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DAMAI SECONDARY SCHOOL End-of-Year Examination 2022

CANDIDATE NAME

CLASS

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INDEX NUMBER

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SCIENCE

Secondary 1 Express

10 October 2022

Setter: Mr Justin Thong

2 hours

Additional Materials: Multiple Choice Answer Sheet

100 marks

READ THESE INSTRUCTIONS FIRST

READ THESE INSTRUCTIONS FIRST

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

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

You may use an 2B pencil for any diagrams or graphs.

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

Section A

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

Choose the **one** you consider correct and record your choice in soft **2B-pencil** on the separate Answer Sheet.

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

Section B

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

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

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

You are advised to spend no more than **60 minutes** on Section A.

You may proceed to answer Section B as soon as you have completed Section A.

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

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

This document consists of **27** printed pages.

Section A

Answer **all** questions in this section.

- 1 Pluto was declared as the ninth planet from the Sun in 1930.

Beginning in the 1990s, its status as a planet was questioned following the discovery of several objects of similar size. This prompted the International Astronomical Union (IAU) to formally define the term "planet".

The IAU downgraded the status of Pluto to that of a dwarf planet in 2006 as it did not meet the criteria of clearing its neighbouring region of other objects.

Which statement best illustrates the case study of Pluto?

- A Scientific knowledge is reliable and durable.
 - B Science is a human endeavour which is open to changes.
 - C Scientific knowledge is derived from systematic experimentation.
 - D There are harmful consequences to technological applications to society.
- 2 Which of the following is **not** a laboratory rule?
- A eating and drinking is not allowed in the laboratory
 - B goggles must be worn when heating or mixing chemicals
 - C all unused chemicals must be poured back into their original containers
 - D hands must be washed thoroughly with water after handling the chemicals

- 3 In the school science laboratory, Michelle came across a glass bottle with the symbol as shown below.



Which of the following correctly describes the substance inside the glass bottle?

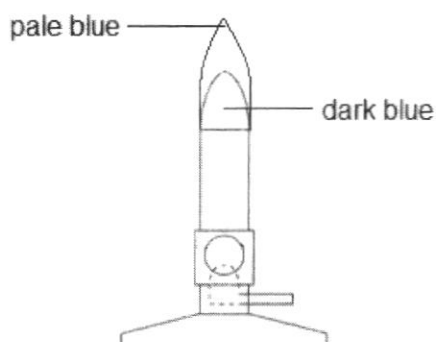
- A the substance can irritate the skin
- B the substance can corrode materials
- C the substance gives off harmful radiation
- D the substance can catch fire easily and burn

- 4 The table shows four investigation topics for a study on exercise habits.

S/No	topics
1	Investigating the average duration of an exercise session.
2	Investigating the frequency of exercise per week among young adults.
3	Investigating the public views about the importance of exercise.
4	Investigating the reasons that motivate people to exercise.

Which pair of investigations will require the collection of qualitative data?

- A** 1 and 2 only
B 1 and 4 only
C 2 and 3 only
D 3 and 4 only
- 5 A Bunsen burner was lighted and the flame was observed to have a dark blue inner zone and a pale blue outer zone.



Which of the following is correct?

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

- 6 The results for an experiment on hardness are shown below.

	scratched by X	scratched by Y	scratched by Z
X		no visible mark	faint mark seen
Y	faint mark seen		deep mark seen
Z	no visible mark	no visible mark	

Which of the following shows the materials in order of increasing hardness?

	least hard	—————→	hardest
A	X	Y	Z
B	Y	Z	X
C	Y	X	Z
D	Z	Y	X

- 7 Tungsten is a metal used to make the filament of light bulb.

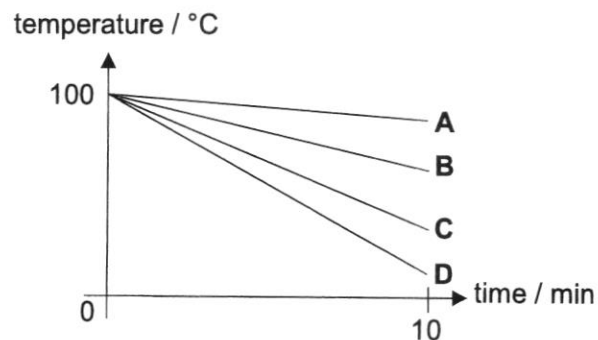
Which are the important properties that determine its use as the filament of light bulb?

- I high melting point
- II high boiling point
- III good conductor of electricity

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

- 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 below.



Which material, **A**, **B**, **C** or **D**, is most suitable for making a container to keep food warm?

