

Name: () Teaching Group:

**ASSUMPTION ENGLISH SCHOOL
END OF YEAR EXAMINATION 2024**

**LOWER SECONDARY SCIENCE
BOOKLET A**



ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL
ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL
ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL
ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL
ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL

LEVEL: Sec 1 G3

DATE: 9 October 2024

TEACHING GROUPS: TG 1, TG 2 & TG 5

DURATION: 2 hours

(For Booklets **A** and **B**)

Additional Materials provided: OAS Paper

INSTRUCTIONS TO CANDIDATES

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

Write your NAME, INDEX NUMBER and TEACHING GROUP at the top of this page and on the OAS paper. **Shade your index number on the OAS paper.**

This paper consists of 2 sections.

Booklet **A**: Section A - Multiple-Choice Questions

Booklet **B**: Section B - Structured Questions

SECTION A (30 marks)

Multiple-Choice Questions

There are 30 questions in this section. Answer **all** questions. For each question, there are four possible answers A, B, C and D. **Choose the correct answer and record your choice in soft or 2B pencil on the OAS paper provided. DO NOT fold or bend the OAS paper.**

A Periodic Table can be found on the last page of Booklet **B**.

At the end of the examination, hand in your OAS paper, Booklets **A** and **B** separately.

Booklet A consists of 14 printed pages including this page.

[Turn over

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 on the OAS paper in soft pencil.

1 Which example is **not** a responsible application of scientific knowledge?

- A using antibiotics to treat a bacterial infection
- B using drugs in sports to improve performance
- C using genetically modified crops to increase food production
- D using solar energy to generate electricity

2 Which statement gives an example of qualitative data?

- A counting the number of apples that turned brown after a day
- B measuring the change in height of a plant over a month
- C recording the colour change of a solution as it is heated
- D timing the duration of an experiment

3 Which S.I. unit is **incorrectly** matched to the physical quantity?

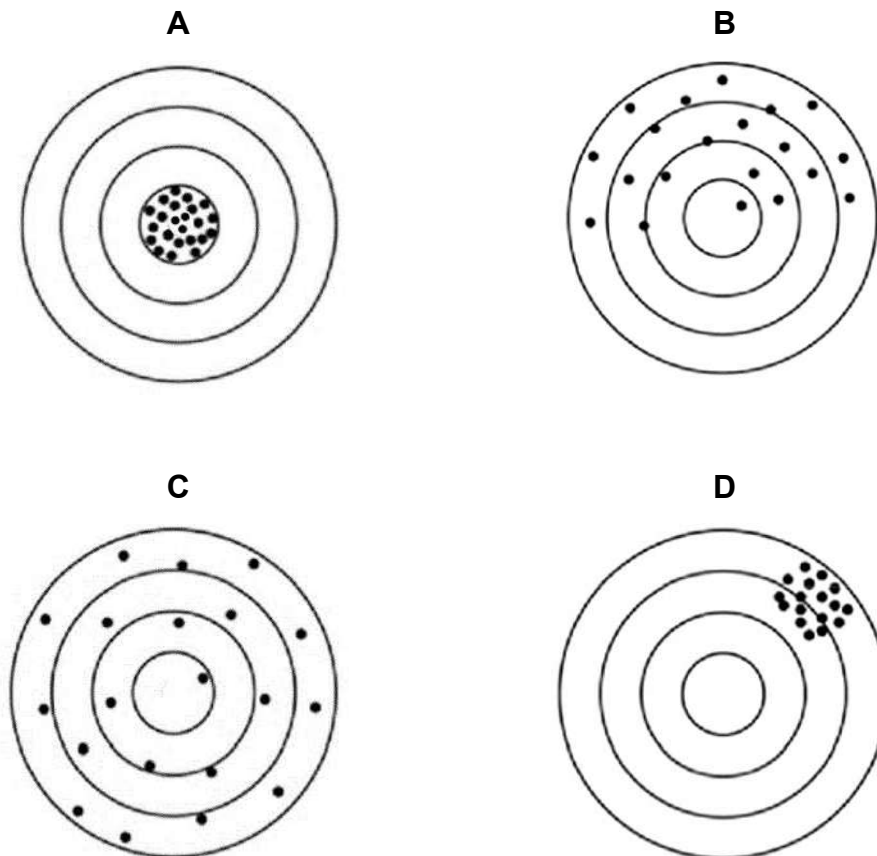
	physical quantity	S.I. unit
A	length	metre (m)
B	mass	kilogram (kg)
C	temperature	Kelvin (K)
D	time	hour (h)

- 4 A canister of hydrogen cyanide was labelled with the hazard symbols shown.

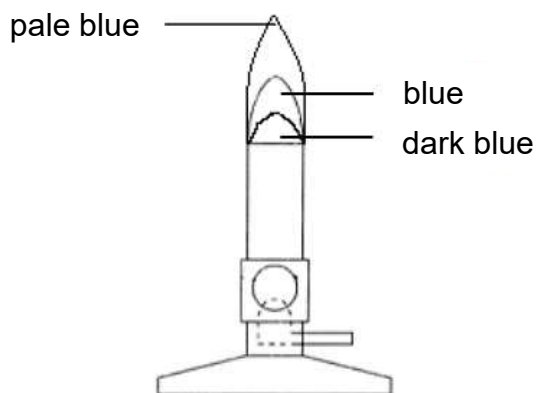


What do these hazard symbols mean?

- A corrosive and flammable
 - B flammable and irritable
 - C harmful and radioactive
 - D toxic and explosive
- 5 Which diagram shows a result with high accuracy **and** high precision?



- 6 A Bunsen burner was lit and the flame was observed to have different regions with different intensity of blue colour.



Which row describes the flame and the air hole of the Bunsen burner?

	type of flame	air hole
A	luminous	closed
B	luminous	open
C	non-luminous	closed
D	non-luminous	open

- 7 An electronic balance reads 28.5 g when an apple is placed on it.
It has a zero error of -0.1 g.
What is the actual mass of the apple?

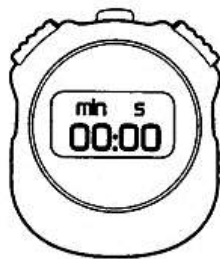
- A** 27.5 g
- B** 28.4 g
- C** 28.5 g
- D** 28.6 g

8 Which statements are possible uses of digital calipers?

- I to measure the diameter of a ping pong ball
- II to measure the height of a student
- III to measure the internal diameter of a small beaker
- IV to measure the length of a A4-size textbook

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

9 A student investigates how the temperature of a beaker of water changes with time as it is heated. The diagrams show the readings on his stopwatch as the water reaches different temperatures.



time at 20 °C



time at 80 °C

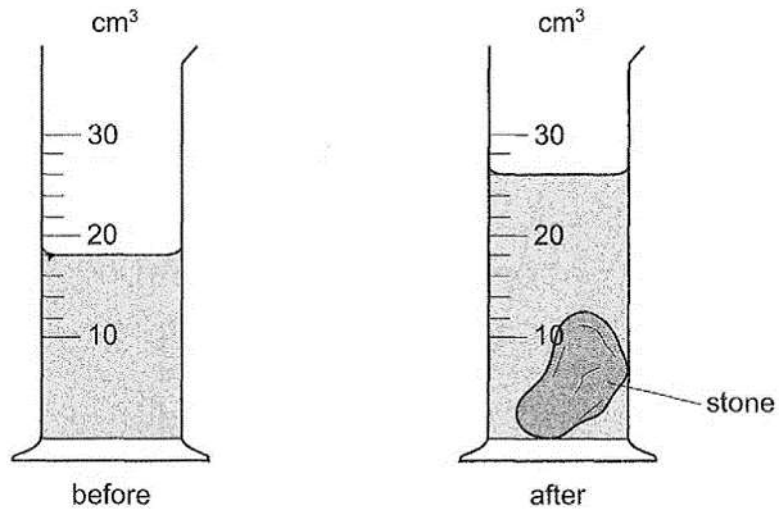


time at 100 °C

What is the time taken for the temperature to rise from 80°C to 100°C?

- A 1 min 54 s
- B 2 min 06 s
- C 3 min 46 s
- D 5 min 40 s

- 10 The diagram shows a measuring cylinder used to measure the volume of a small stone.



What is the volume of the stone?

