Name:	Class: Sec _____	Index No.: _____

1G3

MERIDIAN SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2024

LOWER SECONDARY SCIENCE

SECONDARY 1 G3 9 October 2024

BOOKLET A

1 hour 30 minutes
(for Booklets A and B)

Additional Material:
OTAS

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, class and index number on the OTAS.

Section A: Multiple Choice Questions [30 marks]
There are **thirty** questions in this booklet. 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.

Read the instructions on the OTAS very carefully.

Each correct answer will score one mark.
Any rough working should be done in this booklet.

The use of an approved scientific calculator is expected, where appropriate.

A copy of the Periodic Table is printed on **page 13** of Booklet A**.**

At the end of the exam, hand in Booklet A, Booklet B and OTAS separately.

For Examiner's Use	
Section A	

This question paper consists of **13** printed pages.

Section A

Answer **all** questions in the OTAS.

1 A student needs to use the Bunsen burner to heat a beaker of water. The steps for using the Bunsen burner are listed below but not in the correct order.

I. Open the air-hole.
II. Close the air-hole.
III. Turn on the gas tap.
IV. Light up the Bunsen burner.

What is the correct order of the steps?

A I, III, II, IV

B II, III, IV, I

C III, I, IV, II

D III, II, IV, I

2 A liquid chemical reacts violently with metals. When it comes into contact with bare skin, it causes severe burning sensation and damage to the skin.

What hazard symbol should be used to label this chemical?

A

B

C

D

3 In an experiment, Min Dee and Nabil took multiple measurements of the mass of an object. Their results are shown below.

Min Dee's measurements:

mass / g	10	10.2	10.5	9.7

Nabil's measurements:

mass / g	9.1	9.2	9.2	9.3

Given that the actual mass of the object is 10.0 g, which statement is correct about the measurements obtained by Min Dee and Nabil?

A Nabil's measurements are more accurate because they are closer to one another.

B Min Dee's measurements are more precise because they are closer to the actual mass.

C Nabil's measurements are more precise because they are closer to one another.

D Min Dee's measurements are more accurate because they are closer to one another.

4 Electrical wires are commonly made of copper.

Which properties of copper make it a suitable material?

A low electrical conductivity, easily malleable

B high electrical conductivity, easily malleable

C low electrical conductivity, shiny appearance

D high electrical conductivity, shiny appearance

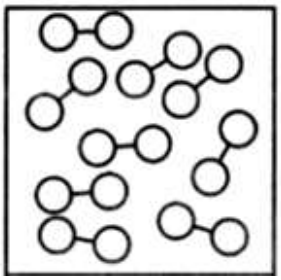
5 A solid block of metal is cut into two equal halves.

What are the differences in the mass and density of one half of the block compared to the original block?

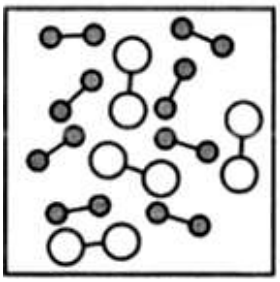
	mass	density
A	same	same
B	same	smaller
C	smaller	smaller
D	smaller	same

6 Which of the following diagrams shows a mixture of elements?

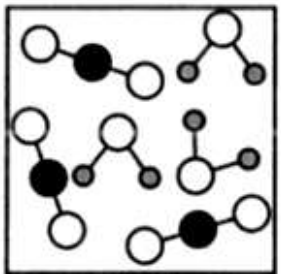
A



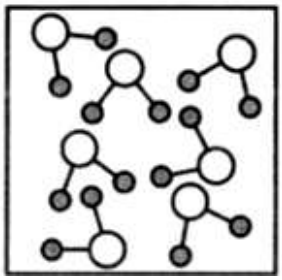
B



C



D



7 Limestone breaks down to form carbon dioxide and calcium oxide when heated.

Which statement explains the observation?

A Limestone has a high melting point.

B Limestone is made up of three atoms chemically combined.

C Limestone has changed its state from solid to liquid.

D Limestone is made up of three elements chemically combined.

8 Three tablespoons of flour are added to a beaker of water. The mixture is stirred for a minute.

What observation can be made after the beaker is left standing for 30 minutes?

A A clear solution is formed at the top of the beaker.

B Light cannot easily pass through.

C Heat is released from the beaker.

D The flour dissolves completely in water.

9 Which of the following statements concerning the Periodic Table is **correct**?

A All elements in the same period have the same number of protons.

B All elements in the same group have the same number of outermost electrons.

C Elements in the same group have the same number of electron shells.

D Elements in the same group exist in the same state.

10 Which of the following can be separated from metal waste using magnetic attraction?

A aluminum pots

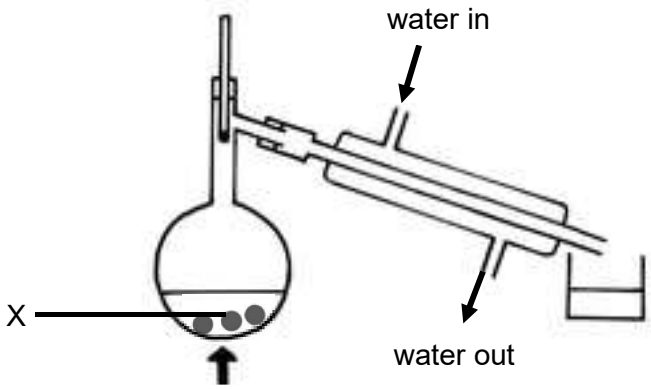
B copper coins

C iron gate grilles

D zinc rooftops

For questions **11** to **13**, refer to the diagram below.

