



St. Patrick's School End-Of-Year Examinations 2023

Subject : SCIENCE

Date : 12 OCT 2023

Level : SECONDARY 1 NORMAL (ACADEMIC) Duration : 2 H

INSTRUCTIONS TO CANDIDATES:

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

- Write your name, class and index number on the **Question Paper** and the **Optical Answer Sheet** in the spaces provided. It is also required that you **SHADE** your index number on the **Optical Answer Sheet**.
- This paper consists of **Three (3) Sections**: **Section A**, **Section B** and **Section C**.
- Answer **ALL** questions in **Section A** on the **Optical Answer Sheet** provided.
- Answer **ALL** questions in **Section B** and **Section C** in the spaces provided.
- Calculators may be used where necessary. Give all numerical answers to **3 significant figures**.
- DO NOT DETACH** any sections from this paper.
- Submit the **Optical Answer Sheet** and **this paper SEPARATELY**.

INFORMATION FOR CANDIDATES:

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

FOR MARKER'S USE ONLY:

Section	A [20]	B [30]	C [30]	Total [80]	Grade
Score					

This question paper consists of 23 printed pages including this cover page.

Section A: [20 marks]

Each question is provided with **four** possible answers (**A**, **B**, **C** and **D**). Select the most appropriate answer and shade you answers in the **Optical Answer Sheet**.

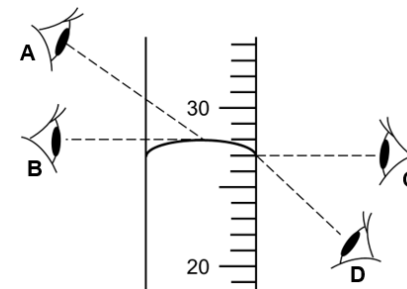
- Which option correctly describes the 'open-mindedness' of a good scientist?
A not falsely report one's observations to fit beliefs
B stick to the truth until the scientist's discovery is proven
C conducting the investigation a few times to obtain reliable results
D be willing to accept that something could happen contrary to popular belief
- The following hazard symbols are found on a bottle containing a chemical in the laboratory.



Which row correctly identifies each hazard symbol?

	I	II	III
A	irritant	explosive	corrosive
B	corrosive	flammable	irritant
C	corrosive	explosive	toxic
D	irritant	flammable	toxic

- Which process should be conducted before carrying out an experiment?
A analyse data
B recording data
C forming conclusions
D proposing hypothesis
- At which position should the eye be placed to take the reading from the measuring cylinder?



- 5 A student bought some pencil lead with a thickness of 0.50 mm.

He measured the thickness of his pencil lead and recorded the readings in the table.

no. of readings	1st	2nd	3rd
readings (mm)	0.59	0.60	0.59

Which option correctly describes the accuracy and precision of his readings?

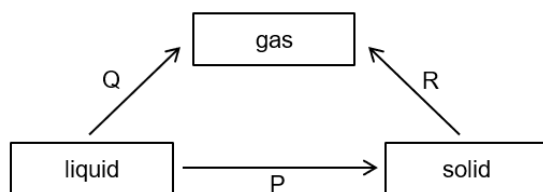
	accuracy	precision
A	low	high
B	low	low
C	high	low
D	high	high

- 6 When a student was cleaning, he noted that dust particles take a long time to settle down on surfaces.

Why do dust particles take a long time to settle down?

- A Dust particles are less dense than air.
- B Gravity has no effect on tiny dust particles.
- C Air molecules that are always moving knock into them.
- D Dust particles repel one another as they are magnetic in nature.

- 7 The diagram shows the different processes that a substance undergoes.



Which statement about the processes P, Q, and R is correct?

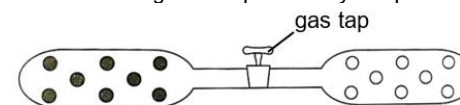
- A During processes P and Q, the energy of the particles increases.
- B During process P, the particles move slower and closer together.
- C During process Q, the distance between the particles decreases.
- D During process R, the attractive forces between the particles increases.

- 8 When particles undergo diffusion, there is a net movement of particles from a region of I concentration to a region of II concentration.