- A 4 cm³
 B 8 cm³
 C 18 cm³
 D 26 cm³
- 11 The Mohs scale is often used to compare the hardness of different materials. The higher the number, the harder the material. The table shows the hardness of four different materials, J, K, L and M.

material	J	K	L	M
hardness	4	3	7	5

Which statement is true?

- A Material K can scratch all other materials.
 B Material J can scratch material M but not material K.
 C Material M can scratch material K but not material L.
 D Material J and K together can scratch material L.

- 12** The Singapore Green Plan 2030 promotes environmental sustainability. An example is to encourage people to use reusable cloth bags by implementing a plastic bag charge at supermarkets.

Which statement is **not** correct?

- A** Cloth bags are single-use while plastic bags can be reused many times.
- B** Cloth bags are strong and flexible.
- C** Plastic bags are non-biodegradable and cannot be decomposed naturally.
- D** Plastic bags can break down to form microplastics over time.

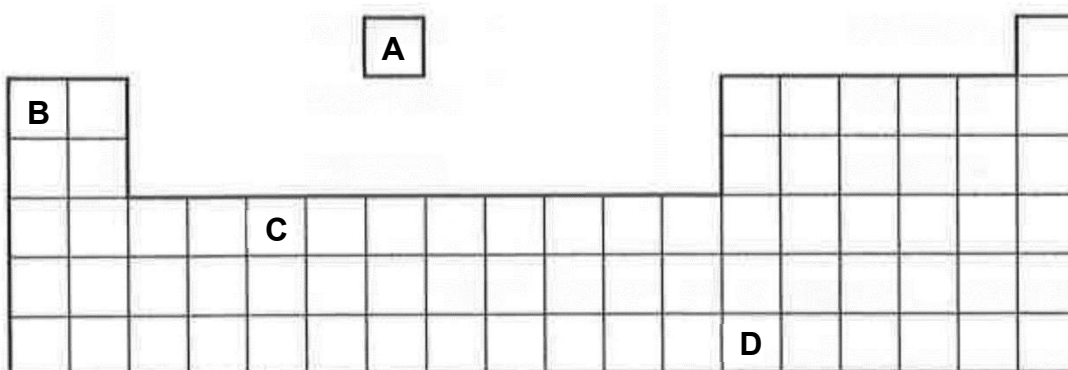
- 13** Which statement about compounds and mixtures is correct?

- A** Compounds can be easily separated into their constituents.
- B** Compounds do not have fixed compositions.
- C** Mixtures can only contain elements.
- D** Mixtures have the same properties as their constituents.

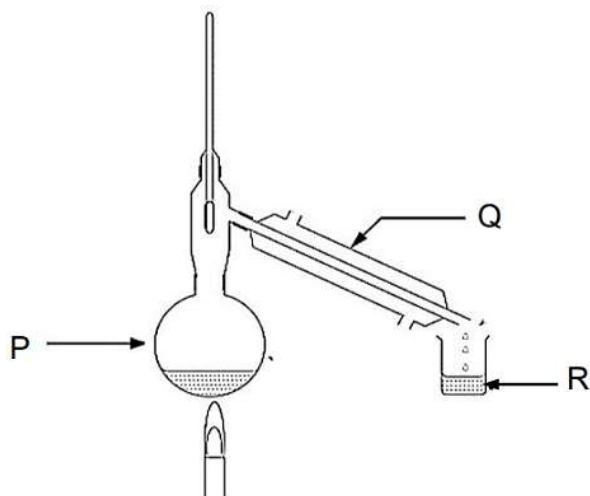
- 14** The diagram shows an outline of the Periodic Table.

The positions of four elements are shown.

Which element is a non-metal?



15 The diagram shows an experimental set-up.



What are P, Q and R?

	P	Q	R
A	conical flask	channeler	residue
B	conical flask	condenser	distillate
C	distillation flask	channeler	residue
D	distillation flask	condenser	distillate

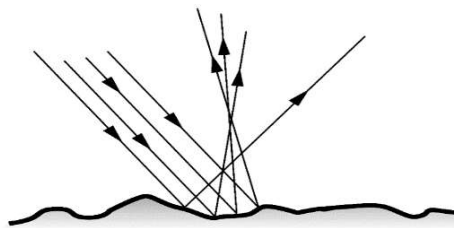
- 16 The image shows a mirror placed at a road junction.



Which row is correct about the type and function of the mirror?

	type of mirror	function
A	concave	give a magnified image of the cars
B	concave	give a wide vision of the road
C	convex	give a magnified image of the cars
D	convex	give a wide vision of the road

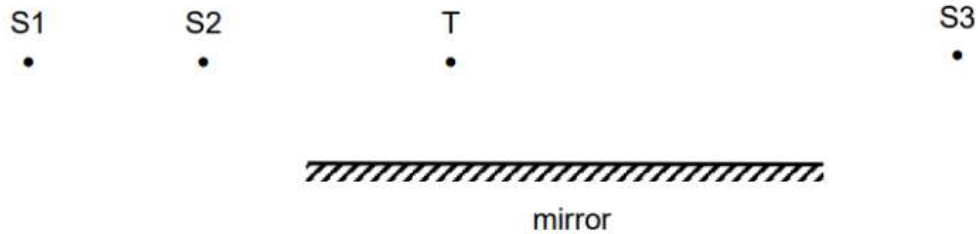
- 17 The diagram shows a beam of light hitting and reflecting from a surface.



Which statement is true?

- A** A clear image will be formed.
- B** Each light ray is reflected in the same direction.
- C** The angle of reflection of each light ray is equal to the angle of incidence.
- D** The surface is smooth.

- 18 A ballet teacher, T, stands in front of a plane mirror with three students, S1, S2 and S3.

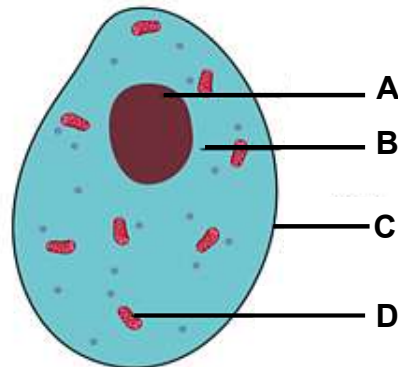


Which student(s) will the teacher **not** be able to see in the mirror?

- A S1 only
 - B S3 only
 - C S1 and S2 only
 - D S1 and S3 only
- 19 Which example is **not** caused by the refraction of light?
- A A fishing rod appears bent when placed in a sea water.
 - B Objects appear larger under a magnifying glass.
 - C Sunlight gets dispersed into seven colours after rain, forming a rainbow.
 - D We see our image on the surface of a puddle of water after a downpour.
- 20 Which example is a harmful effect of electromagnetic radiation?
- A disinfection of medical equipment using ultraviolet light
 - B overexposure to ultraviolet radiation causing skin cancer
 - C LED bulbs lighting up our homes at night
 - D use of infrared thermometer to screen people for fever at the airport

- 21 The diagram shows a cell.

Which part of the cell contains deoxyribonucleic acid (DNA)?



- 22 Cells may contain structures V, W, X, Y and Z.

Each structure has a specific function as shown in the table.

structure	function
V	absorbs sunlight
W	controls cell division
X	controls movement of substances in and out of a cell
Y	rigid and gives the cell a regular shape
Z	stores liquids, food and waste materials

Which structures are **not** found in an animal cell?

- A V and Y only
- B V, W and X only
- C V, Y and Z only
- D X and Z only

23 Which is a unicellular organism?

- A ant
- B bacterium
- C grass
- D stomach

24 Brownian motion proves that particles are in constant random motion.
Which is **not** an example of Brownian motion?

- A A drop of ink spreads in a beaker of water.
- B Dust particles appear to 'dance' in front of a light source.
- C The wax of a candle melts as the candle burns.
- D The whole bus smells of durian if a passenger brings it on board.

25 When an iron rod is heated, it expands.
Which statement is true?

- A The iron particles become bigger.
- B The iron particles become more strongly attracted to one another.
- C The mass of the iron rod does not change.
- D The volume of the iron rod does not change.

26 Which statement about gas particles is **not** correct?

- A The distance between the particles is very small.
- B The particles are held together by weak forces of attraction.
- C The particles have high kinetic energy.
- D The particles move randomly in all directions.