The diagram shows an experimental set-up to separate salt and water.



11 What is the purpose of X?

A to cool and condense the water vapour into liquid

B to heat up the mixture in the flask

C to ensure smooth boiling of the water

D to measure the temperature of water vapour

12 Which of the following **correctly** identifies the mistake made in the set-up?

A the volume of water in the beaker is reaching the brim

B a round-bottom flask is used for heating instead of a conical flask

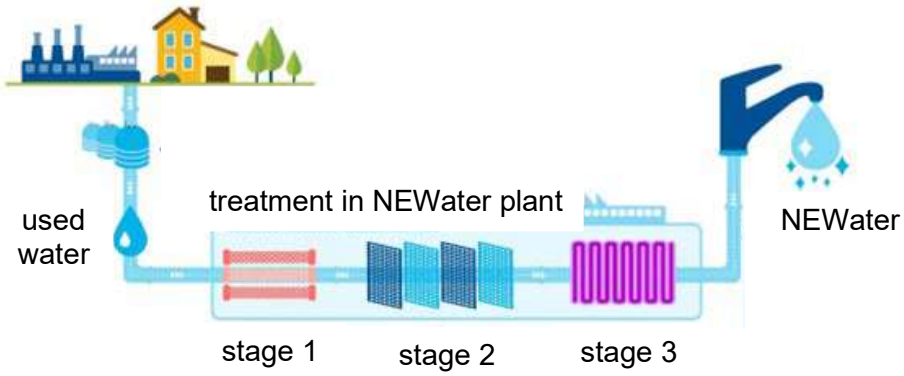
C the bulb of the thermometer is placed too near the exit of the flask

D the water entering and exiting the condenser is in the wrong direction

13 Which row correctly identifies the location of salt and pure water the end of the experiment?

	salt	pure water
A	in the round-bottom flask	in the round-bottom flask
B	in the beaker	in the beaker
C	in the round-bottom flask	in the beaker
D	in the surrounding air	in the surrounding air

14 The NEWater process recycles Singapore's used water into ultra-clean, high-grade reclaimed water.



Which is the correct sequence of processes from stage 1 to 3?

A microfiltration → reverse osmosis → ultraviolet disinfection

B ultraviolet disinfection → microfiltration → reverse osmosis

C reverse osmosis → ultraviolet disinfection → microfiltration

D microfiltration → ultraviolet disinfection → reverse osmosis

15 Which statement is **incorrect** about light?

A Light is a form of energy.

B Light always travels in straight lines.

C Light cannot travel in vacuum.

D Light travels faster than sound.

16 When Jane looks at the surface of a calm pool of water, she sees an image of her face. However when she looks at a white concrete wall, she is not able to see any image of her face.

Which statement explains this observation?

A The light rays are all absorbed by the concrete wall.

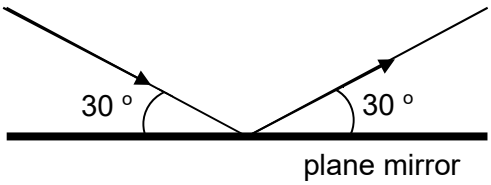
B The light rays all passed through the concrete wall.

C The light rays are reflected from the concrete wall in the same direction.

D The light rays are reflected from the concrete wall in different directions.

17 The diagram shows the reflection of a light ray from a plane mirror.

What are the angles of incidence and reflection?



	angle of incidence / °	angle of reflection / °
A	30	30
B	60	60
C	30	120
D	60	120

18 Which row correctly describes the properties of an image seen in a convex mirror?

	size of image	field of vision
A	diminished	wide
B	diminished	narrow
C	magnified	wide
D	magnified	narrow

19 What is the function of the cell membrane?

A allows photosynthesis to take place

B controls movement of substances in and out of the cell

C provides energy for the cell

D site for chemical reactions to take place

20 The root of a plant consists of different tissues like water carrying vessels and food carrying vessels. The root also contains different cells, for instance the root hair cell which is specialised for water absorption.

At which order of organisation does the root fall under?

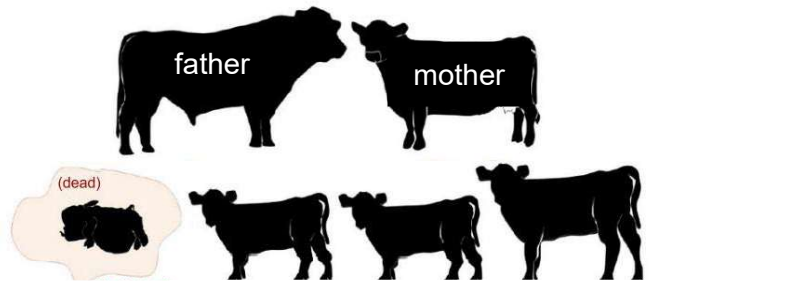
A cell

B tissue

C organ

D system

21 The diagram shows a family of cows with either short legs, long legs, or birth defect.



birth defect short-legged offspring long-legged offspring

Which organelle in the cow's cell is responsible for this phenomenon?

A cell membrane

B chromosome

C mitochondria

D vacuole

22 The table shows the average size of different types of cells.

type of cell	average size (μm)
animal cell	100
bacteria	1
virus	0.1
plant cell	10
prion	0.01

Which cells are visible **only** under an electron microscope?

