Name:	Class: Sec _____	Index No.: _____

1E

MERIDIAN SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2022

LOWER SECONDARY SCIENCE

SECONDARY 1 EXPRESS 13 October 2022

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 15** of Booklet **B**.

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 **9** printed pages.

[Turn over

Section A

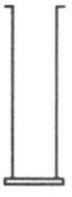
Answer **all** questions in the OTAS.

1 What is the SI unit for temperature?

A K **B** °K

C °C **D** °F

2 The diagram shows a laboratory apparatus.



Which apparatus does this diagram represent?

A test tube **B** boiling tube

C beaker **D** gas jar

3 What does the following hazard symbol represent?

A carcinogenic **B** flammable

C oxidising substances **D** explosives

4 Which of the following sets of values should a good scientist possess?

A open-mindedness, dishonesty, subjectivity

B curiosity, objectivity, perseverence

C integrity, perseverance, subjectivity

D close-mindedness, objectivity, integrity

5 An object **P** is rubbed against an object **Q**. It is found that scratches are formed on object **P** but not on object **Q**.

What conclusion can be made about the objects?

A Object **Q** is harder than object **P**.

B Object **Q** is stronger than object **P**.

C Object **Q** is more brittle than object **P**.

D Object **Q** is more rigid than object **P**.

6 Wool is commonly used to make clothing such as sweaters and winter jackets.

Which properties of wool make it a suitable material to make such clothing?

A Wool is flexible and a good thermal conductor.

B Wool is flexible and a poor thermal conductor.

C Wool is soft and rigid.

D Wool is hard and flexible.

7 When a small plastic toy is placed into a pail of water, it sinks to the bottom of the pail.

What is one possible way to make the plastic toy float to the top?

A Add more water into the pail.

B Replace the water with oil.

C Dissolve salt in the water.

D Cut the plastic toy into two smaller pieces.

8 A student wants to measure the internal diameter of a hollow pipe.

Which instrument is most suitable for this measurement?

A measuring tape

B metre rule

C 15-cm ruler

D digital calipers

9 To help conserve the environment, a method called the 3Rs is practiced.

What do the R's in 3Rs stand for?

A Reduce, Reuse, Recycle

B Reduce, Resell, Recycle

C Reuse, Recollect, Recycle

D Reuse, Recollect, Resell

10 Which statement about air is correct?

A Air is an element.

B Air is a compound.

C Air is a mixture of elements only.

D Air is a mixture of elements and compounds.

11 Which of the following mixtures is **not** a suspension?

A milk

B tomato soup

C salt water

D muddy water

12 Which of the following mixtures can be separated into its constituents by magnetic attraction?

A iron and steel

B steel and copper

C copper and plastic

D plastic and glass

13 Which separation technique is used to obtain salt from seawater?

A distillation

B filtration

C evaporation

D condensation

14 Which condition is required for filtration to be successful?

A The pore size of the filter paper must be smaller than the size of the residue particles.

B The pore size of the filter paper must be larger than the size of the residue particles.

C The pore size of the filter paper must be equal to the size of the residue particles.

D The pore size of the filter paper must be larger than the pore size of the filtrate particles.

15 The boiling points of four different liquids **W, X, Y** and **Z** are listed below.

liquid	**W**	**X**	**Y**	**Z**
boiling point	100 °C	82 °C	80 °C	80 °C

Which two liquids, if mixed together, can be most successfully separated by simple distillation?

A X and Z

B Y and Z

C X and Y

D W and Z

16 Which statement correctly explains how we are able to see a non-luminous object?

A Light travels from our eyes to the non-luminous object.

B The non-luminous object gives out light that travels into our eyes.

C Light is reflected from the non-luminous object into our eyes.

D Light is reflected from our eyes to the non-luminous object.

17 No mirror image is formed on a rough surface because

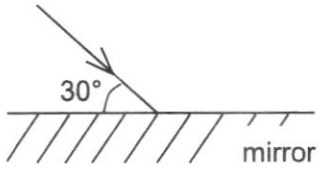
A the rough surface absorbs all the light rays.

B the reflected angles are not equal to the incident angles of the light rays.

C the reflected light rays are parallel to one another.

D the reflected light rays are scattered in all directions.

18 An incident light ray falls on a mirror as shown in the figure.



What is the angle of reflection of the reflected ray (not shown in figure)?

A 30°

B 60°

C 90°

D 150°

19 Sunlight can be split into seven colours by dispersion.

What are four of the colours?