- 27 The melting and boiling points of four substances are given.
Which substance is a liquid at room temperature in Singapore?

	melting point / °C	boiling point / °C
A	-39	100
B	0	18
C	78	150
D	266	1500

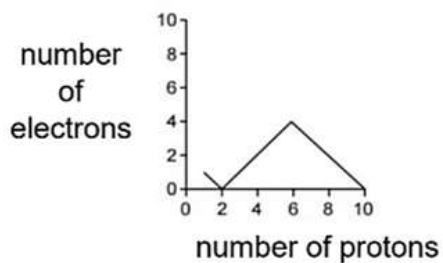
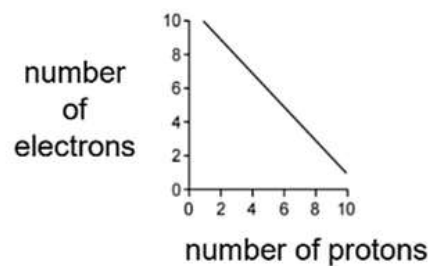
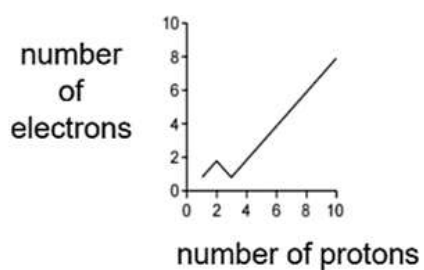
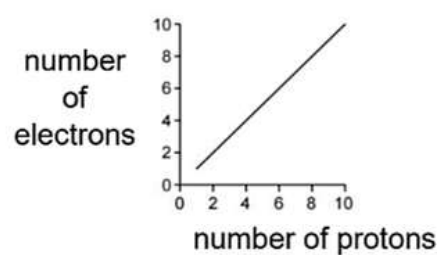
- 28 Potassium dichromate is a compound with chemical formula $K_2Cr_2O_7$.
What is the number of elements and atoms in one unit of $K_2Cr_2O_7$?

	number of elements	number of atoms
A	3	11
B	3	12
C	4	11
D	4	12

- 29 An element has an electronic configuration of 2,7.
Which statement about an atom of the element is **not** correct?

- A** It has 9 electrons.
- B** It is beryllium.
- C** It is in Group 17.
- D** It has two electron shells.

- 30 Which graph shows the relationship between the number of protons and the number of electrons for the first 10 elements in the Periodic Table?

A**B****C****D**

- END OF BOOKLET A -

Name: () Teaching Group:

**ASSUMPTION ENGLISH SCHOOL
END OF YEAR EXAMINATION 2024**

**LOWER SECONDARY SCIENCE
BOOKLET B**



ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL
ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL
ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL
ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL
ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL

LEVEL: Sec 1 G3

DATE: 9 October 2024

TEACHING GROUPS: TG 1, TG 2 & TG 5

DURATION: 2 hours

(For Booklets **A** and **B**)

Additional Materials provided: Nil

INSTRUCTIONS TO CANDIDATES

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

Write your NAME, INDEX NUMBER and TEACHING GROUP at the top of this page.

SECTION B (70 marks)

Structured Questions

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

Show all workings.

A Periodic Table is included on Page 20.

For Examiner's Use	
Section A	30
Section B	70
Total	100

At the end of the examination, hand in your OAS paper, Booklets **A** and **B** separately.

Booklet B consists of 20 printed pages including this page.

[Turn over

Section B: Structured Questions (70 marks)

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

- 1 The diagrams **A**, **B**, **C**, **D**, **E** and **F** in Fig. 1.1 represent the particles in different substances.

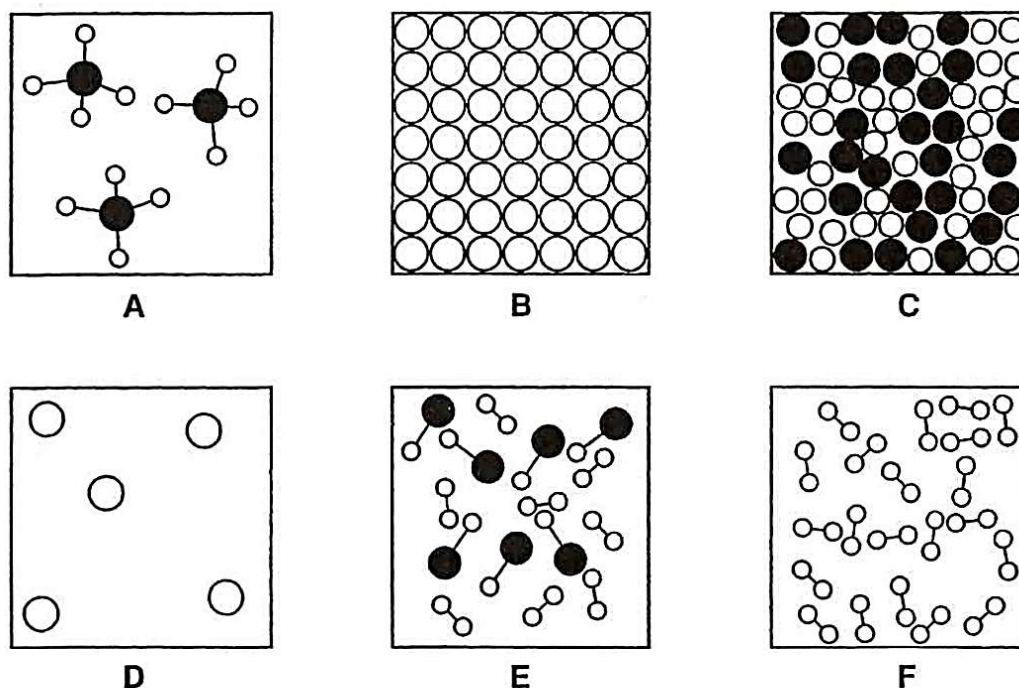


Fig. 1.1

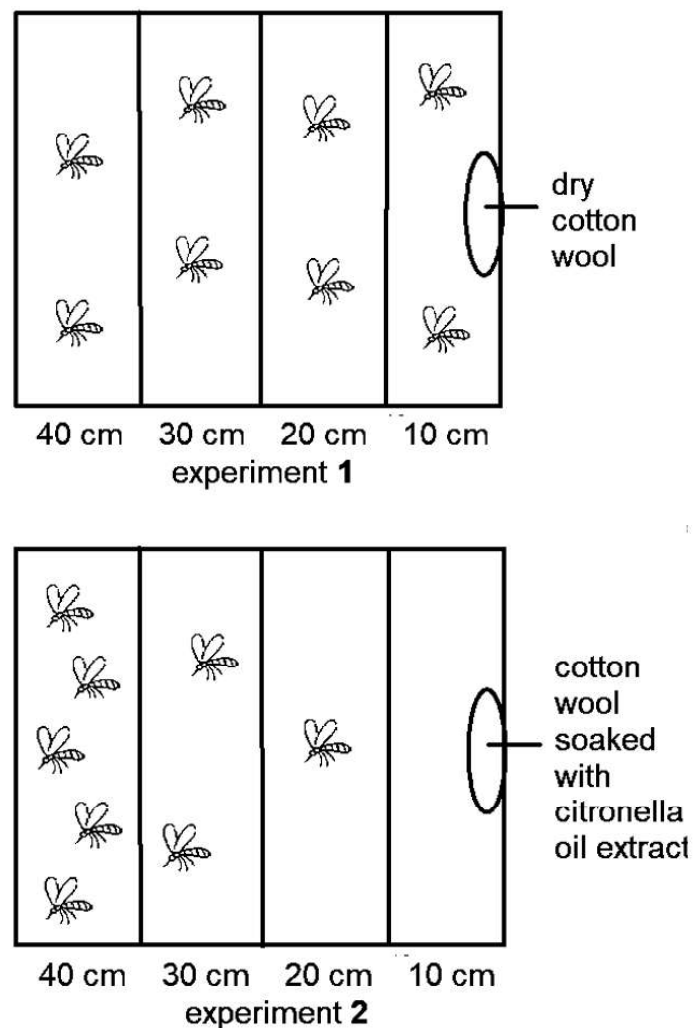
- (a) Which **one** of the diagrams **A**, **B**, **C**, **D**, **E** and **F** best represents
- (i) a solid element,
 - (ii) a gaseous compound,
 - (iii) a liquid mixture? [3]
- (b) Some of the diagrams **A**, **B**, **C**, **D**, **E** and **F** represent *molecules*.
- (i) Define the term '*molecule*'.
 -
 - [1]
 - (ii) State which diagram(s) represent molecules (state all that apply).
 - [1]

- 2 Citronella oil, which comes from the citronella plant, is used as a natural mosquito repellent. A scientist wants to test how well citronella oil works to keep mosquitoes away, so he conducts two experiments.