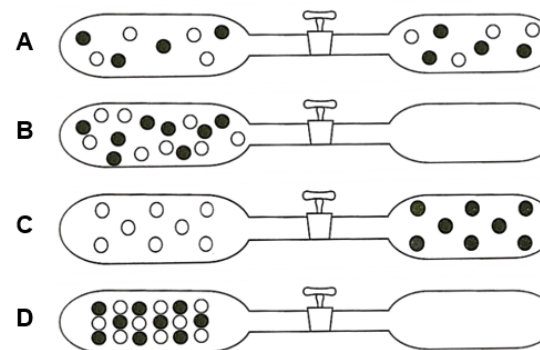
Which row correctly identifies I and II?

	I	II
A	low	high
B	low	low
C	high	low
D	high	high

- 9 The diagram shows two different gases separated by a tap.



Which diagram best represents how the gas particles will be distributed after the tap is left open for some time?



- 10 Which statement about the elements in the Periodic Table is true?

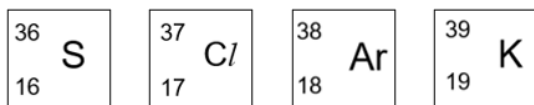
- A Each element has its own unique proton number.
- B Elements can be broken down into simpler substances upon heating.
- C Elements in the Periodic Table are arranged according to their nucleon number.
- D The properties of the elements change from non-metallic to metallic as we move from left to right of the Periodic Table.

- 11 An atom of a newly discovered element was found to have a proton number of 88 and a mass number of 230.

Which statement about this atom is correct?

- A The nucleus is negatively charged.
- B The atom has 88 protons and 142 neutrons.
- C The atom has 88 electrons and 142 protons.
- D All the subatomic particles are located in the nucleus of the atom.

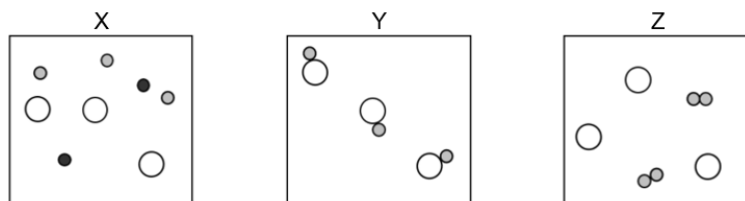
- 12 Four atoms have the following chemical symbols.



What can you conclude about the following atoms?

- A They have the same atomic masses.
- B They have the same number of electrons.
- C They have the same number of neutrons.
- D They have the same total number of electrons, protons and neutrons.

- 13 Three substances, X, Y and Z are represented in the diagrams.



Which row best describes X, Y and Z?

	X	Y	Z
A	element	compound	element
B	compound	mixture	mixture
C	mixture	element	compound
D	mixture	compound	mixture

- 14 Which statement correctly describes the difference between a solution and a suspension?

- A A solution is always colourless but a suspension appears cloudy.
- B A solution can be separated by filtration but a suspension cannot.
- C A solution allows light to pass through but a suspension does not.
- D A solution allows more solutes to be dissolved in it than a suspension.

- 15 Mr Tan wants to dissolve some sugar in his coffee as quickly as possible.

Which action will **not** help him to do so?

- A using a bigger cup
- B stirring the coffee more quickly
- C crushing the sugar into powder form
- D increasing the temperature of the coffee

- 16 Which property of a substance shows that it is pure?

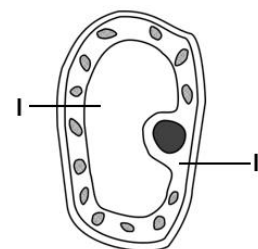
- A melting between 96 to 103 °C
- B burning in air to form two new products
- C evaporating to dryness without any residue
- D producing only one spot on the chromatogram

- 17 Jacob accidentally mixed sand, table salt and iron fillings together.

Which sequence of separation techniques should be used to separate and collect dry samples of each of the three substances?

- A add water → distillation → magnetic attraction
- B magnetic attraction → filtration → add water → distillation
- C magnetic attraction → add water → filtration → evaporation
- D filtration → magnetic attraction → dissolve in water → evaporation

- 18 The diagram shows a cell.



Which row correctly describes the parts labelled I and II?