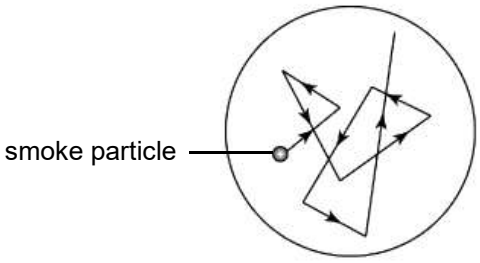
A animal cell, bacteria

B animal cell, prion

C bacteria, plant cell

D prion, virus

23 The diagram shows the movement of a smoke particle in a transparent box observed under a microscope.



What causes the smoke particle to move in a zig-zag manner?

A The smoke particle is pushed by microorganisms in the air.

B The air particles collide with the smoke particle randomly.

C The smoke particle is pulled by the forces of attraction between the air particles.

D The smoke particle is propelled by its own internal energy.

24 In which processes is there a gain in energy of the particles in a substance?

A expansion, freezing, boiling

B contraction, melting, condensation

C expansion, melting, boiling

D contraction, freezing, condensation

25 Which observation is caused by the process of diffusion?

A The other end of a metal rod gets hot after some time when one end is heated.

B Cold air from the air-conditioner always sinks downwards.

C Water always flows from a higher height to a lower height.

D Food colouring spreads outwards when a drop of it is added into water.

26 A certain brand of soft drink is sold in a glass bottle with a metal screw cap. The diagram shows the neck of the glass bottle with the screw cap opened.

Occasionally the screw cap is too tight and cannot be opened. One method to solve this problem is to insert the bottleneck and screw cap into a glass of warm water for a few seconds.

How does this method make it easier to unscrew the metal cap?

A The metal cap expands more than the glass bottleneck in warm water.

B The metal cap contracts more than the glass bottleneck in warm water.

C The warm water reduces the friction between the bottleneck and metal cap.

D The warm water increases the friction between the bottleneck and metal cap.

27 The chemical formula for sodium sulfate is Na_2SO_4.

Which row shows the correct number of elements and atoms present in sodium sulfate?

	number of elements	number of atoms
A	3	7
B	3	6
C	7	3
D	6	5

28 What contributes to the mass number of an atom?

A protons only

B protons and electrons

C protons and neutrons

D electrons and neutrons

29 The electronic configuration of element X is 2,8,5.

Which statement about element X is **not** true?

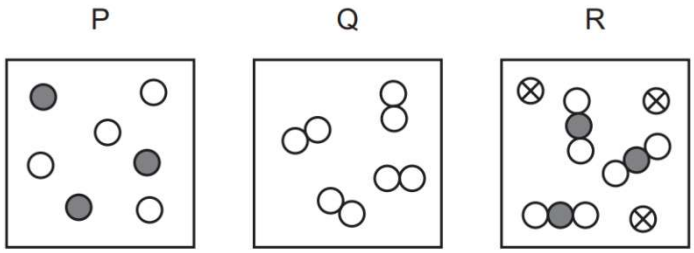
A Element X is phosphorus.

B Element X is a non-metal.

C Element X is in Group 15.

D Element X is in Period 2.

30 The diagram represents different substances.



Which row represents the substances?

	consist of atoms only	consist of molecules only
A	P	Q
B	Q	P
C	P	R
D	Q	R

END OF BOOKLET A

The Periodic Table of Elements

Group																	
1	2											13	14	15	16	17	18
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9		Key proton (atomic) number atomic symbol name relative atomic mass									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	3	4	5	6	7	8	9	10	11	12	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 –		

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 –

[Turn over

Name:	Class: Sec _____	Index No.: _____

1G3

MERIDIAN SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2024

LOWER SECONDARY SCIENCE

SECONDARY 1 G3 9 October 2024

BOOKLET B

1 hour 30 minutes
(For Booklets A and B)

Additional Material:
NIL

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work that you hand in.
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 B: Structured Questions [40 marks]
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

Section C: Free Response Questions [30 marks]
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

A copy of the Periodic Table is printed on page **14.**

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 **70**.

For Examiner's Use	
Section B	
Section C	
Total Marks	

This question paper consists of **14** printed pages.

Section B

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

1 Fig. 1.1 shows the solubility of substance J in water and ethanol at different temperatures.

● represents the results for ethanol, while ▲ represents the results for water.

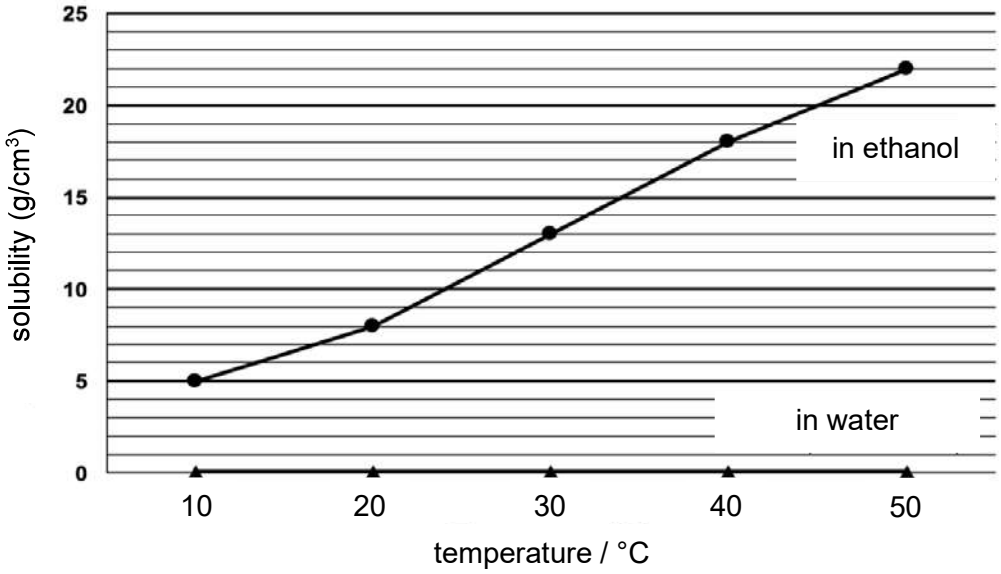


Fig. 1.1

(a) Describe the relationship between temperature and solubility of substance J in water and in ethanol.