In experiment 1, he puts a **dry** cotton wool in a clear box. The box has areas marked 10 cm, 20 cm, 30 cm, and 40 cm away from the cotton wool. He then releases 80 mosquitoes into the box. After 10 minutes, he counts how many mosquitoes are left in each area.

In experiment 2, he repeats the experiment but replaces the dry cotton wool with a cotton wool **soaked** in citronella oil extract.

Fig. 2.1 shows the results of these experiments.



Legend
 represents a count of 10 mosquitoes

Fig. 2.1

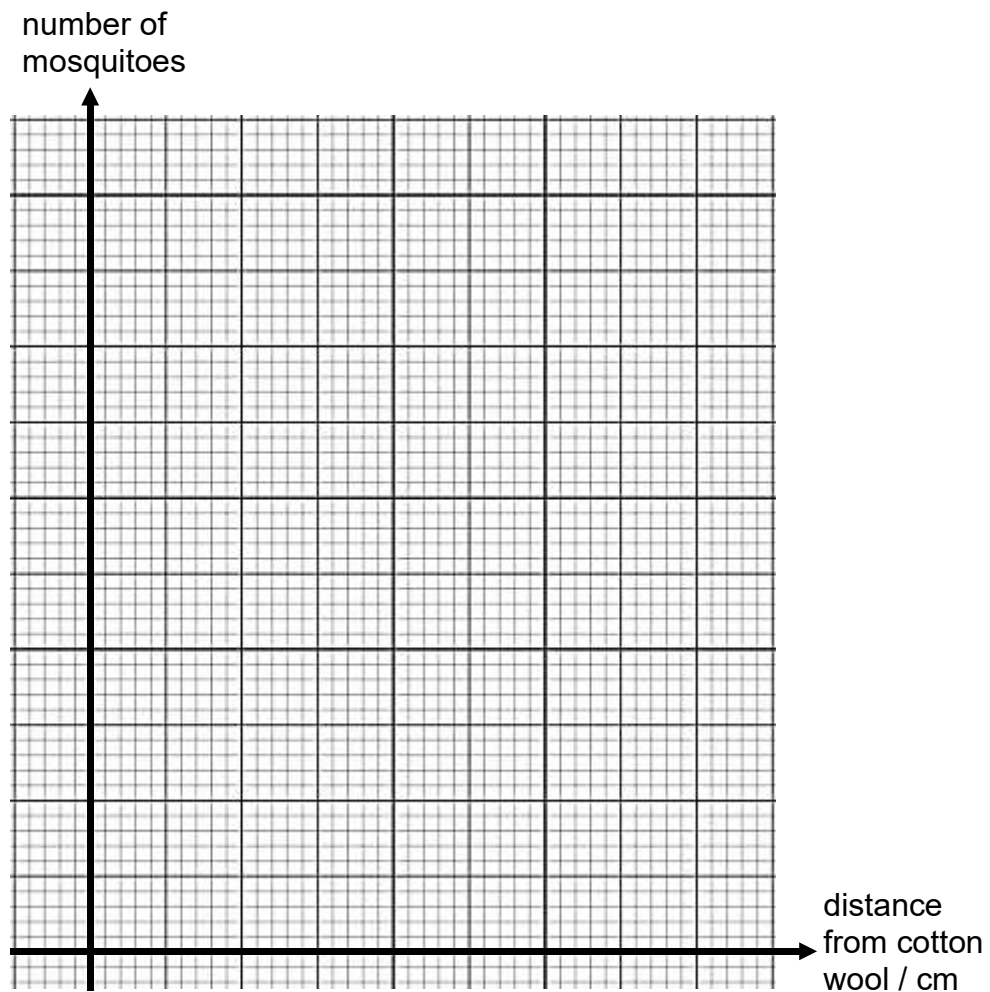
- (a) Using information from Fig. 2.1, fill in the results from experiment 2 in Table 2.1.

Table 2.1

distance from cotton wool / cm	number of mosquitoes	
	experiment 1	experiment 2
10	20	
20	20	
30	20	
40	20	

[1]

- (b) Using data from **experiment 2**, plot a graph of number of mosquitoes against distance from cotton wool, marking each point with a cross (×). Label the scale of both axes clearly. Join your plotted points using straight lines.



[3]

- (c) Describe the purpose of experiment 1.

.....

..... [1]

- (d) Draw an appropriate conclusion for the scientist's investigation. Explain your answer by comparing the results of experiment 1 and 2.

Citronella is effective / not effective (*circle*) as a mosquito repellent

because

.....

.....

.....

..... [3]

- 3 Fig. 3.1 shows the apparatus used to separate a mixture of coloured compounds using water.

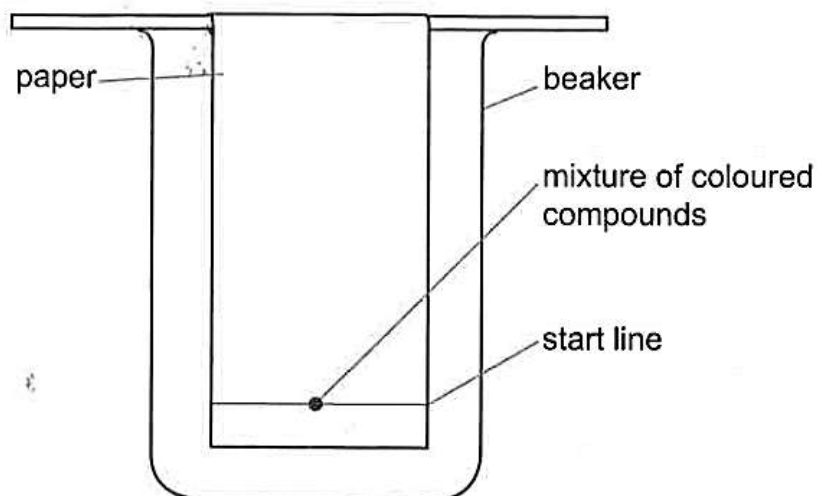


Fig. 3.1

- (a) State the name of this separation technique.

..... [1]

- (b) Draw a horizontal line in Fig. 3.1 to show the level of the water when the paper is placed in the beaker. [1]

- (c) The start line has been drawn in pencil.
Suggest why this line is drawn in pencil.

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

- 4 John wanted to separate a mixture of iron filings, salt and sand. Fig. 4.1 shows his plan.