	I	II
A	fluid-filled space	jelly-like substance
B	fluid-filled space	site where chemical reactions take place
C	stores water, food and mineral salts	jelly-like substance
D	stores water, food and mineral salts	site where chemical reactions take place

19 The table shows a scratch test carried out on three different materials, P, Q and R.

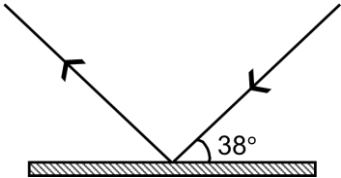
If metal 1 is able to leave a scratch mark on metal 2, a tick (✓) is put in the box.
 If metal 1 is unable to leave a scratch mark on metal 2, a cross (X) is put in the box.

metal 1 \ metal 2	P	Q	R
P		✓	X
Q	X		X
R	✓	✓	

Which option correctly arranges the materials, P, Q and R in order of increasing hardness?

	least hard	→	most hard
A	P	Q	R
B	R	Q	P
C	Q	R	P
D	Q	P	R

20 A ray of light strikes the surface shown in the diagram. What is the angle of reflection for the ray?



- A 38° B 52° C 104° D 142°

Section B: [30 marks]
 Answer ALL questions in this section. Show your working and answers in the space provided.

- 1 Isaac conducted an experiment to investigate how the initial height at which he dropped a ball would affect the maximum height the ball could reach after bouncing once. Fig. 1.1 shows how the measurements were taken.

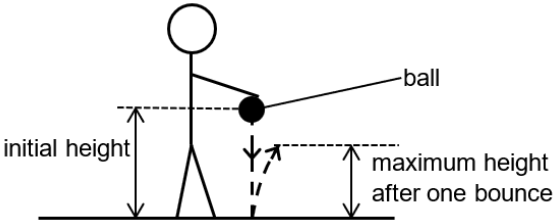


Fig. 1.1

Table 1.1 shows the results of his experiment.

Table 1.1

initial height / cm	maximum height after one bounce / cm
50	32
75	48
100	64
125	80
150	x

- (a) State the independent variable, dependent variable and one constant variable for Isaac's experiment.

independent variable:

dependent variable:

constant variable: [2]

- (b) Propose a hypothesis for Isaac's experiment.

.....
 [1]

- (c) Predict the maximum height, x cm, reached by the ball after the first bounce when the initial height is 150 cm.

..... cm [1]

- 2 Fig. 2.1 shows part of a Bunsen burner found in the laboratory.

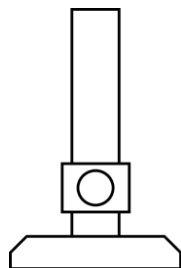


Fig. 2.1

- (a) On Fig. 2.1, draw the flame obtained when the air hole is opened and label the colours of the flame observed. [2]

- (b) State the name of the flame in (a) and explain why this flame is suitable for heating.

.....

 [1]

- 3 Solid X is cooled down in the laboratory from 150 °C to 27 °C.

Fig. 3.1 shows a diagram representing particles in solid X at 150 °C and 27 °C.

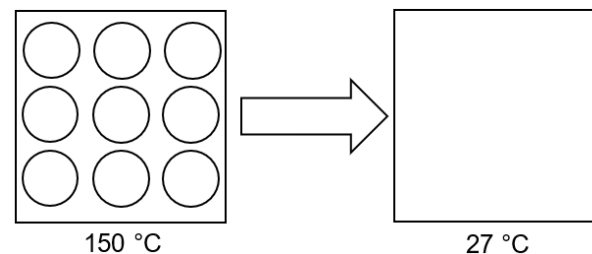


Fig. 3.1

- (a) The particles in solid X occupy a smaller volume as solid X is cooled down from 150 °C to 27 °C.

Explain how this happens using the particulate nature of matter.

..... [1]

- (b) Complete Fig. 3.1, by drawing a diagram to represent the particles in solid X at 27 °C. [2]

- (c) Suggest a possible temperature for the melting point of solid X.

..... °C [1]

- 4 Fig. 4.1 shows the solubility of three solutes **P**, **Q** and **R** in 20 cm³ of three different solvents, **X**, **Y** and **Z** at room temperature.

