ORCHID PARK SECONDARY SCHOOL
End-of-Year Examination 2022

CANDIDATE NAME

CLASS INDEX NUMBER

LOWER SECONDARY SCIENCE

BOOKLET A **10 October 2022**

Secondary 1 G3 **2 hours (For Booklets A, B & C)**

Setter: Mr Muhammed Khairil **100 Marks**

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

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

This paper consists of **3** sections.

Booklet A:	Multiple Choice Questions
Booklet B:	Structured Questions
Booklet C:	Free Response Questions

A copy of the Periodic Table is printed on page 8 of Booklet C.

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

At the end of the examination, hand in Multiple Choice Answer Sheet, Booklets A, B and C separately.

Booklet A consists of **12** printed pages.

[Turn over

BOOKLET A [30 Marks]

Answer **all** questions in the Multiple Choice Answer Sheet.

1 A student wants to conduct an experiment to find out if the volume of water used affects the growth in plants.

Which variables should be kept constant to make the experiment a fair test?

1 the place where the pots of plants are placed
2 the type of plant used
3 the type of soil used
4 the volume of water given to each plant

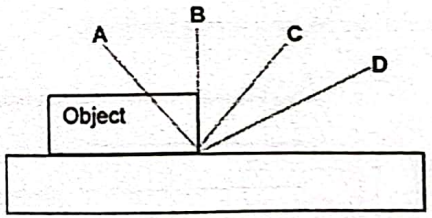
A 1 and 2 only

B 1, 2 and 3 only

C 2, 3 and 4 only

D 3 and 4 only

2 Where should the eye be positioned to avoid parallax error when taking reading using a meter rule?



3 In some laboratories, hazard warning symbols like those labelled X and Y as shown can be observed.

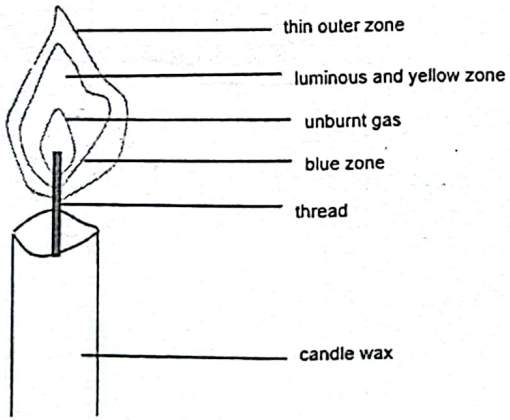
X

Y

What do the symbols, labelled X and Y, represent?

	X	Y
A	explosive	acute toxicity
B	explosive	corrosive
C	flammable	irritant
D	flammable	carcinogenic

4 The diagram shows the flame when a candle is lit.



Which statement is true about the candle flame?

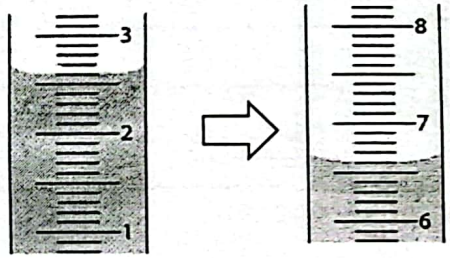
A It is safe to touch the blue zone of the candle flame.

B Objects get heated up at the blue zone faster.

C The presence of excess air results in the formation of the yellow zone.

D The yellow zone has the highest temperature.

5 Four students used a measuring cylinder filled with some water to measure the volume of a ring. The diagrams show the readings before and after the ring was placed in the measuring cylinder.



before after

Four students, A, B, C and D recorded their readings in a table.

Which student is correct?

	initial volume / cm^3	final volume / cm^3	volume of the ring / cm^3
A	2.6	6.6	4.0
B	2.7	6.7	4.0
C	3.3	7.3	4.1
D	3.4	7.4	4.1

6 Which is an application or invention of Science that causes environmental problems when used?

A chicken pox vaccine

B panadol painkillers

C plastics

D recycling of paper products

7 Drills operated in mining fields are used to remove rock formation blocking access to the valuable ores beneath. The intense drilling also generates high amount of frictional heat.

Which combinations of physical properties is of highest concern when considering the material used to make the drill?

A electrical conductivity, thermal conductivity

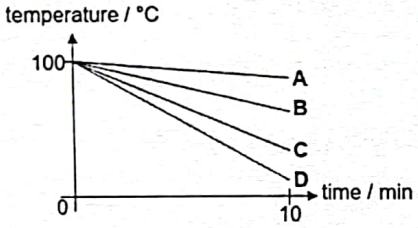
B hardness, electrical conductivity

C hardness, melting point

D melting point, transparency

8 Four identical rods of different materials were heated to 100 °C.

They were left to cool over a period of ten minutes and the results were recorded in the graph shown.