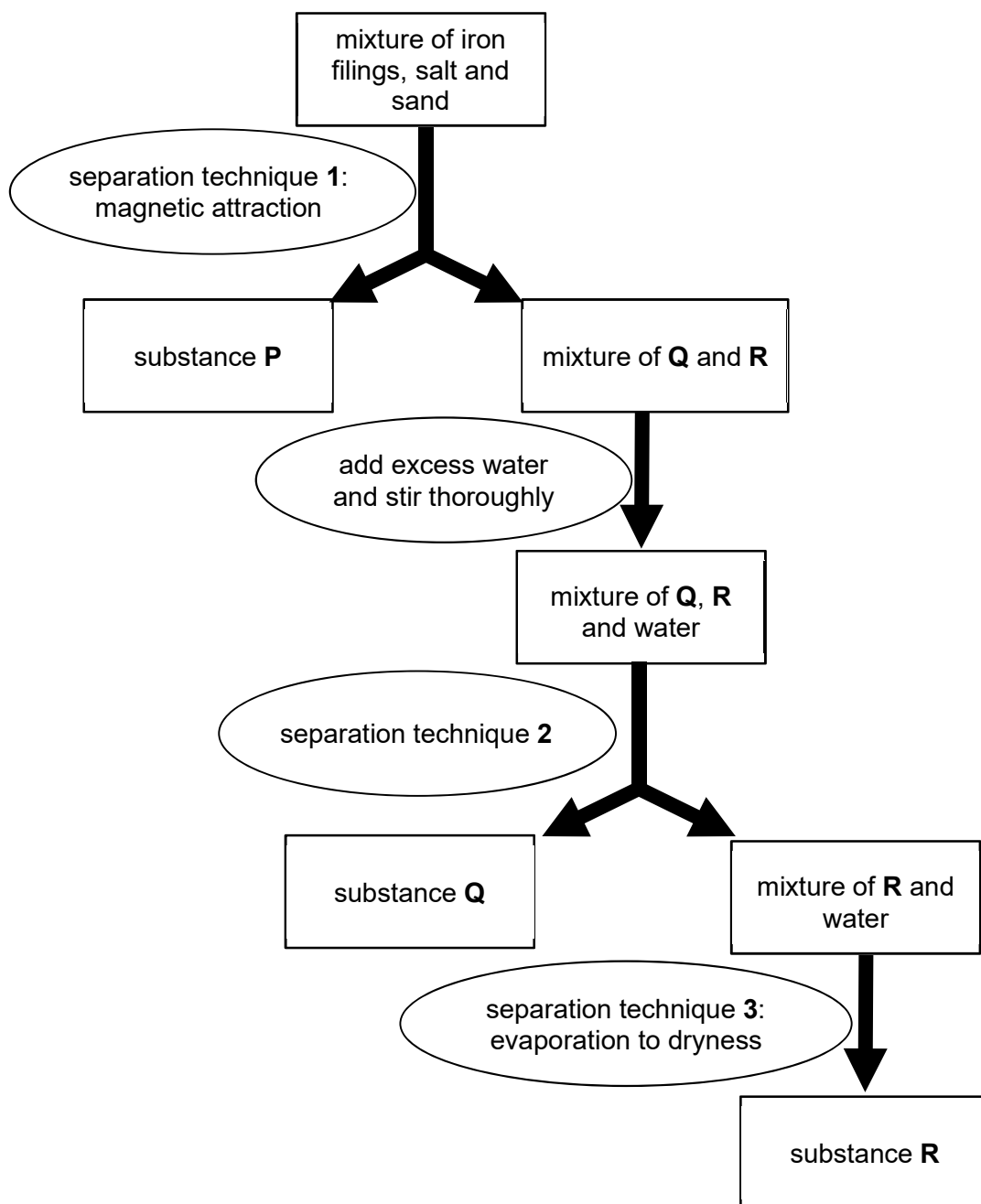


Fig. 4.1

- (a) Identify substances **P**, **Q** and **R**.

P:

Q:

R:

[3]

(b) State the name of separation technique **2**.

..... [1]

(c) In the space below, draw a diagram of the experimental set-up used in separation technique **2**. On the diagram:

- label clearly the apparatus used;
- indicate clearly the positions of **(i)** substance **Q**, and **(ii)** mixture of **R** and water, at the end of the experiment.

[3]

(d) Suggest one safety precaution to take while carrying out separation technique **3**.

..... [1]

- 5 Fig. 5.1 shows how a student measured the length of a metal ball.

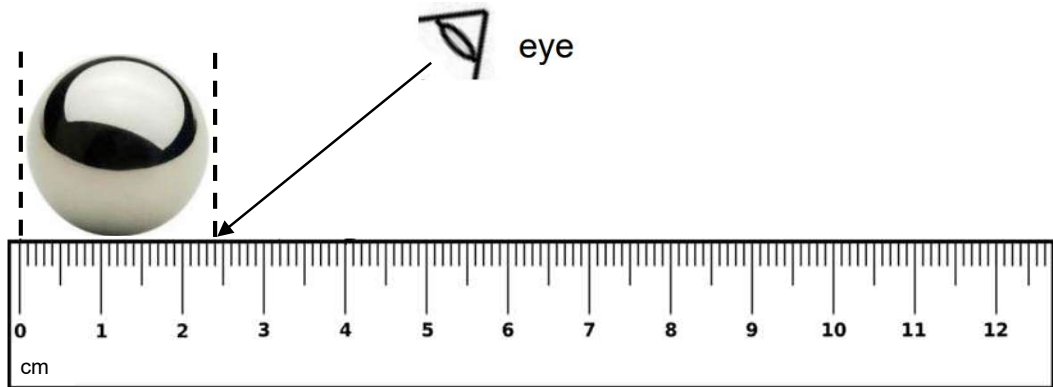


Fig. 5.1

- (a) State the error made by the student in the measurement of the length.

..... [1]

- (b) Another student accurately measured the length of the ball and used it to calculate its volume as 7.20 cm^3 . The mass of the ball is 54.0 g .

Calculate the density of the metal ball.

density = g/cm^3 [2]

- (c) Using your answer in (b), describe what will happen when the metal ball is placed in a liquid with a density of 3.50 g/cm^3 . Explain your answer.

.....

.....

..... [2]

- 6 Fig. 6.1 shows a graph of solubility, measured by mass (in grams) of solute dissolved in 100 cm^3 of water, against temperature of water. The two solutes are sugar and salt.

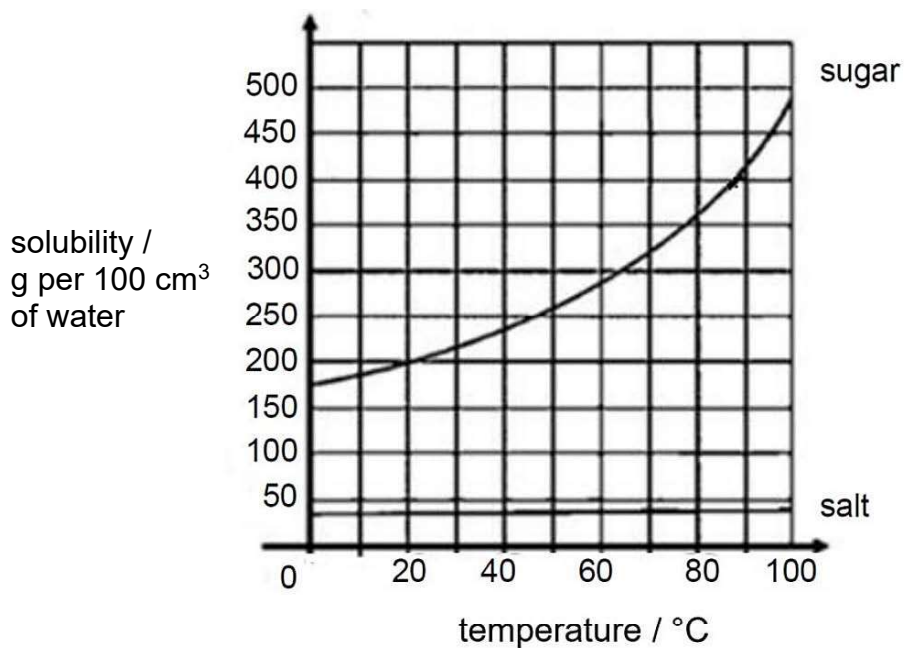


Fig. 6.1

- (a) Describe how the solubility of salt and sugar varies with the temperature of water.

.....

.....

..... [2]

- (b) Fig. 6.2 shows 200 g of salt added to 100 cm^3 of water at 30°C in beaker X, and 200 g of sugar added to 100 cm^3 of water at 30°C in beaker Y.

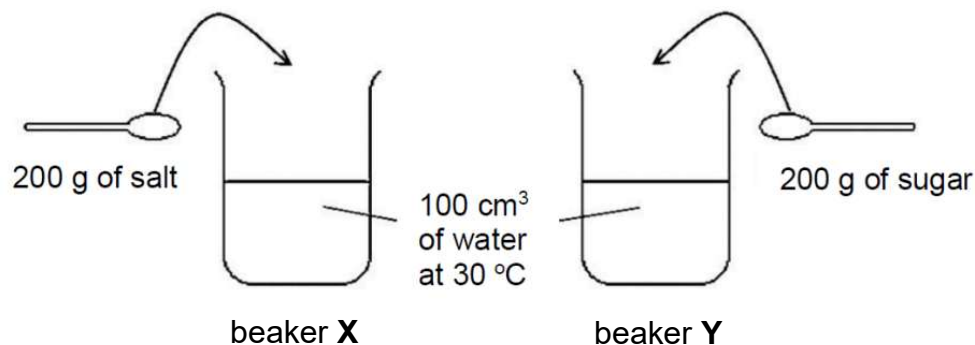


Fig. 6.2

- (i) Determine whether the resulting mixtures in beakers **X** and **Y** will be a solution or a suspension. Explain your answer with reference to information in Fig. 6.1.