in water ……

in ethanol ……[2]

(b) Identify the solute(s) and solvent(s) in the experiment.

solute(s) ……

solvent(s) ……[1]

(c) Amy poured 8 g of substance J into 0.5 cm^3 ethanol at 30 °C and stirred the mixture.

What is the mass of substance J left undissolved?

mass of substance J remaining ……g [1]

(d) Suggest another factor, other than temperature, that affects rate of dissolving of substance J.

……[1]

2 Fig. 2.1 shows the micrograph of a blood sample under a light microscope.

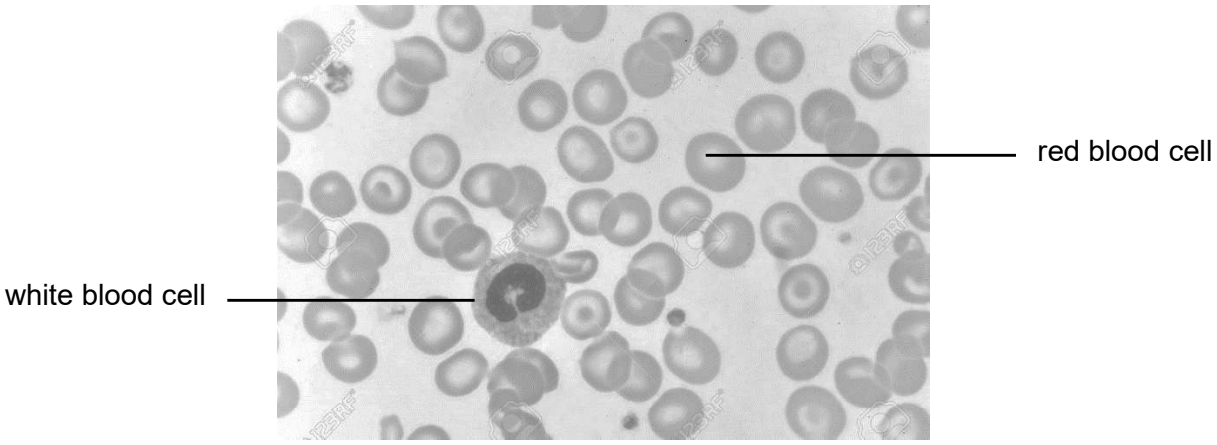


Fig. 2.1

(a) Based on Fig. 2.1, describe one difference between a white blood cell and a typical animal cell.

……

……[2]

(b) Draw the white blood cell as seen in Fig. 2.1.
Label the nucleus, cell membrane and cytoplasm.

[3]

(c) The white blood cell and red blood cell serve different functions in the cell.

(i) Describe the function of a red blood cell.

……[1]

(ii) Describe and explain the benefit of different cells performing different functions.

……

……[2]

3 Chlorine is widely used to disinfect swimming pools and drinking water due to its ability to kill bacteria and other microbes.

(a) Draw a dot-and-cross diagram for a chlorine atom.

[2]

(b) Explain why a chlorine atom is electrically neutral.

……..…

……..[1]

(c) Chlorine is known to exist in isotopic forms, including chlorine-35 and chlorine-37.

(i) Define the term *isotope*.

……

……[2]

(ii) Suggest one similarity and one difference in the properties of chlorine-35 and chlorine-37.

similarity …….

difference ……..……

……..……....[1]

(d) Chlorine exists as a molecule consisting of two atoms.

Write the chemical formula of chlorine.

……..……[1]

4 A student planted some radish seeds in four similar pots. Each pot contains soil with a different fertiliser, **P**, **Q**, **R** and **S**. The experimental set-up is shown in Fig. 4.1. After two weeks, the student measured the height of the radish plants as shown in Fig. 4.2.

start of experiment

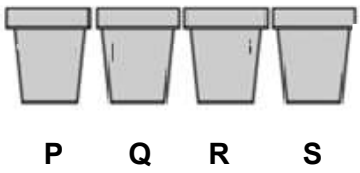


Fig 4.1

after 2 weeks

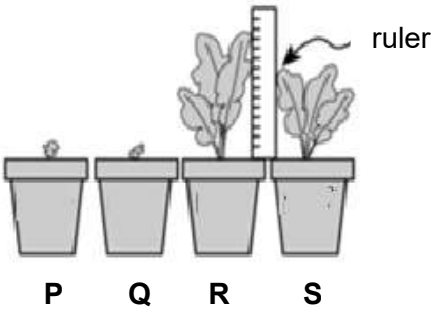


Fig. 4.2

(a) State a hypothesis for this experiment.

……...

……..[1]

(b) State the dependent and independent variables for this experiment.

dependent variable: ……

independent variable: ……[2]

(c) State one control variable to ensure a fair experiment.

……..……[1]

(d) What can the student conclude from this experiment?

……...