Which material is most suitable for making a container to keep food warm?

9 There are several metallic elements which are found in the Earth's crust, known as ores. The table shows the chemical formulae of some compounds found in ores, together with the names of the ores.

name of ore	chemical formula of compound
argentite	Ag_2S
chromite	$FeCr_2O_4$
galena	PbS
scheelite	$CaWO_4$

Which statement is **incorrect**?

A There are at least two ores containing sulfur.

B There are only two compounds containing two different elements.

C We can extract tungsten from only one of the ores.

D We can extract chromium from only two of the ores.

10 The solubility of salt is 36 g per 100 ml of water.

What would be observed when 50 g of salt is mixed with 200 ml of water and then filtered?

A a colourless filtrate is obtained and a residue remains

B a colourless filtrate is obtained and no residue remains

C only a cloudy filtrate is obtained

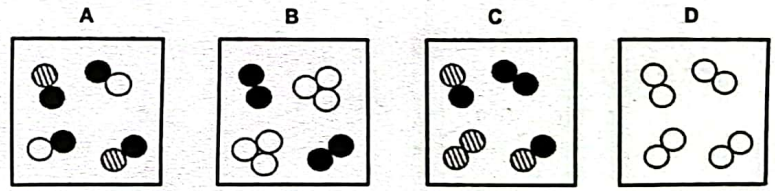
D only a white solid is obtained as residue

11 An equal amount of sugar is added to equal volume of identical solvents under different conditions.

Which setup would sugar dissolve the fastest?

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

12 Which diagram shows a mixture of two different elements and a compound?



13 A student tried to separate aluminium powder from a mixture of solids using a magnet but was unsuccessful.

Which statement explains why the student's separation method did not work?

A aluminium is a metal

B aluminium is a non-magnetic material

C aluminium powder can only be separated from the mixture by filtration

D aluminium powder is too small to be attracted by the magnet

14 Xavier was given a concentrated sugar solution.

Which step can be carried out to obtain a diluted sugar solution?

A add more sugar into the solution

B add more water into the solution

C evaporate to remove water from the solution

D stir more vigorously

15 Which two separation techniques are used to purify sewage water to obtain NEWater?

A distillation and filtration

B microfiltration and evaporation

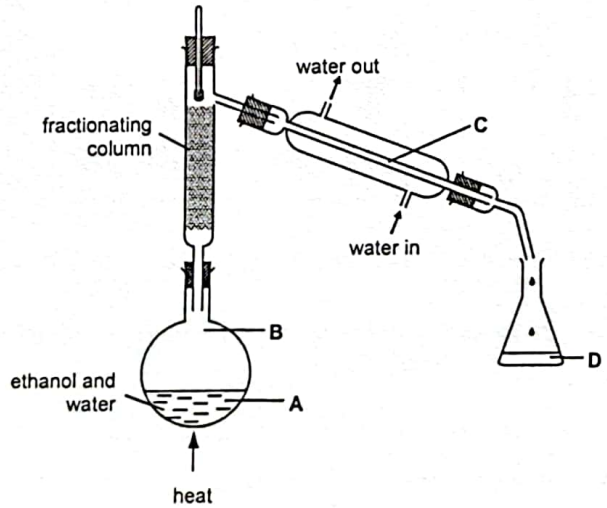
C microfiltration and reverse osmosis

D simple distillation and chromatography

16 The diagram shows the apparatus used to separate ethanol and water from a mixture of ethanol and water.

The boiling point of ethanol is 78 °C and the boiling point of water is 100 °C.

Which region, A, B, C or D, has the highest concentration of ethanol at 80 °C?



17 Which correctly explains why shadows form?

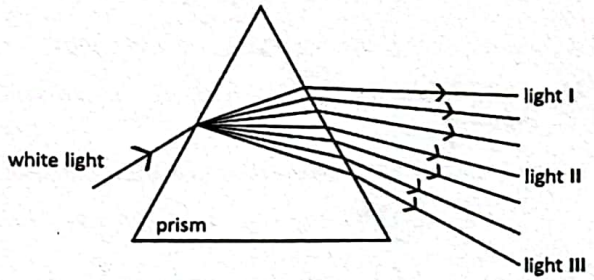
A light bends and go around obstacles

B light can pass through any object

C light travels in a straight line

D shadow absorbs light

18 The diagram shows the path of a ray of white light dispersed by a prism.



What are the colours of light I, II and III?

	light I	light II	light III
A	blue	orange	violet
B	red	green	violet
C	red	yellow	indigo
D	violet	green	red

19 Which uses a convex mirror?

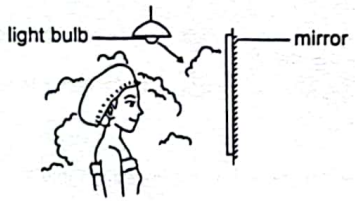
A blind spot mirror

B car headlight

C microscope

D periscope

20 Jane looks at the light bulb in the bathroom mirror. Water vapour from the hot bath has condensed on the mirror.



Instead of a clear image of the light bulb, she sees that the mirror looks foggy.