A red, orange, blue, violet

B pink, yellow, green, indigo

C yellow, blue, purple, indigo

D orange, yellow, green, brown

20 What is the function of the cytoplasm in a cell?

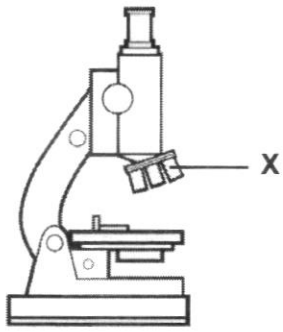
A controls the activities in the cell

B stores food and water

C releases energy for chemical reactions in the cell

D acts as a site for chemical reactions to take place

21 The diagram shows a light microscope.



What is the function of part **X**?

A to shine light through the sample

B to adjust the magnification of the image

C to adjust the height of the stage

D to adjust the focus to get a sharp image

22 The stomach is an organ because it is made of

A different types of cells performing the same job.

B different types of organelles performing the same job.

C several systems working together to perform a function.

D several tissues working together to perform a function.

23 According to the particulate nature of matter,

A all matter is made of constantly moving particles.

B all matter exists in solid, liquid or gaseous state.

C all matter is made of particles vibrating about fixed positions.

D all matter is made of particles that are arranged in random patterns.

24 Which row correctly ranks the states of matter in the order of weakest to strongest attractive forces between their particles?

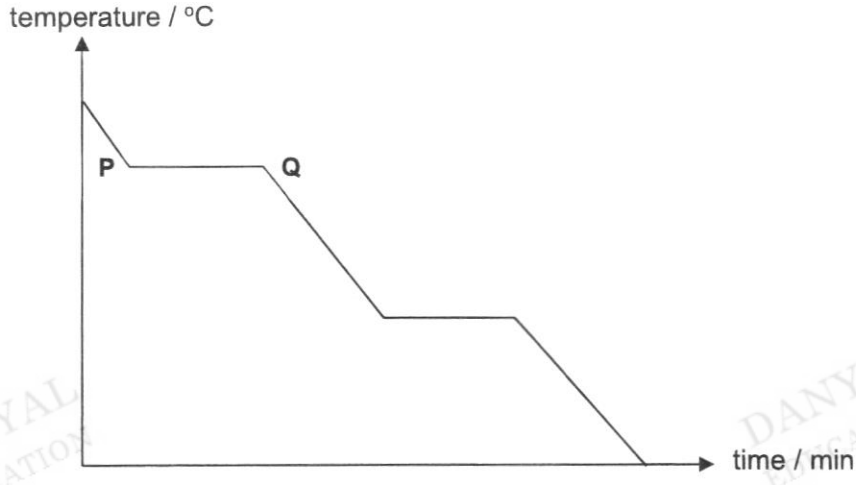
A solid → liquid → gas

B gas → liquid → solid

C liquid → gas → solid

D solid → gas → liquid

25 A solid substance was heated until it became a gas. After the heater was removed, the temperature was recorded at regular intervals as the gas cools down to become a solid again. The graph shows temperature plotted against time.



What was happening to the substance during the time from **P** to **Q** on the graph?

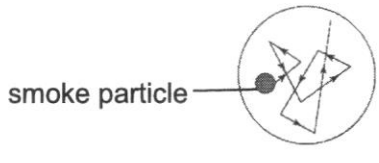
A boiling

B condensation

C melting

D freezing

26 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 air particles collide with the smoke particle randomly.

B The smoke particle absorbs energy from its surroundings to move more vigorously.

C The air particles attract and repel the smoke particle with intermolecular forces.

D The smoke particle moves due to the changes in density of the air.

27 Which row correctly shows the relative charge and relative mass of a proton?

	relative charge	relative mass
A	-1	1/1840
B	+1	1
C	0	1
D	+1	1/1840

28 A glucose molecule has the chemical formula $C_6H_{12}O_6$.

How many atoms are there in a glucose molecule?

A 3 **B** 6

C 12 **D** 24

29 What is the electronic configuration of a sulfur atom?

A 2,8,6 **B** 8,8

C 2,6,8 **D** 2,7,7

30 Which chemical formula represents a molecule of an element?

A He **B** CO_2

C NaC*l* **D** P_4

~ END OF SECTION A ~

Name:	Class: Sec _____	Index No.: _____

1E

MERIDIAN SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2022

LOWER SECONDARY SCIENCE

SECONDARY 1 EXPRESS

13 October 2022

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 **15.**

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 **15** printed pages.