- 9 Three objects of different shapes are cut from the same sheet of steel. The mass of the different objects are shown below.



disc



square

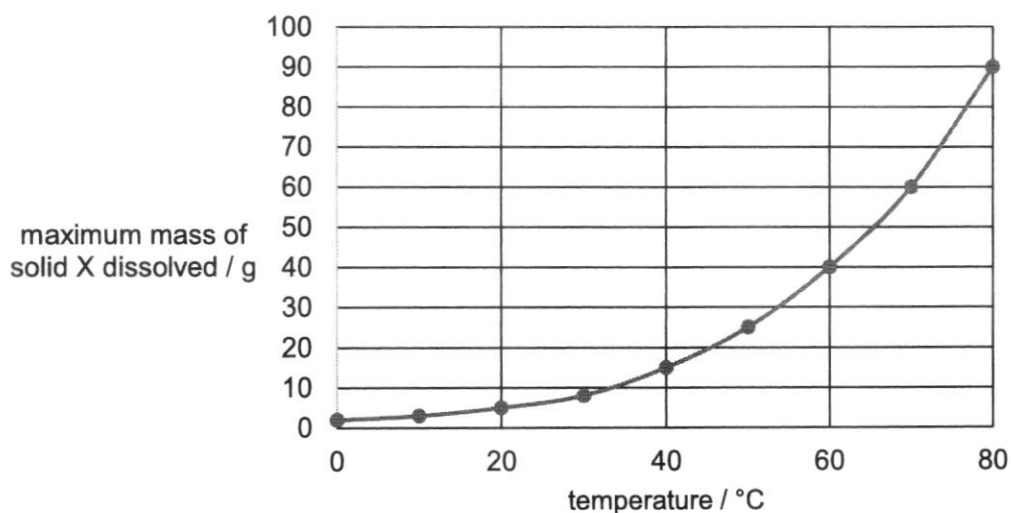


L-shape

Which object has the greatest density?

- A disc
 B square
 C L-shape
 D all have the same density
- 10 A student is trying to dissolve 60 g of solid X in 100 ml of water.

The graph below shows how temperature affects the solubility of solid X in 100 ml of water.



At what temperature would she be left with 20 g of undissolved solid X?

- A 15 °C
 B 43 °C
 C 60 °C
 D 70 °C

11 Which substance is a compound?

- A bromine (Br_2)
- B carbon monoxide (CO)
- C gold (Au)
- D sulfur (S_8)

12 Which statement about the Periodic Table is correct?

- A The horizontal row of the Periodic Table is known as the period.
- B Elements in the same group have the same number of electrons.
- C The elements change from non-metal to metal across each horizontal row.
- D The elements are arranged in the Periodic Table in increasing number of neutrons.

13 Four statements describing compounds and mixtures are given below.

- I Compounds have fixed compositions by mass.
- II Compounds have variable melting points.
- III Mixtures can be separated by physical means.
- IV Mixtures have their unique properties different from their constituents.

Which statements are correct?

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

14 Which of the following correctly compares a difference between a solution and suspension?

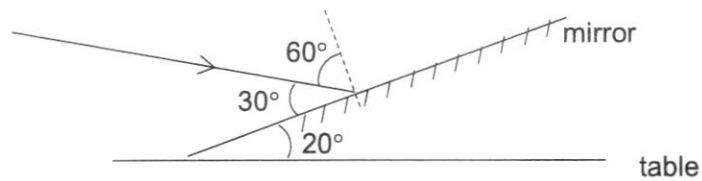
	solution	suspension
A	light cannot pass through	light can pass through
B	solute does not dissolve	solute dissolves
C	solute settles to form solid deposit	no solid deposit formed
D	solute particles cannot be seen	particles can be seen

15 Which statement about elements and compounds is true?

- A Elements and compounds can exist as molecules.
- B Elements and compounds cannot be broken down by chemical means.
- C Elements exist only as atoms while compounds exist only as molecules.
- D Elements can be broken down by chemical means while compounds can be broken down by physical means.

- 16 Which of the following **cannot** be separated by physical methods?
- A air
 - B water
 - C salt solution
 - D sand and salt
- 17 Which mixture can be separated using a magnet?
- A iron and steel
 - B glass and copper
 - C rubber and sulfur
 - D aluminium and iron
- 18 In an experiment, a student filtered a mixture of sand, water and an unknown substance. The student observed that the filtrate was a clear liquid. Sand was the only residue collected.
- What conclusion can the student make?
- A The filtrate is pure water.
 - B The filtrate contains dissolved sand.
 - C The unknown substance is soluble in water.
 - D The unknown substance is insoluble in water.
- 19 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
- 20 Which of the following correctly explains why evaporation to dryness is **not** suitable for obtaining sugar from sugar solution?
- A sugar is highly soluble in water
 - B sugar solution has very high boiling point
 - C sugar is unstable and decomposes in the presence of very high heat
 - D sugar solution is a compound and requires a chemical process for separation

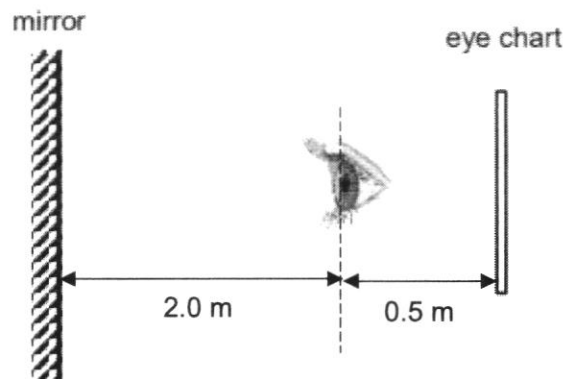
- 21 A ray of light is directed onto a mirror that is tilted at an angle of 20° from the table as shown in the diagram.



What is the angle of reflection?

- A 20°
 B 30°
 C 50°
 D 60°
- 22 In an eye clinic, a patient undergoing an eye test looks at the image of an eye chart in a mirror placed 2.0 m in front of him.

