- (b) Explain why boiling chips are present in the round-bottomed flask.

.....

..... [1]

- (c) The graph below shows the temperature-time graph of the thermometer reading.

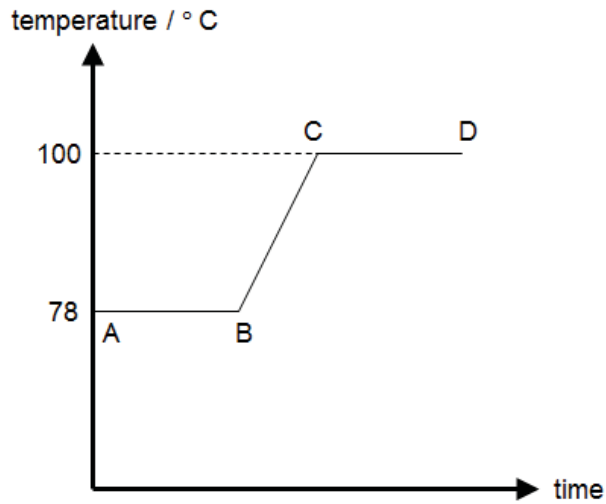


Fig 30.2

Describe what is happening in the experiment during segments **AB** and **CD** of the graph.

**AB** : .....

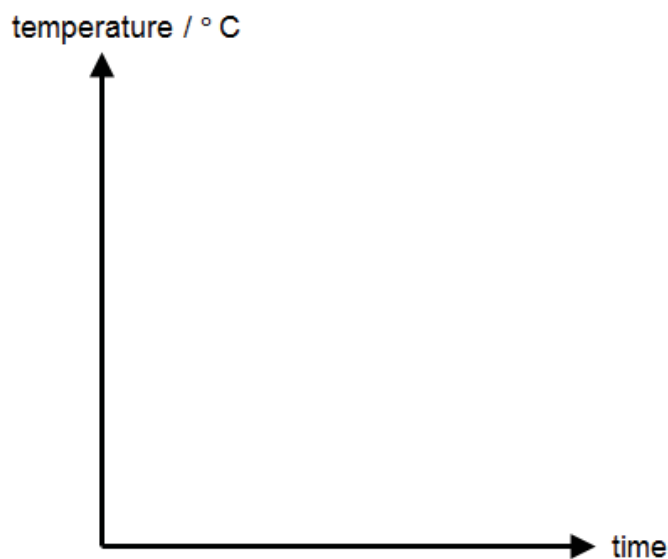
.....

**CD** : .....

.....

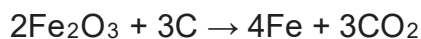
[2]

- (d) Draw a labelled temperature-time graph of the fractional distillation of a mixture of hexane (boiling point = 68°C) and acetone (boiling point = 56°C).



[2]

- 31 In the extraction of iron, iron (III) oxide is reacted with carbon to produce iron and carbon dioxide. The equation for the reaction is:



- (a) Classify the above four substances as elements or compounds.

Elements : .....

Compounds : ..... [2]

- (b) Describe a method to separate a small sample of a mixture of iron filings and iron (III) oxide.

.....

.....

..... [2]

- 32 A triangular card with edges **A**, **B** and **C** is placed in front of a plane mirror as shown in Fig 32.1.

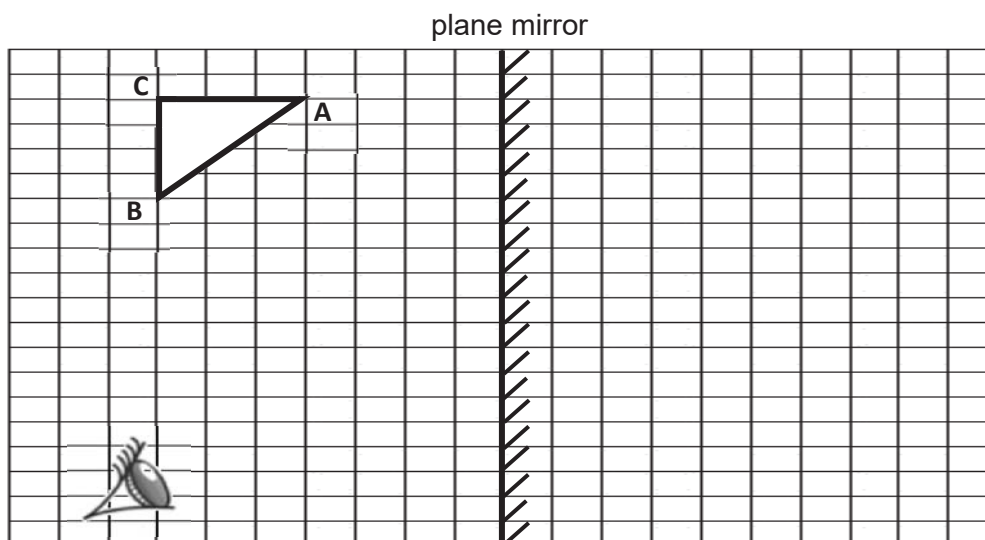


Fig. 32.1

- (a) Draw the image of the triangular card as seen by the eye and label the edges **A'**, **B'** and **C'** respectively. [1]
- (b) Complete the ray diagram in Fig. 32.1 with two light rays leaving point **A**. [2]

- (c) Javier describes the image formed by a plane mirror to be 'inverted', while Jane describes it to be 'laterally inverted'.

State who is correct and explain the meaning of the term 'laterally inverted'.

.....

.....

.....

.....

[2]

- (d) Describe two other characteristics of an image formed by a plane mirror.

.....

.....

[2]

- 33 Fig 33.1 shows an ambulance used by the Singapore Civil Defence Force. Peter pointed out the word 'AMBULANCE' is printed wrongly.



Photo: ST

Fig 33.1

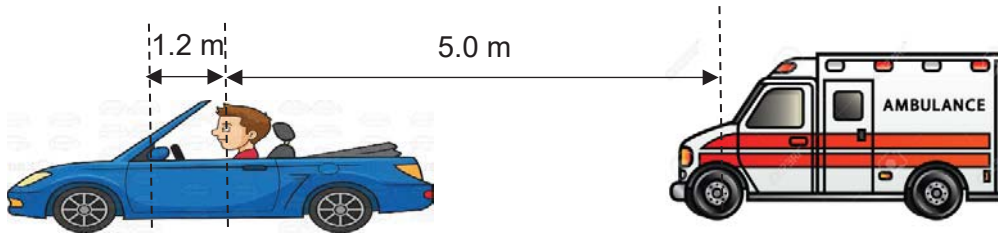
- (a) Do you agree with Peter? Give a reason to support your answer.

.....

.....

[2]

- (b) The ambulance is 5.0m behind the eyes of the driver in a car. The driver is looking at the side mirror placed 1.2m in front of him as shown in Fig 33.2.



**Fig 33.2**

Calculate the distance of the image of the ambulance to the driver's eyes.

distance = .....m [1]

- (c) The driver has a circular-shaped mirror affixed on his side mirror as shown in Fig 33.3. He claims that this mirror helps him to have a better view of his surroundings.



**Fig 33.3**

- (i) What type of mirror is this circular-shaped mirror?

..... [1]

- (ii) Explain how this mirror helps the driver to have a better view of his surroundings.

.....  
..... [1]



34 (a) Define conduction of heat.

.....  
.....

[1]

(b) Fig 34.1 shows a pot specially designed for efficient cooking. It is made of a type of metal known as stainless steel. Its handles are also made of stainless steel.



Fig 34.1

(i) Explain why metal is chosen to be the material for the pot.

.....

[1]

(ii) Explain why the handles should not be made of metal.

.....  
.....

[1]

(iii) Suggest a suitable material for the handles and explain your choice.

.....  
.....

[2]

35 Describe how a displacement can is used to measure the volume of a large irregular object that sinks in water.

.....  
.....  
.....  
.....

[3]

End of paper

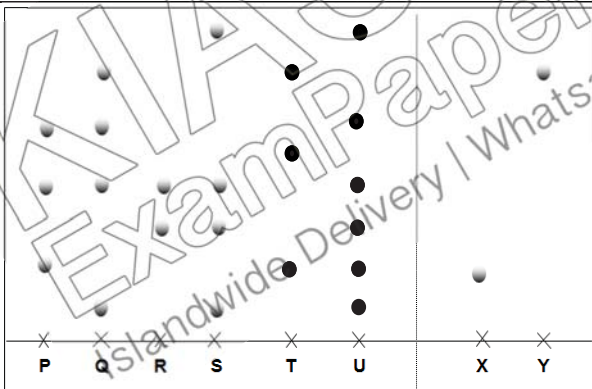


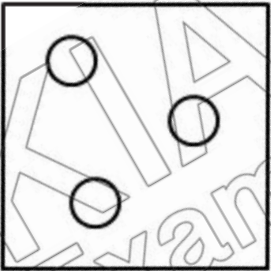
GEYLANG METHODIST SCHOOL (SEC)  
EOY 2018  
SEC 1 EXP SCIENCE Marking Scheme

**Section A**

1	2	3	4	5	6	7	8	9	10
A	C	C	A	C	D	C	B	A	B
11	12	13	14	15	16	17	18	19	20
C	B	B	C	D	B	B	C	A	A

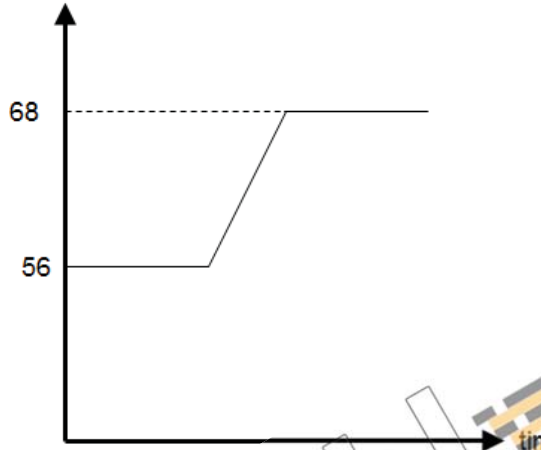
**Section B**

Q	Suggested Answers	Acceptable	Unacceptable
21(a)	Pencil is <b>insoluble</b> [1] in the solvent and <b>will not interfere with the separation results.</b> [1]  Pen is <b>soluble</b> [1] in the solvent and <b>will interfere with the separation results.</b> [1]	Mix/Merge with the dyes  Travel with dye	Smudge Inaccurate results Unfair experiment Affect results Interfere with results
21(b)	Water [1]		
21(c)	P and Q [1]		Extra answers, missing answers
21(d) 21(e)	 <p style="text-align: center;">soft drinks                          dyes</p> <p><i>For T, the third spot can be anywhere. For U, all 6 spots must be present in correct relative positions.</i></p>		
21(f)	If the chromatogram of a substance <b>contains only one spot, it is pure.</b> [1]  If it <b>contains more than one spot, it is impure.</b> [1]		
22(a)	<b>Temperature affects the solubility</b> of a substance.[1] The <b>higher the temperature, the more soluble</b> it is.[1]	Vice versa	Rate of solubility 'Might affect'
22(bi)	Solution [1] Suspension [1]		

Q	Suggested Answers	Acceptable	Unacceptable
22(bii)	There will be <b>light falling on screen A</b> [1]. Mixture of solid P with water would form a solution and a solution <b>allows light to pass through.</b> [1]  No/Little light will fall on screen B [1]. Mixture of solid Q with water would form a suspension which <b>does not allow light to pass through.</b> [1]	Shadow/No shadow  Transparent/ Opaque/ Translucent  Must show comparison	Clear/Cloudy  'Nothing', 'Blank screen'  See marker's report
23(a)	X: liquid [1] Y: gas [1] Z: solid [1]		
23(b)	Y, X, Z [1]		
23(c)	At 0°C, Y is a liquid.  Its particles are <b>sliding over each other freely.</b> [1]  Its particles are <b>closely packed</b> [1] with <b>no fixed arrangement.</b> [1]		
23(d)	At 0°C, X is a solid. Its particles are <b>closely packed</b> [1] with little space in between, hence it cannot be compressed.		X is a solid. X cannot be compressed.
23(e)	 <i>Particles spaced far apart, not touching, at least 3 – 4, random arrangement.</i>		
24 (a)	60 cm <sup>3</sup> [1]		
24 (b)	100.8 g [1]		
24 (c)	D = M/v = 100.8/60 [1] – substitution of formula = 1.68 g/cm <sup>3</sup> [1]	Allow ecf from (a) and (b)	
24 (d)	Contaminated [1]		
25 (a)	P, S, Q, R [1]		
(i)			
(ii)	R [1]		
(b)	High melting point, [1] Strong [1]	Low density Withstand high temperature 'Has strength'	High boiling point, 'strength' only, electrical and thermal conductivity
26 (a)	<u>Metals, ceramics, plastics, fibres</u>	½ mark each	

Q	Suggested Answers	Acceptable	Unacceptable
26 (b)	They break easily. [1]	Not strong Weak Fragile	
26 (c)	Flexibility. [1] They can bend without breaking <b>or</b> they can return to their original shape and size after bending. [1]	Low density Elastic Soft	Poor conductor of heat  Person feels more comfortable/ fit different sizes
27 (a)	When the ice is at the bottom, the water at the bottom is cooled, becomes denser and remains at the bottom. The water at the top is warmer, is less dense and remains at the top. No convection current is set up for efficient cooling. [2]		
27(b)	The black pot. [1] Black is a <b>good emitter of heat</b> , [1]		
27(c)	The <b>greater surface area</b> [1] increase the <b>rate of evaporation</b> and thus, cools the coffee faster. [1]	By conduction/ convection/ radiation	Lose heat to saucer
28(a)	Refraction is the <b>bending of light</b> when it <b>travels from one medium to another of different optical density</b> . [1]		
28(b)	60°, [1] 20° [1]		
28(c)	Slows down [1]		
29	The angle of incidence is equal to the angle of reflection. [1]		Accept "incident ray, normal and reflected ray all lie on the same plane"

**Section C**

Q	Suggested Answers	Acceptable	Unacceptable
30(a)	Condensation [1]		
30(b)	To ensure smooth boiling of the solution. [1]	Accept even,	Reject faster
30(c)	AB: Ethanol is being distilled out. [1] CD: Water is being distilled out. [1]	"coming out"	
30(d)	<p>temperature / ° C</p>  <p>1m – labelling of temperatures 1m – line</p>		
31(a)	<p>Elements: Carbon, Iron Compounds: Iron (III) oxide, carbon dioxide</p> <p>All correct – 2m 2-3 correct – 1m 0-1 correct – 0m</p>	Formulae of substances	
31(b)	<p><b>Place a magnet near the sample.</b> [1] <b>Only the iron filings will be attracted</b> [1] to the magnet, leaving iron (III) oxide behind.</p> <p>Answer must show/imply that one substance is attracted but not the other.</p>		
32 (a) (b)	<p>Triangle correctly drawn with proper labels – equidistant and same size. [1] Light rays correctly drawn [1] and arrows to the eye [1]</p>		
32(c)	<p>Jane [1] Inverted means that the image becomes upside down, but <b>laterally inverted means the left side of the image is exchanged with the right side.</b> [1]</p>		Mark given for description of lateral inversion

Q	Suggested Answers	Acceptable	Unacceptable
32 (d)	Upright, Virtual, Same Size, Same distance to the mirror – Any two [1], [1]	Accept undistorted (as same size)	
33 (a)	No. [1] It is printed in this manner so that it will be read correctly in the rear-view mirror of the car in front. [1]		
33(b)	7.4m [1]		
33(c)(i)	Convex mirror [1]		
(ii)	The convex mirror has a <b>wider field of vision</b> . [1]		
34(a)	Conduction is a transfer of heat <b>without any movement</b> of the medium or material. [1]		
34 (b)(i)	Metal is a good conductor of heat. [1]		
(ii)	Handles should not be hot as it will be safe for the person to hold the pot. [1]	Any possible answers about safety	Reject answers about “material must be insulator of heat”
(iii)	Plastic. [1] It is a poor conductor of heat / good insulator of heat [1]		Accept other materials which are insulators of heat
35	1. <b>Fill the displacement can with water to the brim</b> . [1] 2. Place a <b>measuring cylinder</b> at the spout of the displacement can. [1] 3. <b>Lower the object</b> in the can. The <b>water collected</b> in the measuring cylinder will be the volume. [1]	A sequential brief description of “filling up”, “lowering object”, and “measuring water in measuring cylinder” will suffice.	





Name:	Index Number:	Class:
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HUA YI SECONDARY SCHOOL

**1E**

End-of-Year Examination 2018

**1E****SCIENCE**

Section A

11 October 2018

2 hours

Candidates answer on the Multiple Choice Answer Sheet  
 Additional Materials: Multiple Choice Answer Sheet

**READ THESE INSTRUCTIONS FIRST**

Write your Name, Index Number and Class on all the work you have done.

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

There are **thirty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Optical Answer Sheet.

**Read the instructions on the Answer Sheet very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Any rough working should be done in this booklet.

This document consists of **12** printed pages including the cover page.

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**[Turn Over]**

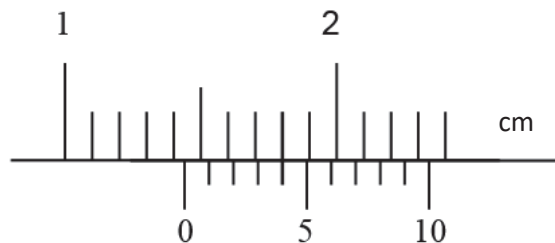
Setter: Mrs Celine Wong

**Section A (30 marks)**

- 1 Fiona was tasked by her teacher to carry out an experiment. In the experiment, she placed a cup full of water and an identical cup full of alcohol near a window. A few hours later, Fiona observed that both cups had lesser volume of liquid than before and that the volume of alcohol remaining was much less than that of water.

What was the main aim of the experiment?

- A** to investigate the amount of evaporation of the two liquids  
**B** to investigate the factors involved in evaporation  
**C** to investigate whether all liquids would evaporate  
**D** to investigate which of the two liquids would evaporate faster
- 2 What is the correct reading of the vernier calipers as shown?



- A** 1.44 cm  
**B** 1.45 cm  
**C** 1.54 cm  
**D** 1.55 cm
- 3 The table shows the densities of three substances.

substance	density in g/cm <sup>3</sup>
mercury	13.6
corn oil	0.9
milk	1.03

Which of the following statements is correct?

- A** corn oil will float on milk but sink in mercury  
**B** mercury will float in both corn oil and milk  
**C** milk will float on mercury but will sink in corn oil  
**D** milk will sink in both mercury and corn oil

4 Which of the following statements is true about substances that are liquids at room temperature?

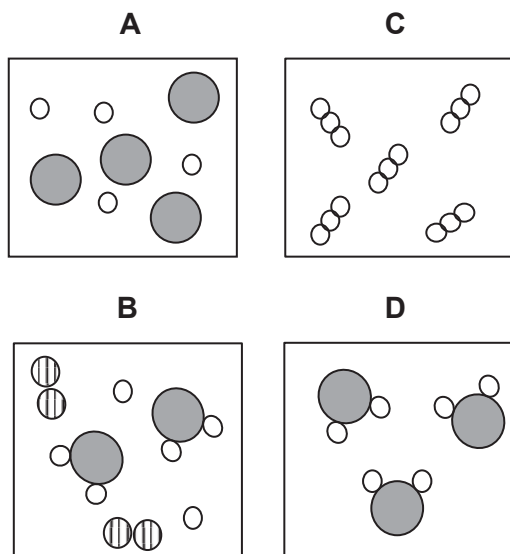
- 1 Their boiling point is above room temperature.
- 2 Their boiling point is below room temperature.
- 3 Their melting point is above room temperature.
- 4 Their melting point is below room temperature.

- A** 1 and 3 only  
**B** 1 and 4 only  
**C** 2 and 3 only  
**D** 2 and 4 only

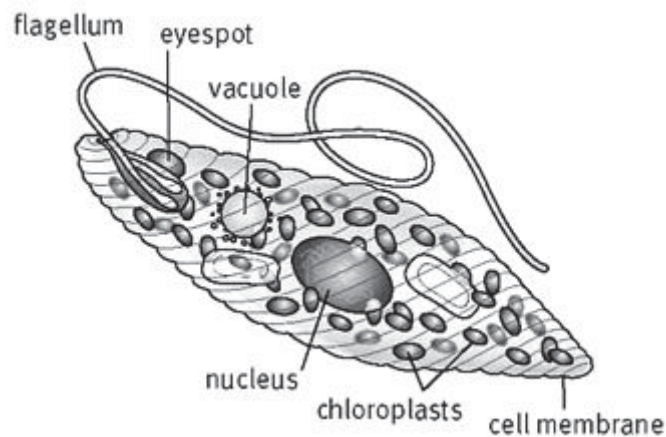
5 Which of the following shows an element, a compound and a mixture?

	element	compound	mixture
<b>A</b>	boron	bronze	copper
<b>B</b>	carbon monoxide	magnesium oxide	milk
<b>C</b>	nitrogen gas	water	fizzy drink
<b>D</b>	sodium	air	water

6 Which of the following diagrams represents only the molecules of a compound?



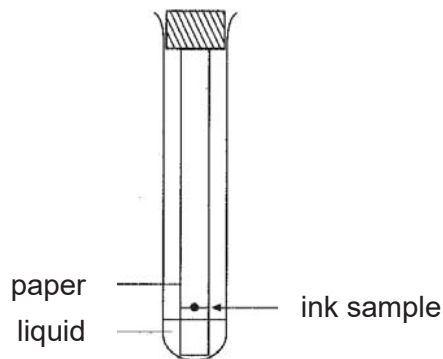
- 7 The diagram shows a unicellular organism, *Euglena*.



Which structure in *Euglena* is the likely reason why it does **not** need to consume any food?

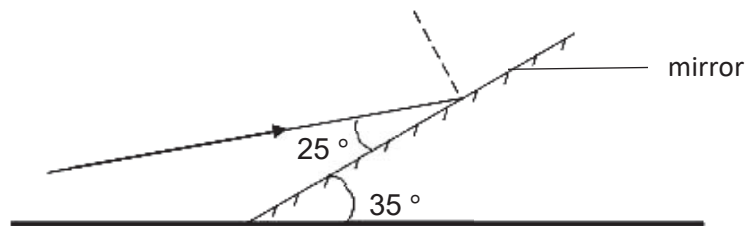
- A chloroplasts
- B flagellum
- C nucleus
- D vacuole

For questions 8 and 9, refer to the diagram below.  
Daniel sets up the apparatus as shown in the diagram.