[Turn over

Section B

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

1 Fig. 1.1 shows a Bunsen burner.

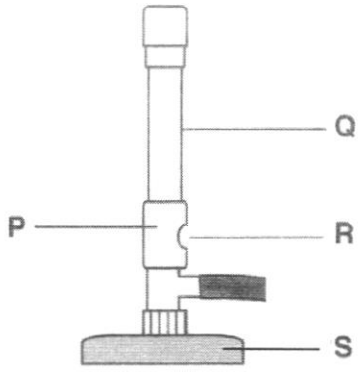


Fig. 1.1

(a) Label the parts of the Bunsen burner.

P: ..... **Q**: .....

R: ..... **S**: ..... [2]

(b) State the type of flame that is produced when part **R** is fully opened.

.....[1]

2 Fig. 2.1 shows a student performing an experiment in a science laboratory.

Fig. 2.1

Identify **two** mistakes made by the student in Fig. 2.1.

.....

.....

.....

.....[2]

3 Fig. 3.1 shows a root hair cell.

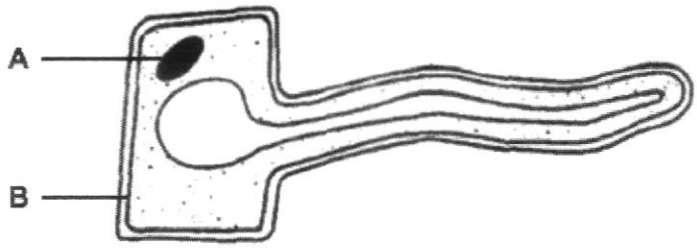


Fig. 3.1

(a) Identify structure **A** and describe its function.

name .....

function .....

.....[2]

(b) Identify structure **B** and describe its function.

name .....

function .....

.....[2]

(c) By referring to the structure of the root hair cell in Fig. 3.1, explain why the root hair cell is a plant cell.

.....

.....

.....[2]

(d) Name the structure that is found in the cells of a green leaf but missing in the root hair cell.

Explain why this structure is not present in the root hair cell.

missing structure .....

explanation .....

.....[2]

4 Study Table 4.1 and answer the questions that follow.

Table 4.1

	transparency	strength	thermal conductivity	electrical conductivity	melting point
material P	opaque	high	good	good	high
material Q	transparent	moderate	good	poor	high
material R	transparent	moderate	poor	good	high
material S	transparent	low	poor	poor	low
material T	opaque	high	poor	poor	high

(a) Explain what is meant by the term *strength*.

.....

.....[1]

(b) Which material is most suitable for making a round-bottom flask?

Give **two** reasons to support your choice of material.

.....

.....

.....

.....[3]

(c) Suggest a possible identity for material **P**.

.....[1]

5 Fig. 5.1 (not drawn to scale) shows the volume of water in the measuring cylinder when different objects are placed in it.

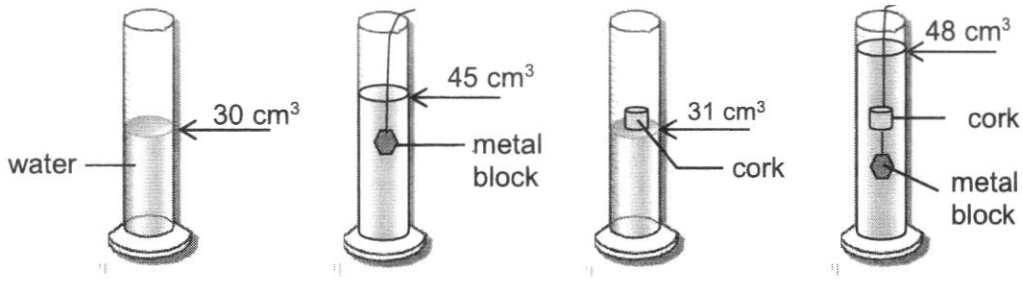


Fig. 5.1

(a) Define the term *density*.

.....