The resulting mixture in beaker **X** will be a solution / suspension

(circle) because

.....

.....

The resulting mixture in beaker **Y** will be a solution / suspension

(circle) because

.....

.....

[4]

- (ii) Besides increasing the temperature, suggest one other way to increase the rate of dissolving the sugar in water.

.....

.....

[1]

- 7 We often see images in a plane mirror due to the reflection of light. Fig. 7.1 shows a drawing of the mirror image of a toy car.

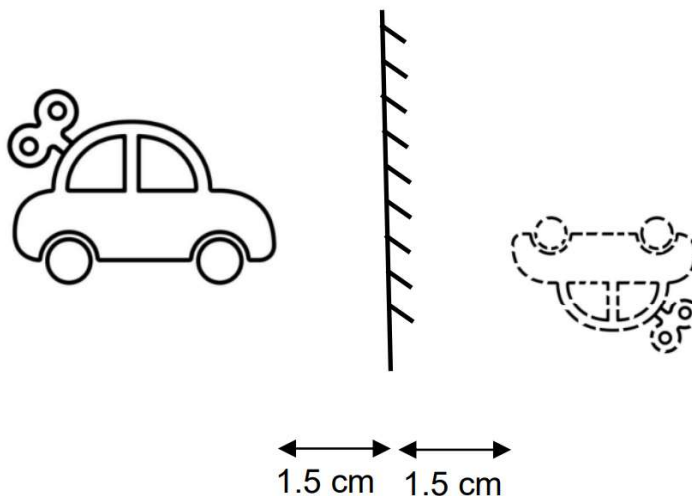


Fig. 7.1

- (a) Identify **two** mistakes in the drawing shown in Fig. 7.1.

1.

.....

2.

.....

[2]

Refraction is the bending of light when it travels through different media due to a change in speed of light as it passes from one medium to another.

- (b) State the physical property that affects the speed at which light travels through different mediums.

..... [1]

- (c) Complete Fig. 7.2 to show how an incident light ray is refracted as it travels from air to a rectangular glass block, and then emerges into air again. Include all the normals in your drawing.

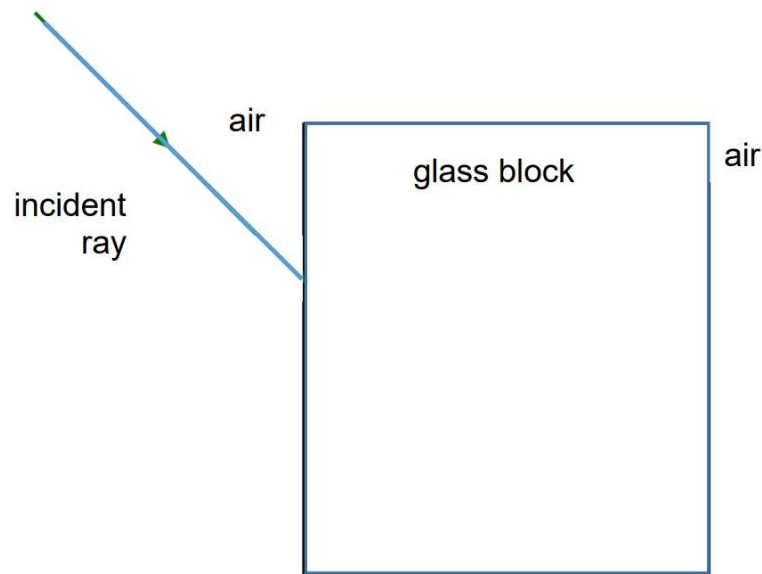


Fig. 7.2 [3]

- (d) Using your understanding of refraction, explain how you completed the ray diagram in Fig. 7.2.

..... [2]

- 8 A gaseous substance is allowed to cool and the temperature of the substance is taken at regular intervals.

A graph of the readings obtained is shown on Fig. 8.1.

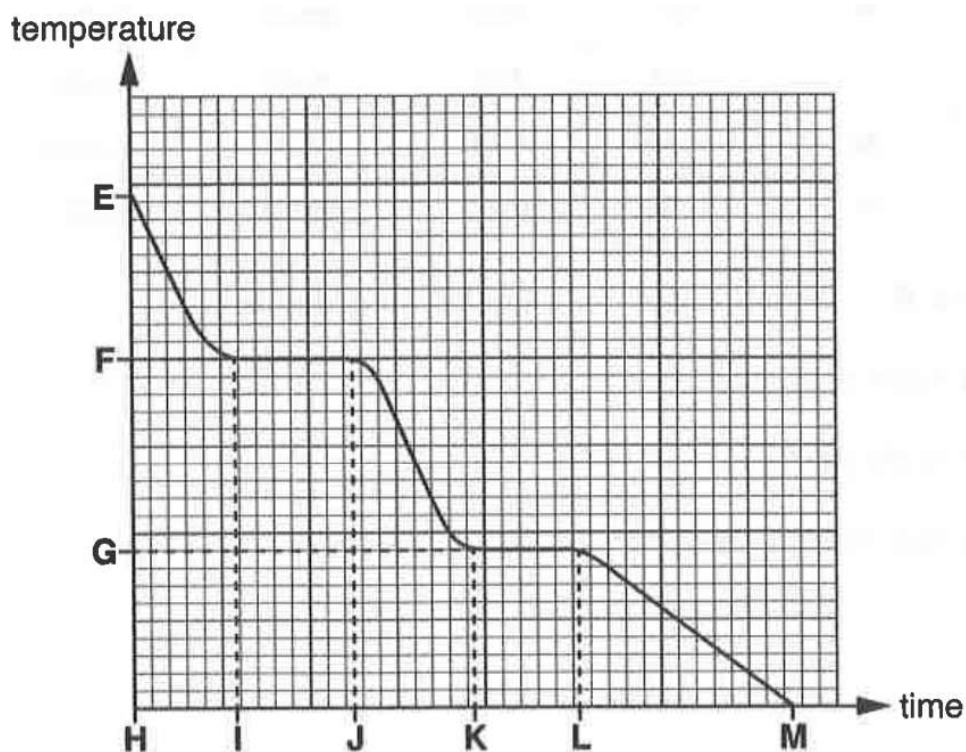


Fig. 8.1

- (a) Complete Table 8.1. to name the state(s) of matter present at the various parts on the time axis.

Table 8.1

part on time axis	state(s) of matter present
between H and I	gas
between I and J	
between J and K	
between K and L	
between L and M	

[2]

(b) Name the process occurring at

(i) temperature **F**,

(ii) temperature **G**. [2]

(c) Based on your understanding of the kinetic particle theory, explain the changes in arrangement and motion of the particles in the substance between time **K** and **L**.

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

- 9 (a) Complete Table 9.1 with information about the sub-atomic particles.

Table 9.1

	proton	neutron	electron
relative charge		0	
relative mass	1		

[3]

- (b) Fig. 9.1 shows an atom of Element **Z**, with its sub-atomic particles.

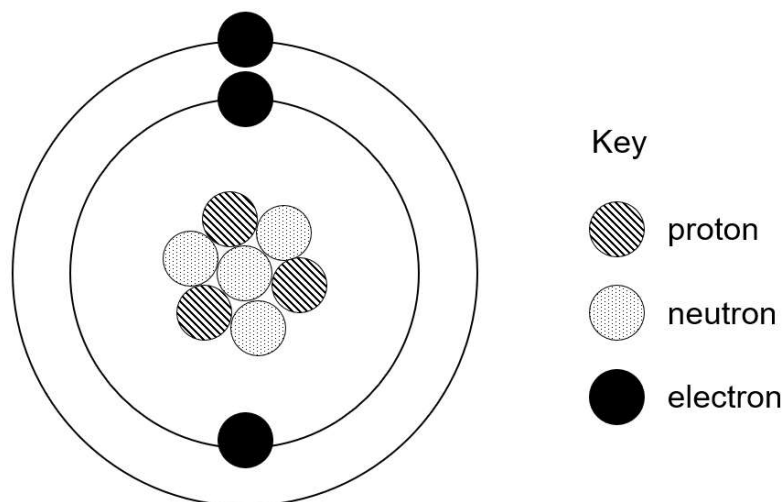


Fig. 9.1

Using the Periodic Table,

- (i) Identify Element **Z**.