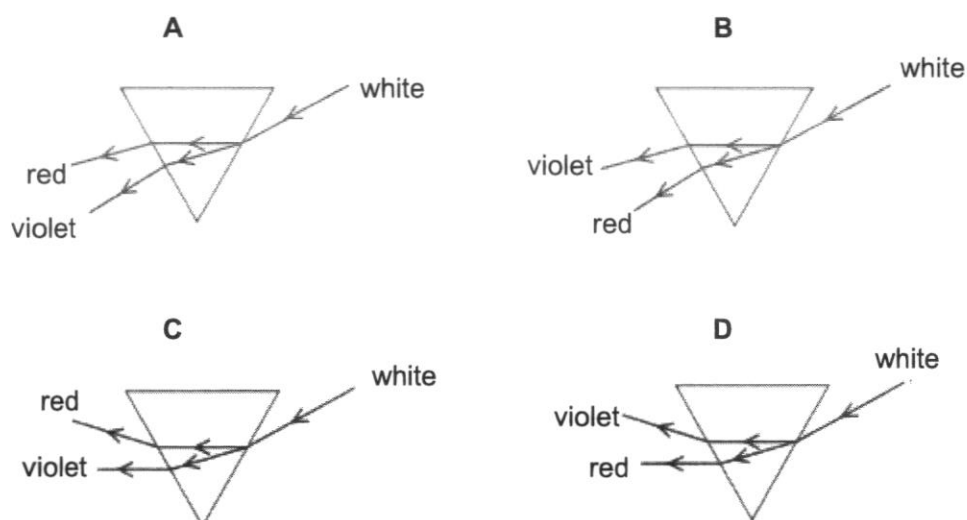
The actual eye chart is positioned 0.5 m behind his eyes.



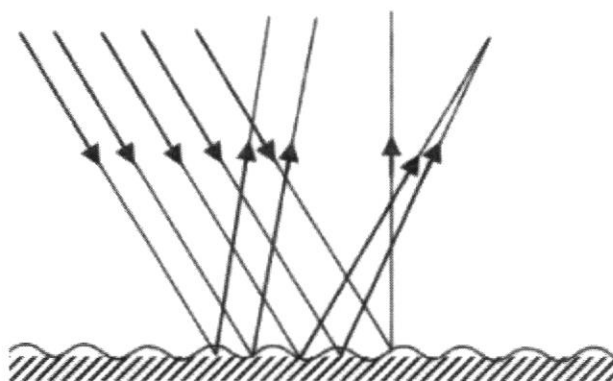
What is the distance between the image of the chart and his eyes?

- A 2.0 m
 B 2.5 m
 C 4.0 m
 D 4.5 m

- 23 Which diagram correctly shows the dispersion of white light by a glass prism?



- 24 The diagram below shows light rays hitting a surface.



Which of the following about the type of reflection and the material of the reflecting surface is correct?

	type of reflection	material of reflecting surface
A	regular	glass
B	irregular	mirror
C	diffused	paper
D	regular	still water

- 25 Which item uses a convex mirror?

- A** periscope
- B** microscope
- C** car headlight
- D** blind spot mirror

26 Which statement(s) is/are true of a cell wall?

- I gives cell a regular shape
- II made up of cellulose
- III partially permeable
- IV protects cell from mechanical injury

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

27 Which of the following is a multicellular organism?

- A** Amoeba
- B** Penicillium
- C** Paramecium
- D** Escherichia coli

28 Which statement best describes the benefit of having a division of labour in a multi-cellular organism?

- A** It reduces the energy requirement in a multi-cellular organism.
- B** It reduces the waste products produced in a multi-cellular organism.
- C** It enables the multi-cellular organism to defend against bacteria better.
- D** It enables efficient functioning of the processes in the multi-cellular organism.

29 An organelle in a plant cell is known to contain cell sap.

What is this organelle likely to be?

- A** chloroplast
- B** cytoplasm
- C** vacuole
- D** nucleus

30 In the human body, the stomach functions together with the liver, small intestine and large intestine when food is consumed.

Which level of organisation is the above description referring to?

- A** cell
- B** organ
- C** system
- D** tissue

31 Which statement about solids, liquids and gases is correct?

- A Liquids and gases can be easily compressed.
- B In a solid, particles vibrate about fixed positions.
- C In a liquid, particles move slowly in some directions only.
- D In a gas, particles move slowly downwards due to the force of gravity.

32 The table below gives the melting points and boiling points of four elements.

Which element is a liquid at 900 °C?

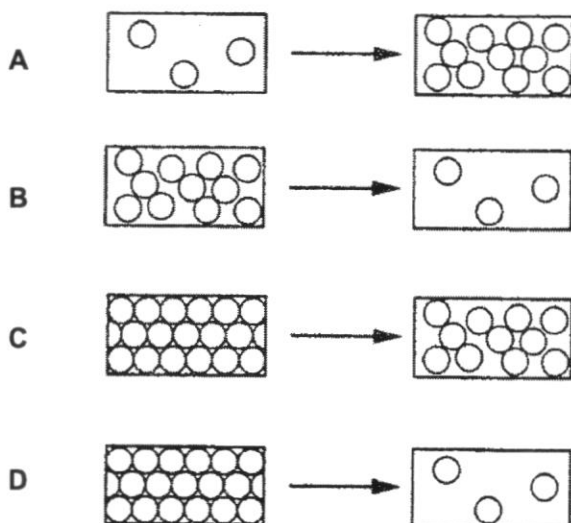
	element	melting point / °C	boiling point / °C
A	zinc	419	907
B	neon	-249	-246
C	iron	1540	2750
D	mercury	-39	357

33 A liquid is heated.

Which statement is **not** correct?