- 8 Daniel is trying to find out \_\_\_\_\_.
- A how many pigments are present in the ink
  - B how long it takes for the liquid to move up the strip of paper
  - C the quantity of each pigment present in the ink
  - D whether the pigments will react with each other

- 9 Which of the following conclusions could be made if the ink drop remains intact?
- A** The ink drop is not in contact with the liquid.  
**B** The pigments in the ink are probably not soluble in the liquid used.  
**C** The pigments vapourise, they cannot be seen.  
**D** The strip of paper is too thin for the pigments to spread out.
- 10 In order to make lollipops, a manufacturer needs to dissolve sugar cubes in water to obtain a sugar syrup. His current machine heats the mixture of all the sugar cubes and water to a temperature of  $50^{\circ}\text{C}$ . A staff worker then stirs it until all the sugar has dissolved.
- How can he shorten the time in preparing the sugar syrup?
- A** increase the size of the pot containing the water  
**B** reduce the amount of water used  
**C** reduce the temperature of the water  
**D** use smaller sugar cubes
- 11 A fisherman sees the image of a fish and wants to use a spear to catch it.
- Where should he aim to make a direct hit?
- A** above and slightly behind the image  
**B** above and slightly in front of the image  
**C** below and slightly in front of the image  
**D** directly above the image
- 12 A mirror is tilted at an angle of  $35^{\circ}$  to a bench. A ray of light is directed so that it hits the mirror at an angle of  $25^{\circ}$  to the surface of the mirror.



What is the angle of reflection?

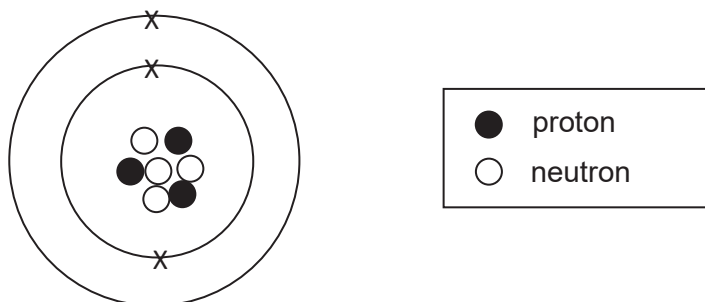
- A**  $25^{\circ}$   
**B**  $35^{\circ}$   
**C**  $65^{\circ}$   
**D**  $120^{\circ}$

- 13 Which statement provides the best evidence that matter exists as tiny particles moving at random?
- A** A small mass of water can produce a much larger volume of steam.  
**B** Air can be readily compressed  
**C** Metals can conduct electricity.  
**D** When a bottle of ammonia is opened, the pungent smell is quickly detected in all parts of the room.

- 14 Which of the following shows the correct properties of the images formed by the 2 types of curved mirrors?

	convex mirror	concave mirror
<b>A</b>	diminished	magnified
<b>B</b>	magnified	magnified
<b>C</b>	magnified	diminished
<b>D</b>	magnified	virtual

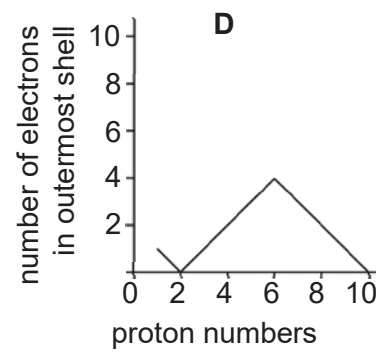
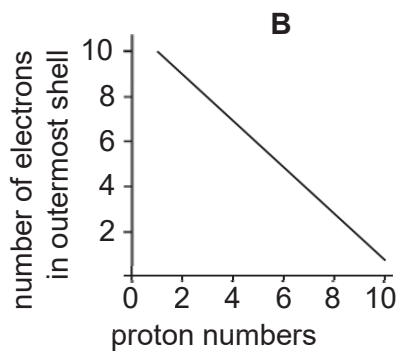
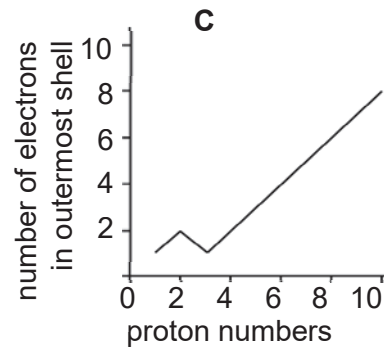
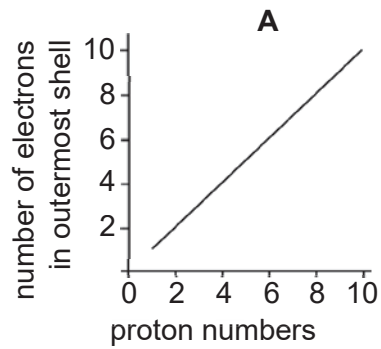
- 15 A particle, **P**, has the following structure.



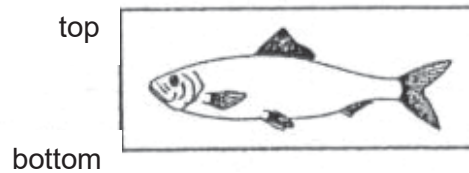
Which of the following statements about **P** is true?

- A** **P** has an atomic number of 4.  
**B** **P** has a mass number of 10.  
**C** **P** loses one electron to form a stable ion.  
**D** **P** is found in Period 1 of the Periodic Table.

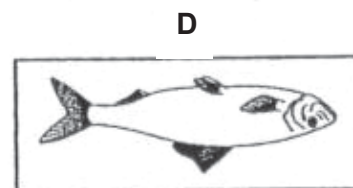
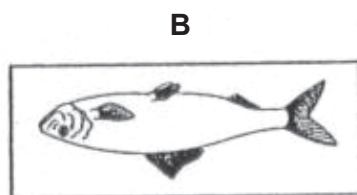
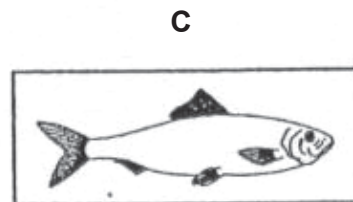
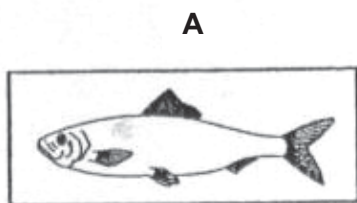
- 16 Which of the following graphs shows the number of electrons in the outermost shell of an atom plotted against the proton number for the first ten elements in the Periodic Table?



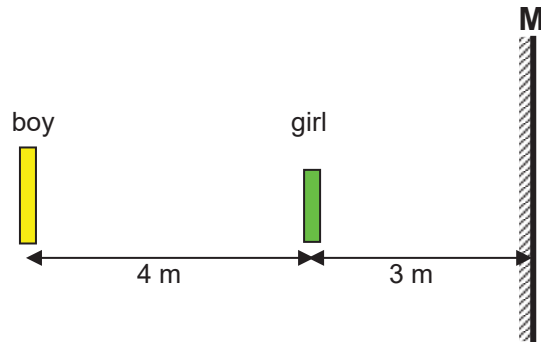
- 17 Peter holds a picture of a fish in front of a plane mirror.



What does the reflection of the fish look like?

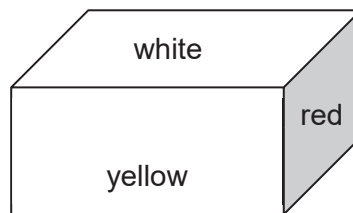


- 18 A girl stands at a distance of 3 m in front of a plane mirror. A boy stands at a distance of 4 m behind her.



What is the distance between the boy and the image of the girl?

- A 1 m  
 B 4 m  
 C 10 m  
 D 14 m
- 19 Three surfaces of a large block are painted with white, yellow and red as shown.

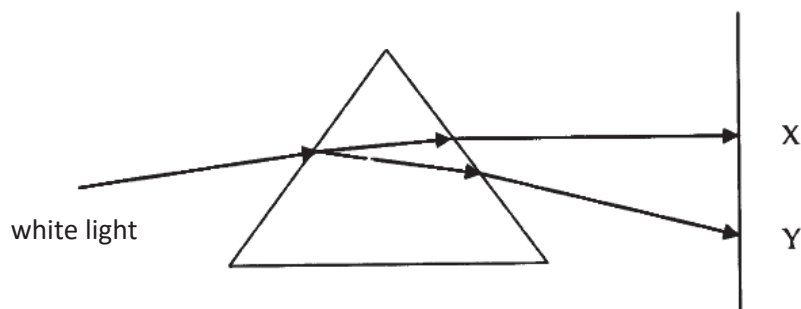


Which of the following correctly shows the colour changes under blue light?

	white surface	yellow surface	red surface
<b>A</b>	blue	black	black
<b>B</b>	blue	white	red
<b>C</b>	white	black	white
<b>D</b>	white	yellow	black



- 20 The diagram shows a ray of white light enters a prism.



What colours are **X** and **Y**?

	X	Y
<b>A</b>	red	violet
<b>B</b>	red	indigo
<b>C</b>	indigo	red
<b>D</b>	violet	red

- 21 20 cm<sup>3</sup> of liquid **A** is poured into 30 cm<sup>3</sup> of liquid **B**. If there is no loss of either liquid, why is the total volume less than 50 cm<sup>3</sup>?
- A** The liquid particles attract each other and reduces the volume.
- B** The particles in the liquid move slower and arrange themselves in fixed positions, reducing the volume.
- C** The total mass of the mixture increases which compresses the liquids into a smaller volume.
- D** There are spaces between the particles. Hence, the smaller particles of one liquid fill the spaces between the larger particles of the other liquid.

- 22 The table shows the positions of four elements in an outline of the Periodic Table.

I	II		III	IV	V	VI	VII	0
	<b>P</b>						<b>R</b>	
<b>Q</b>							<b>S</b>	

Which statement is correct?

- A** **P** forms an ion with a charge of -2.
- B** **P** and **Q** have similar chemical properties.
- C** **R** and **S** are in the same period.
- D** **Q** is a metal while **R** is a non-metal.

- 23 The table shows the number and the type of atoms in one molecule of different compounds.

Which of the following is **not** correct?

	chemical formula	number of atoms	type of atoms
<b>A</b>	HCl	2	2
<b>B</b>	CF <sub>4</sub>	5	2
<b>C</b>	H <sub>2</sub> NO <sub>3</sub>	5	3
<b>D</b>	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>	24	3

- 24 Which of the following correctly describes the heat change for the different processes?

	evaporation	freezing	melting
<b>A</b>	heat absorbed	heat absorbed	heat absorbed
<b>B</b>	heat absorbed	heat lost	heat absorbed
<b>C</b>	heat lost	heat absorbed	heat lost
<b>D</b>	heat lost	heat lost	heat lost

- 25 What are the relative mass on the proton, neutron and electron?

	proton	neutron	electron
<b>A</b>	1	1	$\frac{1}{1840}$
<b>B</b>	1	1	$\frac{1}{180}$
<b>C</b>	1	$\frac{1}{180}$	1
<b>D</b>	$\frac{1}{180}$	$\frac{1}{1840}$	$\frac{1}{1840}$

- 26 A newly found atom is assigned with a chemical symbol as shown below.



Which of the following data is correct?

	no. of protons	no. of electrons	no. of neutrons
<b>A</b>	95	235	235
<b>B</b>	95	95	235
<b>C</b>	95	235	140
<b>D</b>	95	95	140

27 Which resource(s) are constantly recycled to maintain life on earth?

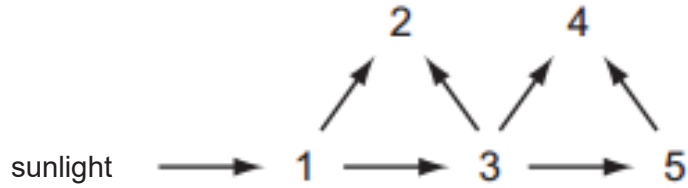
	carbon	energy
<b>A</b>	✓	✓
<b>B</b>	✓	✗
<b>C</b>	✗	✓
<b>D</b>	✗	✗

key

✓ recycled

✗ not recycled

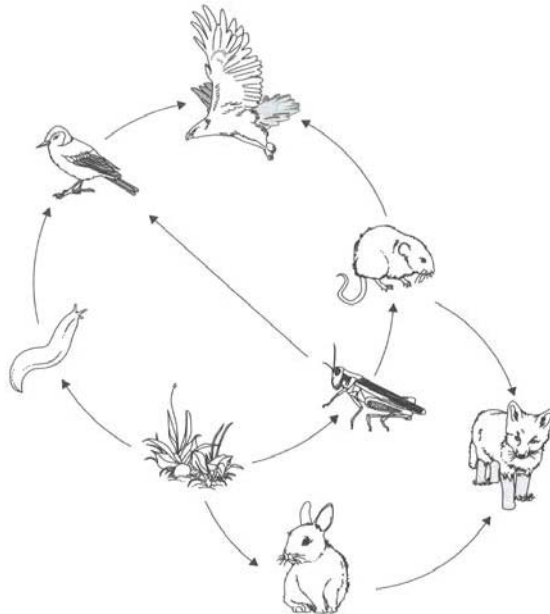
28 The diagram shows energy flow in a food web.



Which number represents an organism that eats both plants and animals?

- A** 2
- B** 3
- C** 4
- D** 5

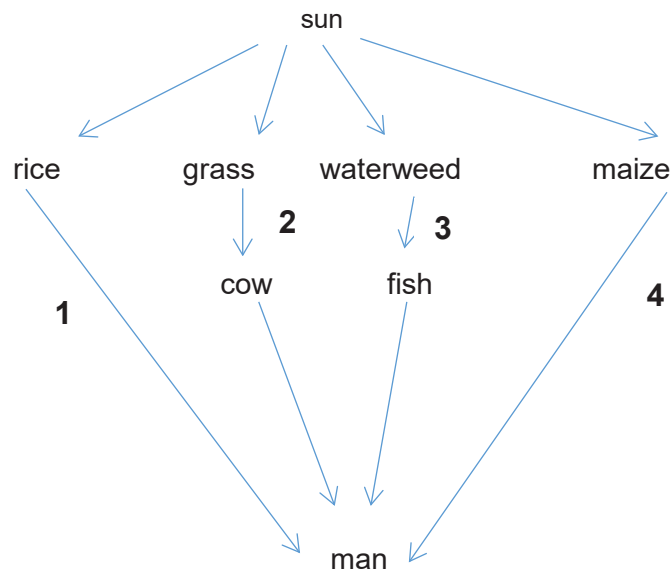
29 The diagram shows part of a food web in the temperate grasslands.



How many primary consumers are shown in this food web?

- A** 1
- B** 2
- C** 3
- D** 4

30 The diagram shows four food chains.



Which chains make the most efficient use of solar energy?

- A 1 and 2
- B 1 and 4
- C 2 and 3
- D 2 and 4

**End of Section A**

Name:	Index Number:	Class:
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HUA YI SECONDARY SCHOOL

**1E**

End-of-Year Examination 2018

**1E****SCIENCE**

Section B and C

11 October 2018

2 hours

Candidates answer on the Question Paper.  
Additional Materials: NIL

**READ THESE INSTRUCTIONS FIRST**

Write your Name, Index Number and Class on all the work you have done.  
Write in dark blue or black pen.  
You may use a pencil for any diagrams, graphs, tables or rough working.  
Do not use staples, paper clips, highlighters, glue or correction fluid.

**Section B**Answer **all** questions.

Write your answers in the spaces provided on the question paper.

**Section C**Answer **all** the questions.

Write your answers in the spaces provided on the question paper.

The number of marks is given in brackets [ ] at the end of each question or part question.

A copy of the Periodic Table is printed on page 14.

For Examiner's Use	
Section B	
Section C	
Total	

This document consists of **15** printed pages including the cover page.

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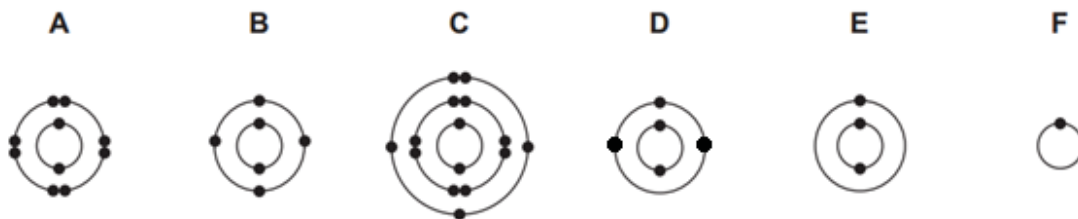
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**[Turn Over]**

Setter: Mrs Celine Wong

**Section B (40 marks)**  
**Short Structured Questions**  
 Answer **all** the questions in this section.

1 Fig. 1.1 shows the electronic structures of six atoms.



**Fig. 1.1**

Answer the following questions by choosing from the structures **A, B, C, D, E** or **F**. You can use each structure once, more than once or not at all.

Which structure represents

(a) an atom in Period 3 of the Periodic Table,

(b) an atom containing six protons,

(c) an atom with a complete outer shell of electrons?

[3]

[Total: 3]

2 (a) Read the following passage and answer the questions below.

Sweeteners and flavourings are added to a bottle of liquid medicine to cover up the taste of the medicine so that it is more pleasant to take. When left standing, a layer of particles settles to the bottom of the container. Hence, patients are advised to shake the bottle of medicine before taking it.

(i) State whether the liquid medicine is a solution or suspension. Support your answer with evidence from the passage.

.....

.....

.....

[1]

- (ii) Describe another method you would use to support your answer in (a)(i).

.....  
 ..... [2]

- (iii) Comment on the density of the layer of particles as compared to the rest of the mixture found in such liquid medicines.

.....  
 ..... [1]

- (iv) Is this liquid medicine a homogeneous mixture or a heterogeneous mixture?  
 Explain your answer.

.....  
 ..... [2]

- (b) Stainless steel is an alloy which contains mainly iron and small amounts of carbon, chromium and nickel.

There are three main types of stainless steel:

*Austenite* stainless steels make up over 70% of total stainless steel production. They contain a maximum of 0.15% carbon, and a minimum of 16% chromium.

*Ferritic* stainless steels are less expensive. They contain between 10.5% and 27% chromium and very little nickel.

*Martensitic* stainless steels contain chromium (12–14%), molybdenum (0.2–1%), nickel (less than 2%), and carbon (about 0.1–1%).

- (i) From the information given above, state one property of stainless steel which shows that it is a mixture.

.....  
 ..... [1]

- (ii) Suggest another property that you would expect of stainless steel because it is a mixture.

.....  
 ..... [1]

[Total: 8]

3 Fig. 3.1 shows a food web for a habitat in United Kingdom.

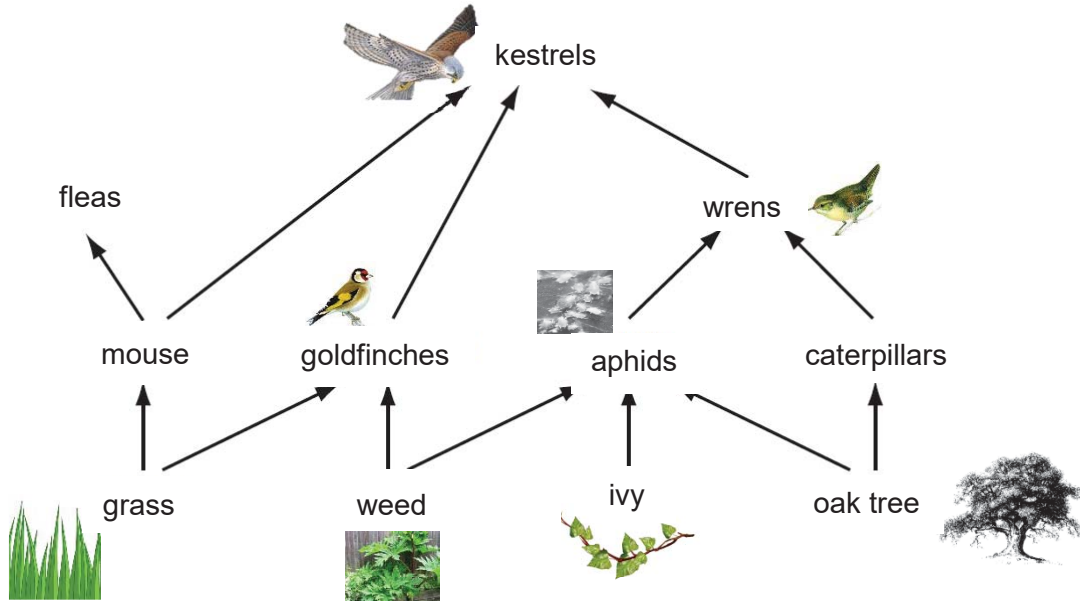


Fig. 3.1

(a) Circle a food chain which shows four trophic levels in Fig. 3.1. [1]

(b) The oak tree is known as a producer. Why is it called a producer?  
 .....  
 ..... [1]

(c) Explain why food chains are typically short.  
 .....  
 .....  
 ..... [2]

(d) State and explain two effects on the food web if all the oak trees are killed by a viral disease.  
 .....  
 .....  
 ..... [2]

[Total: 6]



- 4 (a) Fig. 4.1 shows the position of an object, (labelled **O**), placed in front of a plane mirror. The position of an eye is also shown.