Which statement explains what Jane sees?

A Due to the water droplets, the light rays reflect off in different directions.

B Due to the water droplets, the light rays reflect off in the same direction.

C There are lots of little regular reflections of light by the mirror.

D There are lots of little regular reflections of light by water droplets.

21 Which is arranged in **decreasing** order of complexity in a multicellular organism?

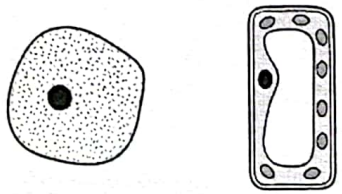
A cell, tissue, organ, system

B cell, tissue, system, organ

C organ, tissue, cell, system

D system, organ, tissue, cell

22 The diagram shows two cells.



Which process can be carried out by only one of these cells?

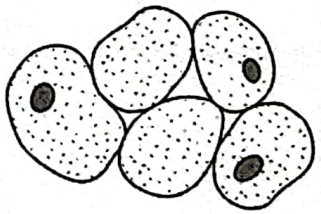
A controlling the chemical reactions in the cell

B controlling the movement of substances into the cell

C absorbs energy from the sun to make food

D respiration

23 The diagram shows some liver cells as they appear under the microscope.



How many cell walls can be seen?

A 0

B 2

C 3

D 5

24 During which process do particles move faster and further apart?

A candle wax solidifies

B dry ice sublimes

C iodine vapour crystallizes

D steam condenses

25 What property does not change when an iron rod is heated?

A density

B energy

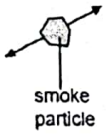
C mass

D volume

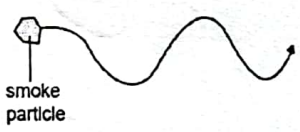
26 A student observes the Brownian motion of a bright speck of smoke particle through a light microscope.

Which diagram best represents the motion of the smoke particle?

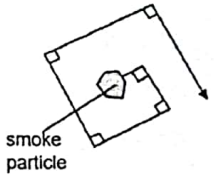
A



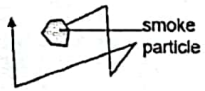
B



C



D



27 Scientists predict that there are rivers of chlorine passing through mountains of radon and mercury on the surface of planet X. The table shows the melting and boiling points of chlorine, mercury and radon.

substance	melting point / °C	boiling point / °C
chlorine	-102	-34
mercury	-39	357
radon	-71	-62

What is a possible temperature on planet X?

A -120 °C

B -75 °C

C -35 °C

D -20 °C

28 The diagram shows the nucleus of an atom of T.

⊕ represents a proton

● represents a neutron

Which is the correct representation of T in the Periodic Table?

A C

B N

C Li

D O

29 Which contains three different non-metallic elements?

A CH_2Cl_2

B CH_4

C NaCl

D K_2CO_3

30 Which has the greatest number of atoms?

A C_2H_6

B CO_2

C HNO_3

D NH_3

END OF BOOKLET A

ORCHID PARK SECONDARY SCHOOL
End-of-Year Examination 2022

CANDIDATE NAME

CLASS | INDEX NUMBER

LOWER SECONDARY SCIENCE

BOOKLET B **10 October 2022**

Secondary 1 G3 **2 hours (For Booklets A, B and C)**

Setter: Mr Muhammed Khairil **100 Marks**

Additional Materials: Nil

READ THESE INSTRUCTIONS FIRST

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Booklet B (Structured Questions)
Answer all questions. Write your answers in the spaces provided.
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At the end of the examination, hand in Multiple Choice Answer Sheet, Booklets A, B and C separately.

A copy of the Periodic Table is printed on page 8 of Booklet C.

For Examiner's Use	
Booklet B	/40

BOOKLET B [40 Marks]

Answer all questions in the spaces provided.

1 Tim wanted to investigate the effect of different light intensities on the rate of photosynthesis. He set up the experiment as shown in Fig. 1.1 with the lamp initially 50 cm away from the plant.