- A The particles expand.
- B The particles gain energy.
- C The particles move faster.
- D The particles move further apart.

34 Which diagram represents condensation?



39 How many atoms does one molecule of ethanol ($\text{C}_2\text{H}_5\text{OH}$) contain?

- A** 3
- B** 5
- C** 7
- D** 9

40 Which row in the table below correctly shows the sub-atomic particles found inside and outside of the nucleus?

	inside the nucleus	outside the nucleus
A	electrons only	protons and neutrons
B	electrons and neutrons	protons only
C	protons and neutrons	electrons only
D	protons only	electrons and neutrons

-- End of Section A --



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SCIENCE

10 October 2022

Secondary 1 Express

2 hours

Setter: Mr Justin Thong

100 marks

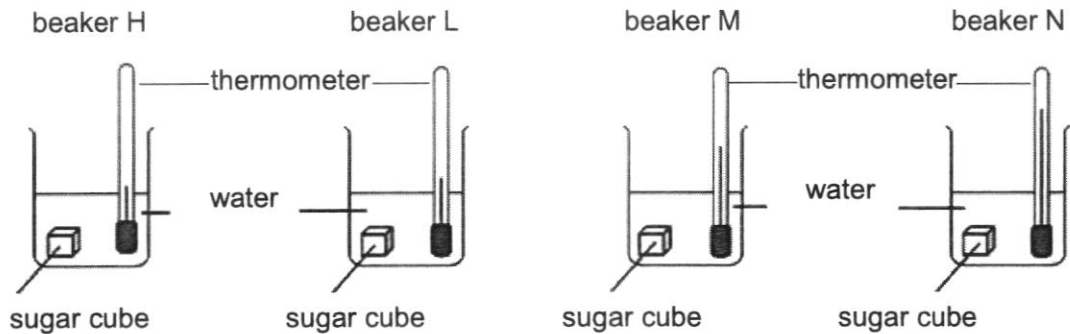
ANSWER BOOKLET

Section	Marks
A	/ 40
B	/ 60
Total	/ 100

Section B

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

- 1 Merlin set up an experiment as shown below. She placed an identical sugar cube and poured equal volumes of water, but at various temperatures, into each beaker. She then measured the time taken for each sugar cube to dissolve completely in the water.



- (a) Suggest a possible hypothesis for this experiment.

.....
 [1]

- (b) Identify two controlled variables.

1 [1]

2 [1]

- (c) Identify the independent variable of the experiment.

..... [1]

- (d) Predict in which beaker the sugar cube would dissolve the fastest.

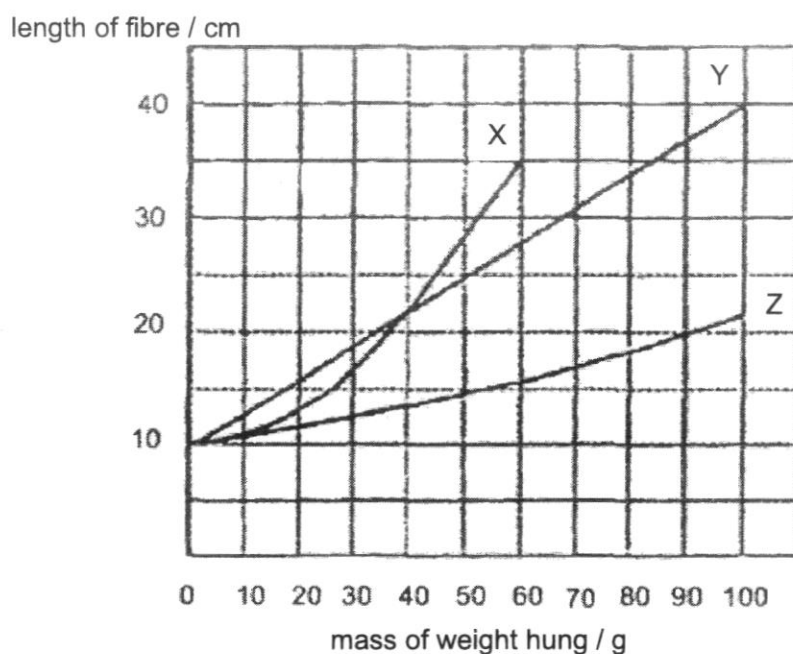
..... [1]

- (e) Suggest two other ways to shorten the time taken for the sugar cube to dissolve completely in the same volume of water in all the four beakers.

1 [1]

2 [1]

- 2 A student carried out an experiment by hanging consecutively 10 g masses, up to a maximum of 100 g, on three types of fibres X, Y and Z. The graph below shows the results of stretching fibres X, Y and Z.



- (a) One of the fibres broke before the end of the experiment.

Which fibre, X, Y or Z, is this?