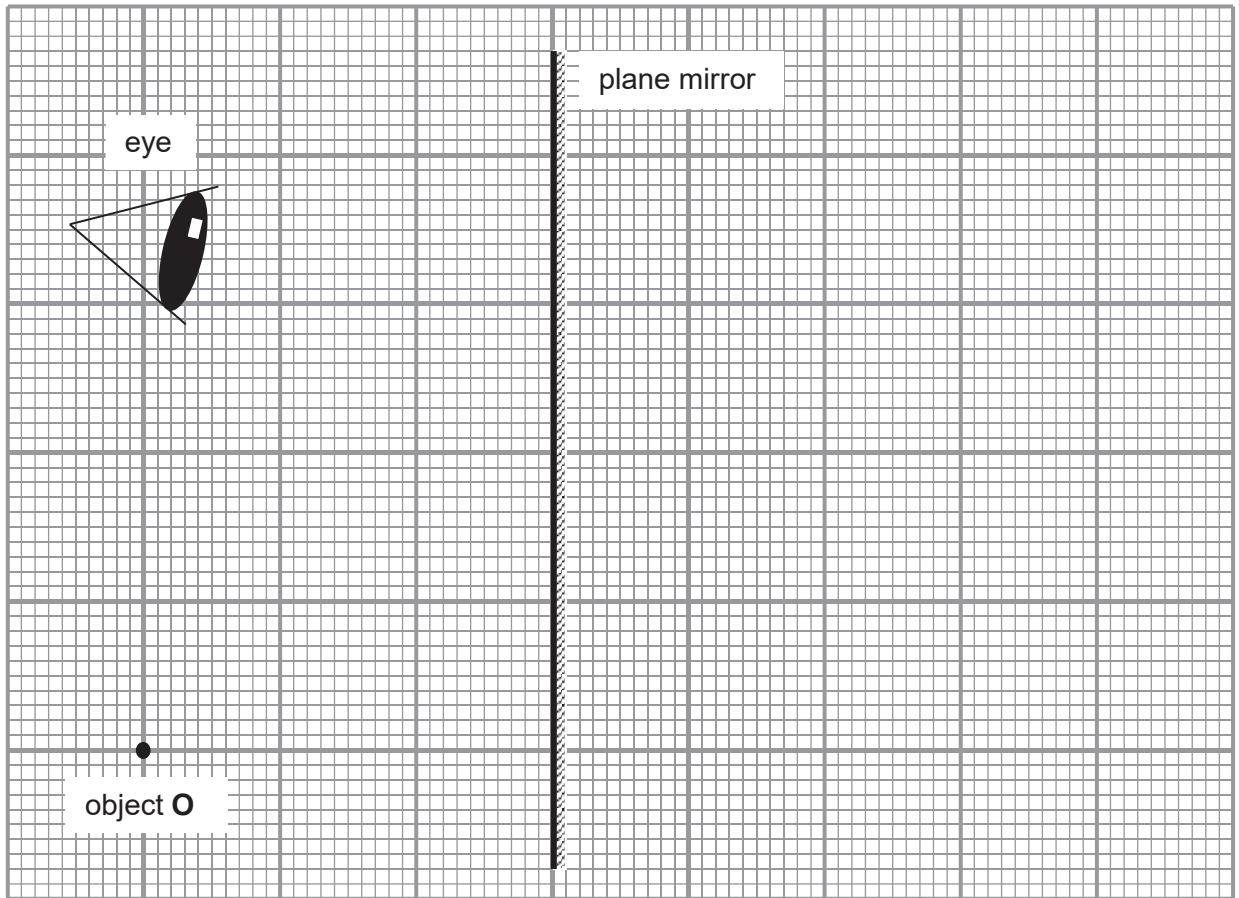


Fig. 4.1

- (i) Mark the position of the image of the object **O** and label the image **I**. [1]
- (ii) Draw the path of **two** light rays which leaves the object and which is reflected at the mirror into the eye. [3]
- (iii) State two characteristics of the image formed in the plane mirror.

.....  
 .....

[2]

(b) Fig. 4.2 shows a setup to demonstrate refraction of light through a glass block.

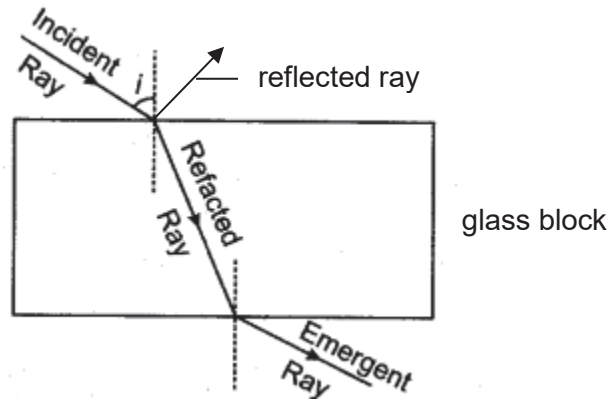


Fig. 4.2

(i) Why does refraction of light occur in the glass block?  
 .....  
 ..... [1]

(ii) Is the emergent ray as bright as the incident ray? Explain your answer.  
 .....  
 .....  
 ..... [2]

[Total: 9]

5 Gallium is an element in the Periodic Table. It has the following physical properties:

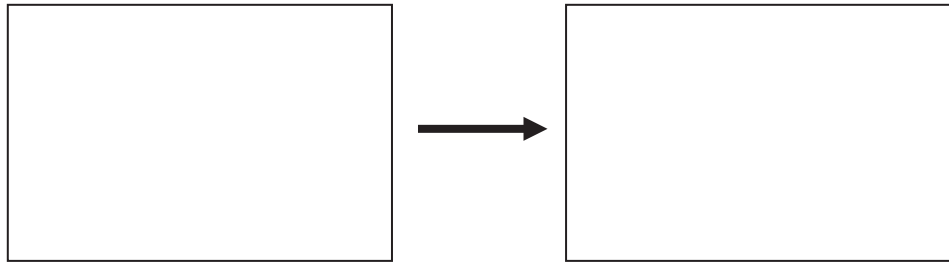
- its melting point is 29.8°C.
- its boiling point is 2204°C.

(a) What is the state of gallium at room temperature of 25°C?  
 ..... [1]

(b) Describe the motion and arrangement of particles in gallium at room temperature of 25°C.  
 .....  
 .....  
 ..... [2]

(c) What will happen to solid gallium when held in the palm of a hand? (Assuming temperature of a healthy human body is 37°C.)  
 ..... [1]

(d) Show the change in the arrangement of particles during the process in 5(c).



[2]

[Total: 6]

6 Dawn heated liquid X from room temperature until it becomes a gas. Fig. 6.1 shows the heating graph of liquid X.

temperature/°C

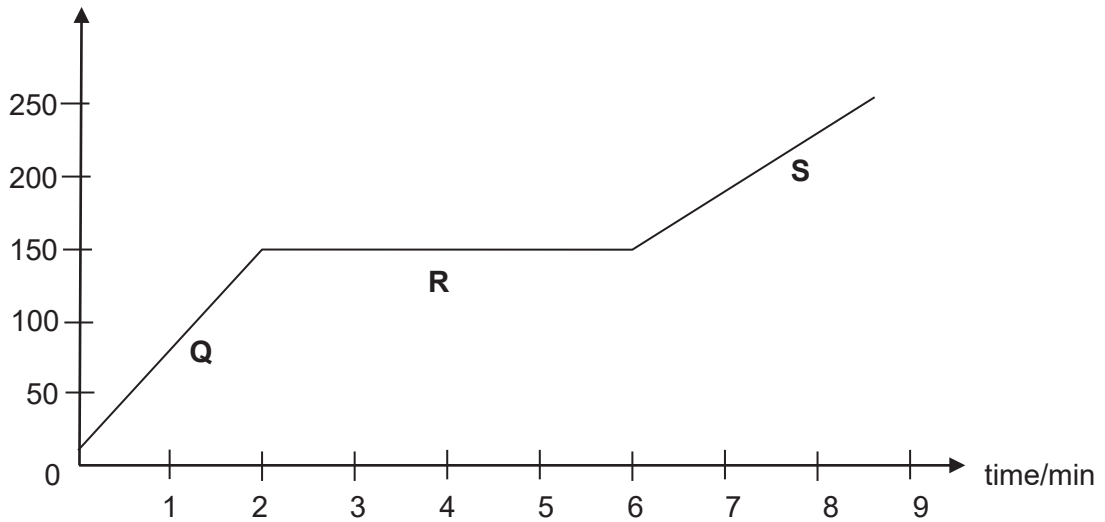


Fig. 6.1

(a) With reference to Fig. 6.1, state

(i) the boiling point of liquid X;

..... [1]

(ii) the time taken when liquid X undergoes boiling.

..... [1]

(b) Which part of the graph (Q, R or S) do the particles

(i) exist only in the liquid state?

..... [1]

(ii) have the most amount of kinetic energy?

..... [1]

(c) Explain why the temperature remains constant from the 2<sup>nd</sup> to 6<sup>th</sup> minute of the heating process.

.....  
.....  
..... [2]

(d) Dawn concluded that Fig. 6.1 shows the evaporation of liquid X. She explained that the processes of *boiling* and *evaporation* are the same as both involve changing the state of a substance from liquid to gas.

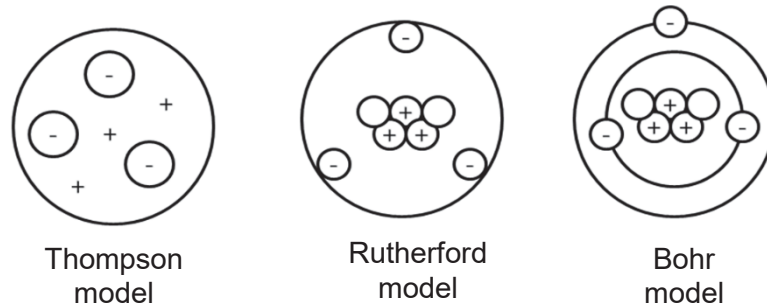
Using information from Fig. 6.1, provide **one** example to explain why her statement is incorrect.

.....  
.....  
..... [2]

[Total: 8]

**Section C (30 marks)**  
**Free Response Questions / Data-Based Questions**  
 Answer **all** questions.

7 John Dalton, JJ Thompson, Ernest Rutherford and Niels Bohr are some of the greatest scientists devoted to the discovery of atomic science. From their discovery of atom, they create models to explain the atomic structures as shown in Fig. 7.1.



**Fig. 7.1**

One common rule derived from their models which followed until today was that all atoms are electrically neutral particles.

(a) Explain why all atoms are electrically neutral.

.....  
 ..... [2]

(b) State one similarity and two differences of the models shown in Fig. 7.1.

(i) one similarity

.....  
 .....  
 ..... [1]

(ii) two differences

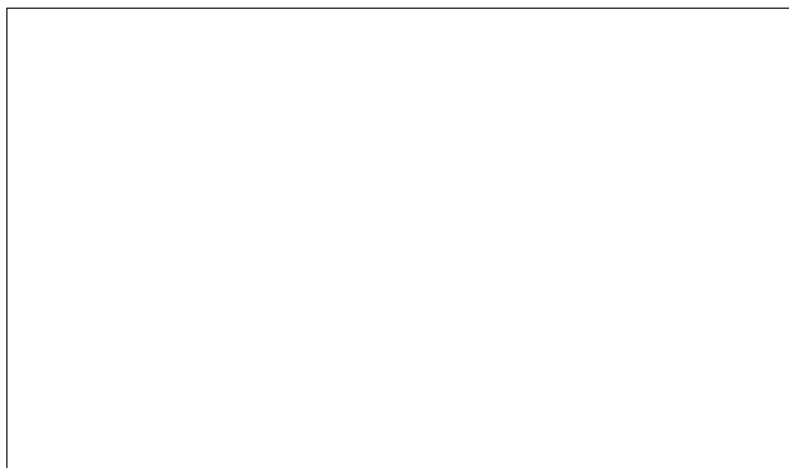
.....  
 .....  
 ..... [2]

(c) JJ Thompson also deduced the formation of a positively charged atom. He explained that atom such as lithium will lose its negatively charged sub-atomic particles to form a positive ion.

(i) What is the name of a positively charged ion?

.....  
 ..... [1]

- (ii) Draw the structure of a lithium ion.



[2]

- (d) A recently discovered element, **M**, has a proton number of 88 and a mass number of 188. Deduce the number of protons, electrons and neutrons in an atom of element **M**.

.....

.....

[2]

[Total: 10]

8 Fig. 8.1 shows the experimental set-up for a separation in the laboratory.

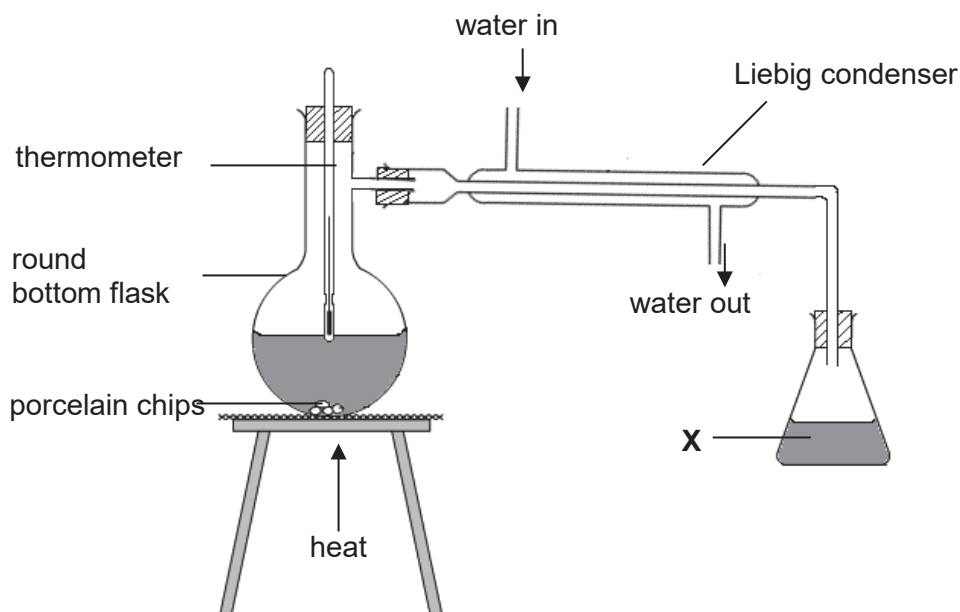


Fig. 8.1

(a) (i) What is the name of the separation technique shown in the diagram?

..... [1]

(ii) Identify **two** mistakes present in the experimental set-up shown in Fig. 8.1.

.....  
 .....  
 ..... [2]

(b) What is the purpose of the porcelain chips in the flask?

.....  
 ..... [1]

(c) This separation technique can be used to obtain liquid **X** from sea water. Identify liquid **X** and suggest how you would determine that liquid **X** is a pure substance during the separation.

.....  
 .....  
 ..... [2]

(d) Name another way which can be used to obtain liquid **X** from seawater.

..... [1]

(e) The table shows the properties of three substances.

substance	effect of heat	adding water	adding alcohol
<b>X</b>	no reaction	dissolves	dissolves
<b>Y</b>	decomposes	dissolves	insoluble
<b>Z</b>	no reaction	insoluble	dissolves

Substances **X**, **Y** and **Z** are mixed.

Starting from the mixture, briefly describe how you would obtain a dry sample of **X**, **Y** and **Z**.

.....  
 .....  
 .....  
 .....  
 ..... [3]

[Total: 10]



- 9 Fig. 9.1 shows the changes in the size of the prey and predator population in a lake over six years.

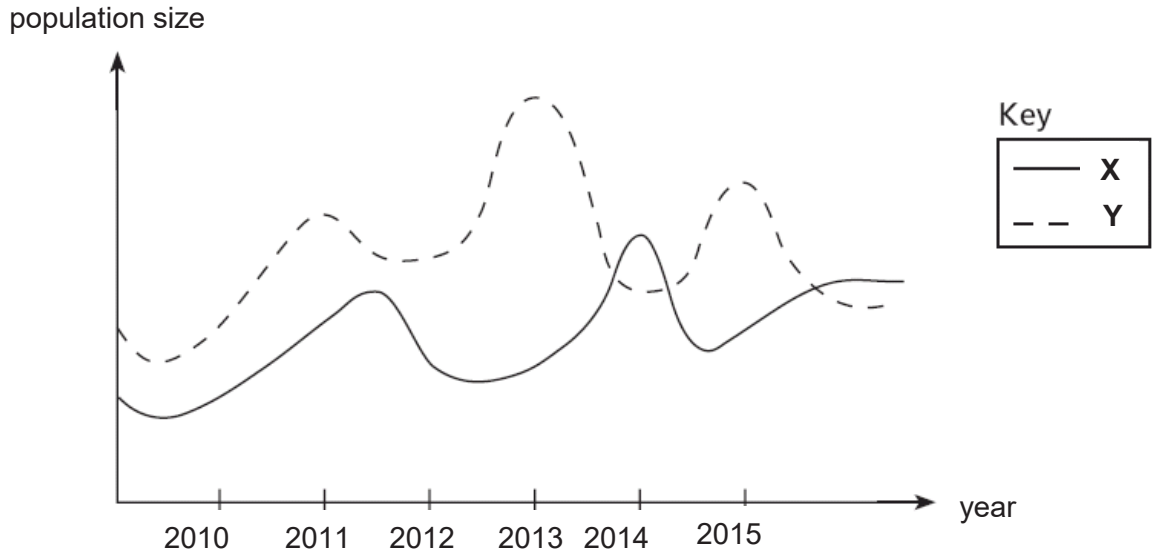


Fig. 9.1

- (a) Which curve, X or Y, represents the prey? Explain your answer.

.....  
 .....  
 .....

[1]

- (b) An ecologist who studied the lake found that there was an increase in the population of producers from 2011 – 2013.

Suggest how the producer population affects the prey population and the relationship between the prey and producer.

.....  
 .....  
 .....

[2]

- (c) Describe and explain the relationship between populations X and Y.

.....  
 .....  
 .....

[2]

- (d) Fig. 9.2 shows the changes of the percentage of dissolved oxygen in a lake during different times of the day.

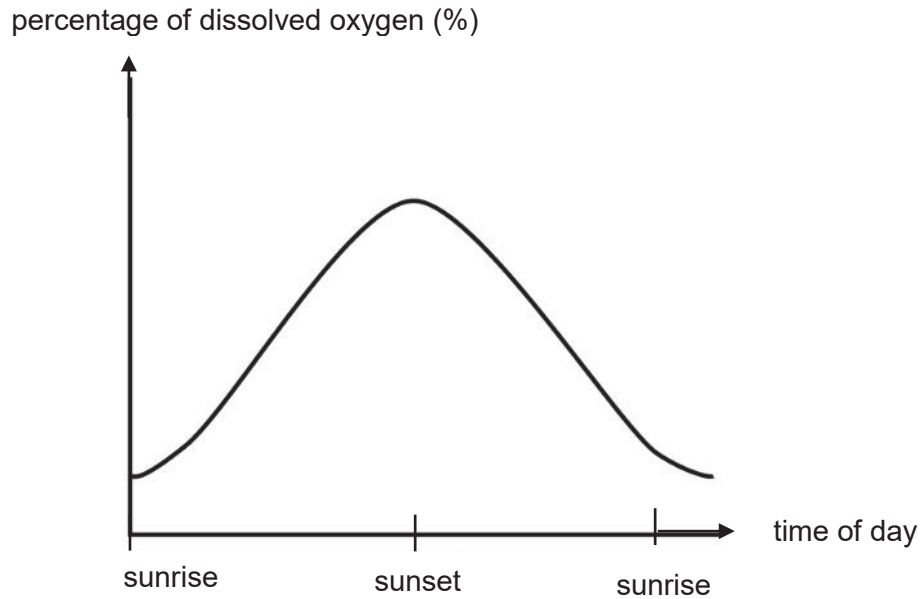


Fig. 9.2

- (i) Name the process which released oxygen into the water of the lake.

..... [1]

- (ii) Describe the changes in the percentage of dissolved oxygen in the lake as the day progresses.

.....  
.....  
..... [2]

- (iii) Explain your answers in (ii).

.....  
.....  
..... [2]

[Total: 10]

End of Paper

# The Periodic Table of Elements

		Group																																																																									
I	II	III	IV	V	VI	VII	0																																																																				
3 Li lithium 7	4 Be beryllium 9	11 Na sodium 23	12 Mg magnesium 24	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Lv livermorium -	116 Ts tennessine -	117 Oh oganeson -	118 Og ogesson -

1  
H  
hydrogen  
1

**Key**  
proton (atomic) number  
atomic symbol  
name  
relative atomic mass

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

lanthanoids

actinoids

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).