……..[1]

(e) The student uses an electronic balance to measure the mass of a radish. The electronic balance shows a reading of 0.5 g when nothing is placed on it. When the student places the radish on the electronic balance, it shows a reading of 100 g.

(i) Name the type of error in the electronic balance.

……...[1]

(ii) What is the actual mass of the radish?

actual mass = ……..g [1]

5 **(a)** Four properties of a material are listed below:

thermal conductivity strength hardness flexibility

Complete the table to match these properties to their correct definitions.

property	definition
	ability to support a heavy load without changing shape permanently
	measure of how easily heat flows through the material
	ability to bend without breaking and return to its initial shape and size after bending
	resistance to wear and tear and scratches

[2]

(b) The dimensions of a rectangular block made from an unknown material is shown in Fig. 5.1. The block has a mass of 500 g.

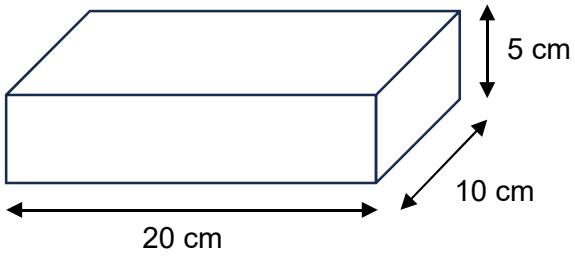


Fig. 5.1

(i) Define *density*.

……..……[1]

(ii) Calculate the density of the block. Show your working clearly.

density = …….. [3]

(iii) This block is placed into a tank of water. The density of water is 1 g/cm^3.

Based on your answer in part **(b)(ii)**, explain what happens to the block.

……

……..…[2]

6 A pure solid substance is heated and its temperature is recorded at regular intervals. Fig 6.1 shows a graph that is plotted using the results.

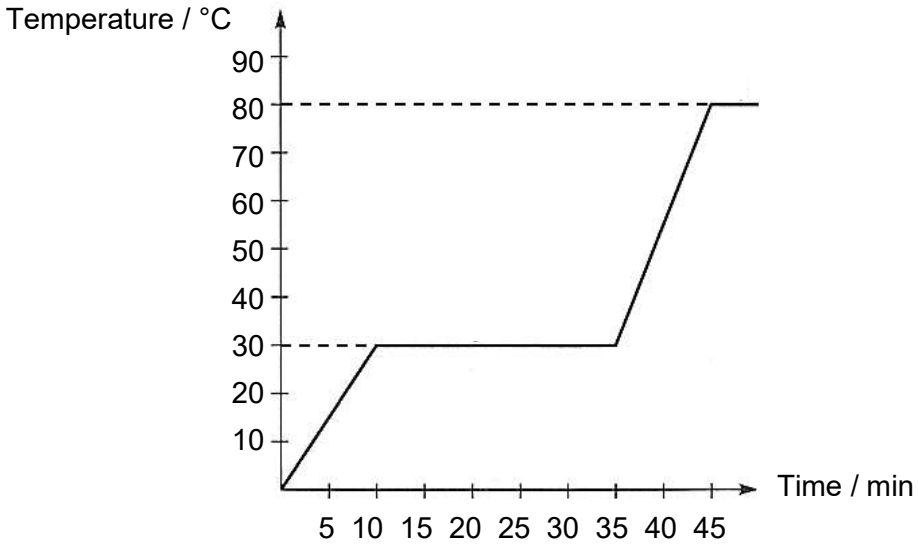


Fig. 6.1

(a) Define *melting point*.

……...

……..[1]

(b) Using Fig. 6.1, state the melting and boiling points of the substance.

melting point = ……..ºC boiling point = ……..ºC [2]

(c) What is the state of the substance

(i) when the temperature is 20 ºC? …… [1]

(ii) after 40 minutes of heating? …… [1]

Section C

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

7 **(a)** A sports official suspects that swimmers **X**, **Y** and **Z** have used illegal performance-enhancing drugs to help them boost their swimming speed. Swimmers that use these drugs will be disqualified from the race.

Paper chromatography is used to analyse the athletes' urine samples. The results are compared to illegal performance-enhancing drugs **J36**, **EP1**, **R57**, **P23** and **C32**.

The resulting chromatogram is shown in Fig. 7.1.

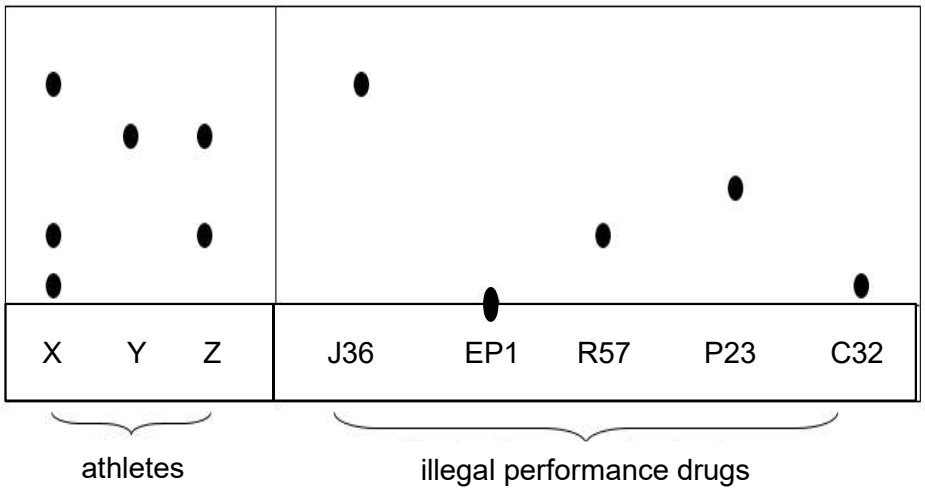


Fig. 7.1

(i) Suggest why the final positions of **J36** and **R57** are different.