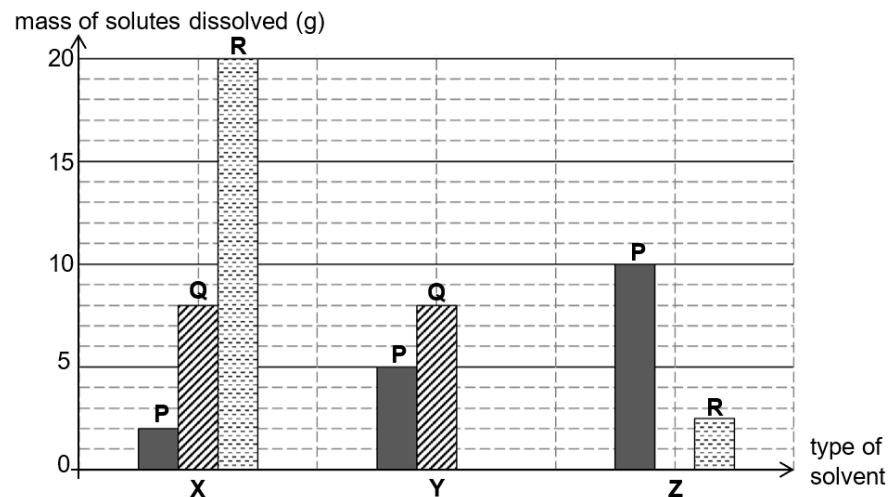


Fig. 4.1

- (a) A student accidentally mixed 7 g of solute **Q** and 7 g of solute **R** together. To obtain pure and dry solutes **Q** and **R**, he carried out the following steps:

1. Add 20 cm³ of one of the solvents to the mixture.
2. Filtration
3. Evaporation to dryness on filtrate in step 2.

- (i) Suggest a suitable solvent (**X**, **Y** or **Z**) that can be used to separate **Q** and **R**. Explain your choice, making reference to Fig. 4.1.

.....

[2]

- (ii) Draw a well-labelled diagram for the filtration step. Label the filtrate and residue in your diagram.

[3]

- (iii) State which solute was collected by evaporation to dryness.

.....

[1]

- (b) Sam's shirt was accidentally stained with 15 g of solute **P**. If Sam only had 20 cm³ of each solvent, suggest a solvent (**X**, **Y** or **Z**) he can use to remove the stain. Explain your choice.

.....

[2]

5 Fig. 5.1 shows an experimental set-up to find the volume of solid X. An enlargement of the reading is shown.

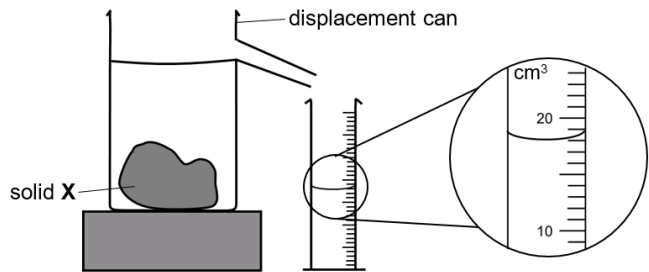


Fig. 5.1

(a) State the volume of solid X. cm³ [1]

(b) The mass of solid X is 22.5 g. Hence, calculate the density of solid X in g/cm³, correct to 2 decimal places.

density = g/cm³ [1]

(c) Table 5.1 shows the density of three liquids, water, turpentine and mercury.

Table 5.1

liquid	density (g/cm³)
water	1.0
turpentine	0.87
mercury	13.6

Fig. 5.2 shows the beaker containing water, turpentine and mercury.

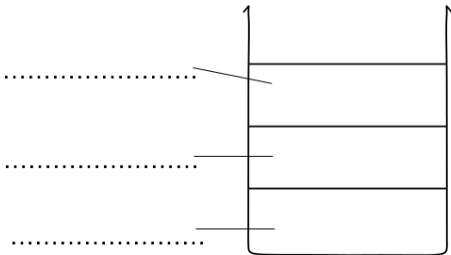


Fig. 5.2

(i) Using the information in Table 5.1, label the liquids (water, turpentine and mercury) in the beaker in Fig. 5.2. [1]

(ii) Solid X was placed into the beaker containing water, turpentine and mercury. On Fig. 5.2, indicate the position of solid X using a . X [1]

(d) Solid X is cut into two halves.
 State whether the density of the cut pieces will increase, remain the same or decrease. Explain your answer.

 [2]

6 A student is observing the image of object, O through a plane mirror as shown in Fig. 6.1. X is a point on the image.

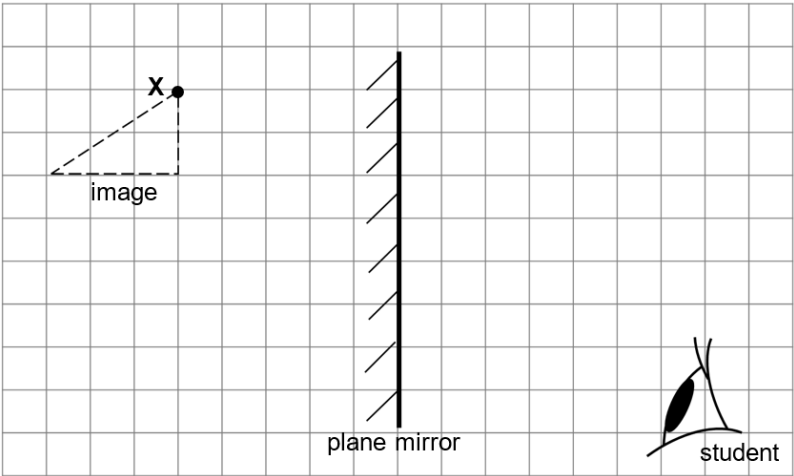


Fig. 6.1

(a) On Fig. 6.1,
 (i) draw the object that produces the image observed by the student. Label this object, O. [1]