..... [1]

- (b) A sweater must be able to retain its shape after it has been tumbled dry in a washing machine.

- (i) State the physical property of a material that is referred to by the phrase "to retain its shape after it has been tumbled dry in a washing machine".

..... [1]

- (ii) Which fibre X, Y or Z would you choose to make this sweater?

Explain your choice.

.....

..... [2]

- (c) List two properties, other than the one mentioned in (b)(i), that fibres should have to be suitable for making clothes.

.....
 [2]

- (d) Name a type of fibre that is suitable to be made into clothing for a tropical country like Singapore.

..... [1]

- 3 During a lab session, Leonard removed a small piece of plasticine from a block of plasticine. He measured the mass of the small piece of plasticine using an electronic balance.

- (a) The electronic balance showed a reading of 2.45 g.

- (i) Given that the electronic balance had a zero error of - 0.05 g, calculate the actual mass of the piece of plasticine.

actual mass = [1]

- (ii) Beside using mathematical calculation in (i) to obtain the actual mass, suggest what could Leonard do to ensure that the electronic balance is free from zero error before taking the measurement.

..... [1]

Leonard filled a measuring cylinder with water as shown in diagram 1. He then gently submerged the piece of plasticine into the water.

Diagram 2 shows the water level when the piece of plasticine is fully submerged.

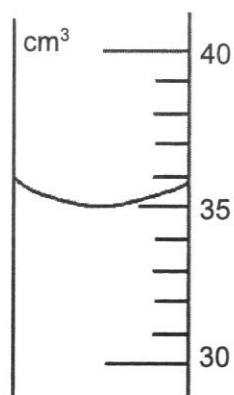


diagram 1

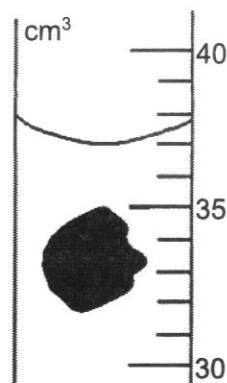


diagram 2

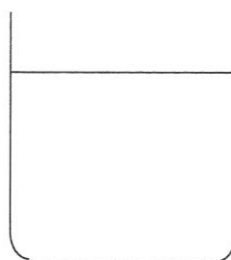
- (b) Determine the volume of the piece of plasticine.

volume = [1]

- (c) Using the answers in (a)(i) and (b), calculate the density of the piece of plasticine in g/cm^3 .

density = [2]

- (d) Leonard removed the piece of plasticine and dropped it into a beaker containing an unknown liquid of density 3.5 g/cm^3 .

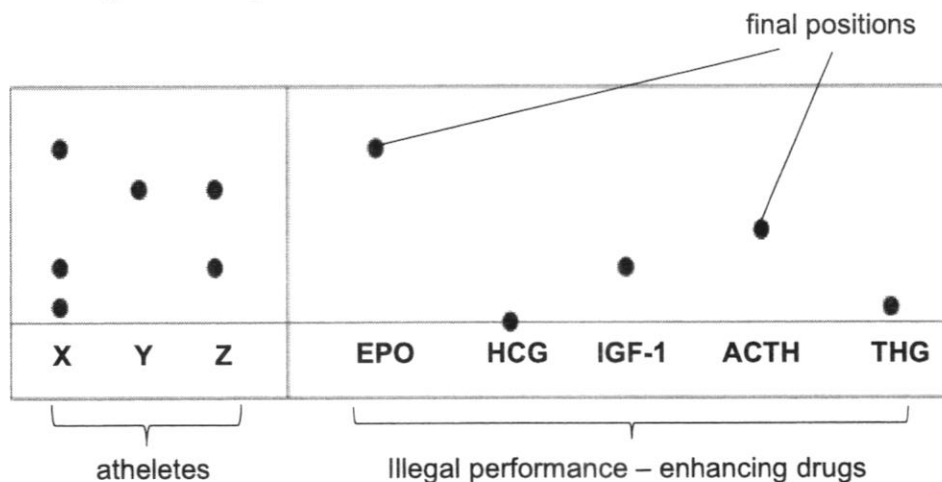


On the diagram above, mark clearly with a 'X', the position of the piece of plasticine in the beaker containing the unknown liquid. [1]

- 4 A sports official suspects that athletes **X**, **Y** and **Z** have used use illegal performance-enhancing drugs to help them boost their running speed.

Paper chromatography is used to analyse the athletes' urine samples. The results are compared to some known illegal performance-enhancing drugs **EPO**, **HCG**, **IGF-1**, **ACTH** and **THG**. Alcohol is used as the solvent.

The resulting chromatogram is shown below.



- (a) Suggest a reason why the final positions of the samples of **EPO** and **ACTH** differ on the chromatogram.

.....
 [1]

- (b) Explain why the sample of **HCG** remains at the starting line at the end of the experiment.

.....
 [1]

- (c) Name the illegal performance-enhancing drugs present in athlete **X**?