.....[1]

(a) Determine the volume of the cork. Show your working clearly.

volume = ...cm^3 [1]

(b) Given that the mass of the cork is 2.4 g, calculate the density of the cork Show your working clearly.

density = ...g/cm^3 [2]

6 Fig. 6.1 shows a periodic table with **7** elements labelled 1-7.

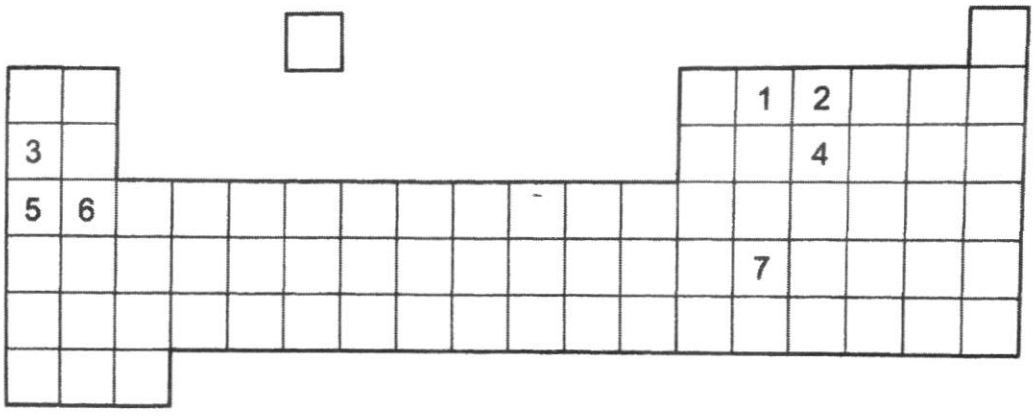


Fig. 6.1

Using Fig. 6.1, answer the following questions.

(a) State which two elements are metals in the same period.

.....[1]

(b) Element **5** reacts violently with water.

State and explain which other element is likely to react violently with water.

.....

.....

.....[2]

(c) State **one** difference in the physical properties of element **3** and element **4**.

.....

.....[1]

7 **(a)** Fig. 7.1 shows the particles in the nucleus of an atom for an element.

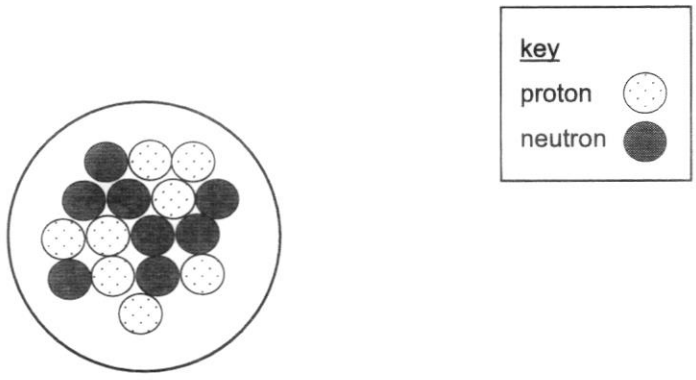


Fig. 7.1

(i) Identify the element shown in Fig. 7.1.

.....[1]

(ii) Determine the mass number of the element.

.....[1]

(iii) State the number of electrons in the atom of the element.

Explain your answer.

number of electrons .....

explanation .....

.....

.....[2]

(iv) State what would happen to the atom if an electron is added to it.

.....[1]

(b) Draw a dot and cross diagram to illustrate how the electrons are arranged in a fluorine atom.

Write the chemical symbol of fluorine in the centre of your diagram.

[2]

8 **(a)** Table 8.1 shows the melting and boiling points of four different substances.

Table 8.1

substance	melting point / °C	boiling point / °C
P	- 100	- 56
Q	- 12	26
R	18	97
S	56	205

(i) At a temperature of 20 °C, state the substance(s) that is/are in the liquid state.

.....[1]

(ii) Draw the arrangement of the particles in substance **P** at 0 °C in the box below.

[1]

(b) Using the particulate nature of matter,

(i) explain why a substance expands when it is heated up;

.....

.....

.....[2]

(ii) explain why solids have fixed shapes and fixed volumes;

.....

.....

.....[2]

(iii) explain why a person in the living room can smell the aroma of food being cooked in the kitchen.

.....

.....

.....[1]

~ END OF SECTION B ~

Section C

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

9 **(a)** Fig. 9.1 shows the position of an object placed in front of a plane mirror. The position of an eye is also shown.