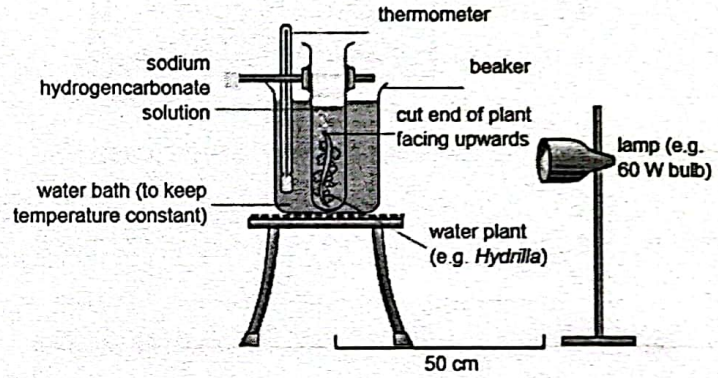


Fig. 1.1

Air bubbles are given off from the cut end of the plant. When bubbles are produced at a regular rate, Tim counted the number of bubbles produced over a period of 5 minutes.

Tim repeated the experiment by moving the light source closer to the plant, at distances 40 cm, 30 cm, 20 cm and 10 cm respectively and managed to obtain the number of bubbles produced for each distance.

(a) Identify the independent and dependent variables.

independent variable .....

dependent variable ..... [2]

(b) State the **two** constant variables in this experiment.

.....

.....

..... [2]

(c) Suggest a suitable hypothesis for this experiment.

.....

..... [1]

2 (a) Fig. 2.1 shows two students carrying out an experiment in a science laboratory.

Fig. 2.1

Identify **two** unsafe practices demonstrated by the students.

.....

.....

..... [2]

(b) Fig. 2.2 shows some apparatus commonly found in the laboratory.

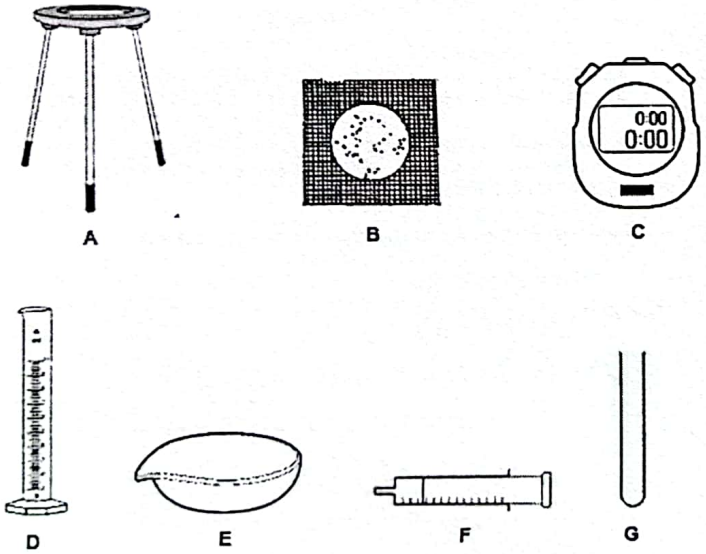


Fig. 2.2

(i) Which of the apparatus is/are needed to measure the volume of a gas every 30 s?

..... [1]

(ii) Which of the apparatus is/are needed to evaporate salt water to dryness?

..... [1]

(iii) The usage of apparatus C can often result in a certain type of error.

State the type of error.

..... [1]

(iv) Suggest how the type of error you mentioned in (b)(iii) can be reduced.

.....

..... [1]

3 Corrugated cardboard boxes are often used to pack goods before shipping. To save space, the boxes are kept flat before use as shown in Fig. 3.1.

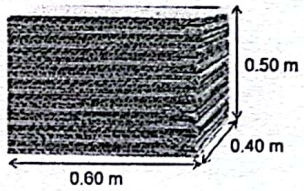


Fig. 3.1

The stack of corrugated cardboards in Fig. 3.1 has a mass of 15.6 kg.

(a) Calculate the density, in g/cm^3, of the corrugated cardboard.

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

(b) Fig. 3.2 shows an enlarged view of a sheet of corrugated cardboard. It is made of three thick sheets of paper glued together.

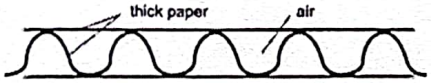


Fig. 3.2

State and explain how the density of the thick paper compares to the density of the corrugated cardboard calculated in **(a)**.

.....

.....

..... [2]

(c) Fig. 3.3 shows an electrical iron and the inside of its wiring cable.