(ii) complete the ray diagram by drawing two rays of light from **X** to show how the student sees the image reflected by the object, **O**. [2]

(b) Suggest how the image would differ when observing through a concave mirror instead.

.....

..... [1]

(c) When the student observes the object, **O** through a rough reflecting surface, he did not see any image.

Explain why in terms of light rays.

.....

..... [1]

SECTION C: [30 marks]
Each question is worth 10 marks. Answer ALL questions in this section. Show your working and write your answers in the spaces provided.

1 (a) Bromine is an element found on the Periodic Table.

(i) Using the Periodic Table on page 23, state the group and period bromine is from.

Group: Period: [1]

(ii) The mass number and proton number of bromine is 80 and 35 respectively.

In Table 1.1, state the total number of protons, neutrons and electrons in an atom of bromine.

Table 1.1

number of protons	number of neutrons	number of electrons

[1]

(iii) Using bromine as an example, explain why atoms are electrically neutral.

.....

..... [1]

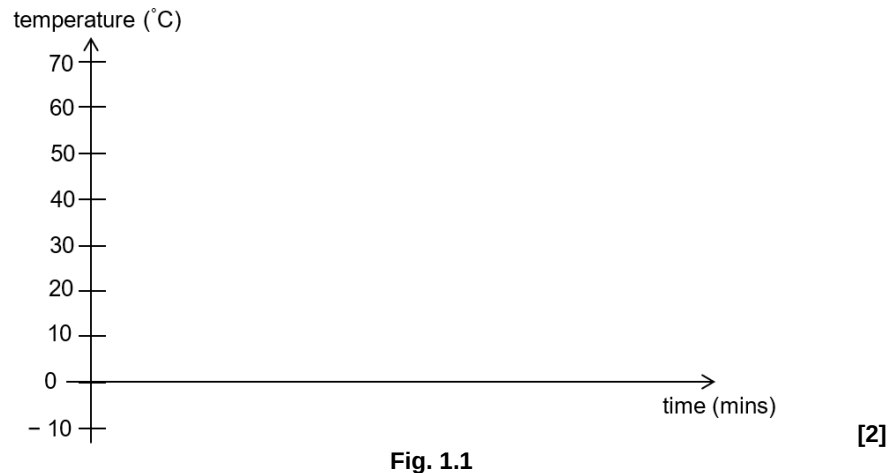
(iv) Explain why the mass of an atom is contributed by **only** protons and neutrons.

.....

..... [1]

(b) Bromine is an element that can be found in the Periodic Table. Bromine has a melting point of -7°C and a boiling point of 59°C .

(i) On Fig. 1.1, complete the graph of temperature against time as bromine is heated from -10°C to 70°C . Label the melting point and boiling point clearly, where applicable.



(ii) Draw the particles representing bromine at 100°C in the space provided.

[1]

(iii) Describe the movement and arrangement of bromine at room temperature, 27 °C.

.....

.....

.....

[2]

(c) Fluorine and chlorine are elements that have similar physical properties as bromine.

Table 1.2 shows the boiling points of bromine, chlorine, and fluorine.

Table 1.2

element	boiling point/ °C
fluorine	-188
chlorine	
bromine	59

Complete Table 1.2 by suggesting the boiling point for chlorine.

[1]

2 Specialised cells are cells that have structural adaptations for specific functions.

(a) The small intestine is an organ responsible for absorption of nutrients into the bloodstream after digestion.

The inner walls of the small intestine are lined with villi (singular: villus) which have a layer of cells on its surface. Each of these cells has multiple folds on their cell membrane called microvilli.

Fig. 2.1 shows the inner wall of the small intestine, a magnified view of a villus and the structure of one cell on the surface of the villus.