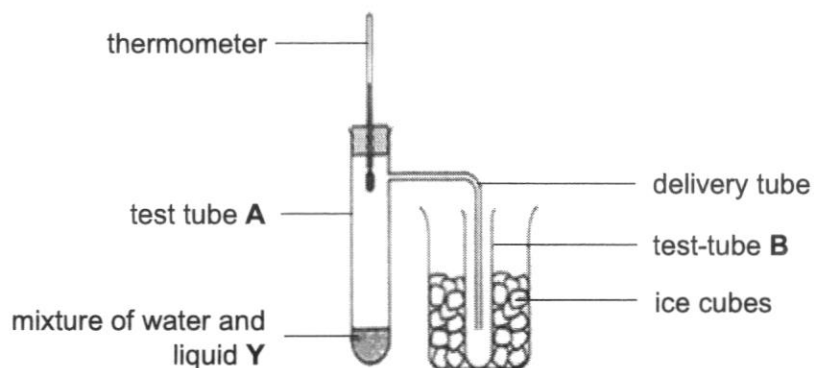
..... [1]

- (d) Besides athlete **X**, which athlete should be disqualified from the race?

Explain your answer.

.....
 [2]

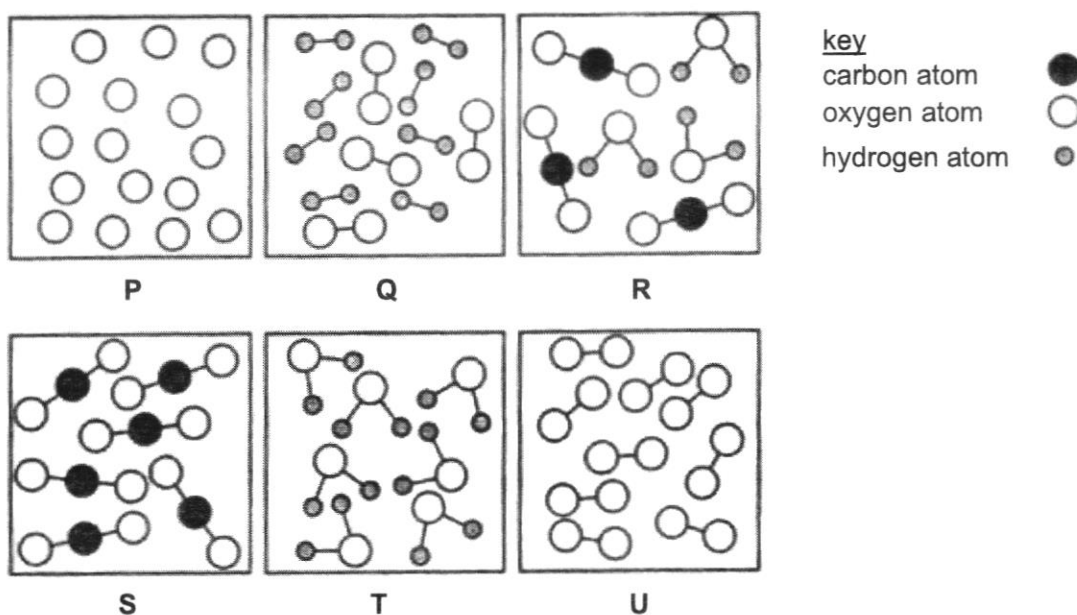
- 5 The diagram below shows the apparatus used to separate a mixture of water and another liquid **Y** which has a boiling point of 72 °C.



- (a) State the separation technique used above.
 [1]
- (b) Explain the function of the ice cubes.
 [1]
- (c) Which liquid, water or **Y**, will be collected first in test-tube **B** when the mixture is heated?
 Explain your answer.

 [2]
- (d) State the scientific name of the pure liquid collected in (c).
 [1]

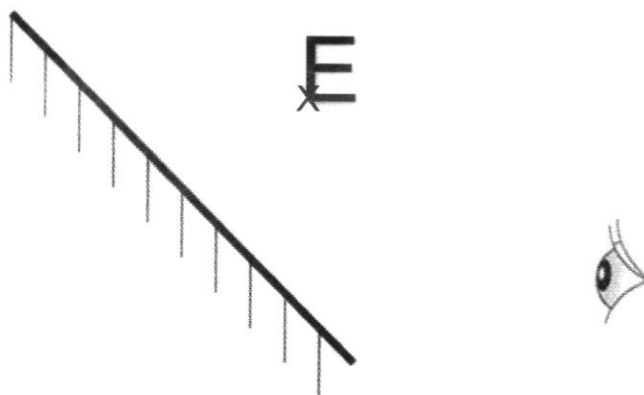
- 6 In the diagram below, **P**, **Q**, **R**, **S**, **T** and **U** represent the particles in different substances.



Which one of **P**, **Q**, **R**, **S**, **T** and **U** best represents

- (a) pure carbon dioxide [1]
 (b) pure oxygen gas [1]
 (c) pure water [1]
 (d) a mixture of compounds [1]
 (e) a mixture of elements [1]

- 7 (a) A letter E is placed in front of a plane mirror as shown in the diagram below.



On the diagram,

- (i) mark with a 'X', the position of the image of the bottom corner of E and label it as I, [1]
 - (ii) draw one incident ray and one reflected ray to show how the image is seen by the eye, [2]
- (b) (i) The letter E appears in the mirror.

State the characteristic of the image formed that describe this appearance.