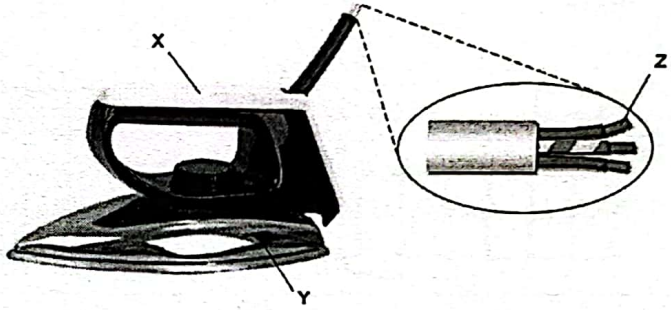


Fig. 3.3

For each of the parts **X, Y** and **Z**, suggest a suitable material and explain the property of the material which makes it suitable for these parts.

parts	name of material	property
X		
Y		
Z		

[3]

4 Fig. 4.1 shows part of the Periodic Table which classifies elements based on their properties.

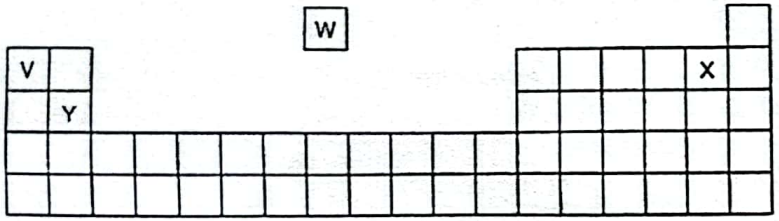


Fig. 4.1

(a) Define the term *elements*.

.....

..... [1]

(b) Based on their position in the Periodic Table, categorise elements **V**, **W**, **X** and **Y** as metals or non-metals in Table 4.2.

Table 4.2

metals	non-metals

[2]

(c) Information about four substances **P**, **Q**, **R** and **S** are given.

P	A colourless liquid formed by reacting oxygen and hydrogen.
Q	A colourless gas in air that is necessary for photosynthesis.
R	A liquid that produces one spot on the chromatogram.
S	A solid with a non-uniform distribution of white and brown powder. Both the white and brown solids dissolve in water.

Classify the substances **P**, **Q**, **R** and **S** as an element, compound or a mixture.

Complete Table 4.3 by placing a tick (✓) in one box in each row.

Table 4.3

substance	element	compound	can be an element or a compound	mixture
P				
Q				
R				
S				

[4]

5 Fig. 5.1 shows a particle model of substance **Z** in its solid state.

(a) The melting point and boiling point of **Z** are 28 °C and 150 °C respectively.

Draw the particulate model of the substance at 160 °C in Fig. 5.2.

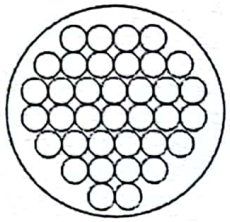


Fig. 5.1

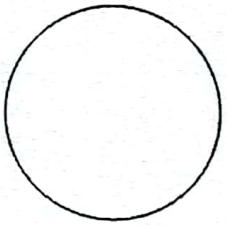


Fig. 5.2 [1]

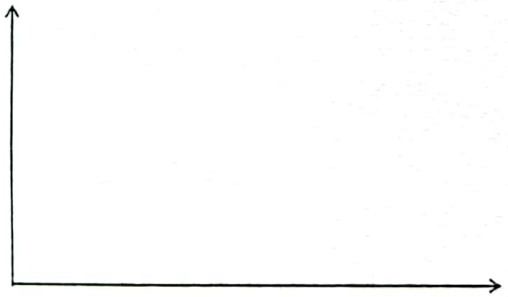
(b) Compare the movement and arrangement of the particles in substance **Z** in solid state and at 160 °C by filling in Table 5.3.

Table 5.3

factor	solid state	state at 160 °C
movement of particles		
arrangement of particles		

[4]

(c) Sketch the heating curve of substance **Z** from 20 °C to 50 °C. Label the axes and the value of the melting point.



[2]

6 **(a)** **(i)** State the electrical charge of an atom.

Explain your answer in terms of sub-atomic particles.

.....

.....

..... [2]

(ii) Complete Table 6.1 to show the information of the sub-atomic particles found in an atom.

Table 6.1

name of sub-atomic particle	proton	electron	.....
relative mass	.....	$\frac{1}{1840}$	1
relative charge	+1	.....	0

[3]

(b) Fig. 6.2 shows models of various structures.