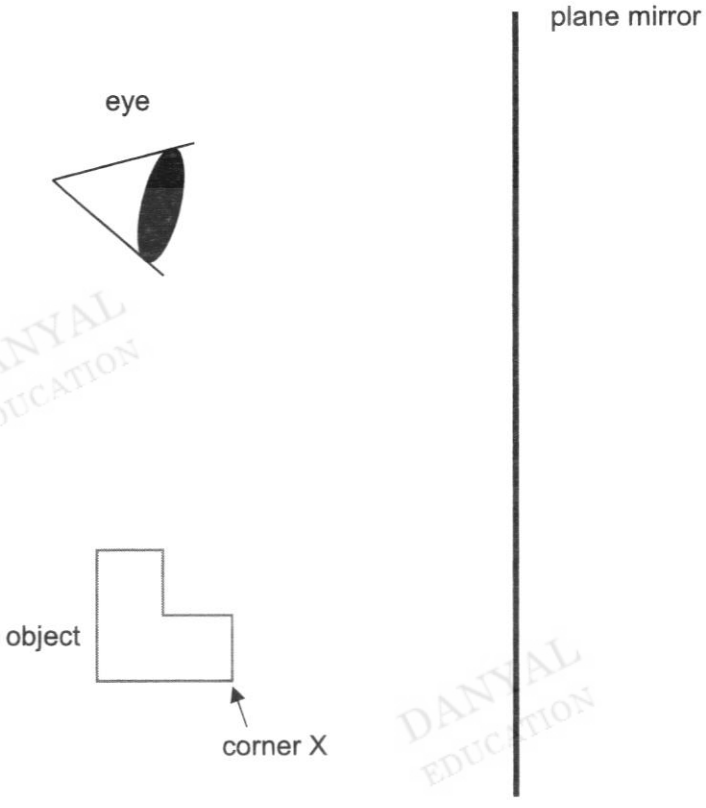


Fig. 9.1

On Fig. 9.1,

(i) draw the image of the object in its correct location behind the mirror; [1]

(ii) draw the path of **one** light ray which leaves corner X of the object and is reflected from the mirror into the eye. [2]

(iii) State **two** properties of the image formed in the plane mirror.

.....

.....

.....[2]

(b) Fig. 9.2 shows a setup to demonstrate refraction of light through a rectangular glass block. Glass is optically denser than air.

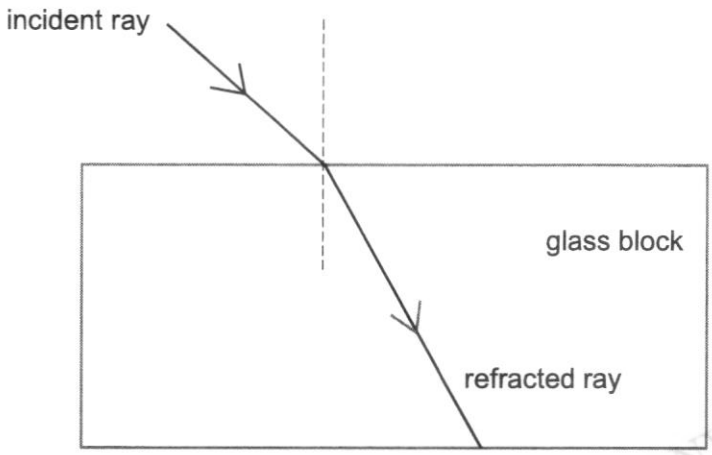


Fig. 9.2

(i) On Fig. 9.2, indicate the angle of incidence and the angle of refraction.

Label the angle of incidence with the letter *i*, and the angle of refraction with the letter *r*. [2]

(ii) Briefly explain why the light ray bends towards the normal as it enters the glass block.

.....

.....[1]

(c) Fig. 9.3 shows a mirror which has been installed at a corner of a storeroom, near the ceiling.

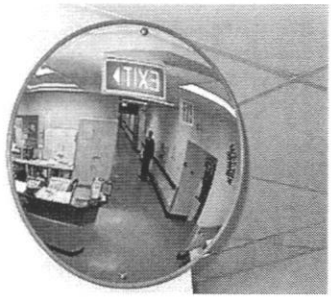


Fig. 9.3

(i) State the type of mirror shown in Fig. 9.3.

.....[1]

(ii) Give one reason why this mirror is a better choice than a plane mirror in the storeroom.

.....[1]

10 **(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. 10.1 are those of the three substances, Troponin, CK-MB and Myoglobin and the blood samples of three patients, **X**, **Y** and **Z**.