.....[1]

(ii) Explain why the sample of **EP1** remains at the starting line at the end of the experiment.

.....[1]

(iii) Name the illegal performance drug(s) used by athlete **X**.

.....[1]

(iv) Besides athlete **X**, state if other athletes should be disqualified from the race. Explain your answer.

……

……...[2]

(b) Draw a labelled experiment showing how you would separate a mixture of sand and water.

[3]

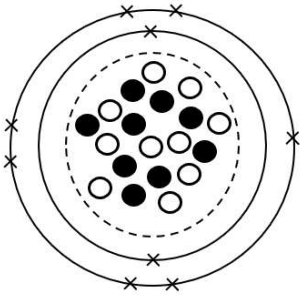
(c) **(i)** Name the method used to separate water from ethanol.

……...[1]

(ii) State the physical property that allows water and ethanol to be separated by the method in **(c)(i)**.

……...[1]

8 **(a)** An atom of element R (not the actual symbol) is shown in Fig. 8.1, with its different sub-atomic particles found in the atom.



Key:

● represents protons

x represents electrons

o represents neutrons

Fig. 8.1

(i) Define the term *element*.

……...[1]

(ii) Describe one difference between a compound and a mixture.

……

……...[1]

(iii) From Fig. 8.1, determine the identity of element R.

……...[1]

(iv) Element Q is two spaces to the left of element R in the Periodic Table.

Complete Table 8.2 with the correct information about elements R and Q.

Table 8.2

element	number of protons	number of electrons	number of neutrons
R			
Q			

[2]

(b) Fig. 8.3 shows the particulate model of substance **Z** in its solid state. The melting point and boiling point of **Z** are 28 ºC and 150 ºC respectively.

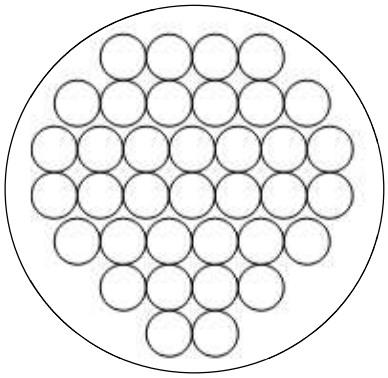


Fig. 8.3

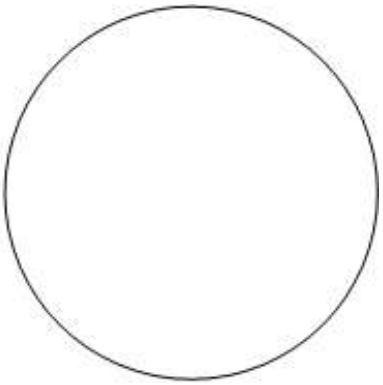


Fig. 8.4

(i) In Fig. 8.4, draw the particulate model of substance **Z** at 160 ºC. [1]

(ii) Compare the movement and forces of attraction between the particles in substance **Z** in solid state and at 160 ºC by filling in the table below.

	particles of substance Z in	
	solid state	state at 160 ºC
movement		
forces of attraction		

[4]

9 **(a)** Fig. 9.1 shows a triangular object placed in front of a plane mirror.

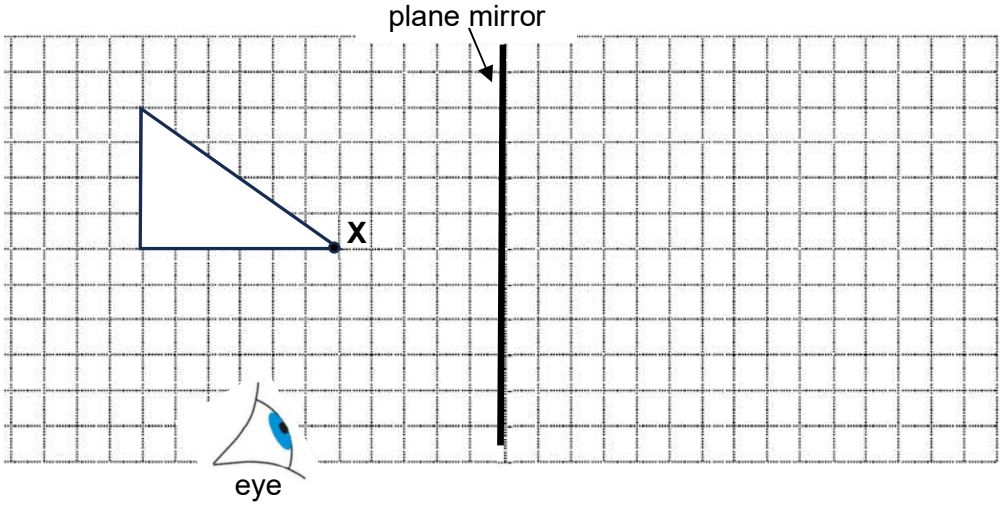


Fig.9.1

(i) On Fig 9.1, draw

- the image of the object formed in the plane mirror;
- the path of a ray of light leaving point X and reflecting from the mirror before entering the eye.

[4]

(ii) State two properties of the image formed in a plane mirror.