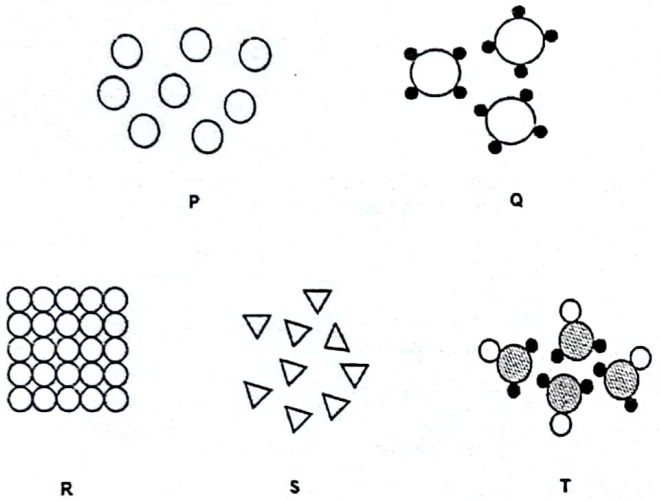


Fig. 6.2

Which of these structure(s) are compounds?

Explain your answer.

.....

.....

..... [2]

END OF BOOKLET B

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LOWER SECONDARY SCIENCE

BOOKLET C **10 October 2022**

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For Examiner's Use	
Booklet C	/30

BOOKLET C [30 Marks]

Answer all questions in the spaces provided.

7 Mixture Y contains copper(II) oxide, sodium chloride and iron powder.

Table 7.1 gives some information about the properties of these substances.

Table 7.1

substances	appearance at room temperature	solubility in water
copper(II) oxide	black powder	insoluble
sodium chloride (table salt)	white solid	soluble
iron powder	dark grey powder	insoluble

(a) A magnet is used to remove one of the components in mixture Y.

Name this component and state the principle behind this technique.

.....

.....

..... [2]

(b) Water is then added to the remaining mixture from **(a)** and stirred.

Explain the reason of this step.

.....

.....

..... [2]

(c) Describe the step that must be done after the one in **(b)**.

Explain why.

.....

.....

..... [2]

(d) Draw a labelled diagram to show the experimental setup used in (c).

[3]

(e) Name the separation technique used to remove water from the solution collected in (d).

..... [1]

8 (a) Fig. 8.1 shows an object placed in front of a mirror.

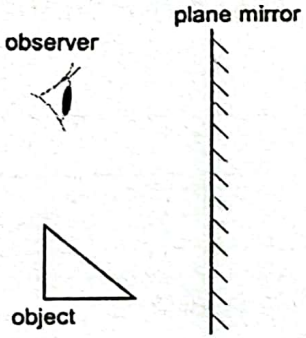


Fig. 8.1

(i) On Fig. 8.1, draw the image of the object as seen by the observer. [1]

(ii) On Fig. 8.1, draw the path of two rays of light leaving one point on the object and then reflecting at the mirror before entering the eye, allowing the observer to see the image of the object. [2]

(b) State two characteristics of the image formed in Fig. 8.1.

.....

..... [2]

(c) Fig. 8.2 shows the path of a light ray travelling from air into a paperweight that is made of medium I, medium II and wood.

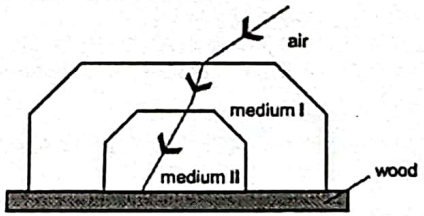


Fig. 8.2

(i) Using Fig. 8.2, arrange the three medium, air, medium I and medium II in decreasing optical density (from most optically dense to least optically dense).

most optically dense ⟶ least optically dense

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

(ii) Using the idea of speed of light, explain why light refracts as it travels from medium I to medium II.

.....

.....

..... [2]

(d) A boy decided to place a mirror vertically against the wall.

He placed a fan 2.5 m behind him as shown in Fig. 8.3.

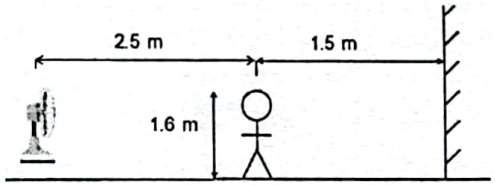


Fig. 8.3

Calculate the distance between the image of the fan and the boy.

distance = ... m [2]

9 Fig. 9.1 shows the structure of a modified cell **X**.

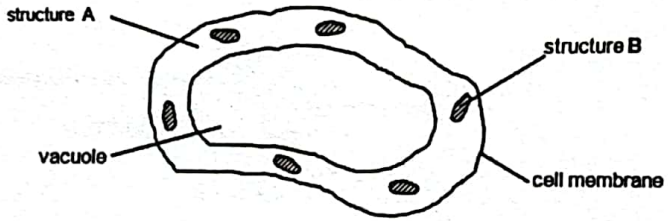


Fig. 9.1

(a) Structure **A** is a jelly-like substance that allows the chemical reactions of the cell to take place.