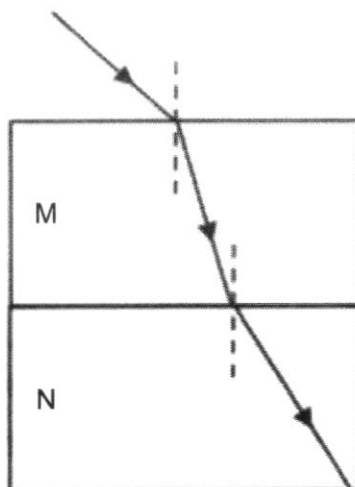
..... [1]

- (ii) The image formed by the mirror is virtual.

Explain the term virtual.

..... [1]

- 8 The diagram below shows how a light ray passing from air through two different transparent media of different optical densities from air.



- (a) Explain what causes the bending of the light in the diagram.

.....
 [1]

- (b) The table below shows the relative optical density of air and medium N.

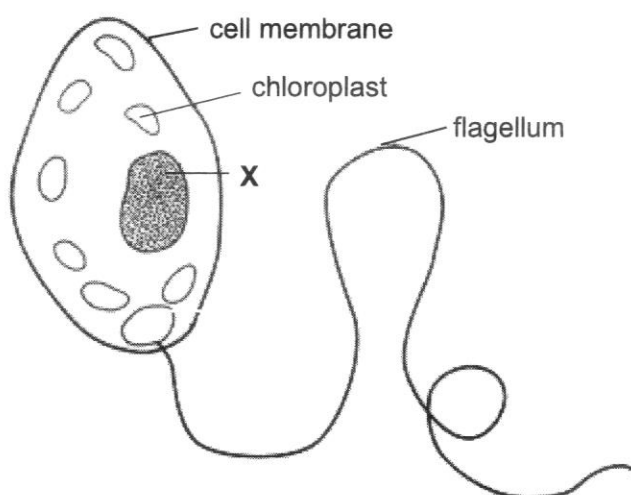
medium	relative optical density
air	1.01
N	1.78

With reference to diagram and the table, suggest a possible value for medium M's relative optical density and explain your answer.

.....

 [2]

- 9 (a) The diagram below shows the unicellular organism, *Euglena*.



- (i) Some scientists classify the organism as a plant.

Identify one feature which suggests why scientists classify the *Euglena* as a plant.

..... [1]

- (ii) Some scientists classify the organism as an animal.

State two structures of a plant cell that are **not** present in the *Euglena*.

1

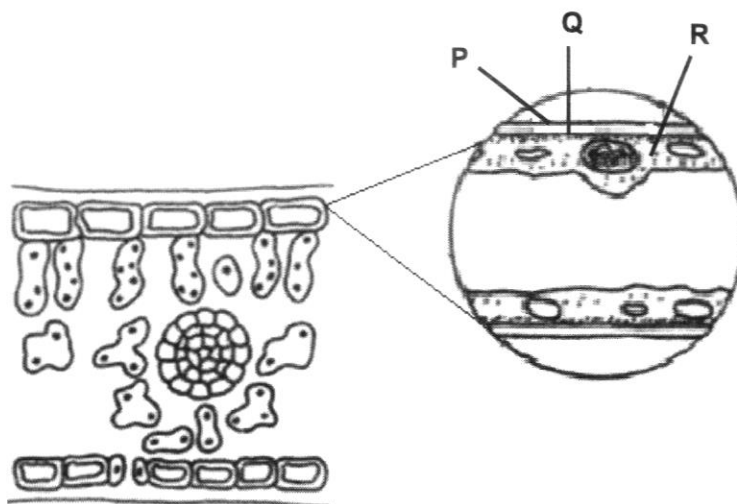
2 [2]

- (iii) Predict what structure **X** is and state what it contains.

.....

..... [2]

- (b) Unlike *Euglena*, most plants are multicellular organism. The diagram below shows the cross-sections of a leaf and a magnified part of a leaf belonging to a Balsam plant.



- (i) Describe the term partially permeable.

..... [1]

- (ii) Which structure, **P**, **Q** or **R** is partially permeable?

..... [1]

- (iii) Is a leaf an organ or a tissue?

Explain your answer.

.....

..... [2]

- 10 The table below gives information about the elements M, Q, R and T.

element	proton number	nucleon number	electronic configuration
M	4	9	
Q	20	40	
R	8	16	
T	13	27	

- (a) In the table above, fill in the empty column with the respective electronic configuration of all the elements. [2]

- (b) Which element(s), M, Q, R or T, is/are a non-metal?
..... [1]
- (c) Which element(s), M, Q, R or T, has/have the same number of electron shells as neon?
..... [1]
- (d) Which element(s), M, Q, R or T, has/have the same number of valence electrons as gallium?
..... [1]
- (e) An unknown element X has a proton number of 8 and nucleon number of 14.
Which element, M, Q, R or T, is an isotope of element X.
Explain your answer.
.....
..... [1]
- (f) Using a "dot and cross" diagram, draw the electronic structure of the atom of element T.