..... [1]

- (ii) State whether Element **Z** is a metal or non-metal.

..... [1]

- (iii) In the space below, draw the electronic structure of the element directly below Element **Z** in the Periodic Table.

[2]

- (c) The atom shown in Fig. 9.1 is *electrically neutral*.
Explain this statement with reference to the number of sub-atomic particles in an atom of Element **Z**.

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

- (d) In a Science lesson, two students were debating about the mass number of the atom shown in Fig. 9.1.

Student **A** said, "Since there are 10 sub-atomic particles in total, the mass number is 10."

Student **B** said, "Since there are 7 protons and neutrons in total, the mass number is 7."

Explain why Student **B** is correct but Student **A** is wrong.

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

- 10** The circulatory system helps to transport important substances such as oxygen, digested food, water and waste around the human body.

- (a) (i)** Complete Table 10.1. to show the organisation of cells in the circulatory system.

Table 10.1

level of organisation	example in circulatory system
cell	red blood cell
	blood
	heart
organ system	circulatory system

[2]

- (ii)** The organisation of cells in an organ system is called 'division of labour'. Explain the importance of 'division of labour' in a multicellular organism like humans.

.....

.....

.....

.....

[2]

- (b)** Fig. 10.2 shows a model of a typical animal cell.

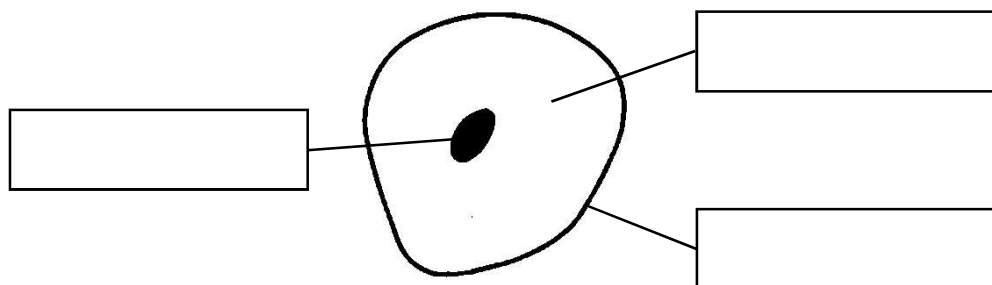


Fig. 10.2

- (i)** Complete the blanks in Fig. 10.2 to label the parts of an animal cell. [3]

- (ii) State **two** differences between the models of a typical animal cell and a typical plant cell.

1.

.....

2.

.....

[2]

- END OF BOOKLET B -

Group																			
1	2	Key										13	14	15	16	17	18		
		proton (atomic) number atomic symbol name relative atomic mass										1 H hydrogen 1							
3 Li lithium 7	4 Be beryllium 9																		
11 Na sodium 23	12 Mg magnesium 24	3	4	5	6	7	8	9	10	11	12	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20		
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	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	europtium	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^3 at room temperature and pressure (r.t.p.). The Avogadro constant, $L = 6.02 \times 10^{23} \text{ mol}^{-1}$.





End of Year Examination 2024
LSS Sec 1 G3
Marking Scheme

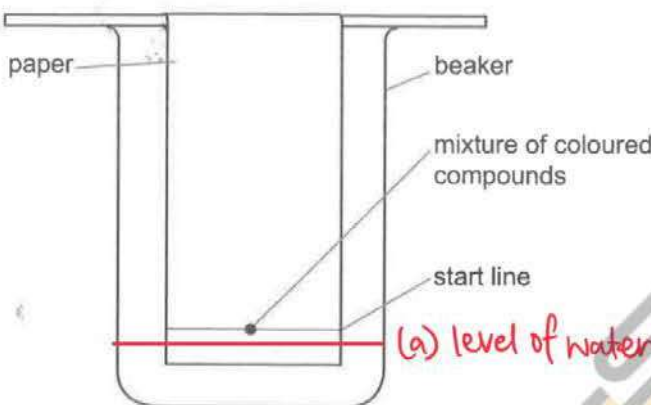
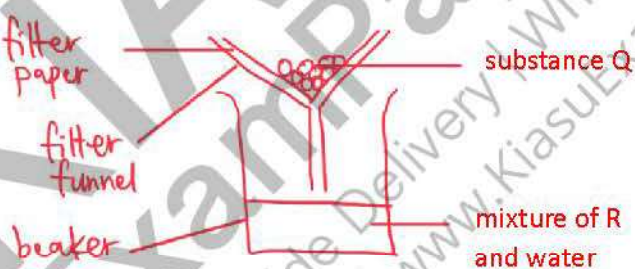
Booklet A (30 MCQs)

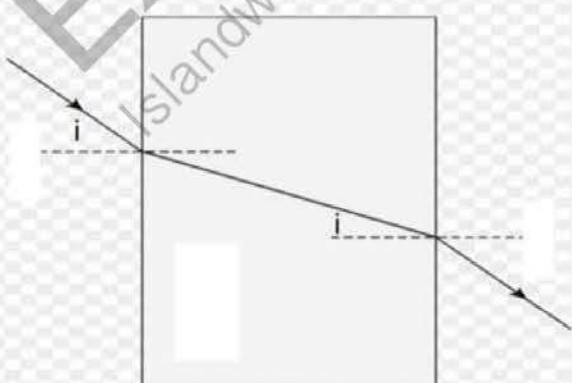
1	2	3	4	5	6	7	8	9	10
B	C	D	D	A	D	D	A	A	B
11	12	13	14	15	16	17	18	19	20
C	A	D	A	D	D	C	A	D	B
21	22	23	24	25	26	27	28	29	30
A	A	B	C	C	A	A	A	B	D

Booklet B (Structured Questions) – 70 m

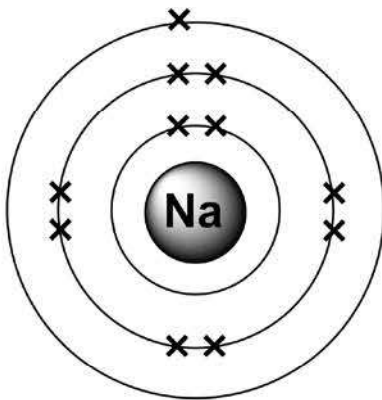
Qn	Answer			Marks																			
1	(a)	(i)	B	1m																			
		(ii)	A	1m																			
		(iii)	C	1m																			
	(b)	(i)	A group of <u>two or more atoms</u> that are <u>chemically combined</u>	1m																			
		(ii)	A, E and F	1m																			
				Total: 5m																			
2	(a)	<table><tr><td></td><td colspan="2">number of mosquitos</td></tr><tr><td>distance from cotton wool / cm</td><td>experiment 1</td><td>experiment 2</td></tr><tr><td>10</td><td>20</td><td><u>0</u></td></tr><tr><td>20</td><td>20</td><td><u>10</u></td></tr><tr><td>30</td><td>20</td><td><u>20</u></td></tr><tr><td>40</td><td>20</td><td><u>50</u></td></tr></table>				number of mosquitos		distance from cotton wool / cm	experiment 1	experiment 2	10	20	<u>0</u>	20	20	<u>10</u>	30	20	<u>20</u>	40	20	<u>50</u>	1m for all correct
	number of mosquitos																						
distance from cotton wool / cm	experiment 1	experiment 2																					
10	20	<u>0</u>																					
20	20	<u>10</u>																					
30	20	<u>20</u>																					
40	20	<u>50</u>																					