Hua Yi Secondary School  
Science Department  
Lower Secondary Science  
Secondary One Express  
2018 SA 2

**PAPER 1 Answers**  
**Section A (30 marks)**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
D	A	C	B	C	D	A	A	B	D
<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
C	C	D	A	C	C	C	C	A	A
<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>
D	D	C	B	A	D	B	A	C	B


**PAPER 2 Answers**  
**Section B & C (70 marks)**

<b>1</b>	<b>(a)</b>	C	1
	<b>(b)</b>	B	1
	<b>(c)</b>	A	1
<b>2</b>	<b>(a)(i)</b>	Suspension A layer of particles <u>settles to the bottom</u> of the container.	1
	<b>(ii)</b>	Filtration /use touch light to obtain the <u>solid particles</u> left on the <u>filter paper</u> .  R: evaporation	1 1
	<b>(iii)</b>	The layer of particles is <u>denser/higher</u> so it <u>sinks</u> to the bottom of the liquid medicine.  R: larger/heavier	1
	<b>(iv)</b>	It is a heterogeneous mixture as the density, taste and colour are <u>not the same throughout/not uniform/layer of particles at the bottom of the container</u>  R: insoluble particles	1 1
	<b>(b)(i)</b>	The components in stainless steel are not mixed in <u>any fixed</u> composition.	
	<b>(ii)</b>	The components in stainless steel can be <u>separated</u> by <u>physical methods</u> .  No chemical reaction takes place when stainless steel is made.	1

		<p>Stainless steel has the properties of its components.</p> <p>Range of boiling point/melting point</p> <p>R: broken down into simpler substances by chemical means</p>	
3	(a)	<p>Any one:</p> <p>Weed → aphids → wrens → kestrels</p> <p>Ivy → aphids → wrens → kestrels</p> <p>Oak → aphids → wrens → kestrels</p> <p>Oak → caterpillars → wrens → kestrels</p>	1
	(b)	<p>It make its own food from light energy/ make their own organic matter</p>	1
	(c)	<p>90% of energy is <u>lost</u> due to cellular respiration, lost in metabolic/ biological waste products.</p> <p>Resulted in only 10% is energy transfer from one trophic level to another. There would be <u>inefficient/not enough energy</u> to sustain long food chain.</p>	1 1
	(d)	<p>Decrease population of caterpillar as no more source of food. + Decrease population of aphids because one less source of food and more wrens will feed on aphids at the same time. Decrease population in wrens due to decrease population of caterpillar and aphids</p>	2

4	(a)(i)		4
	(a)(iii)	<p>Virtual/equal distance between object and mirror as image and mirror/same size as object</p>	2

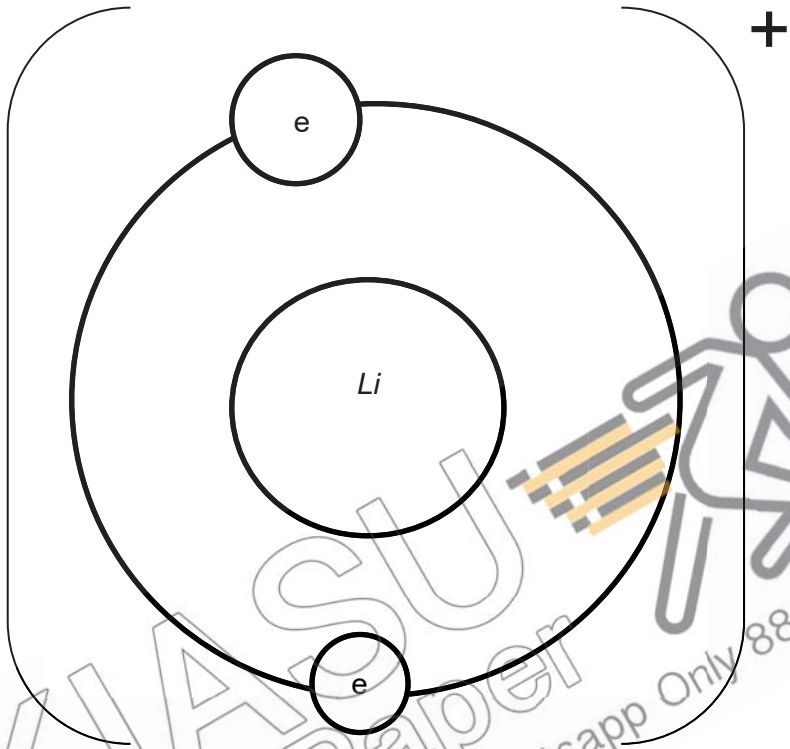
	Any two	
(b)(i)	Refraction of light occurs because light travels from a less dense medium, air, to a denser medium, glass block/change in speed of light ray as it moves in different medium.	1
(b)(ii)	<u>No</u> , the emergent ray is less bright than the incident ray. This is because some of the light is reflected when it hits the glass block. /The glass block absorbs some of the light that is passing through it.	1 1

5	(a)	Gallium is <u>solid</u> at room temperature of 25°C	1
	(b)	Particles of gallium are <u>regularly arranged and closely packed</u> . They <u>vibrate</u> about their <u>fixed position</u> .	1 1
	(c)	It will melt.	1
	(d)	 <p>- Solid must be regularly arranged. - Liquid must be irregularly arranged.</p>	2

6	(a)(i)	150 °C	1
	(ii)	4 minutes	1
	(b)(i)	Q	1
	(ii)	S	1
	(c)	During the process of boiling, <u>heat absorbed</u> by the particles is used to <u>overcome the forces of attraction</u> between the particles.	1 1
	(d)	Evaporation is a slow process but boiling is a <u>fast process</u> where liquid X only took <u>2 minutes</u> to become a gas.  Evaporation occurs at <u>any temperature</u> below the boiling point but boiling only occurs at the boiling point where the <u>temperature remained constant</u> at <u>150°C</u> .  [Any one] R: no supporting data	1 1 1 1

7	(a)	All atoms have <u>equal numbers</u> of positively charged protons and negatively charged electrons. All atoms are neutral because there is <u>no net charge</u> .	1 1
	(b)(i)	All three atomic models consist of positive and negative charged particles.	1
	(b)(ii)	Rutherford's model and Bohr's model are made up of positive, negative and neutrally charged particles while Thompson's model lacks neutrally charged particles.	1



	Bohr's model has electron shells where electrons are located on it while Thompson's model and Rutherford's model both lack electron shells.	1
(c)(i)	cation	1
(c)(ii)		
(d)	protons= 88, electrons= 88 neutrons=100	1 1

8	(a)(i)	simple distillation/distillation	1
	(ii)	<p>The bulb of the thermometer should be <u>above the entrance of the condenser / next to the spout</u> of the round bottom flask.</p> <p>The Liebig condenser should tilt downwards into the conical flask. Water in the Liebig condenser should enter from the lower inlet and flow out from the higher outlet.</p> <p>The conical flask should not be stoppered. [Any two]</p>	2
	(b)	Ensure smooth boiling	1
	(c)	Liquid X is Pure / distilled water	1
		boiling point remains constant at 100°C	1
		[No marks for "water"]	



	(d)	reverse osmosis	1
	(e)	<u>Add alcohol</u> to the mixture, as Y is insoluble, it remains as residue + <u>filter</u> to remove <u>Y</u> .	1
		Collect <u>the filtrate</u> and <u>evaporate</u> to remove the alcohol added.	1
		Add water to the <u>residue</u> + <u>filter</u> to remove <u>Z</u> as residue.	1
		<u>evaporate</u> the filtrate to obtain <u>X</u>	1
		<u>Add water</u> to the mixture, as Z is insoluble, it remains as residue + <u>filter</u> to remove <u>Z</u> .	1
		Collect <u>the filtrate</u> and do crystallisation to remove the alcohol added.+ add alcohol to the obtained solid	1
		<u>Filter</u> to remove <u>Y</u> + <u>evaporate</u> the filtrate to obtain <u>X</u>	1
9	(a)	Curve Y This is because the population of <u>preys outnumbers/is more than</u> the population of <u>predators</u>	1 1
	(b)	Since there is an <u>increase in the population of producers</u> , this means that there will be <u>more food for the preys</u> .  Therefore, the <u>population of preys would increase</u> .	1 1
	(c)	As population <u>Y increases</u> , population <u>X increases</u> .  This is because as the population of <u>preys increases</u> , there is <u>more food for the predators</u> . Therefore, the <u>population of predators increases</u> as well.	1 1
	(d)(i)	photosynthesis	1
	(ii)	percentage of dissolved oxygen increases during the day; percentage of dissolved oxygen decreases during the night;	1 1
	(iii)	During the day, the rate of photosynthesis is higher than respiration as water plants carry out <u>photosynthesis</u> in the presence of light energy (day time) and <u>oxygen released</u> as by-product;  During the night, water plants do not carry out photosynthesis due to the absence of light energy; however, <u>respiration still takes place at night</u>	1 1



NAME : \_\_\_\_\_ (     )

CLASS : 1E\_\_\_ / 1A\_\_\_



## SCIENCE PAPER 1

**Monday**

**08 October 2018**

**P1 & P2: 2 hours**

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**JUYING SECONDARY SCHOOL  
END YEAR EXAMINATION  
SECONDARY ONE EXPRESS / NORMAL ACADEMIC (SBB)**

Instructions to students:

**DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.**

1. This paper consists of Section A with 30 questions. (30 marks)
2. Shade your answers in the Answer Sheet provided.
3. The use of a scientific calculator is allowed.
4. The Periodic Table is provided on page 15 of the paper.

---

This Question Paper consists of 15 printed pages including this page.

[TURN OVER]

Setter: Mr Soh Joon Wei

Vetter: Ms. Yeo Yee Teng and Mr Lee Hon Yen

## 2

## Section A

Answer **all** the questions in this section in the Answer Sheet provided.

The total mark for this section is 30.

- 1 Which is an example of a benefit from technology?
- A developing tsunami early-warning systems
  - B developing dangerous micro-organisms for biological warfare
  - C developing nerve gas for use in a terrorist attack
  - D creating computer viruses to spread on the internet

Refer to the paragraph below and answer Questions 2 and 3.

Patrick believes that green plants exposed to lights of different colours will grow at different rates. He decides to perform an experiment by placing three pots of green plants under lights of different colours for a period of two weeks. Patrick measured the original heights of the green plants and left them to grow. During the two weeks, he measured the height of each green plant in the three different set-ups every day. The experiment ended thereafter.

- 2 Which stage of the scientific method is **not** present?
- A analysis of results
  - B making observations
  - C proposing hypothesis
  - D recording of results
- 3 Which is the most suitable instrument for measuring the height of the plant?
- A metre rule
  - B Vernier calipers
  - C beam balance
  - D electronic balance

3

- 4 The diagram shows a hazard symbol on a chemical bottle.  
What would be the harmful effect if the person does **not** handle the substance properly?



- A** The substance can cause explosion because it can burst into flames easily.  
**B** The substance can cause irritation to the skin and respiratory system.  
**C** The radiation from the substance destroys the person's body cells and tissues.  
**D** The substance can cause severe damage to body parts.
- 5 Which sequence of actions is the correct method to light a Bunsen burner?
- I light the flame
  - II turn on the gas tap
  - III close the air hole
  - IV open the air hole
- A** I, II, IV, III  
**B** IV, I, II, III  
**C** III, I, II, IV  
**D** III, II, I, IV

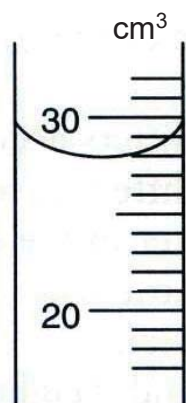
4

6 What are the characteristics of a luminous flame?

- I It is clean.
- II It is smoky.
- III It is unsteady.
- IV It is very hot.

- A I and IV
- B II and III
- C II and IV
- D III and IV

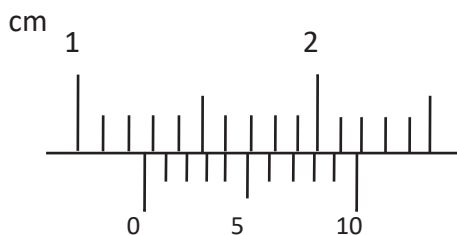
7 What is the volume of the liquid in the measuring cylinder below?



- A 28.0  $\text{cm}^3$
- B 29.0  $\text{cm}^3$
- C 30.0  $\text{cm}^3$
- D 32.0  $\text{cm}^3$

## 5

- 8 Jack used the Vernier calipers to measure the external diameter of two identical coins.



What is the external diameter of one coin?

- A 0.62 cm      B 0.67 cm      C 1.24 cm      D 1.34 cm
- 9 The table shows the densities of four different materials.

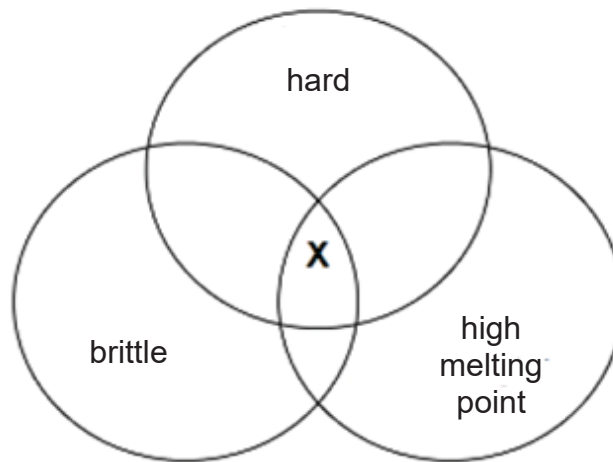
material	density ( $\text{g/cm}^3$ )
gold	19.3
platinum	21.5
aluminium	2.7
iron	7.9

Given that mercury is a liquid at room temperature and has a density of  $13.6 \text{ g/cm}^3$ , which material will float or sink in mercury?

	float	sink
<b>A</b>	aluminium, gold	platinum, iron
<b>B</b>	aluminium, iron	gold, platinum
<b>C</b>	gold, platinum	aluminium, iron
<b>D</b>	platinum, iron	aluminium, gold

6

10 The Venn diagram is used to classify some materials.



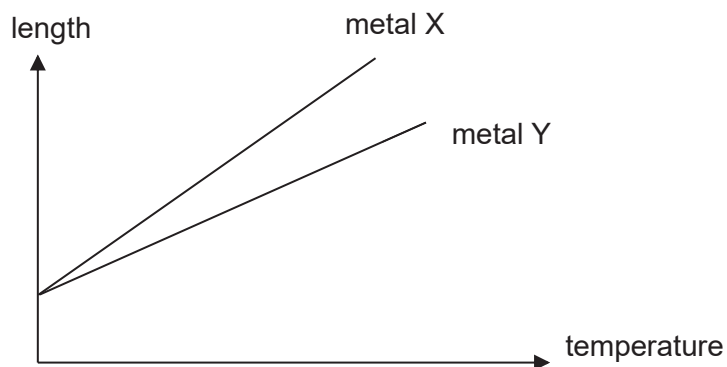
Which object has the properties of X?

- A ceramic pot
- B metallic spoon
- C fishing line
- D plastic cup



7

- 11 The graphs show the changes in length of two different metals when temperature changes.



With reference to the graphs, which statement is **false**?

- A Both metals expand uniformly when temperature increases.
  - B Metal Y contracts more than metal X for the same decrease in temperature.
  - C Metal X expands more than metal Y for the same increase in temperature.
  - D The two metals expand and contract by different amounts for the same change in temperature.
- 12 Which separation technique is used to obtain NEWater in Singapore?
- A chromatography
  - B filtration
  - C reverse osmosis
  - D distillation

## 8

- 13** A very old painting has been sprayed accidentally with new paint. Which solvent could be used to remove the new paint without damaging the original painting?

	old paint	new paint
<b>A</b>	insoluble in solvent	insoluble in solvent
<b>B</b>	insoluble in solvent	soluble in solvent
<b>C</b>	soluble in solvent	insoluble in solvent
<b>D</b>	soluble in solvent	soluble in solvent

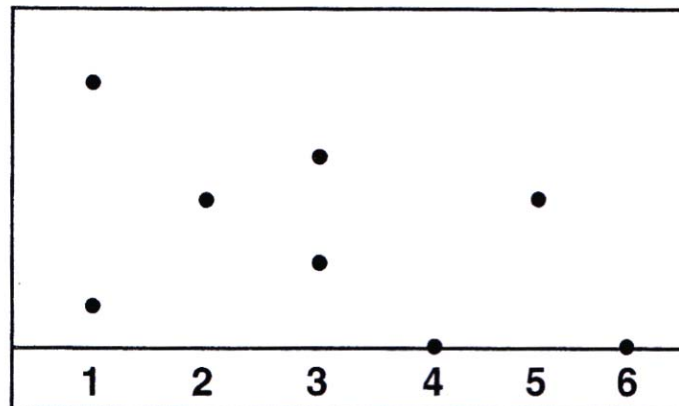
- 14** Some sand has been mixed with solid copper(II) sulfate crystals, which are soluble in water.

What is the correct order to separate copper(II) sulfate from sand?

- A** dissolve, filter, evaporate and crystallise
- B** evaporate, filter, dissolve and crystallise
- C** filter, dissolve, evaporate and crystallise
- D** evaporate, dissolve, filter and crystallise

9

15 The diagram shows a chromatogram of six different samples.



Which statement about the six samples is correct?

- A Samples 1 and 3 are from the same source because both contain only two substances.
- B Samples 2 and 5 are from the same source because both contain substances that travel the same distance on the chromatogram.
- C Samples 4 and 6 are from the same source because both contain only one substance.
- D Samples 2, 4, 5 and 6 are from the same source because all contain only one substance.

16 Which statement is **incorrect** about the cell wall?

- A It is a thick layer surrounding the cell membrane.
- B It is a partially permeable membrane.
- C It is made up of cellulose.
- D It supports the cell and gives it a regular shape.

17 Which statement is true?

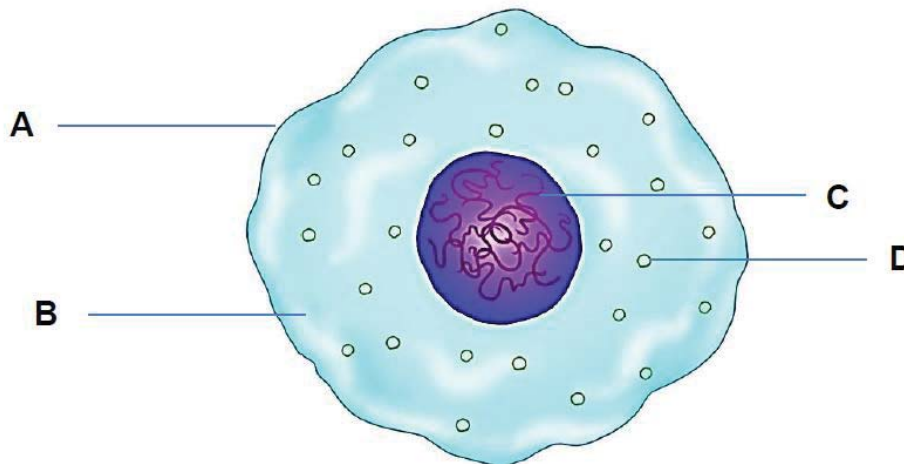
- A A cell is a basic unit of animals only.
- B A unicellular organism does not need a nucleus to function.
- C A multicellular organism has more than one cell in its body.
- D Plant cells and animal cells only differ in terms of the presence of a cell wall.

18 What is the correct order of organisation in a plant?

- A leaf → photosynthetic cells → leaf tissue → shoot system
- B root hair cell → transport tissue → root → transport system
- C reproductive system → reproductive cells → flowers → fruit
- D root tissues → root cells → root system → root

19 The diagram shows a typical animal cell.

Which structure is the site of most of the cell's activities?



20 Which statement about particles does **not** happen during freezing?

- A Particles are more closely packed.
- B Particles overcome the strong attractive forces.
- C Particles vibrate slower.
- D Particles are arranged into fixed positions.

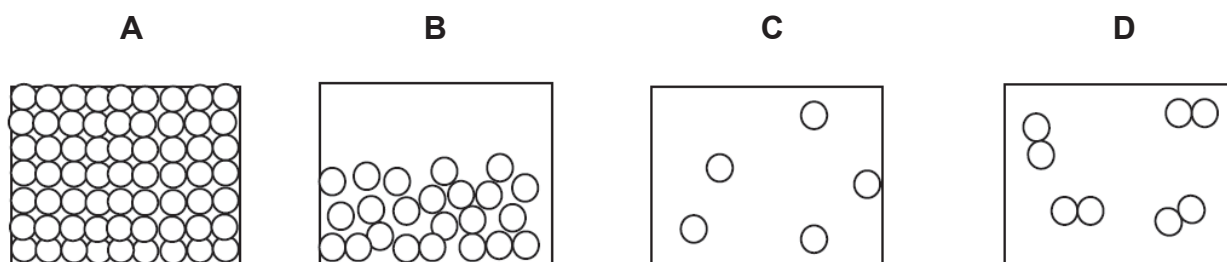
## 11

21 Which process involves a change of state from solid to gas?

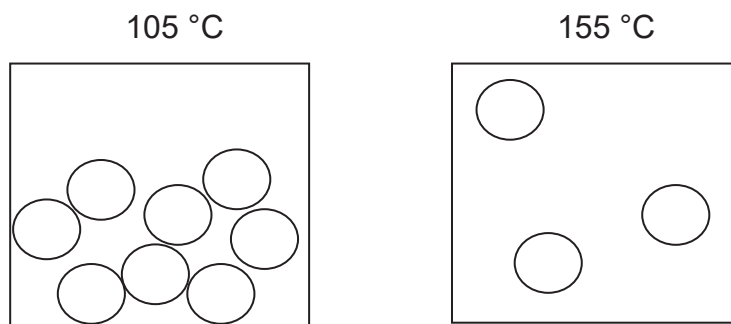
- A condensation
- B boiling
- C freezing
- D sublimation

22 Substance X melts at 44 °C and boils at 280 °C.

Which diagram the correct arrangement of the particles of substance X at 149 °C?



23 The diagrams show the spacing between the molecules of a substance at two different temperatures.



Which is most likely the melting point and boiling point of the substance?

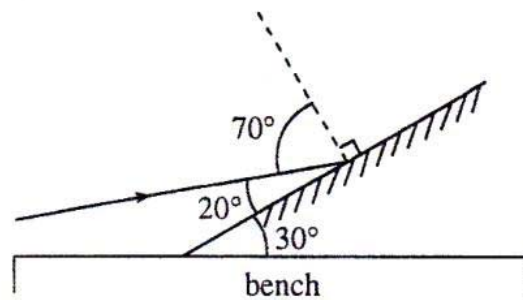
	melting point/ °C	boiling point/ °C
<b>A</b>	95	165
<b>B</b>	100	150
<b>C</b>	110	160
<b>D</b>	115	125

## 12

- 24** Which statement about chlorine-35 is true?
- A** It has 17 neutrons and 18 protons.
  - B** It has 17 electrons and 18 protons.
  - C** It has 17 protons and 17 neutrons.
  - D** It has 17 protons and 18 neutrons.
- 25** Which substance is made up of three different types of elements?
- A**  $\text{CO}_2$
  - B**  $\text{CH}_3\text{COOH}$
  - C**  $\text{C}_2\text{H}_5\text{COONa}$
  - D**  $\text{ZnO}$
- 26** What is best used to determine the identity of an element?
- A** number of neutrons
  - B** number of protons
  - C** number of electrons
  - D** atomic mass
- 27** Mr Lee decided to install a security mirror in his shop after he found out that several items in his shop had been shoplifted.
- Which type of mirror is most suitable for a wider field of vision?
- A** concave
  - B** convex
  - C** plane
  - D** wavy

13

- 28 A ray of light is incident on a mirror that is placed  $30^\circ$  to the bench.  
What will be the angle of reflection?

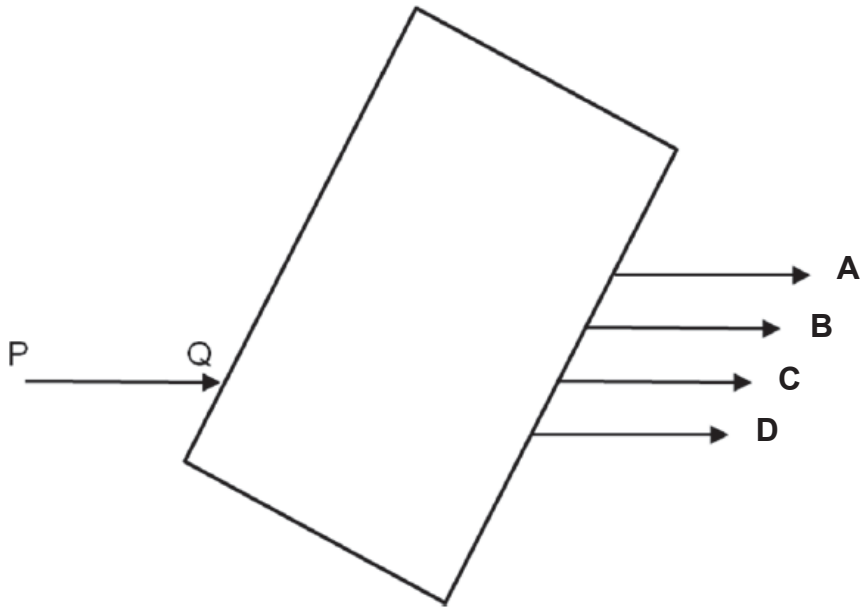


What will be the angle of reflection?