State the name of structure **A**.

..... [1]

(b) Structure **B** contains a green pigment.

(i) Name structure **B**.

..... [1]

(ii) State the function of structure **B**.

.....

..... [1]

(c) Which cell, plant or animal, does cell **X** more closely resemble?

Explain your answer.

.....

.....

..... [2]

(d) Fig. 9.2 shows a white blood cell. A student commented that cell **X** shares a similarity to white blood cells.

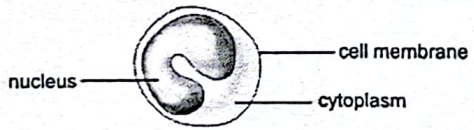


Fig. 9.2

Do you agree with the student?

Explain your answer.

.....

.....

..... [2]

(e) Fig. 9.3 shows a human heart.

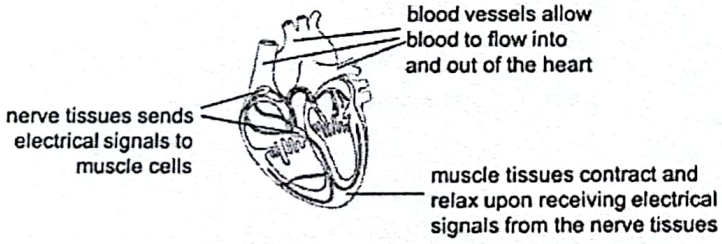


Fig. 9.3

(i) Using the information from Fig. 9.3, is the human heart a cell, tissue, organ or organ system?

..... [1]

(ii) State why division of labour is important in multicellular organisms.

.....

.....

..... [2]

END OF BOOKLET C

The Periodic Table of Elements

Group 1	2																		
																			2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -
87 Fr francium -	88 Ra radium -	89–103 actinoids	104 Rf rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -		114 Fl flerovium -		116 Lv livermorium -		

Key

	proton (atomic) number
	atomic symbol
	name
	relative atomic mass

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

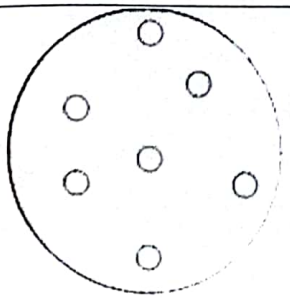
Orchid Park Secondary School
Sec 1 G3 EOY 2022 Lower Sec Science
Answer Scheme

Section A

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

Section B

1a	Independent variable: distance from light source to plant Dependent variable: number of bubbles produced in 5 minutes	1 1
1b	Type of water plant Power/type of lamp Temperature of water Type of solution	2m total - 1 mark for any variable
1c	A closer light source <u>increases the intensity of light which increases the rate of photosynthesis</u>, hence increasing the number of bubbles produced Not acceptable: a closer light source increases number of bubbles or as distance decreases, the rate of photosynthesis increases. As the above are predictions. A hypothesis needs to have explanatory power.	1
2a	- Lab goggles were not worn during heating - Students used bare hands to hold the test tube for heating - Notes are placed near the flame	2m total - 1 mark for any suitable hazard
2bi	C and F	1
2bii	A, B and E	1
2biii	Unpredictable error	1

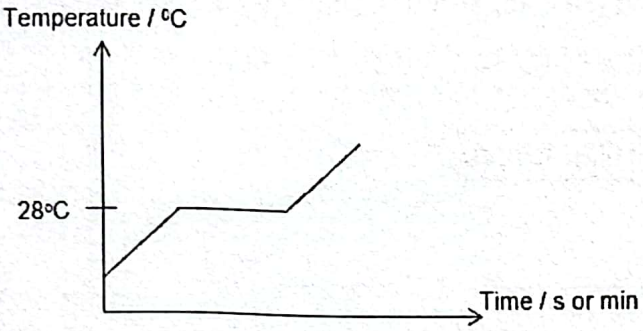
2biv	Take a few readings and calculate the average.	1
3a	15.6 kg = 15 600g Volume = 60 x 40 x 50 = 120 000cm^3 Density = 15 600 / 120 000 = 0.13 g/cm^3	1 1 1
3b	The density of paper will be higher than the cardboard. The cardboard occupies a larger volume due to the air spaces.	1 1
3c	<table><tr><th>parts</th><th>name of material</th><th>property</th></tr><tr><td>X</td><td>plastic</td><td>poor thermal Conductivity</td></tr><tr><td>Y</td><td>metal</td><td>good thermal Conductivity</td></tr><tr><td>Z</td><td>metal / copper</td><td>good electrical Conductivity</td></tr></table>	3 (1 mark per row)
4a	Elements are substances that cannot be broken down into simpler substances (by chemical means).	1
4b	<table><tr><th>metals</th><th>Non-metals</th></tr><tr><td>V and Y</td><td>W and X</td></tr></table>	2 (1m per column)
4c	<table><tr><th>subst</th><th>element</th><th>cmpd</th><th>element or a cmpd</th><th>mixture</th></tr><tr><td>P</td><td></td><td>✓</td><td></td><td></td></tr><tr><td>Q</td><td></td><td>✓</td><td></td><td></td></tr><tr><td>R</td><td></td><td></td><td>✓</td><td></td></tr><tr><td>S</td><td></td><td></td><td></td><td>✓</td></tr></table>	4 (1m for each subst)
5a		1