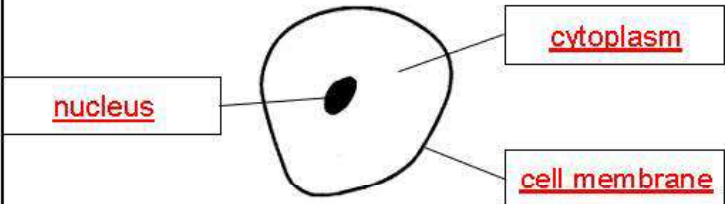
Qn	Answer	Marks
(b)	number of mosquitos distance from cotton wool / cm	1m – S: appropriate scale on both axes (deduct if missing 0 on y-axis as there is a point which requires $y=0$) 1m – P: all four points plotted correctly (allow e.c.f from part (a)) 1m – L: straight lines joining points (can give if attempt was made at joining plotted points, even though points may be plotted wrongly)
(c)	To act as a <u>control</u>, to: • see how the mosquitoes would behave without citronella oil OR • ensure that the mosquitoes are not repelled by the cotton wool OR • compare the results of experiments 1 and 2 without and with citronella oil.	1m – some description of control
(d)	Citronella is <u>effective</u> In experiment 1, the mosquitoes are <u>evenly spread out / anywhere / can go very near the dry cotton wool</u> in the absence of citronella oil extract. In experiment 2, however, are <u>less mosquitos in the zones near the cotton wool soaked with citronella oil extract / the mosquitoes stay further away</u> from cotton wool with oil extract.	1m 1m – description of experiment 1 1m – description of experiment 2
		Total: 8m

Qn	Answer	Marks
3	(a) Chromatography	1m
	(b) 	1m
	(c) Pencil lead <u>will not dissolve</u> / is insoluble in water and will not affect the results. OR pen ink <u>will dissolve</u> / is soluble in water and will affect the results.	1m
		Total: 3m
4	(a) P: iron filings (accept: iron; reject: mixture of iron filings) Q: sand R: salt	3m; 1m each
	(b) Filtration	1m
	(c) 	1m – general filtration set-up 1m – all 3 apparatus drawn and labelled (accept: conical flask) 1m – labelled positions of filtrate and residue (accept e.c.f. from (b))
	(d) Wear <u>safety goggles</u> / handle glassware carefully / tie up long hair / use tongs to handle evaporating dish	1m – accept any reasonable answer
		Total: 8m

Qn	Answer	Marks
5	(a) Parallax error	1m
	(b) Density = mass / volume = 54 g / 7.20 cm ³ = 7.50 g/cm ³	1m 1m
	(c) The metal ball will <u>sink</u> , because the density of the ball is <u>higher</u> than the density of the liquid.	1m 1m accept e.c.f from (b)
		Total: 5m
6	(a) Salt: As temperature increases, there is <u>no change / very small increase</u> in solubility. Sugar: As temperature increases, <u>solubility increases</u> .	1m 1m
	(b) (i) Beaker X: <u>suspension</u> At 30°C, the solubility of salt is only about <u>40 g</u> per 100 cm ³ , so there would be <u>remaining salt (out of the 200g that was added) that cannot be dissolved</u> , forming a suspension. Beaker Y: <u>solution</u> At 30°C, the solubility of sugar is about <u>220 g</u> per 100 cm ³ , so all 200 g of the sugar would <u>dissolve</u> in water to form a solution.	1m 1m – must quote solubility value (accept ~30-49) 1m 1m – must quote solubility value (accept ~201-230)
	(ii) Crush the sugar into smaller pieces / stir the mixture at a <u>faster rate</u>	1m
		Total: 7m
7	(a) Any two: • The image does <u>not</u> have the <u>same size</u> as the object. / The image is <u>smaller</u> . • The image is <u>not upright / upside down</u> . • The image is <u>not laterally inverted</u> to the object.	2m; 1m each
	(b) Optical density	1m
	(c) 	1m – refracted ray in glass block 1m – emergent ray in air, parallel to incident ray 1m – normals and arrows labelled.

Qn	Answer	Marks												
	(d) Glass is optically denser than air. When light travels from air into the glass block, it slows down and bends towards the normal. Air is optically less dense than glass. When light travels from glass to air, it speeds up and bends away from the normal.	1m – concept of glass v.s. air optical density 1m – concept of speed of light and bending towards / away from normal												
		Total: 8m												
8	(a) <table><tr><td>part on time axis</td><td>state(s) of matter present</td></tr><tr><td>between H and I</td><td>gas</td></tr><tr><td>between I and J</td><td><u>gas + liquid</u></td></tr><tr><td>between J and K</td><td><u>liquid</u></td></tr><tr><td>between K and L</td><td><u>liquid + solid</u></td></tr><tr><td>between L and M</td><td><u>solid</u></td></tr></table>	part on time axis	state(s) of matter present	between H and I	gas	between I and J	<u>gas + liquid</u>	between J and K	<u>liquid</u>	between K and L	<u>liquid + solid</u>	between L and M	<u>solid</u>	2m – all 4 correct 1m – 2 to 3 correct 0m – 0-1 correct
part on time axis	state(s) of matter present													
between H and I	gas													
between I and J	<u>gas + liquid</u>													
between J and K	<u>liquid</u>													
between K and L	<u>liquid + solid</u>													
between L and M	<u>solid</u>													
	(b) (i) Condensation	1m												
	(ii) Freezing	1m												
	(c) Arrangement: The particles change from <u>closely and disorderly packed</u> to <u>closely and orderly packed</u>. Motion: The particles change from <u>sliding past each other</u> to <u>vibrating around fixed positions</u>. Award 1m for generic explanation e.g. particles <u>lose kinetic energy / move slower</u> (motion) and <u>come closer together / held closer by very strong forces of attraction</u> (arrangement).	1m 1m												
		Total: 6m												
9	(a) <table><tr><td></td><td>proton</td><td>neutron</td><td>electron</td></tr><tr><td>relative charge</td><td><u>+1</u></td><td>0</td><td><u>-1</u></td></tr><tr><td>relative mass</td><td>1</td><td><u>1</u></td><td><u>1/1840 or 1/1836</u></td></tr></table>		proton	neutron	electron	relative charge	<u>+1</u>	0	<u>-1</u>	relative mass	1	<u>1</u>	<u>1/1840 or 1/1836</u>	3m – all correct 2m – 2 to 3 correct 1m – 1 correct 0m – all wrong
	proton	neutron	electron											
relative charge	<u>+1</u>	0	<u>-1</u>											
relative mass	1	<u>1</u>	<u>1/1840 or 1/1836</u>											

Qn	Answer			Marks										
	(b)	(i)	lithium	1m										
		(ii)	metal	1m – accept e.c.f										
		(iii)		1m – correct no. of electrons 1m – correct electron arrangement (2,8,1) Accept e.c.f from (i) Deduct 1m for missing/incorrect chemical symbol for Na.										
	(c)	An atom of Element Z has <u>equal number</u> of protons and electrons – <u>3 protons and 3 electrons</u> . As <u>protons are positively-charged</u> and <u>electrons are negatively-charged</u> , the equal number of positive and negative <u>charges cancel out</u> , making the atom electrically neutral.		1m – must mention '3' 1m – description of charges										
	(D)	The mass number is contributed by the total number of protons and neutrons, since <u>protons and neutrons each have a relative mass of 1</u> . <u>Electrons have a relative mass of 1/1840</u> (negligible mass) and <u>do not contribute to the mass</u> of an atom.		1m 1m										
				Total: 11m										
10	(a)	(i)	<table><tr><td>level of organisation</td><td>example in circulatory system</td></tr><tr><td>cell</td><td>red blood cell</td></tr><tr><td><u>tissue</u></td><td>blood</td></tr><tr><td><u>organ</u></td><td>heart</td></tr><tr><td>organ system</td><td>circulatory system</td></tr></table>	level of organisation	example in circulatory system	cell	red blood cell	<u>tissue</u>	blood	<u>organ</u>	heart	organ system	circulatory system	2m; 1m each
level of organisation	example in circulatory system													
cell	red blood cell													
<u>tissue</u>	blood													
<u>organ</u>	heart													
organ system	circulatory system													
		(ii)	Division of labour allows different parts of an organism (e.g. different organs) to perform various functions. This coordination ensures that the organism can function efficiently.	1m – concept of different parts with different functions 1m – concept of efficiency										

Qn	Answer		Marks
	(b)	(i)	
		(ii)	Any two: - A plant cell has a <u>cell wall</u> while an animal cell <u>does not</u>. - A plant cell may have <u>chloroplasts</u> while an animal cell <u>does not</u>. - A plant cell has <u>one or two large vacuoles</u> while an animal cell has <u>multiple small vacuoles</u>.
			Total: 9m