- A  $20^\circ$       B  $30^\circ$       C  $50^\circ$       D  $70^\circ$
- 29 What causes a swimming pool to appear shallower than its real depth?
- A reflection of light only  
B refraction of light only  
C both reflection and refraction of light  
D mixing of coloured lights

14

- 30 The diagram shows a ray of light, PQ, incident on a rectangular glass block. Which ray **A**, **B**, **C** or **D**, shows the path of the emergent ray?





## The Periodic Table of Elements

		Group															
I	II	III	IV	V	VI	VII	0					0					
3 Li lithium 7	4 Be beryllium 9	1 H hydrogen 1	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20					2 He helium 4				
11 Na sodium 23	12 Mg magnesium 24	<b>Key</b> proton (atomic) number atomic symbol name relative atomic mass		13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40								
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -
87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	114 Fl flerovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganeson -	119 Nh nihonium -	120 Dh dubnium -
lanthanoids		57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175	
actinoids		89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -	

The volume of one mole of any gas is  $24 \text{ dm}^3$  at room temperature and pressure (r.t.p.).

NAME : \_\_\_\_\_ (     )

TOTAL MARKS : \_\_\_\_\_ /100

CLASS : 1E\_\_\_ / 1A\_\_\_



## SCIENCE PAPER 2

Monday

08 October 2018

P1 &amp; P2: 2 hours

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**JUYING SECONDARY SCHOOL  
 END YEAR EXAMINATION  
 SECONDARY ONE EXPRESS / NORMAL ACADEMIC (SBB)**

Instructions to students:

**DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.**

1. This paper consists of three sections:  
 Section B has 8 structured questions. (40 marks)  
 Section C has 3 structured questions. (30 marks)
2. Answer all the questions for Section B in the space provided.  
 Answer all **three** questions for Section C in the space provided.  
 The last question is in the form of an **either/or** and only one of the alternatives should be attempted.
3. The intended marks for questions or parts of questions are given in [     ].
4. The use of a scientific calculator is allowed. All necessary steps must be shown.
5. The Periodic Table is provided on page 22 of the paper.

---

This Question Paper consists of 22 printed pages including this page.

[TURN OVER]

Setter: Mr Soh Joon Wei

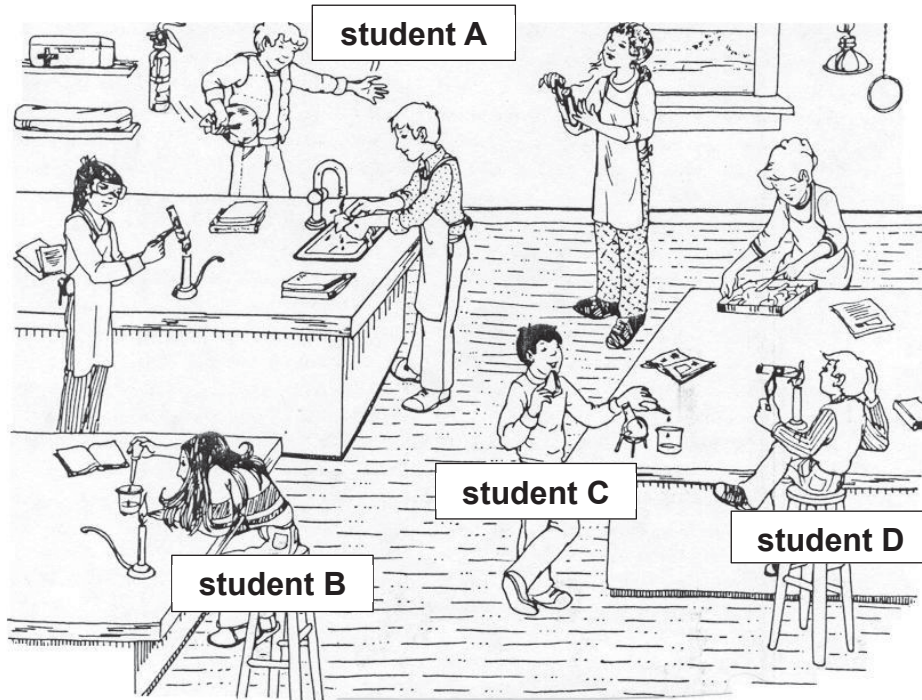
Vetter: Ms. Yeo Yee Teng and Mr Lee Hon Yen

**Section B**

Answer **all** the questions in this section in the spaces provided.

The total mark for this section is 40.

**B1** The diagram shows a scene in a Science laboratory.



Each of the students **A**, **B**, **C** and **D** has violated a laboratory safety rule. Explain what each student has done wrong.

student **A**: .....  
..... [1]

student **B**: .....  
..... [1]

3

student **C**: .....

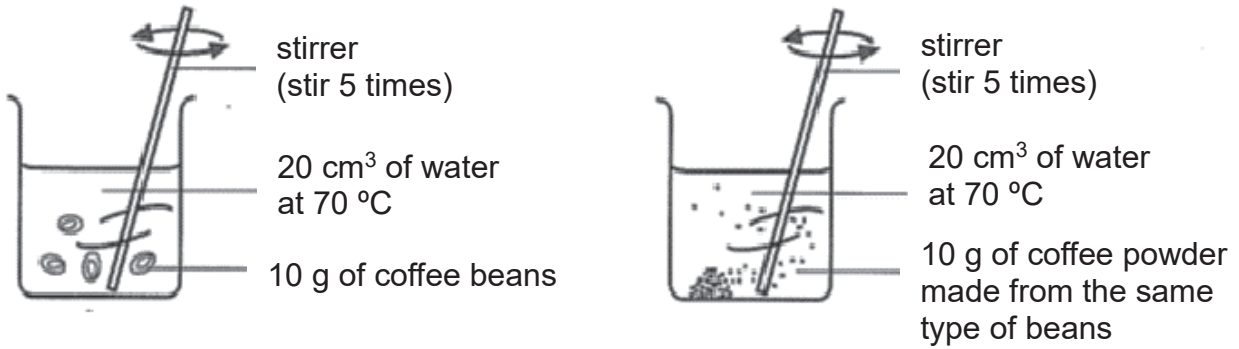
..... [1]

student **D**: .....

..... [1]

[Total: 4]

**B2** John conducted an experiment using coffee beans and finely ground coffee powder in two separate beakers to see which coffee can dissolve faster. He measured the result of his experiment using a stopwatch. The experimental set-up is as shown.



(a) Suggest the conclusion of the experiment. Explain your answer.

.....  
 ..... [2]

(b) Identify one of each variable from the experiment:

(i) independent variable

..... [1]

(ii) dependent variable

..... [1]

(iii) constant variable

..... [1]

[Total: 5]

## 5

**B3** The table below shows some properties of unknown substances.

substance	colour	melting point / °C	conductor of electricity at room temperature
<b>A</b>	white	42 – 44	no
<b>B</b>	silver	962	yes
<b>C</b>	yellow	115	no
<b>D</b>	white	2852	no
<b>E</b>	grey	650	yes

(a) Which substances are metals?

..... [1]

(b) State two other physical properties of substance **B**.

.....  
 ..... [2]

(c) Which substance is impure? Use information from the table to explain your answer.

.....  
 ..... [2]

6

(d) A student heated substance **E** and obtained substance **D**.

Is this a physical change or chemical change? Use information from the table to explain your answer.

.....

..... [1]

[Total: 6]

7

**B4 (a) (i)** Define the term *molecule*.

..... [1]

**(ii)** Using water as an example, draw and label a molecule of water in the box below.



[2]

**(b)** Describe two differences between compounds and mixtures.

.....  
.....  
.....

..... [2]

[Total: 5]



**B5** The figure shows part of the Periodic Table. The location of the elements **Q**, **R**, **S**, **T** and **U** on the Periodic Table are labelled as shown below.

<b>Q</b>												<b>S</b>	
													<b>T</b>
												<b>R</b>	
													<b>U</b>

Select from the letters (**Q**, **R**, **S**, **T**, **U**) above, an element which fits each description. Each letter may be used once, more than once, or not at all.

(a) Identify the elements that are in the same period.

..... [1]

(b) State one difference in the physical property of the elements you have identified in (a).

..... [1]

(c) Identify the element(s) that have similar chemical properties.

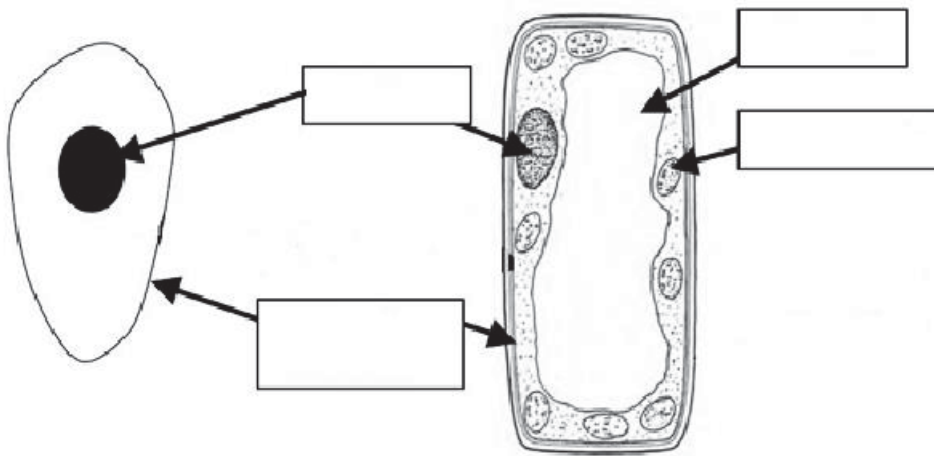
..... [1]

(d) Identify the element(s) that supports burning of substances.

..... [1]

[Total: 4]

**B6** The diagram shows an animal cell and a plant cell.



**(a)** Label on the diagram the names of the parts of the cells. [2]

**(b)** Compare and describe **one** similarity and **one** difference between an animal cell and a plant cell.

.....  
 ..... [2]

**(c)** Define the term *tissue*.

.....  
 ..... [1]

[Total: 5]

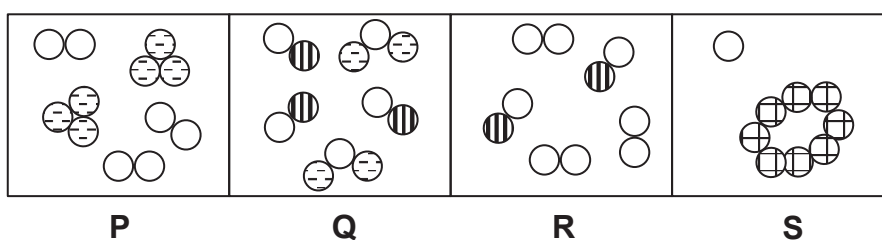
## 10

**B7 (a)** Complete the table with the help of the Periodic Table.

name of molecule	chemical formula	number and names of atoms
phosphorus trichloride	$PCl_3$	1 phosphorus and 3 chlorine atoms
dichloromethane	$CH_2Cl_2$	
caffeine	$C_8H_{10}N_4O_2$	

[2]

**(b)** The diagrams show some particles in four different substances **P**, **Q**, **R** and **S**.



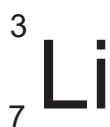
Write down the letter(s) (**P**, **Q**, **R**, **S**) that fit the each of the following descriptions. Each letter may be used more than once.

- (i) two different elements .....
- (ii) two different compounds .....
- (iii) one element and one compound .....

[3]

[Total: 5]

**B8** Two atoms, **A** and **B** are shown.



atom **A**



atom **B**

(a) Describe the differences in atomic structure on the two atoms above.

.....

.....

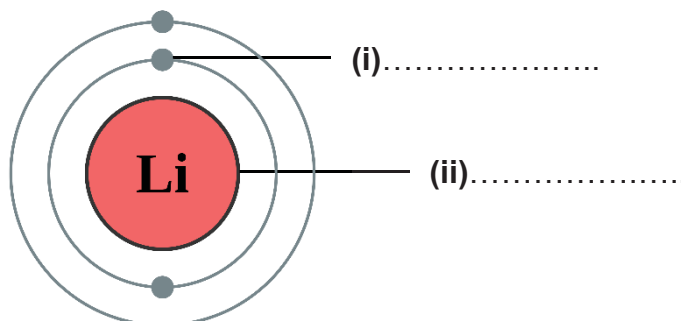
..... [2]

(b) Explain whether atoms **A** and **B** are electrically neutral.

.....

..... [2]

(c) Label the parts of the atom below.



[2]  
[Total: 6]

12

## Section C

Answer **all three** questions from this section.

The last question is in the form of **Either/Or** and only one of the alternatives should be attempted.

The total mark for this section is 30.

**C9** Bromine is a reddish brown liquid at room temperature. It exists as a diatomic molecule, Br<sub>2</sub>.

(a) Draw the particles of bromine molecules at room temperature in the box below.



[2]

(b) Bromine liquid can be easily vapourised by heating. Using ideas about energy and forces of attraction, explain what happens to the motion of bromine molecules as the bromine liquid is heated until it vapourises.

.....  
.....  
.....  
..... [3]

(c) Name the process in which bromine liquid becomes a gas.

..... [1]

13

(d) Using the model of the particulate nature of matter, explain:

(i) why gases have no definite shape and can be compressed;

.....  
..... [2]

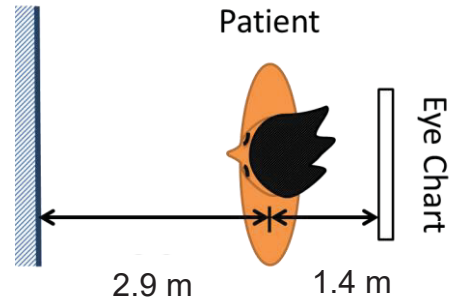
(ii) how a liquid changes to a solid.

.....  
..... [2]

[Total: 10]

14

**C10 (a)** An optician's eye chart is fixed 1.4 m behind the eyes of a patient who is looking into a plane mirror placed 2.9 m in front of him. The patient is seated as shown below in the diagram.



(i) In the diagram above, draw the image of the eye chart. [2]

(ii) Find the distance of the image of the chart as seen by the patient measured from the eye.

..... [1]

(b) The diagram shows the optician's eye chart.



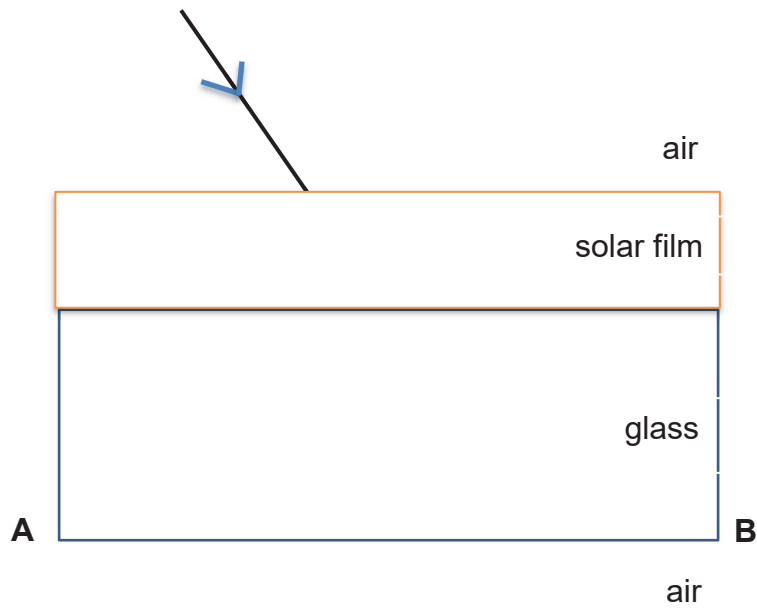
Explain the appearance of the letters on the eye chart.

.....  
 ..... [1]

15

(c) A thin layer of solar film has been applied onto a glass plane for reflection of light. The optical density of glass is higher than solar film and the optical density of solar film is higher than air.

(i) Show how the incident ray will emerge from the interface **AB** in the below diagram. Include the labels for the emergent ray(s), refracted ray(s) and reflected ray(s).



[5]

(ii) Solar film works by reflecting close to 90% of the solar energy. Besides using solar film on cars, suggest another application of solar films in a tropical climate like Singapore.

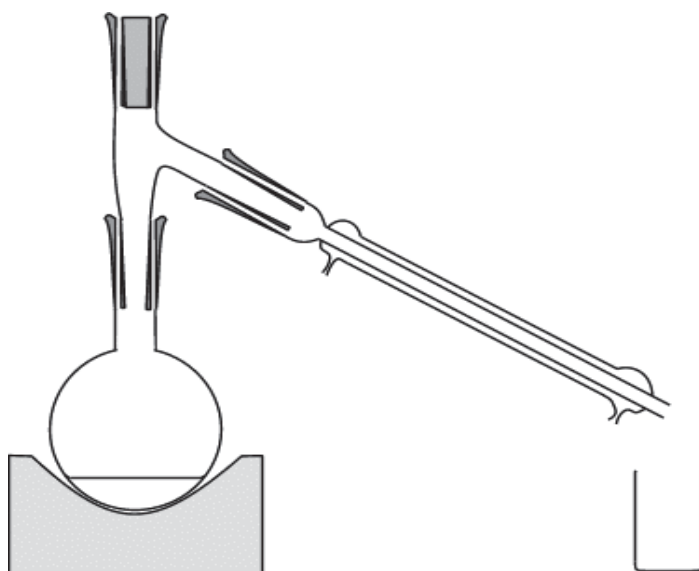
..... [1]

[Total: 10]



Either

C11 (a) The figure shows a simple distillation set-up.



(i) On the set-up above:

1. Label "water in" and "water out".

[1]

2. Draw where the thermometer should be placed.

[1]

(ii) The table shows the boiling points of four different liquids.

type of liquid	boiling point/ °C
chloroform	62
kerosene	147
ethyl alcohol	64
olive oil	300

17

1. If a mixture of chloroform and kerosene is heated in the simple distillation set-up, which liquid will be first collected as the distillate?

.....[1]

2. Which two liquids, when placed into the simple distillation set-up, will result in a contaminated filtrate? Explain your answer.

.....

.....[2]

- (b) Jamie decided to make herself a drink. She poured some cold water into a glass and added Milo powder and sugar to it.

- (i) Identify the solute(s) and solvent(s) in her drink:

solute(s): .....

solvent(s): ..... [1]

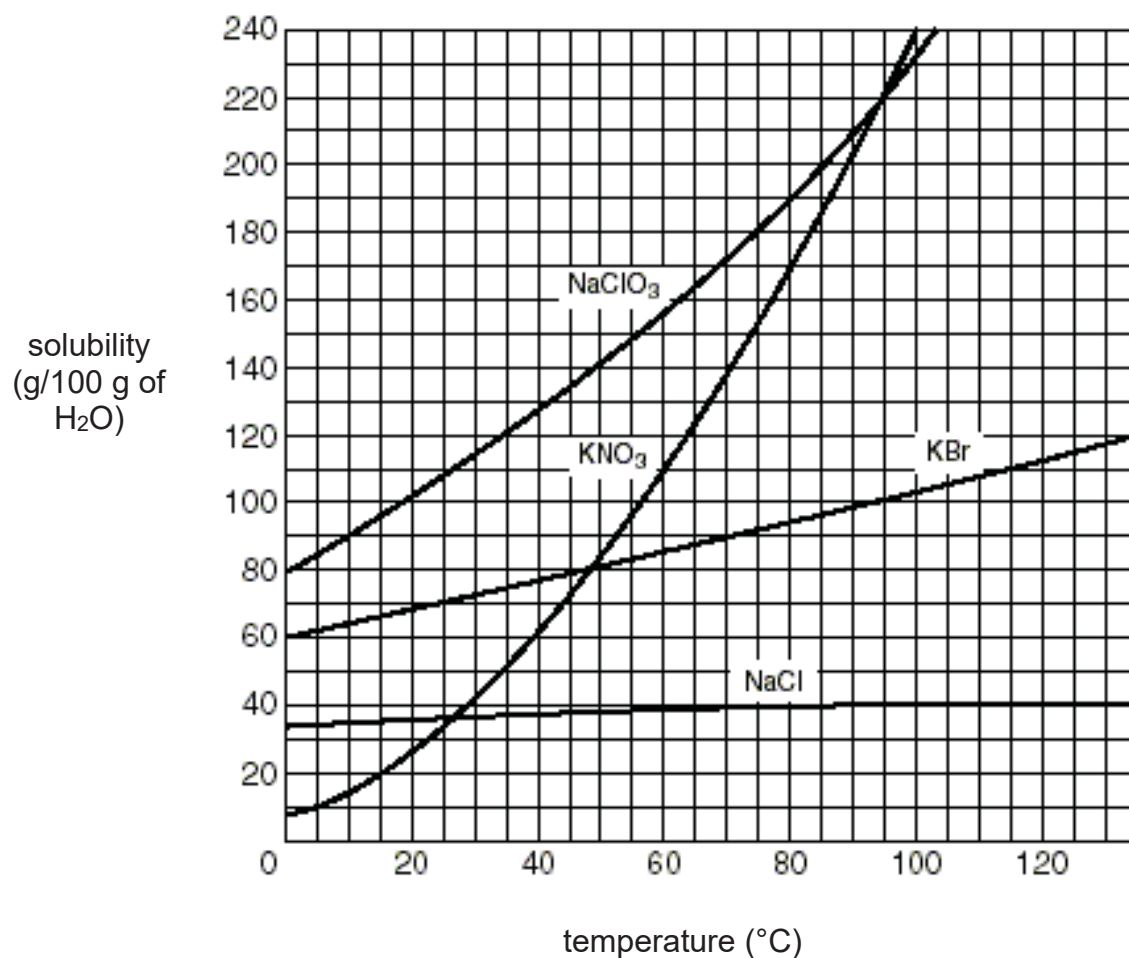
- (ii) Despite repeated stirring, Jamie discovered that there was still a lot of residue at the bottom of the glass. Suggest two things that she can do to make more residue to dissolve.

.....

..... [2]

18

(c) The graph shows the solubility of four chemicals from 0 °C to 120 °C.



(i) How much more KBr can be dissolved when the temperature is increased from 0 °C to 50 °C?