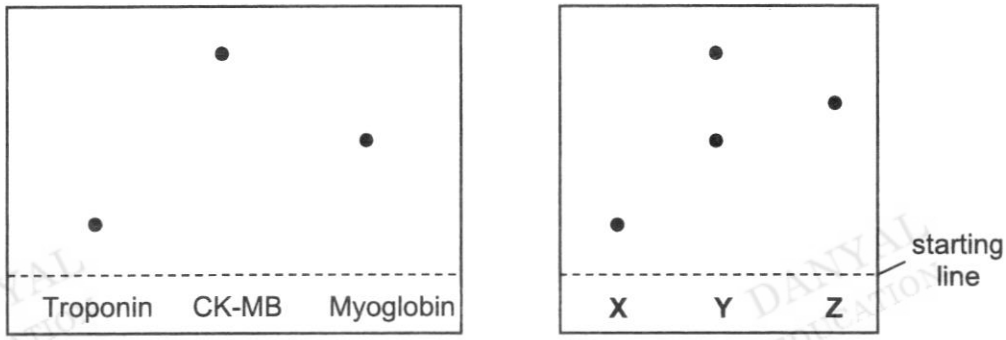


Fig. 10.1

(i) The starting line is drawn with a pencil.

Explain why the starting line should **not** be drawn with a pen.

.....

.....[1]

(ii) Two of the patients may have heart disease.

Identify the patients and the corresponding substance(s) that shows 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 solvent used for the chromatography.

Do you agree with the student?

Explain your answer.

.....

.....[1]

(iv) Vasotec is a drug used to treat heart diseases. It has a chemical formula of $C_{45}H_{65}N_{13}O_{12}S_2$. From looking at the chemical formula of Vasotec, a student identified it as a compound.

Explain how the student was able to identify Vasotec as a compound from its chemical formula.

.....

.....

.....[2]

(b) Fig. 10.2 shows an experimental setup for a separation process.

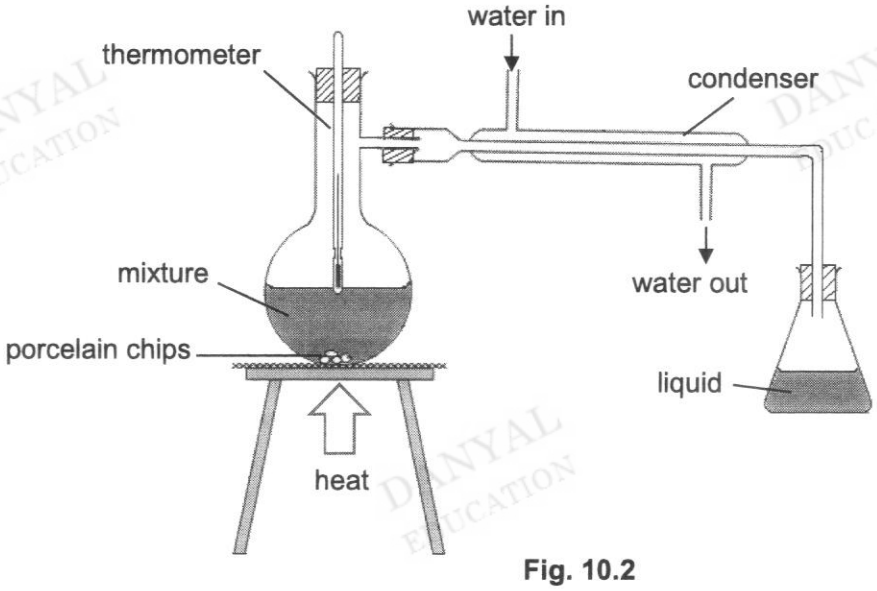


Fig. 10.2

(i) Name the separation technique shown in Fig. 10.2.

.....[1]

(ii) State the function of the porcelain chips.

.....[1]

(iii) Identify **two** mistakes in the setup shown in Fig. 10.2.

.....

.....

.....[2]

11 (a) A student observed that rock sugar seemed to dissolve at different rates when the temperature of the water is different. He came up with this hypothesis: Rock sugar dissolves faster in warmer water.

The student proceeded to test his hypothesis with an experiment. In his experiment, he dissolved a fixed amount of rock sugar in water of different temperatures. He measured the time taken for the sugar to dissolve completely.

Table 11.1 shows the data collected from his experiment.