……

……

……...[2]

(b) Fig. 9.2 shows a man who is spearfishing by the riverbank. The path of a ray of light from the fish to the man's eye is also shown in Fig 9.2.

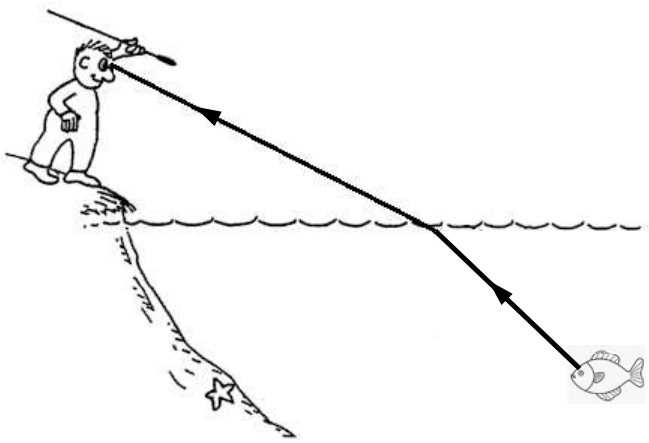


Fig. 9.2

(i) Name the phenomenon that causes the change in the direction of the ray of light.

……...[1]

(ii) Explain why the ray of light changes direction when it emerges from the water surface.

……

……

……

……...[3]

END OF BOOKLET B

The Periodic Table of Elements

Group																	
1	2											13	14	15	16	17	18
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9		Key proton (atomic) number atomic symbol name relative atomic mass									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	3	4	5	6	7	8	9	10	11	12	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 –		

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 –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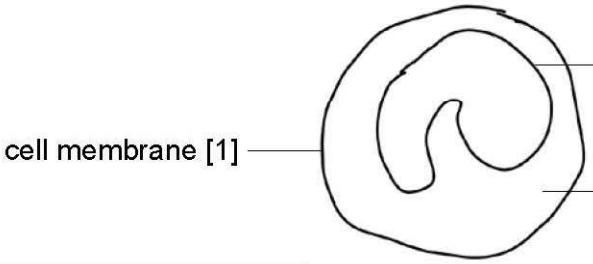
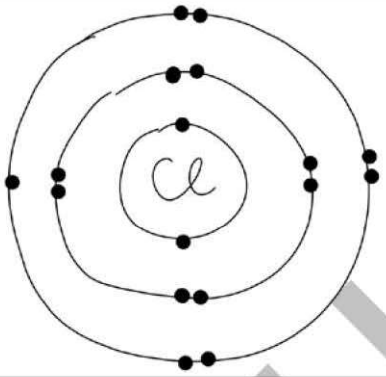
Meridian Secondary School
Sec 1 G3 Science End of Year Examination 2024
Answer Scheme

Section A (30m)

Qn No.	Ans	Qn No.	Ans	Qn No.	Ans
1	B	11	C	21	B
2	A	12	D	22	D
3	C	13	C	23	B
4	B	14	A	24	C
5	D	15	C	25	D
6	B	16	D	26	A
7	D	17	B	27	A
8	A	18	A	28	C
9	B	19	B	29	D
10	C	20	C	30	A

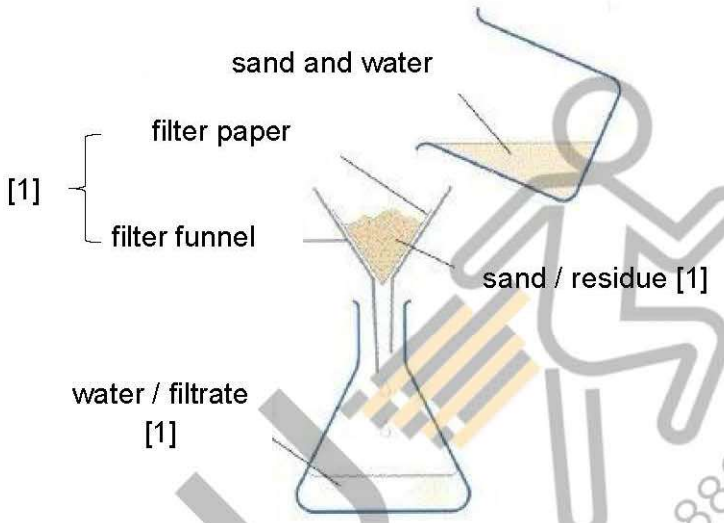
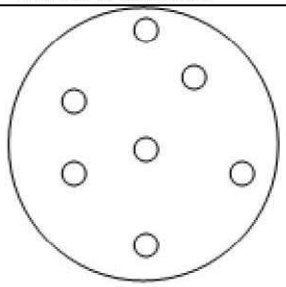
Section B (40m)