..... [1]

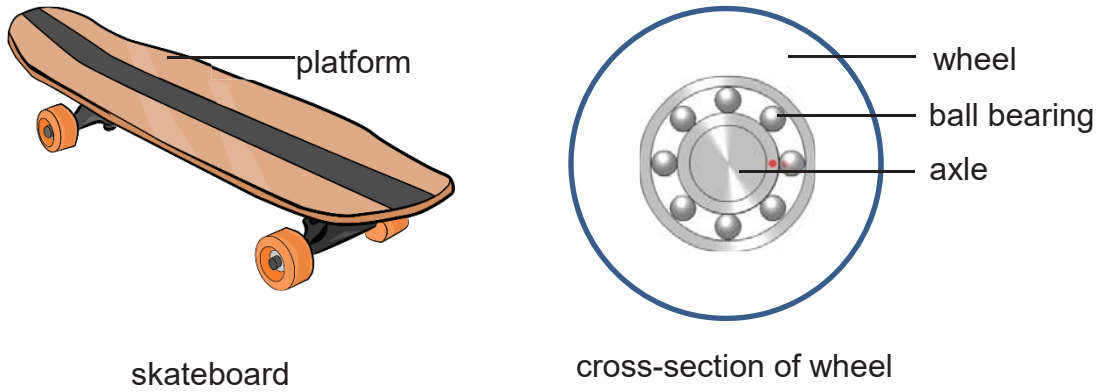
(ii) At which temperature does KNO<sub>3</sub> and NaCl have the same solubility?

..... [1]

[Total: 10]

OR

C11 The diagram shows a skateboard and a cross-section of its wheel.



The ball bearings allow the wheel to spin around the axle smoothly during motion.

(a) What material should the platform of the skateboard be made of? Explain your answer.

.....  
..... [2]

(b) The ball bearing is made of stainless steel. What property of stainless steel makes it suitable to manufacture ball bearings?

..... [1]

## 20

(c) A skateboarder maintains the wheels of the skateboard by removing the ball bearings and soaking them in lubricant oil.

(i) Given that the mass of each ball bearing is 1 g and the radius (r) of the sphere is 0.2 cm, calculate its density. Take  $\pi$  to be 3.14.

Express your answer in 2 decimal places.



Formula for volume of sphere =  $\frac{4}{3} \times \pi \times r^3$

density of sphere = ..... [3]

(ii) Suggest an appropriate instrument to measure the mass of the ball bearing.

..... [1]

21

- (d) The skateboarder left the ball bearings under the hot sun. When he wanted to place the ball bearings back into the groove of each wheel, he found that they would not fit.

Explain his observation using the particulate nature of matter.

.....

.....

.....

.....

.....

..... [3]

[Total: 10]

# The Periodic Table of Elements

		Group															
I	II	III	IV	V	VI	VII	0					0					
3 Li lithium 7	4 Be beryllium 9	1 H hydrogen 1	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20					2 He helium 4				
11 Na sodium 23	12 Mg magnesium 24	<b>Key</b> proton (atomic) number atomic symbol name relative atomic mass		13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40								
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -
87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	114 Fl flerovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganeson -	119 Nh nihonium -	120 Dh dubnium -

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).





## Section A

Qn	Ans	Qn	Ans	Qn	Ans
1	A	11	B	21	D
2	A	12	C	22	B
3	A	13	B	23	B
4	D	14	A	24	D
5	D	15	B	25	B
6	B	16	B	26	B
7	A	17	C	27	B
8	A	18	B	28	D
9	B	19	B	29	B
10	A	20	B	30	D

## Section B

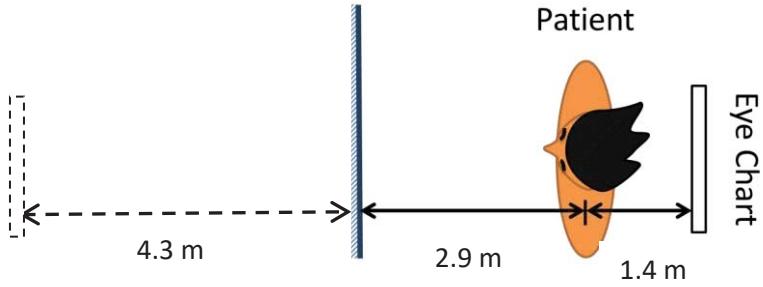
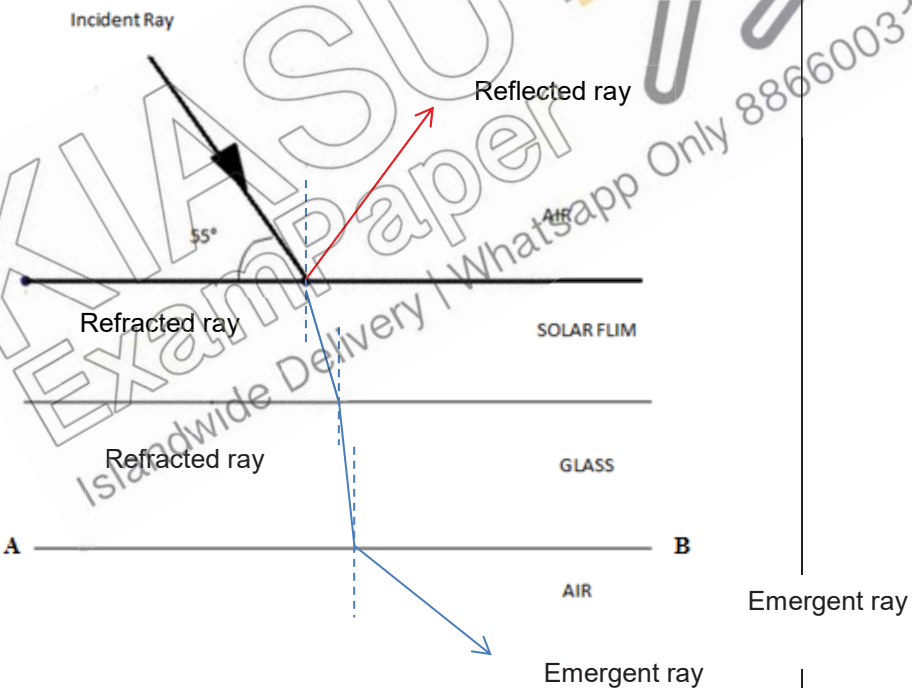
Qn	Answer	Remarks
B1	<p>Student <b>A</b> is playing in the laboratory. [1]</p> <p>Student <b>B</b> left the Bunsen flame unattended / did not tie up her hair. [1]</p> <p>Student <b>C</b> is eating in the laboratory / has put the apparatus too close to the table edge / has put the apparatus too close to his arm. [1]</p> <p>Student <b>D</b> is not wearing safety goggles when heating chemicals. [1]</p>	
B2a	<p>The finely <u>ground coffee powder</u> will dissolve faster than the <u>coffee beans</u>. [1]</p> <p>The solubility of coffee increase as its particle size decreases [1] OR Powdered coffee powder has a <u>greater surface area</u> than coffee beans [1]</p>	<p>(Must specify size difference)</p> <p>Reject "different type of coffee"</p>
b(i)	Particle size of coffee / surface area [1]	
(ii)	Rate / time taken to dissolve the coffee [1]	
(iii)	temperature / number of times to stir / mass of coffee / type of coffee /volume of water (any 2)	

B3a	Substance B and E [1]	
b	Good conductor of heat / electricity / ductile / malleable/ (any 2) [2]	Reject hard and strong
C	Substance A [1] It melts over a range of temperature / melts over 42-44 °C / melting point is not fixed [1]	
D	Chemical change as substance D is a new product which can <u>conduct electricity unlike Substance E</u> . OR <u>have different melting point from substance E</u> . [1]	Comparison should be shown
B4a(i)	Molecules are two or more atoms chemically combined/bonded together. [1]	
(ii)	Draw 2 hydrogen atoms, 1 oxygen atom [1] (order/sequence of drawing not considered)  Label the atoms (H and O).	
(b)	Compounds can only be separated by chemical methods / cannot be separated by physical methods but mixtures can be separated by physical methods /without the use of chemical methods  <b>(The components of a) compound chemically combined but mixtures are not.</b>  Compounds do not have the properties of its constituent elements but mixtures do.  <b><u>Elements of a compound are combined in a fixed proportion by mass but a mixture is not.</u></b>	Any 2
B5a	Q and T [1]	

b	Any one  Q- good conductor of electricity/ heat/ malleable/ solid/ high melting point T – poor conductor of electricity/ heat/ non-malleable/ gas/ low boiling point	
c	T and U [1]	
d	S [1]	
B6a	Nucleus, cell membrane, large central vacuole, chloroplast [2]	Any 1 mistake minus 1m
b	Animal and plant cells have nucleus [1]  Animal cells have no chloroplasts, plant cells have [1] OR Animal cells have no cell wall, plant cells have [1]	Accept any correct answers.
c	Tissue is a group of the same type of cells performing a certain function [1]	
B7a	1 carbon, 2 hydrogen and 2 chlorine atoms  8 carbon, 10 hydrogen, 4 nitrogen and 2 oxygen atoms	
b(i)	P, S	
(ii)	Q	
(iii)	R	
B8a	Atom A has 4 neutrons, while atom B has 5 neutrons. [1]  Atom A has a relative mass of 7, while atom B has a relative mass of 8. [1]	
b	They have the same number of protons and electrons [1] and the negative charges of the electrons and the positive charges of the protons cancel/balance out each other. [1]	Reject: <u>amount</u> of protons and electrons
c(i)	Electron [1]	
(ii)	Nucleus [1]	

## Section C

Qn	Ans	Remarks
C9a		Must see diatomic [1] and closely packed [1]
b	<p>As bromine is heated, bromine molecules <u>gains kinetic/heat energy</u> and <u>move faster</u>. [1]</p> <p>This causes the <u>forces of attraction between the molecules to become weaker</u> and molecules moves further apart. [1]</p> <p>When the temperature reaches boiling point, the bromine molecules will become very far apart and start to <u>move quickly and rapidly in all directions</u>[1], forming a gas.</p>	<p>Must relate energy gain to change in movement.</p> <p>Reject: <u>vibrate faster</u></p>
c	Evaporation / boiling [1]	
d(i)	<p>Particles in a gas are <u>far apart</u> [1]</p> <p>When squeezed, they can move closer together as there is a lot of empty space in between. [1]</p>	
d(ii)	<p>When the particles in a liquid <u>loses enough energy</u>, the particles will come <u>closer</u> and move <u>slower</u>. [1]</p> <p>At this point, the particles <u>return to their fixed positions</u> [1] and the liquid changes back to solid.</p>	

<p>C10ai</p>	 <p>Distance of image of chart from mirror is the same as distance of chart from mirror ie 4.3 m. [1] Image of chart is virtual (drawn in dotted line) [1]</p>	
<p>li</p>	<p><math>2.9 + 2.9 + 1.4 = 7.2 \text{ m}</math> [1]</p>	
<p>b</p>	<p>The letters appear this way, as the mirror image will be <u>laterally inverted</u>, hence reverting the letters back to normal, so that the patient is able to read them. [1]</p>	
<p>c(i)</p>	 <p>Air/Solar film, angle must be smaller, bend towards normal [1] Solar film/Glass, angle must be even smaller, bend further towards normal[1]</p>	

	Glass/Air, angle must be bigger, bends away from normal [1] Label the 2 refracted rays & 1 emergent ray [1] Label and draw the reflected ray [1]	
(ii)	building / office / home windows [1]	
Either		
C11ai1.	'water in' at the lower end of the condenser [1]	
lb2.	Next to the side arm [1]	
aii1.	Chloroform	
aii2.	Chloroform and ethyl alcohol. Boiling points too close.	
bi	Solute: ovaltine, sugar [1] Solvent: water [1]	Must have both
ii	Increase temperature of water [1] Increase volume of water [1]	Accept any 2 or any other appropriate answers.
di	20 g [1]	
ii	27.5 ( $\pm 1$ ) °C [1]	
OR		
C11a	Accept any appropriate answers. fibreglass → withstand high load / light [2] wood → withstand high load / durable [2] plastic → hard / light [2] metal → durable / malleable [2]	
b	it is smooth / allows less friction [1] it is resistant to scratches [1] it is strong [1] more resistant to corrosion / won't rust [1] Accept any one answer	
c(i)	Density = $1\text{g} / 0.0335$ (showing knowledge of use of density formula) [1] answer: 29.86 [1]	

	$\text{g/cm}^3$ [1]	
(ii)	Electronic balance [1]	
(d)	The particles of ball bearings gain energy / heat and vibrate vigorously [1]  The particles will start to move apart [1]  This increases the volume / expanded [1]	





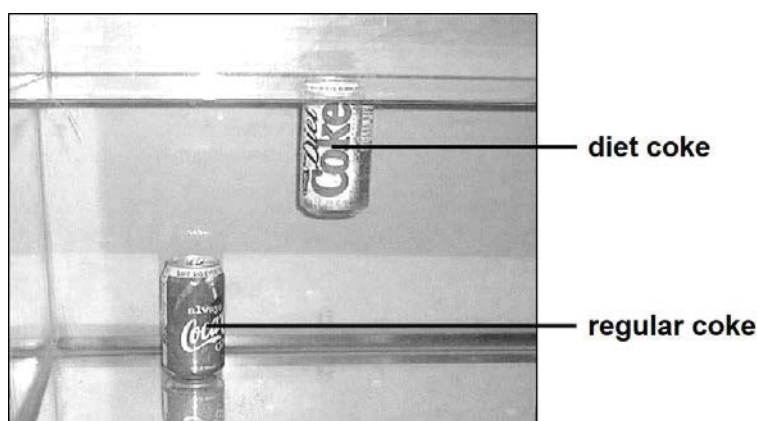






**Section A**The total mark for this section is **30**.

- 1 Which of the following is a characteristic of a luminous flame?
- I It burns and produces soot.
  - II It is unsteady.
  - III It is very hot compared to a non-luminous flame.
  - IV It is yellow.
- A I only  
 B I and II  
 C III and IV  
 D I, II and IV
- 2 The average measurement for the length of a book was calculated to be 18.423 cm. If the measurement was taken with a metre rule, how should it be recorded?
- A 18 cm  
 B 18.4 cm  
 C 18.42 cm  
 D 18.423 cm
- 3 James wants to test if similar cans of diet coke and regular coke will float or sink in water. These were the results he observed.



If the density of water is  $1.0 \text{ g / cm}^3$ , what do the results tell you about the respective densities of diet coke and regular coke?

	Density	
	Diet coke	Regular coke
A	Equals to $1.0 \text{ g / cm}^3$	More than $1.0 \text{ g / cm}^3$
B	Less than $1.0 \text{ g / cm}^3$	Equals to $1.0 \text{ g / cm}^3$
C	Less than $1.0 \text{ g / cm}^3$	More than $1.0 \text{ g / cm}^3$
D	More than $1.0 \text{ g / cm}^3$	Less than $1.0 \text{ g / cm}^3$

4 Seawater is a ..... because .....

<b>A</b>	compound	it is formed by different components joined in a fixed amount
<b>B</b>	compound	it cannot be separated into its components by physical methods
<b>C</b>	mixture	it can be separated into its components by physical methods
<b>D</b>	mixture	the properties of its components are different from itself

5 Aluminium is used for kitchen utensils such as spoons and forks because it is .....

- A** a good conductor of heat
- B** flexible
- C** has a low melting point
- D** light

6 Which of the following can be separated into its components by adding water followed by stirring and filtering?

- A** Chalk and iron filings
- B** Milk and sugar
- C** Salt and sugar
- D** Sand and salt

7 Which of the following statements about birds is false?

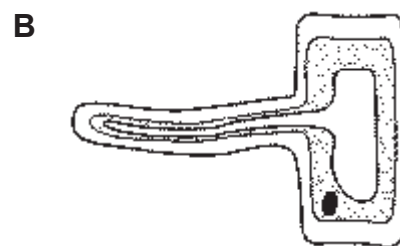
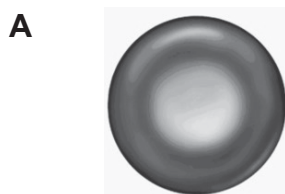
- A** All birds can fly.
- B** All birds have wings.
- C** Birds have streamlined bodies covered with feathers.
- D** The body temperature of birds does not change with the environment.

8 Animal X has a body temperature that fluctuates with its surroundings. It takes in oxygen through its gills and is protected by slimy hard scales. Which group is it most likely to belong to?

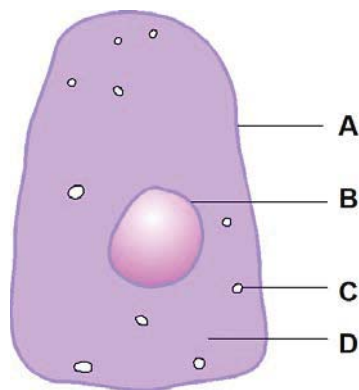
- A** Amphibian
- B** Fish
- C** Insect
- D** Reptile

- 9 Which of the following statements show the benefit of division of labour in multicellular organisms?
- A All the cells perform the same task to improve efficiency.
  - B Different processes can take place simultaneously.
  - C It does not require energy from food.
  - D It reduces the need for growing more new cells.
- 10 James placed a tiny piece of onion skin on a slide and added a few drops of iodine solution before observing the cells under a microscope. What was the purpose of adding iodine solution?
- A To allow iodine to react with starch in the onion cells
  - B To allow the onion skin to stick to the slide so it does not move around
  - C To obtain a magnified image of the onion cells
  - D To stain the cells so as to get a clearer image of the organelles under the microscope
- 11 Which of the following statements about the xylem vessels in plants is not true?
- A They are made of dead tissue.
  - B They have cross walls.
  - C They provide strength and support to the plant.
  - D They run from the roots through the stem to the leaves.
- 12 The diagram shows four types of cells, not drawn to scale.

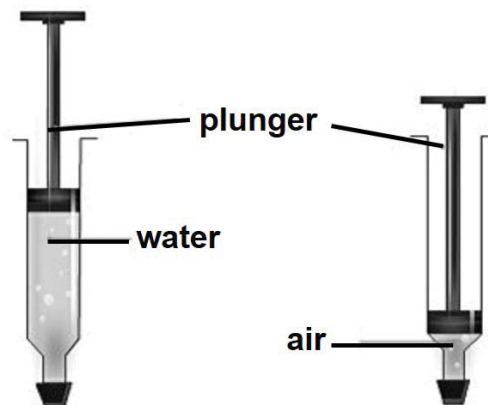
Which cell does not contain cytoplasm?



Refer to the following diagram to answer Questions 13 and 14.



- 13** Which structure is a site for the chemical reactions in a cell?
- 14** Jenny, like her parents, has double eyelids. This characteristic is determined by genes. In which cell structure can genes be found?
- 15** A syringe filled with water cannot be compressed but a syringe filled with air can be compressed as shown below.



Which of the following statements is correct?

- A** Gas particles are in constant and random motion but liquid particles do not move.
- B** Gas particles can shrink in size while liquid particles cannot.
- C** Gas particles have larger spaces between them compared to liquid particles.
- D** Gas particles move at a higher speed compared to liquid particles.

16 When a substance is heated, .....

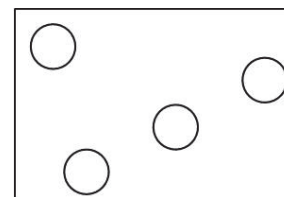
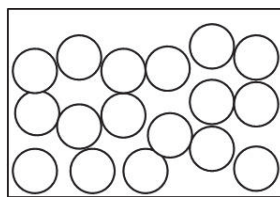
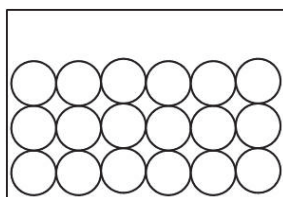
- I the particles move faster
- II the particles move further apart
- III the size of the particles increases
- IV the particles become lighter

- A I and II
- B I, II and IV
- C II, III and IV
- D I, II, III and IV

17 3 states of matter can be found in a lit candle.



What is the arrangement of the particles in the regions, X, Y and Z as the candle burns?

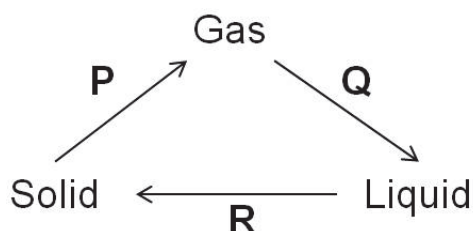


- |          |   |   |   |
|----------|---|---|---|
| <b>A</b> | X | Y | Z |
| <b>B</b> | Y | X | Z |
| <b>C</b> | Z | Y | X |
| <b>D</b> | Z | X | Y |

18 Molten lava flows down the slopes of a volcano and gradually solidifies. Which of the following does not take place?

- A A change of state has taken place.
- B A new substance is formed.
- C Heat is lost from the lava to the surroundings.
- D Molecules in the lava slide past each other.

- 19 The diagram shows the changes of state. Which processes do P, Q and R refer to?



	P	Q	R
<b>A</b>	Condensation	Evaporation	Freezing
<b>B</b>	Evaporation	Sublimation	Melting
<b>C</b>	Freezing	Sublimation	Condensation
<b>D</b>	Sublimation	Condensation	Freezing

- 20 Which of the following statement(s) about air is/are true?

- I It contains some gases consisting of atoms.
- II It contains molecules made up of the same type of atoms.
- III It contains molecules made up of different types of atoms.

- A** II only
- B** I and II
- C** II and III
- D** I, II and III

- 21 The diagram below shows the information about Aluminium from the Periodic Table.

13	Al	27
----	----	----

Which of the following is correct?

	atomic mass	number of electrons	number of neutrons
<b>A</b>	13	27	14
<b>B</b>	13	14	27
<b>C</b>	14	27	13
<b>D</b>	27	13	14

- 22 Arrange the sizes of the following atoms in ascending order.