Table 11.1

temperature of water (in °C)	time taken for sugar to dissolve completely (in seconds)
10	10.25
20	9.10
30	7.82
40	6.33
50	4.52

(i) State the dependent and independent variables in this experiment.

dependent variable: .....

independent variable: ..... [2]

(ii) Suggest **two** variables that should be kept constant during the experiment.

.....

.....[2]

(iii) Based on the data in Table 11.1, should the student accept or reject his hypothesis?

Explain your answer.

.....

.....[1]

(iv) The student wants to do another experiment to determine how the temperature of water affects the solubility of rock sugar in water.

Instead of measuring the time taken to dissolve the sugar, suggest what measurement should be made by the student.

.....[1]

(v) Besides temperature, state one other factor that affects the solubility of a substance.

.....[1]

(b) Fig. 11.2 shows some particles in four different substances, **P**, **Q**, **R** and **S**.

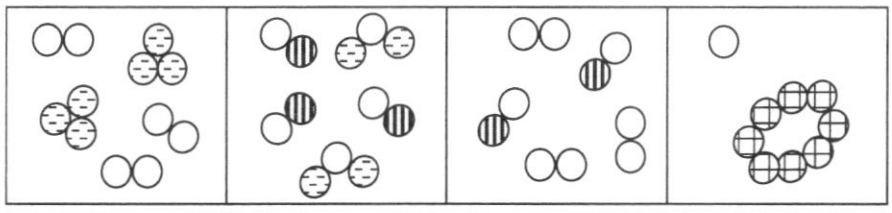


Fig. 11.2

Write down the letter(s) (**P**, **Q**, **R**, **S**) corresponding to the diagram(s) that fit the following descriptions. Each letter may be used once, more than once, or not at all.

(i) two different elements .....

(ii) two different compounds .....

(iii) one element and one compound ..... [3]

~ END OF SECTION C ~

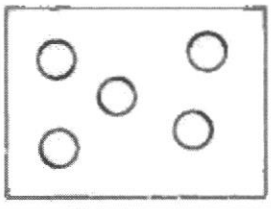
Meridian Secondary School
Sec 1E Science End of Year Examination 2022
Answer Scheme

Section A

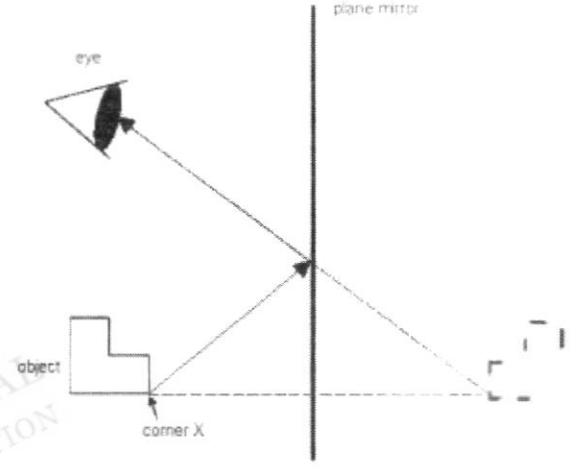
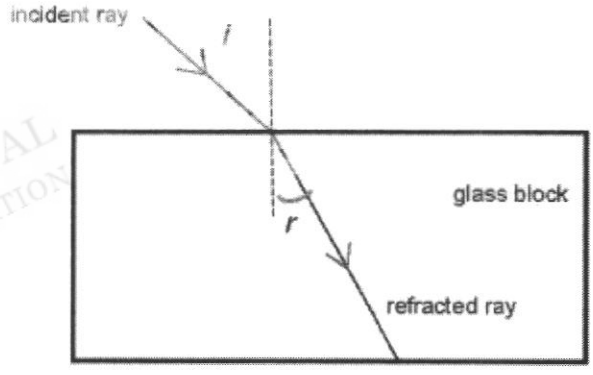
Qn No.	Ans	Qn No.	Ans	Qn No.	Ans
1	A	11	C	21	B
2	D	12	B	22	D
3	C	13	C	23	A
4	B	14	A	24	B
5	A	15	D	25	B
6	B	16	C	26	A
7	C	17	D	27	B
8	D	18	B	28	D
9	A	19	A	29	A
10	D	20	D	30	D