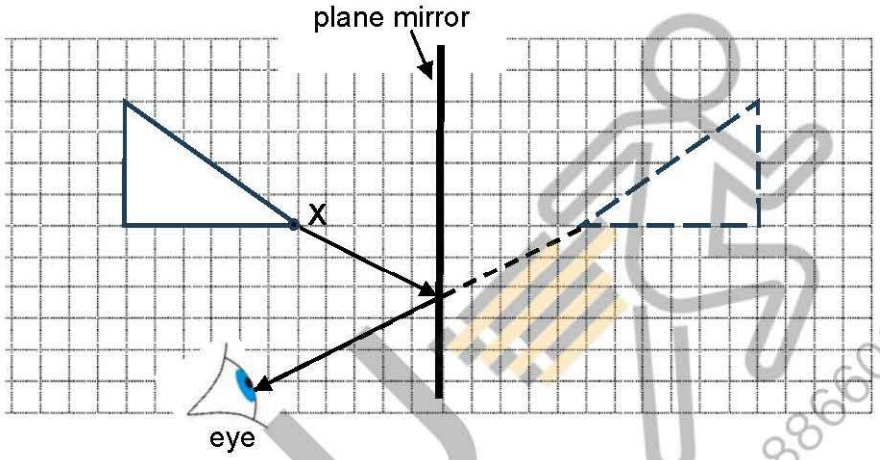
Qn		Answer	Marks
1	(a)	in water: increase in temperature has no effect on solubility of Substance J [1] in ethanol: increase in temperature results in increase in solubility of Substance J [1]	2
	(b)	solute: Substance J [1] solvent: ethanol, water [1]	1
	(c)	At 30°C, solubility of Substance J is 13g/cm^3. In 0.5cm^3 of ethanol, Mass of Substance J dissolved = 0.5 x 13 = 6.5g [1] Hence, Mass of Substance J undissolved = 8 – 6.5 = 1.5g [1]	1
	(d)	Rate of stirring Surface area of solute R: type of solvent/solute, as that affects **solubility**, not rate.	1
			7m
2	(a)	White blood cell has a lobed / elongated / irregular-shaped nucleus [1] while a typical animal cell has a round / circular nucleus [1].	2

	(b)			3
	(c)	(i)	Transports oxygen from the lungs to all parts of the body.	1
		(ii)	Division of labour/specialisation of cells [1] allows the cells to work at maximum efficiency [1]	2
				8m
3	(a)		 1m – correct no. of electrons (17) 1m – correct arrangement of electrons in pairs (2.8.7)	2
	(b)		The positive charge of the proton balances / neutralises the negative charge of the electrons.	1
	(c)	(i)	Isotopes are atoms of the same element [1] that contain the same number of protons and electrons but different number of neutrons [1].	2
		(ii)	similarity: chemical properties difference: physical properties	1
	(d)		Cl_2	1
				7m
4	(a)		Different types of fertilisers affect the growth of the radish plant differently. (accept any other reasonable hypothesis)	1
	(b)		dependent variable: height of plant independent variable: type of fertiliser	1 1
	(c)		amount of water / amount of fertiliser / amount of soil / location of pots / amount of sunlight (accept any other reasonable variable)	1
	(d)		Fertiliser R is best for growing radish plant. (accept any other reasonable conclusion that matches with the hypothesis in part(a)).	1
	(e)	(i)	zero error	1
		(ii)	99.5 g	1
				7m
5	(a)		property | definition	

			strength: ability to support a heavy load without changing shape permanently thermal conductivity: measure of how easily heat flows through the material flexibility: ability to bend without breaking and return to its initial shape and size after bending hardness: resistance to wear and tear and scratches 1 mark for every 2 correct answers	2
	(b)	(i)	Density is mass per unit volume.	1
		(ii)	volume of block = 20 x 10 x 5 = 1000 cm^3 [1] density = mass ÷ volume = 500 ÷ 1000 [1] = 0.5 g/cm^3 [1]	3
		(iii)	The block will float on water [1] because it is less dense than water.[1] (allow e.c.f. if density from part (ii) is greater than 1 g/cm^3)	2
				8m
6	**(a)**		Melting point is the temperature at which a solid becomes a liquid.	1
	(b)		melting point = 30 ºC boiling point = 80 ºC	2
	(c)	**(i)**	solid	1
		(ii)	liquid	1
				5m

Section C (30m)

Qn			Answer	Marks
7	(a)	(i)	They have <u>different solubilities</u> / J36 is <u>more soluble</u> than R57.	1
		(ii)	EP1 is <u>insoluble</u> in the solvent.	1
		(iii)	J36, R57, C32 (all must be present)	1
		(iv)	Athlete Z [1] should be disqualified as he/she took the illegal drug R57 [1].	2
	(b)		 Max. 1m awarded for written description without diagram.	3
	(c)	(i)	Fractional distillation	1
		(ii)	Different boiling points	1
				10m
8	(a)	(i)	Pure substance that cannot be broken down into simpler substances by chemical or physical means.	1
		(ii)	1. Compound is separated by chemical method while mixture is separated by physical method. 2. Compound has fixed melting/boiling point while mixture has variable melting/boiling point. 3. Heat is given off when compounds are formed, while no heat is given off when mixtures are formed.	1
		(iii)	R is fluorine	1
		(iv)	element / number of protons / number of electrons / number of neutrons R: 9 / 9 / 10 Q: 7 / 7 / 7 1m for 3 correct	2
	(b)	(i)		1

		(ii)		solid state	state at 160°C
			motion of particles	vibrate about fixed positions	move quickly and randomly
			forces of attraction	very strong	weak
			1 mark for each box		4
					10m
9	**(a)**	**(i)**	 1 mark for image distance = object distance 1 mark for correct image (laterally inverted and same size) 2 marks for ray diagram (minus 1 mark for every mistake e.g. no arrows, missing dotted line or not dotted behind mirror, point of incidence is located wrongly on mirror)		4
		(ii)	Any two properties: • Image is upright • Image is laterally inverted • Object distance from mirror is equal to image distance behind mirror • Image is virtual • Image is same size as object		2
	(b)	(i)	The phenomenon is refraction.		1
		(ii)	Air is optically less dense than water [1]. Thus when the light ray comes out into the air, its speed increases [1]. This causes it to bend away from the normal [1].		3
					10m

~ End of Answer Scheme ~