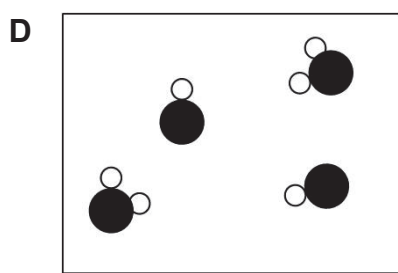
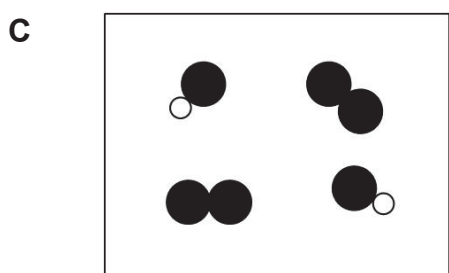
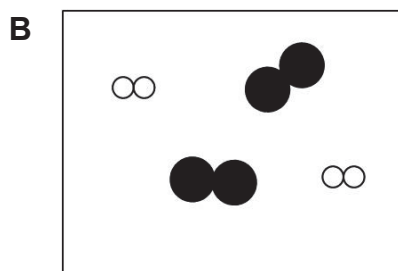
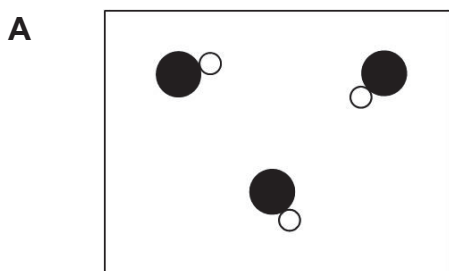
carbon, gold, iron, hydrogen

	smallest	→		largest
A	carbon	hydrogen	gold	iron
B	carbon	hydrogen	iron	gold
C	gold	carbon	hydrogen	iron
D	hydrogen	carbon	iron	gold

- 23 Which substance has the most number of atoms?

- A  $\text{CaCO}_3$   
 B  $\text{C}_2\text{H}_4\text{Cl}_2$   
 C  $\text{K}_2\text{SO}_4$   
 D  $\text{C}_6\text{H}_6$

- 24 Which of the following diagrams shows molecules of elements?



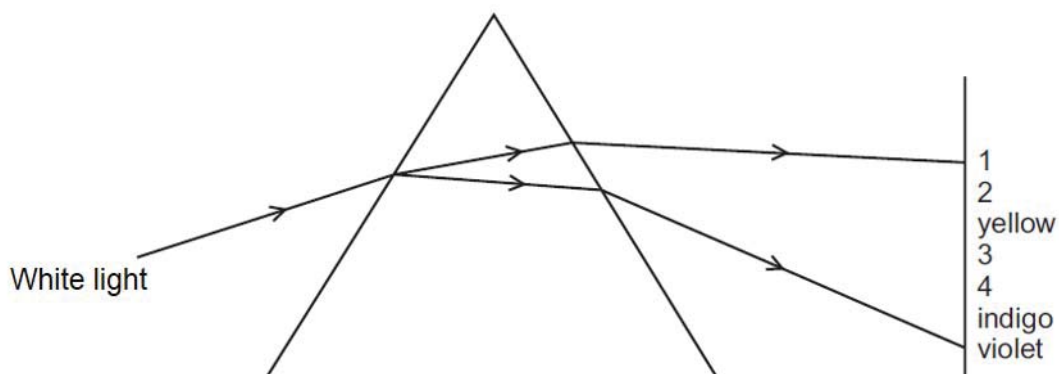


- 25 As Lily was driven to school by her father, she observed a large mirror at a turning point along the road put up to help drivers look out for approaching vehicles.



Which of the following does not describe a property of this mirror?

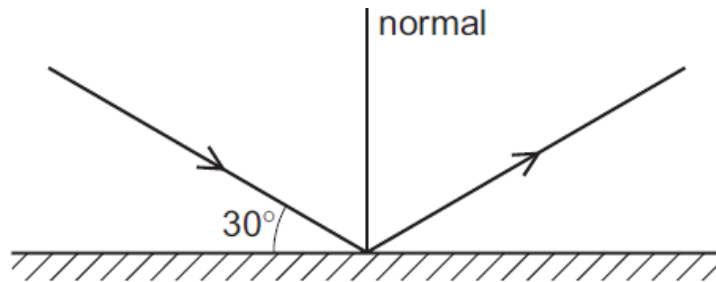
- A The images in this mirror are similar to those formed in a dentist's mirror.  
 B The images in the mirror were laterally inverted.  
 C The images in the mirror were upright.  
 D The mirror provided the driver with a large field of view and allowed many objects to be seen.
- 26 The diagram shows the spectrum of 7 colours produced when white light is dispersed by a glass prism.



Identify the missing colours, 1, 2, 3 and 4.

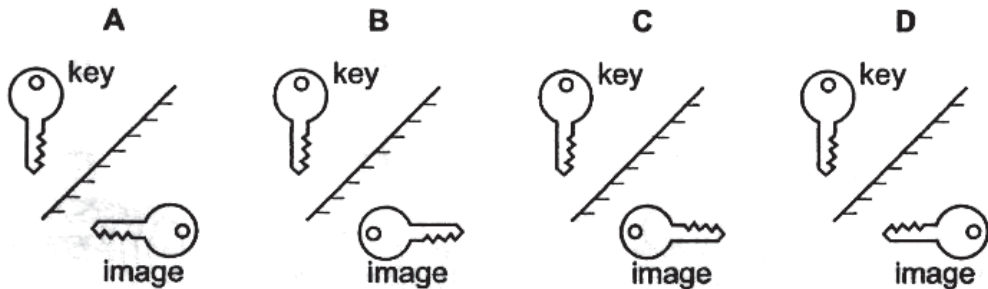
	1	2	3	4
A	infra-red	red	green	ultra-violet
B	red	green	orange	blue
C	red	orange	green	blue
D	red	orange	green	ultra-violet

27 The diagram shows a ray of light reflected from a plane mirror.



What is the angle of reflection?

- A 30 °
  - B 60 °
  - C 90 °
  - D 120 °
- 28 If a shirt appears white in sunlight, it is .....
- A absorbing all the colours in the spectrum
  - B reflecting all the colours in the spectrum
  - C reflecting blue and red light
  - D transmitting blue and red light
- 29 Which diagram shows the correct image of the key in a plane mirror?

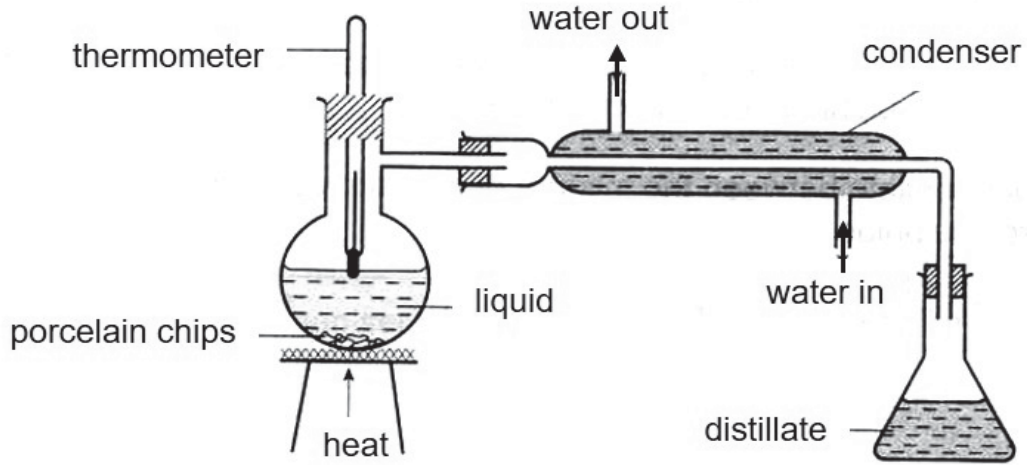


- 30 Which of the following groups consists of only luminous objects?
- A burning candle, glass, mirror
  - B mirror, diamond, firefly
  - C sun, firefly, burning candle
  - D sun, moon, star

**Section B**

The total mark for this section is **30**.

1 The set-up below is used to obtain clean water from dirty water.



(a) Identify 3 errors in the set-up.

.....

.....

.....

.....

.....

..... [3]

(b) What is the temperature registered by the thermometer?

..... [1]

(c) With reference to the Particulate Model of Matter, describe the change in state that occurs in the condenser.

.....

.....

.....

.....

..... [3]

2 (a) The table below shows characteristics of five animals.

Animal	Is it a vertebrate?	Does it have feathers?	Does it have scales?	Does it breathe through gills?
Archerfish	✓		✓	✓
Frog	✓			
Pigeon	✓	✓		
Spider				
Python	✓		✓	

Using the information, construct a dichotomous key to identify the animals. You do **not** need to use all the characteristics in the table. [3]

- (b) In the 1930s, the cane beetle posed an issue to farmers in Queensland, Australia, as the adults ate the leaves of sugarcane and their larvae hatched underground and ate the roots. In 1935, the cane toad was introduced to control the population of this beetle. Soon after, the population of the toad became uncontrollable.



**Cane Toad**

- (i) Define 'invasive species'.

..... [1]

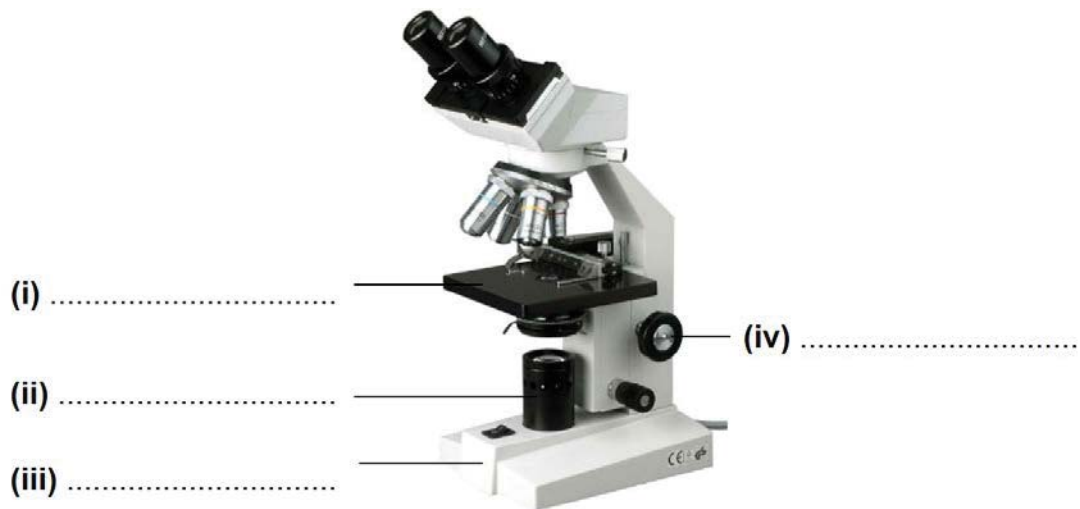
- (ii) What is the danger of introducing an invasive species?

.....  
..... [1]

- (iii) Suggest why the cane toad was able to multiply so quickly?

.....  
..... [1]

- 3 (a) The diagram below shows a light microscope. Label the parts indicated. [4]

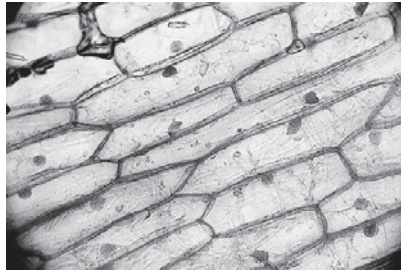


- (b) (i) Jonathan viewed a newspaper strip under the light microscope.

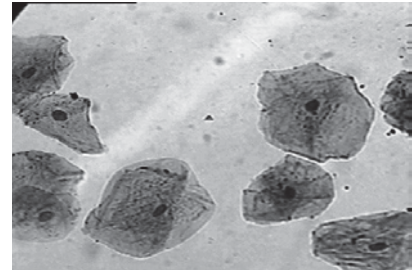
How would the letter 'P' appear under the microscope? Show your answer in the space provided in the table below. [1]

In the newspaper strip	Under the microscope
P	

- (ii) He also observed onion cells and human cheek cells under the light microscope.



**Onion cells**



**Human cheek cells**

Describe one similarity and one difference between the onion and human cheek cells.

Similarity:

.....  
..... [1]

Difference:

.....  
..... [1]

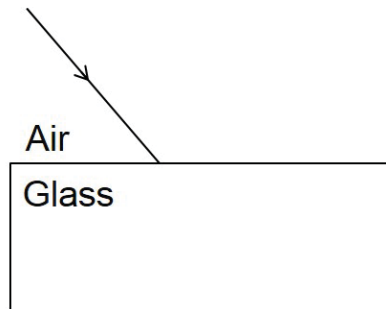
- (c) The length of a tiny bug under the light microscope is 30 mm. If the magnification of the eyepiece and objective lens used are 5x and 10x respectively, what is the actual length of the bug?

Show your working clearly in the space given. [3]

4 (a) Thomas shines a laser pointer into a glass block in two different ways.

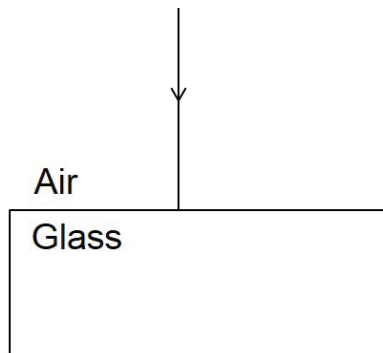
Draw the correct light path as it enters and exits the glass block. There is no need to indicate any angles.

(i)



[2]

(ii)

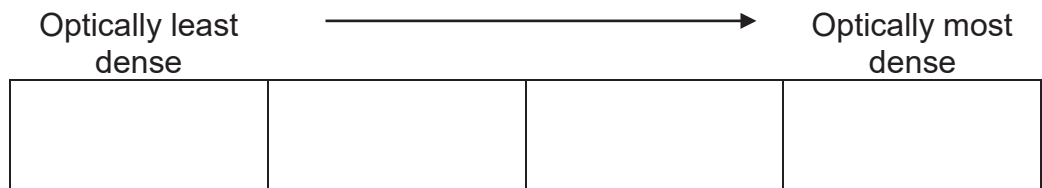


[1]

(iii) The speed of light in four different media, W, X, Y and Z, are shown in the table below.

Medium	Speed of light (km / s)
W	300,000
X	200,000
Y	230,000
Z	125,000

Arrange the optical density of W, X, Y and Z from optically least dense to optically most dense in the table below. [1]





- (b) Naomi looked into a river and spotted a brick. Draw and label the image and complete the ray diagram, showing the path of one ray of light from Point P of the brick to Naomi's eye. There is no need to indicate any angles. [3]



Above water



**End of Booklet 1**

## The Periodic Table of Elements

		Group																					
I	II	III	IV	V	VI	VII	0																
3 Li lithium 7	4 Be beryllium 9	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px;">                     1 H hydrogen 1                 </div> <div style="border: 1px solid black; padding: 5px;">                     proton (atomic) number atomic symbol name relative atomic mass                 </div> </div>										2 He helium 4											
11 Na sodium 23	12 Mg magnesium 24											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84						
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131						
55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -						
87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Lv livermorium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganeson -						
		lanthanoids										71 Lu lutetium 175											
		actinoids										70 Yb ytterbium 173	71 Lu lutetium 175										
		66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	
		99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

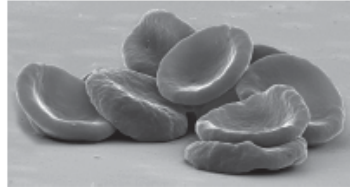
**Section C**

The total mark for this section is **40**.

Answer **four** questions from this section.

The last question is in the form of **Either / Or** and only **one** question should be attempted.

1 (a) The diagram below shows some red blood cells.



(i) State the function of a red blood cell.

.....  
..... [1]

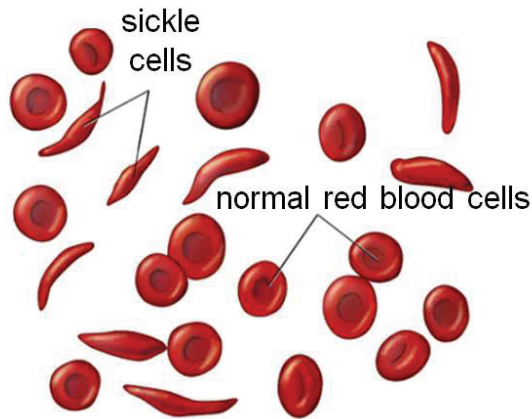
(ii) Describe one difference between a typical animal cell and a red blood cell.

.....  
..... [1]

(iii) Explain how your answer in (a)(ii) helps the red blood cell carry out its function more effectively.

.....  
.....  
..... [2]

- (iv) A rare blood disorder known as sickle-cell anemia can cause some red blood cells to become deformed and have a thin and narrow 'sickle' shape. A person with this disorder would suffer from shortness of breath.



Suggest how this change in shape could affect the red blood cell's normal function.

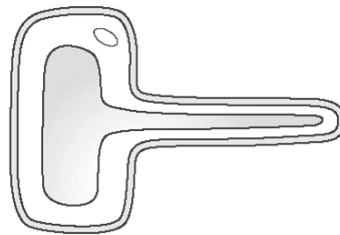
.....

.....

.....

..... [2]

- (b) The diagram below shows a root hair cell.



State two features of this cell, which are different from a typical plant cell and describe how it suits the function of the root hair cell.

Feature 1:

.....

.....

..... [2]

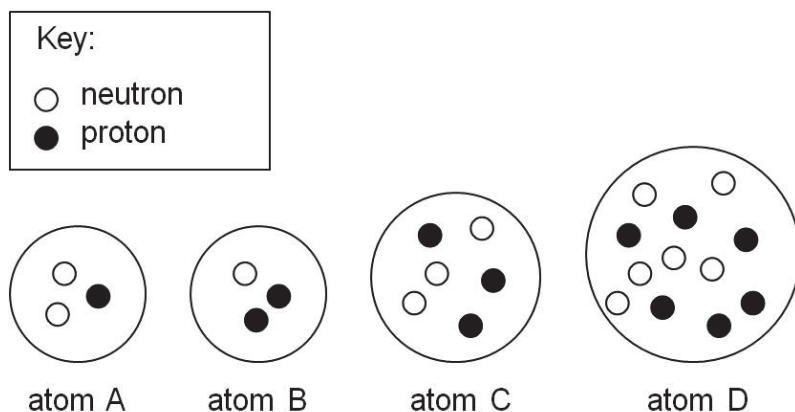
Feature 2:

.....  
.....  
..... [2]

- 2 (a) Construct a table in the space below to show the relative charge and relative mass of a proton, electron and neutron in an atom. [3]

Particle	Relative Charge	Relative Mass
Proton		
Electron		
Neutron		

(b) The diagram shows the nuclei of four different atoms.



(i) What is the atomic mass of atom **C**? ..... [1]

(ii) Which group in the Periodic Table does atom **D** belong to? ..... [1]

(iii) What is the number of electrons in atom **A**? ..... [1]

(iv) Explain how you derived your answer in (b)(iii).  
 .....  
 ..... [1]

(v) State one difference between atoms of different elements.  
 ..... [1]

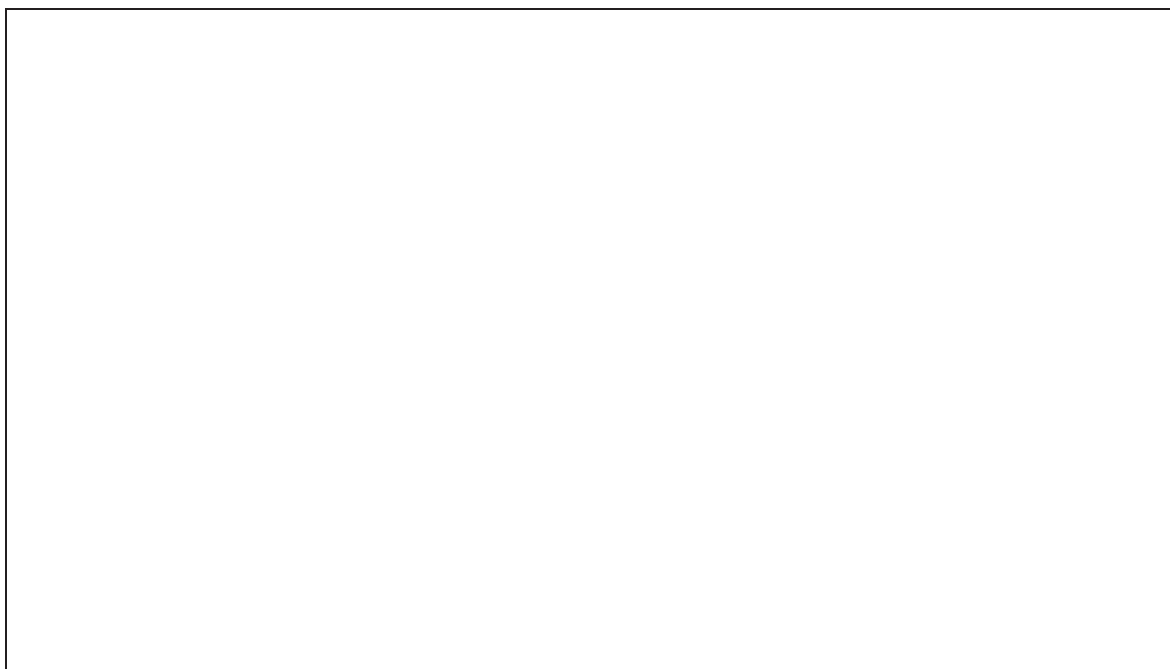
(c) Draw the atomic structure of a lithium atom in the space below. Your drawing should include:

- (1) the nucleus, similar to the nuclei shown in part (b) and
- (2) the arrangement of the electrons.

You should use the following symbols.

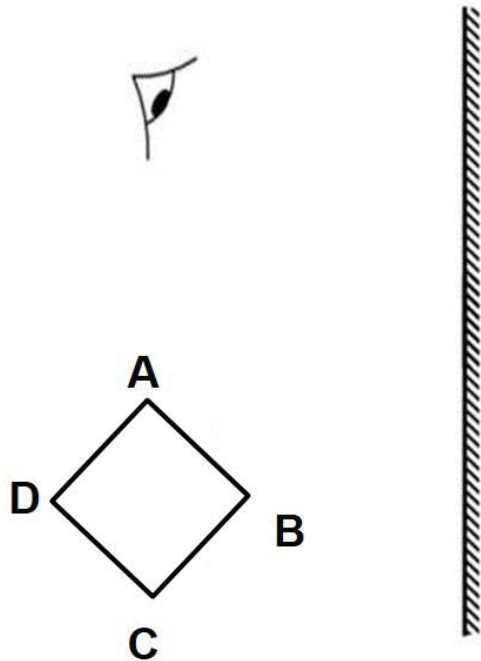
[2]

x	electrons
●	protons
○	neutrons





3 (a) A table is placed in front of a plane mirror as shown in the diagram below.