[2]

-- End of Section B --**-- End of Paper --**

2022 Sec 1E Science End of Year Examination

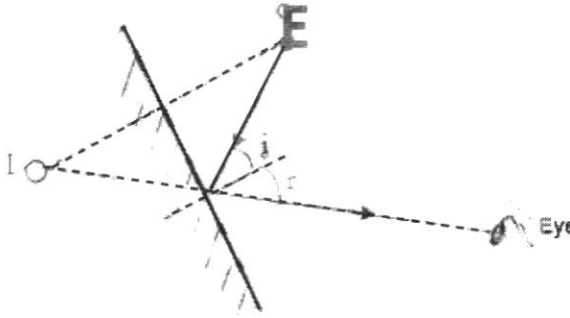
Section A

1	2	3	4	5	6	7	8	9	10
B	C	A	D	D	C	B	A	D	C
11	12	13	14	15	16	17	18	19	20
B	A	C	D	A	B	D	C	C	C
21	22	23	24	25	26	27	28	29	30
D	D	C	C	D	D	B	D	C	C
31	32	33	34	35	36	37	38	39	40
B	A	A	A	A	D	A	C	D	C

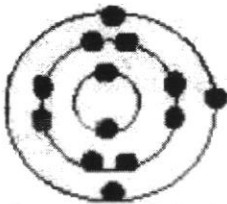
Section B

Qn	solution	Mark
1	(a) The time taken for the sugar to dissolve is affected by the temperature of the water. Or The rate of dissolving of sugar is affected by the temperature of the water.	B1
	(b) • volume of water • mass of sugar • size of the sugar cube • type of sugar cube • size and material of beaker used	Any two answers B1 each
	(c) Temperature of water	B1
	(d) beaker N	B1
	(e) Stir the mixture Use sugar grain instead of cube.	B1 each
2	(a) Fibre X	B1
	(b)(i) Strength	B1
	(b)(ii) Fibre Z. It is strong enough to carry the load without affecting much of its original shape/length	A1 M1
	(c) Flexible, soft Or any possible answer	B1 each
	(d) Linen, cotton or light wool Or any possible answer	B1
3	(a)(i) 2.50 g	B1
	(a)(ii) Press the tare button to zero the electronic balance before placing the piece of plasticine on top.	B1
	(b) 2.0 cm ³ (note: accept 2 cm ³)	B1
	(c) $\text{density} = \frac{2.50}{2}$ = 1.25 g/cm ³	M1 A1
	(d) The cross must be drawn exactly on the liquid surface because the plasticine will float on the unknown liquid.	B1

[Turn over

4	(a)	EPO is more soluble than ACTH, which is why the spot of EPO is higher than the spot of ACTH. or EPO and ACTH have different solubilities.	B1
	(b)	HCG is insoluble in the solvent/alcohol.	B1
	(c)	EPO, IGF-1, THG	B1
	(d)	Athlete Z. The urine sample of Z contains IGF-1.	A1 M1
5	(a)	Distillation	B1
	(b)	To condense the vapour that flows through the delivery tube	B1
	(c)	Liquid Y Liquid Y has a lower boiling point and will be changed into vapour and enter the delivery tube first and be condensed by the ice cubes.	A1 M1
	(d)	Distillate	B1
6	(a)	S	B1
	(b)	U	B1
	(c)	T	B1
	(d)	R	B1
	(e)	Q	B1
7	(a)	 Minus total of 1 mark if no arrows and/or dotted line to represent ray behind mirror	B1- mark and label image B1- for correct incident ray B1- for correct reflected ray
	(b)(i)	Laterally inverted	B1
	(b)(ii)	It means the image can be captured/projected on a screen	B1
8	(a)	The speed of light changes as it travels from one optical medium to another optical medium of different optical densities.	B1
	(b)	Accept values above 1.78. The refracted ray bends towards the normal as light passes from air to M and bends away from the normal as light passes from M to N. This is because M is optically more dense than air and N.	B1 B1
9	(a)(i)	It has chloroplast/ many chloroplasts	B1
	(a)(ii)	It does not have - cell wall - large central vacuole	B1 each

[Turn over

	(a)(iii)	Nucleus It contains - genetic information/materials, or - Chromosomes, or, - Genes, or - DNA	B1 B1																				
	(b)(i)	Partially permeable means to allow some substances to pass through and not the rest.	B1																				
	(b)(ii)	Q	B1																				
	(b)(iii)	Leaf is an organ leaf is made up of many groups of tissues that work together to allow the leaf to perform its function.	B1 B1																				
10	(a)	<table border="1"> <thead> <tr> <th>element</th><th>proton number</th><th>nucleon number</th><th>electronic configuration</th></tr> </thead> <tbody> <tr> <td>M</td><td>4</td><td>9</td><td>2,2</td></tr> <tr> <td>Q</td><td>20</td><td>40</td><td>2,8,8,2</td></tr> <tr> <td>R</td><td>8</td><td>16</td><td>2,6</td></tr> <tr> <td>T</td><td>13</td><td>27</td><td>2,8,3</td></tr> </tbody> </table>	element	proton number	nucleon number	electronic configuration	M	4	9	2,2	Q	20	40	2,8,8,2	R	8	16	2,6	T	13	27	2,8,3	B1 for 2 correct answers
element	proton number	nucleon number	electronic configuration																				
M	4	9	2,2																				
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	(b)	Element R	B1																				
	(c)	Element M or R	B1																				
	(d)	Element T	B1																				
	(e)	Element R Element R has the same number of proton as X but different number of neutrons (nucleon number + number of proton + number of neutron)	A1 M0																				
	(f)	 1 mark for correct number of electrons in each shell 1 mark for the valence electrons to be placed in the N-S-E position	B1 B1																				

[Turn over