5b

	solid state	state at 160 °C
movement	Vibrate about in their fixed positions	Randomly and quickly
arrangement	Closely packed in an orderly manner	Far apart from one another

1m for each correct box

5c



1m for correct shape of graph
1m for correct axes and melting point state

2

6ai

No net charge. 1
It has equal number protons and electrons. 1

3

6aii

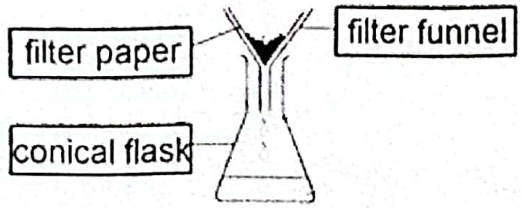
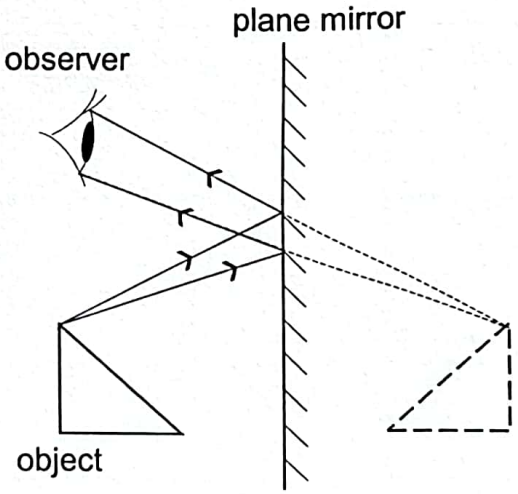
name of sub-atomic particle	proton	electron	**neutron**
relative mass	**1**	$\frac{1}{1840}$	
relative charge		**-1**	

(1m for each box)

6b

Q and T. 1
It has at least two types of atoms combined together. 1

Section C

7a	**Iron** powder. Magnetic attraction makes use of the fact that **only some materials are attracted to magnets**, thus **separating** *(must be written down)* magnetic materials from non-magnetic materials.	1 1
7b	The purpose of adding sufficient water is to dissolve sodium chloride[1] while stirring is done to ensure the process as much sodium chloride dissolves/expedite the process of dissolving [1].	1 1
7c	The mixture should then be **filtered** to **separate** the (insoluble) **copper(II) oxide from** the (soluble) **sodium chloride** that has dissolved in the water.	1 1
7d	 [1] drawing of correct filtration setup. [1] correct labelling of conical flask/beaker [1] correct labeling of filter paper and filter funnel	3
7e	Evaporation	1
8ai	 1 mark for virtual image that is same size and shape. • -1/2 mark for real image	1
8aii	1 mark for real light rays from one point of object to eyes. • -1/2 mark for virtual lines 1 mark for virtual light rays from object to surface. • -1/2 mark for real lines -1/2 for whole question for wrong arrows.	2
8b	Image is (any two of the following): • Virtual	2

	• Same size / shape • Laterally inverted • Upright • Equidistant from object to mirror and mirror to image.	
8ci	most optically dense → least optically dense Medium I Medium II air	1
8cii	Since medium II is optically less dense than medium I, speed of light increases [1], making the light ray bend away from the normal [1].	2
8d	Distance = 1.5 m + 1.5 m + 2.5 m = 5.5 m	2
9a	Cytoplasm	1
9bi	Chloroplast	1
9bii	Absorbs or traps sunlight / light energy to carry out photosynthesis / make food / make glucose.	1
9ci	Plant cell	1
9cii	It has one large central vacoule / it contains chloroplasts.	1
9d	Yes [1] It has a cell membrane / cytoplasm. [1] OR No [1] It does not have a nucleus / cannot make food / absence of chloroplast / it is a plant cell (only if ans in (c)(i) is plant).	2
9ei	Organ	1
9eii	Division of labour is the breakdown of work into smaller and more specific tasks [1] for maximum efficiency. [1]	2

~ End of Answer Scheme ~