(i) On the diagram, draw and label the position of the image formed in the mirror. [1]

(ii) Using 2 rays, complete the ray diagram showing how the eye will see the image of point B. You must indicate the angles of incidence and reflection. [3]

(iii) State two properties of the image formed in the mirror.

.....

.....

..... [2]

- (b) One night, a car almost ran over a teenager who was crossing the road. The area was lit by street lamps emitting yellow light. The teenager, who managed to spot the car as it turned the corner, informed the police that the car was a black Honda.

The police did an investigation and narrowed their search to three suspects. However, none of the Honda cars were black. Car **A** was blue, Car **B** was green and Car **C** was red.

Which car could have belonged to the culprit? Explain why he is guilty while the other two drivers are innocent.

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.....

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.....

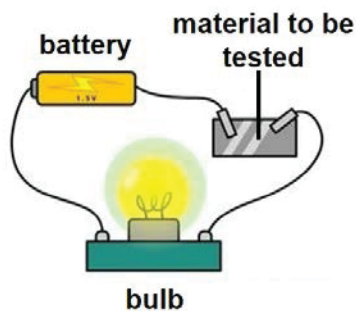
.....

..... [4]

**4 EITHER** (Circle **Q 4E** on cover page of Booklet 2)

- (a) Derek and Shawn are given two unknown elements each, Element A and Element B. They are told that one of the elements is a metal while the other is a non-metal. Element A is a silvery solid while Element B is a yellowish solid at room temperature.

Based on the appearance, Derek deduces that Element B is a non-metal. However, Shawn does not agree that the conclusion should only be based on the appearance and sets up the following experiment to test the nature of the elements.

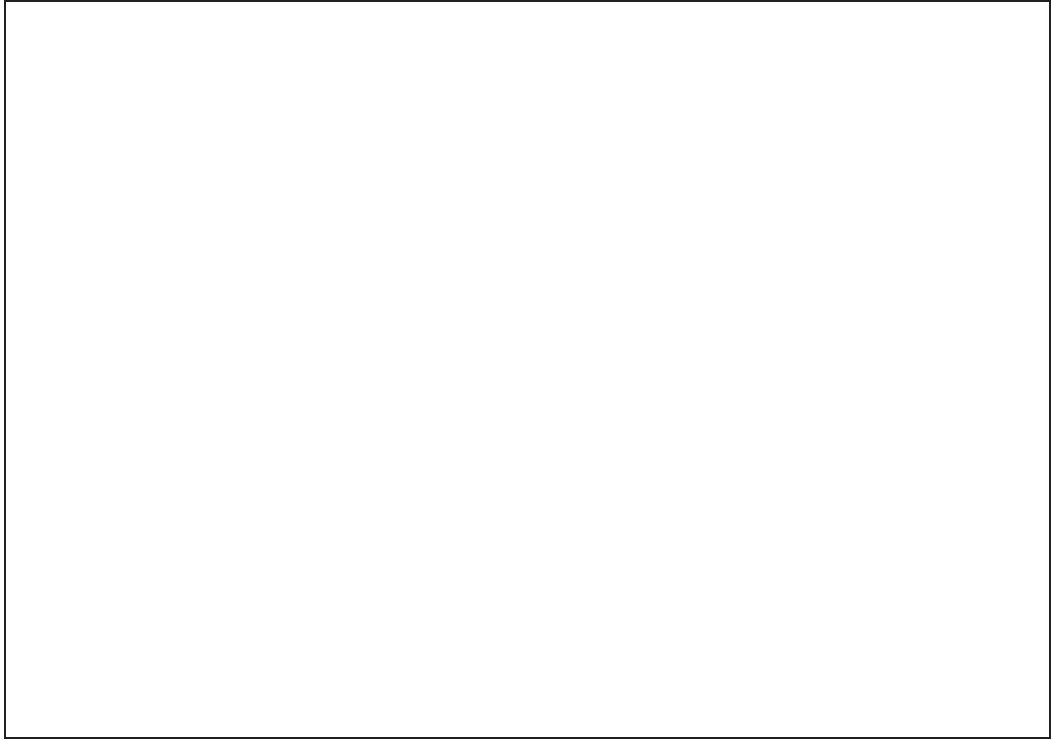


- (i) What physical property of Elements A and B is Shawn testing for?  
 ..... [1]

- (ii) Write down the observations that Shawn would obtain if Element A is indeed a metal and B a non-metal?  
 .....  
 .....  
 ..... [2]

- (iii) Given that the melting point and boiling point of Element A is 650 °C and 1090 °C respectively, what will be its state at the temperature of 900 °C?  
 ..... [1]

- (b) Jeremy wanted to find out the density of a plastic toy that was too large to fit in a measuring cylinder.
  - (i) Draw a neatly labelled diagram to show how Jeremy measured the volume of the toy. [2]



- (ii) Describe the procedure Jeremy followed to find out the density of the toy. You should list all apparatus used.

.....

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..... [4]

4 OR (Circle Q 40 on cover page of Booklet 2)

(a) State a difference between a compound and a mixture.

.....  
..... [1]

(b) The following gives information about three unknown substances, X, Y and Z.

X is a green powder which is made up of two substances in a fixed proportion by mass. It decomposes into a black powder and gives off a colourless gas on heating.

Y is made by adding black powder to a grey powder and no light or heat was released. The grey powder dissolves in acid but the black particles do not.

Z is a fine yellow powder which cannot be broken down into anything simpler. It burns to form sulfur dioxide.

State whether X, Y and Z are elements, compounds or mixtures. In each case, give one reason to support your answer. [6]

X is a ..... because .....

.....  
.....  
.....

Y is a ..... because .....

.....  
.....  
.....

Z is a ..... because .....

.....  
.....  
.....

- (c) The following table gives information about the properties of substances, A, B and C.

Substance	Can it dissolve in water?	Can it be attracted by a magnet?
A	Yes	No
B	No	No
C	No	Yes

Using the information in the table, describe the steps clearly as to how you could separate a solid mixture of A, B and C. You should be able to get a sample of each at the end of the separation.

.....

.....

.....

.....

.....

.....

..... [3]

**End of Booklet 2**





**KENT RIDGE SECONDARY SCHOOL  
SEC 1 EXPRESS  
SCIENCE  
END-OF-YEAR EXAMINATION 2018  
UPDATED MARKING SCHEME & MARKERS REPORT**

**SECTION A [30 marks]**

Question	Answer
1	D
2	B
3	C
4	C
5	D
6	D
7	A
8	B
9	B
10	D
11	B
12	C
13	D
14	B
15	C

Question	Answer
16	A
17	C
18	B
19	D
20	D
21	D
22	D
23	D
24	B
25	A
26	C
27	B
28	B
29	D
30	C



**SECTION B [30 marks]**

Qn	Marking Point		Mark Awarded	Remarks
1	(a)	1. Condenser should be tilted downwards. 2. (Bulb of the) thermometer should be near the opening / mouth of the condenser. <b>or</b> Thermometer should not be touching the water. 3. Conical flask / Container with the distillate / liquid should not be stoppered.	1 1 1	
	(b)	100°C <b>Reject: if unit is wrong</b>	1	
	(c)	The gas particles <u>lose energy</u> and <u>move slower</u> .  <u>Forces of attraction pull particles closer together into a disorderly but closely packed arrangement</u>  <u>as gas changes to liquid / particles can now vibrate and slide over each other.</u> (state change / describe the new state of matter)	1 1 1	

Qn	Marking Point		Mark Awarded	Remarks	
2		<p><b>Accept any reasonable answer.</b></p> <pre> graph TD     Animals --&gt; Non-vertebrates     Animals --&gt; Vertebrates     Non-vertebrates --&gt; Spider     Vertebrates --&gt; No_feathers[No feathers]     Vertebrates --&gt; Feathers     Feathers --&gt; Pigeon     No_feathers --&gt; No_scales[No scales]     No_feathers --&gt; Scales     No_scales --&gt; Frog     Scales --&gt; Does_not_breathe[Does not breathe through gills]     Scales --&gt; Breathes_through_gills[Breathes through gills]     Does_not_breathe --&gt; Python     Breathes_through_gills --&gt; Archerfish   </pre> <p><b>M</b> [1] - Accurate <b>M</b>ain heading (i.e. Animals)</p> <p><b>S</b> [1] - Accurate <b>S</b>ub-headings (e.g. Vertebrates / non-vertebrates) <b>(Reject: "Yes/No" → NOT considered sub-headings)</b></p> <p><b>A</b> [1] - Specific <b>A</b>nimals accurately and individually classified (e.g. spider, python) <b>(Reject: spelling errors)</b></p> <p><b>REJECT: Flowchart</b></p>	3		
	(b)	(i)	A species that is not native to the environment. / A species that is not originally from that environment.	1	
		(ii)	It may disrupt the local food webs / ecosystems.	1	
		(iii)	No natural predator in the new environment	1	
			<b>Reject: Cane toad has plenty of food supply so it multiplied</b>		
			<b>Reject: It has a fast reproduction rate.</b>		

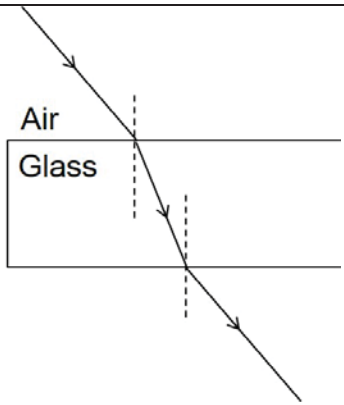
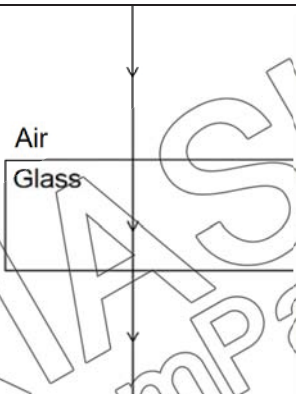
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Qn	Marking Point			Mark Awarded	Remarks
3	(a)	(i)	Stage	1	
		(ii)	Light / Light source	1	
		(iii)	Base	1	
		(iv)	Coarse adjustment knob	1	
	(b)	(i)	<b>d</b>	1	
		(ii)	<p><u>Similarity:</u> (Accept any 1 of the following answers)</p> <ul style="list-style-type: none"> <li>- Each onion cell and human cheek cell has a nucleus / cytoplasm / cell membrane.</li> </ul> <p><u>Difference:</u> (Accept any 1 of the following answers)</p> <ul style="list-style-type: none"> <li>- Onion cells have regular shape while human cheek cells have irregular shape.</li> <li>- Onion cells have cell walls / chloroplasts but human cheek cells do not have cell walls / chloroplasts.</li> <li>- Onion cells have one / large vacuole while human cheek cells have many / tiny vacuoles.</li> </ul>	1 1	
(c)	<p>Total magnification = <math>5 \times 10</math> = 50 x                   <b>[1] - working</b></p> <p>Actual length of bug = <math>30 / 50</math>                   <b>[1] - working</b> = 0.6 mm / 0.06 cm <b>[1] - answer + correct unit</b></p>			3	

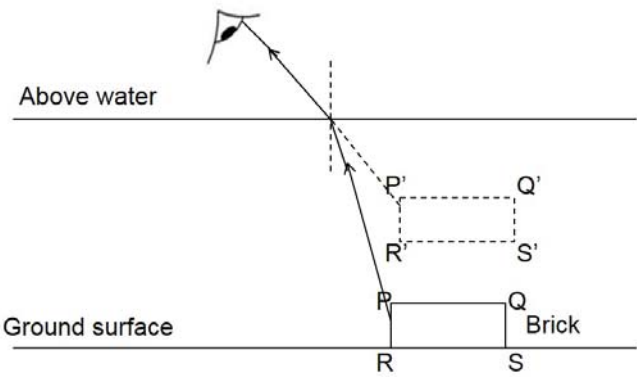
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Qn	Marking Point		Mark Awarded	Remarks
4	(a)	(i)	 <p>[1] - Ray in glass bends <u>towards the normal</u>            [1] - Ray that exits glass <u>bends away from the normal</u> + <b><u>parallel to incident ray</u></b></p> <p><b>Reject: if normals are not indicated.</b></p>	
		(ii)	 <p>[1] - Ray enters and exits glass block in a straight line.</p>	1
		(iii)	W, Y, X, Z	1

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(b)		 <p>Above water</p> <p>Ground surface</p> <p>R Q Brick</p> <p>R S</p> <p>I</p> <p>RR</p> <p>IR</p> <p>[1] - Accurate <u>location</u> (slightly above object) and <u>labelling</u> of <u>I</u>mage (dotted lines)</p> <p>[1] - 1 ray being from point P to water surface (<u>I</u>ncident <u>R</u>ay)</p> <p>[1] - 1 ray entering Naomi's eye from image point P' (line underwater should be a dotted line) (<u>R</u>efracted <u>R</u>ay)</p>	3	
-----	--	--	---	--

  
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**SECTION C [40 marks]**

Qn	Marking Point		Mark	Remarks	
1	(a)	(i)	To transport oxygen around the body	1	Students generally scored well for this question. Common mistake includes students listing down various substances such as "red blood cell transports oxygen, water, food, waste materials". Students are reminded <b>not to list down everything</b> as examiners would not pick and choose the correct answers and ignore the wrong answers.
		(ii)	A typical animal cell has a nucleus but a red blood cell has no nucleus.  An animal cell has an irregular shape but a red blood cell has a biconcave shape.  <b>Reject: If student only talks about absence of nucleus in red blood cell.</b>	1	This question was well done across all classes.
		(iii)	If (ii) talks about nucleus: The absence of a nucleus gives more space for more <b>hemoglobin [1]</b> to <b>take up / bind/ transport more oxygen. [1]</b>  <b>Reject: The absence of a nucleus gives more space for oxygen.</b>  If (ii) talks about biconcave shape: The biconcave shape increases <b>the surface area to volume ratio [1]</b> for <b>more oxygen to be transported/ more efficiently. [1]</b>	2	Many students did not score well as they did not explain what the absence of nucleus results in. Instead, many students jumped into conclusion that without nucleus, a red blood cell would be able to transport more oxygen.
		(iv)	<u>1st point</u> The new shape <b>reduces</b> the <b>surface area to volume ratio</b> of the red blood cell / The sickle shape results in <b>less space</b> for	1	This question was also poorly done as only a handful



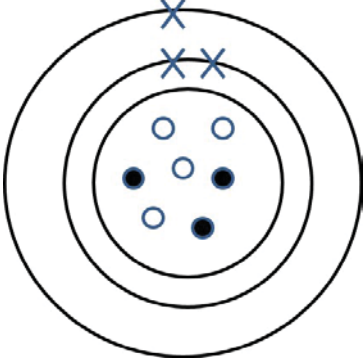
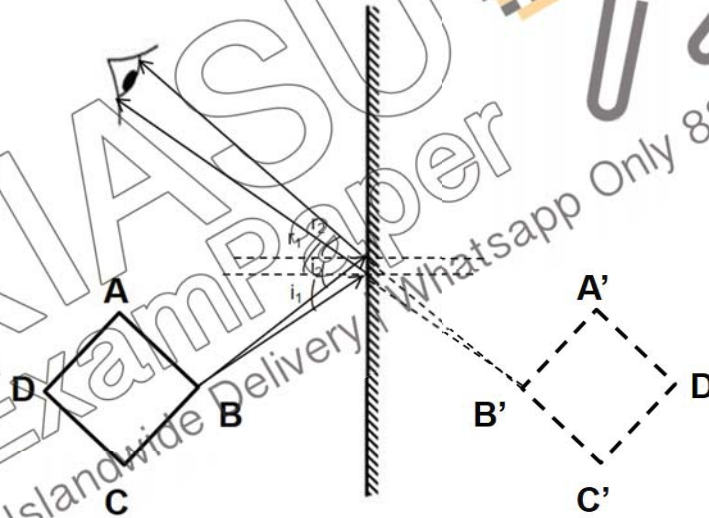
Qn	Marking Point			Mark	Remarks												
			<p><u>hemoglobin</u> in the red blood cell,</p> <p><u>2nd point</u></p> <p>Hence, the red blood cell takes up <u>less oxygen</u>.</p>	1	students could identify the key idea of increasing surface area to volume ratio. Majority of students do not understand the notion behind surface area to volume ratio.												
	(b)		<p>Feature 1:</p> <p>The root hair cell <b>does not have chloroplasts</b> because it is found underground and <b>does not make food</b> or photosynthesize.</p> <p>Feature 2:</p> <p>The root hair cell has an <b>elongated structure which increases its surface area to volume ratio</b> to increase uptake of water.</p>	1 1 1 1	The weaker students are reminded to not just write down chloroplasts are not found as root hair cells are underground. They need to complete their answers by writing down what the cause will be if it is underground. (no photosynthesis or no making food will take place)												
2	(a)		<table border="1"> <thead> <tr> <th></th> <th>Relative mass</th> <th>Relative charge</th> </tr> </thead> <tbody> <tr> <td>Proton</td> <td>1</td> <td>+1</td> </tr> <tr> <td>Electron</td> <td>negligible / 1/1840, 1/1836, 0.0005</td> <td>-1</td> </tr> <tr> <td>Neutron</td> <td>1</td> <td>0</td> </tr> </tbody> </table> <p>[1] - construction of a correct table with labels [1] - correct relative mass for p,e,n [1] - correct relative charge for p,e,n</p> <p><b>Reject:</b> <b>Relative mass of electron: 0</b></p>		Relative mass	Relative charge	Proton	1	+1	Electron	negligible / 1/1840, 1/1836, 0.0005	-1	Neutron	1	0	3	Students who were weaker showed poor understanding on the atomic structure. Many students would write down a negative answer for mass of electron or neutron, which meant they do not understand the meaning of mass and charge. Mass cannot be a negative value.
	Relative mass	Relative charge															
Proton	1	+1															
Electron	negligible / 1/1840, 1/1836, 0.0005	-1															
Neutron	1	0															
	(b)	(i)	6	1	Question was well attempted.												
		(ii)	Group IV	1	The teachers have												

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Qn	Marking Point		Mark	Remarks
				emphasized greatly in class about the importance of writing roman numerals to represent the group. As such, students who wrote Group 4 was penalized.
	(iii)	1	1	Question was well attempted.
	(iv)	Number of protons equals to / is the same as number of electron.	1	Question was well attempted.
	(v)	Different <u>proton</u> / <u>atomic numbers</u> or <u>different sizes</u>  Reject: Mass number. (Calcium and Argon has the same mass number but they are different elements) No. of neutrons. (Calcium and potassium has same number of neutrons)	1	The common misunderstanding was that different elements have also different number of neutrons and mass number. However, it will be good if teachers in class could emphasize that certain elements such as Ca and Ar and Ca and K has the same no. of mass number and neutrons respectively. The only possible answers were proton numbers and size.



	(c)	 <p>[1] - Correct number of protons and neutrons found in the nucleus                  [1] - Correct number of electrons and in 2.7 electronic configuration</p>	2	As the question stated, 'similar to the nuclei in (b);', students were expected to draw protons and neutrons in a randomised fashion. If they have drawn it clustered together or in neat layers, they will be penalized.
3	(a) (i)	 <p><u>Location</u> of image from mirror should be the same as location of object from mirror (no need to indicate distance)                  + Correct <u>labelling</u> of image  <b>Reject: if image is drawn using solid lines or incorrectly labelled</b></p>	1	
	(ii)	<p>[2] - 2 accurate incident and reflected rays (lines behind the mirror should be dotted lines)</p>	3	

		[1] - Accurate indication of angles of incidence and reflection using: $i_1$ , $i_2$ , $r_1$ , $r_2$ .		
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		<b>(iii)</b> <b>Accept any 2 of the following answers.</b> Image is the same size as the object. Image is the same distance from the mirror as the object is from the mirror. Image is virtual. Image is upright. Image is laterally inverted.	2	
	<b>(b)</b>	Car A belongs to the culprit.  When yellow light shines on a Car A, both red and green are absorbed and the car would appear black.  When yellow light shines on a Car B, green is reflected and the car would appear green.  When yellow light shines on a Car C, red is reflected and the car would appear red.	1 1 1 1	
<b>4E</b>	<b>(a)</b>	<b>(i)</b> Electrical conductivity	1	
		<b>(ii)</b> The bulb lights up when Element A is connected to the circuit.  The bulb does not light up when Element B is connected to the circuit.	1 1	
		<b>(iii)</b> Liquid	1	
	<b>(b)</b>	<b>(i)</b>	2	

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		[1] – Neat drawing of apparatus [1] – Correct labelling of apparatus		
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	(ii)	<p>He measured the mass of the toy using an <u>electronic balance</u>.</p> <p>To measure the volume of the toy, he <u>added water to the brim of the displacement can / until water spills out of the displacement can</u>.</p> <p>When the toy is lowered into the displacement can, he recorded the <u>volume of water that spilt out of the can into a measuring cylinder. This is the volume of the toy</u>.</p> <p>He used the following formula to determine the density of the toy. <u>Density = Mass / Volume</u></p>	1 1 1 1	
	(c)	<p><b>Accept any 2 reasonable answers.</b></p> <ul style="list-style-type: none"> <li>- No chemical reaction takes place during the formation of the mixture of iron and sulfur but a chemical reaction takes place during the formation of iron sulfide.</li> <li>- The mixture of iron and sulfur can be separated by physical means but iron sulfide can only be broken down into simpler substances by chemical means.</li> </ul> <p>The properties of the mixture of iron and sulfur are similar to its component elements while the properties of iron sulfide are different from its component elements.</p> <ul style="list-style-type: none"> <li>- Iron and sulfur are mixed in any proportion by mass in the mixture but they are chemically combined in a fixed proportion by mass in iron sulfide.</li> </ul>	{1} - for each difference  Total: [2]	
40	(a)	<p>A compound is made up of two or more elements chemically joined together while</p> <p>A mixture is made up of two or more substances not</p>	1 1	

		chemically joined together.		
(b)		<p>X: compound It is made up of two substances in a fixed proportion by mass. / A new substance is formed.</p> <p>Y: mixture When the mixture was made, no chemical reaction took place. / The mixture has the same properties as its component substances.</p> <p>Z: Element It cannot be broken down into simpler substances.</p>	<p>1 1</p> <p>1 1</p> <p>1 1</p>	
(c)		<p>Step 1: Use a <u>magnet</u> to separate <u>C</u> from the mixture.</p> <p>Step 2: <u>Add water</u> to the mixture of A and B. <u>Filter</u> the mixture and obtain <u>B</u> as the residue.</p> <p>Step 3: <u>Evaporate</u> the water away to obtain <u>A</u>.</p>	<p>1</p> <p>1</p> <p>1</p>	