Section B

Qn			Answer	Marks
1	(a)		P: collar Q: barrel R: air-hole S: base (1 mark for every 2 correct answers)	2
	(b)		non - luminous flame	1
2			Any two mistakes: • drinking in the lab • holding the test tube for heating with bare hands. • not waering goggles	2
3	(a)		name: nudeus function: controlscell activities	1 1
	(b)		name: cell membrance function : controls movment of substances in and out of the cell	1 1
	(c)		its has a large central vacuole and a cell wall	1 1
	(d)		missing structure: chloroplast explanation: The root hair cell is under the ground and does not perform photosynthesis.	1 1
4	(a)		The strength of a material is its ability to support a heavy load without breaking or tearing.	1
	(b)		Material Q is most suitable. Any 2 reasons: • It is transparent which allows its contents to be observed. • It has high melting point to withstand heating. • It has good thermal conductivity to allow its contents to be heated faster.	1 2
	(c)		Material P is a metal. (or accept any metal)	1

5	(a)		Density is the amount of mass per unit volume.	1
	(b)		volume of cork = 48 – 45 = 3 cm^3	1
	(c)		density = mass ÷ volume = 2.4 ÷ 3 = 0.8 g/cm^3	 1 1
6	(a)		elements 5 and 6	1
	(b)		Element 3. It is in the same group as element 5 and thus has similar chemical properties.	1 1
	(c)		Any 1 difference: • Element 3 has a higher melting point. • Element 3 is a conductor of electricity but element 4 is not. • Element 3 is a conductor of heat but element 4 is not. • Element 3 is shiny but element 4 is not. • Element 3 is malleable/ ductile but element 4 is not.	 1
7	(a)	(i)	The element is oxygen	1
		(ii)	The mass number is 16.	1
		(iii)	number of electrons: 8 explanation: an atom is electrically neutral, thus the number of electrons is equal to the number of protons.	1 1
		(iv)	the atom would become negatively charged / gain a negative charge	1
	(b)		Diagram shows correct number of electrons (2 in 1st shell, 7 in 2nd shell) – 1 mark Correct chemical symbol for fluorine (F) – 1 mark	 2
8	(a)	(i)	substances Q and R	1
		(ii)		1
	(b)	(i)	The particles of the substance gain energy and move further apart.	1 1
		(ii)	The particles in a solid have very strong attractive forces (thus fixed volume) and are arranged in a regular pattern (thus fixed shape).	1 1
		(iii)	The particles from the food diffuse (or travel) from a region of higher concentration (in the kitchen) to a region of lower concentration (in the living room).	1

Section C

Qn			Answer	Marks
9	(a)	(i)	image is laterally inverted and image distance is equal to object distance	1
		(ii)	correct path of light ray from corner X to mirror to eye – 1 mark correct arrow directions – 1 mark  Fig. 9.1	2
		(iii)	Any 2 answers: • Image is laterally inverted • Image is virtual • Image distance behind mirror is equal to object distance in front of mirror • Image is upright • Image is same size as object	2
	(b)	(i)	angle of incidence is drawn and labelled between incident ray and the normal – 1 mark angle of refraction is drawn and labelled between the refracted ray and normal – 1 mark  	2
		(ii)	Because the light ray slows down as it enters the glass block.	1
	(c)	(i)	convex mirror	1
		(ii)	because the mirror has a wide field of vision / shows more area of the room.	1
10	(a)	(i)	The pen ink will dissolve in the solvent and affect the results.	1
		(ii)	Patient X → Troponin Patient Y → CK-MB and Myoglobin	1 1

		(iii)	No, because CK-MB travelled further than Myoglobin on the paper, so CK-MB is more soluble.	1
		(iv)	The chemical formula shows that Vasotac is made up of more than one element. It also shows that the elements are combined in a fixed ratio	1 1
	(b)	(i)	distillation	1
		(ii)	To ensure smooth boiling	1
		(iii)	Any 2 of below answers: • The thermometer is touching the mixture • The water in the condenser is flowing in the opposite/worng direction • The condenser is horizontal instead of stanted downwards	2
11	(a)	(i)	dependent variable time taken to dissolve sugar independent variable temperature of water	1 1
		(ii)	any 2 answers • rate of stirring / stirring or no stirring • amount of water • size of rock sugar crystals	2
		(iii)	accept hypothesis, because the data shows that the time taken to dissolve the sugar is decreasing as temperature of water increases	1
		(iv)	mass (or amount) of sugar that dissolves in a fixed ammount of water	1
		(v)	nature)or type) of solvent / solute	1
	(b)	(i)	P and S	1
		(ii)	Q	1
		(iii)	R	1

~ End of Answer Scheme ~