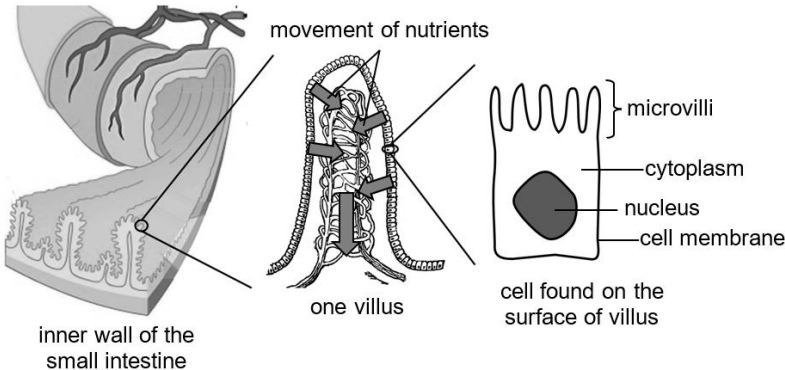


Fig. 2.1

(i) State whether the cell found on the surface of the villus is a plant or animal cell. Explain your answer.

.....

.....

[2]

(ii) Describe and explain how the multiple folds of the microvilli help the villus in the absorption of nutrients.

.....

.....

[2]

(iii) Describe and explain the property of the cell membrane that enables the cell to absorb water and nutrients.

.....

.....

[2]

- (iv) In simple distillation, the mixture is placed in the distillation flask and heated directly. Suggest a reason why the essential oil of plant **X** is collected using steam distillation instead of simple distillation.

.....
 [1]

- (b) Essential oil of plant **X** was used to produce perfume **A**. The perfume company also produced two other perfumes, **B** and **C**.

These perfumes were separated into their components using paper chromatography with ethanol as a solvent. Substance **P** is a toxic chemical that should not be used in perfumes.

Fig. 3.2 shows the results of the paper chromatography.

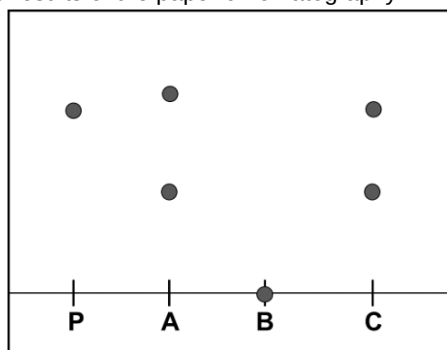


Fig. 3.2

- (i) Perfume **A** is a mixture of two substances, essential oil **X** and chemical **Y**. Essential oil **X** is more soluble in ethanol than chemical **Y**.

On Fig. 3.2, label the spots representing essential oil **X** and chemical **Y**. [1]

- (ii) State a conclusion about perfume **B**.

..... [1]

- (iii) The perfume company made the following claim:

“All the perfumes tested are safe.”

Do you agree with the claim? Explain your answer.

.....
 [1]

- (c) A molecule of essential oil **X** contains 10 carbon and 16 hydrogen atoms.

- (i) Write down the chemical formula for a molecule of essential oil **X**.

..... [1]

- (ii) State whether the molecule of essential oil **X** is a molecule of element or a molecule of compound. Explain your answer.

.....
 [2]

END OF PAPER

The Periodic Table of Elements

Group																																																																																							
1	2	1 H hydrogen 1														17	18																																																																						
		Key																																																																																					
3	4	proton (atomic) number atomic symbol name relative atomic mass																																																																																					
Li lithium 7	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 sulphur 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 98	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57 – 71 lanthanoids actinoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium 209	85 At astatine 210	86 Rn radon 222	87 Fr francium 223	88 Ra radium 226	89 – 103 actinoids	104 Rf rutherfordium 261	105 Db dubnium 262	106 Sg seaborgium 266	107 Bh bohrium 264	108 Hs hassium 277	109 Mt meitnerium 268	110 Ds darmstadtium 271	111 Rg roentgenium 272	112 Cn copernicium 285	113 Nh nihonium 286	114 Fl flerovium 289	115 Lv livermorium 293	116 Ts tennessine 294	117 Uue unbinilium 298	118 Og oganesson 294

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium 147	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 237	94 Pu plutonium 244	95 Am americium 243	96 Cm curium 247	97 Bk berkelium 247	98 Cf californium 251	99 Es einsteinium 252	100 Fm fermium 257	101 Md mendelevium 258	102 No nobelium 259	103 Lr lawrencium 262

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

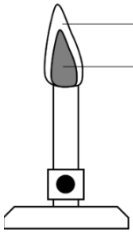
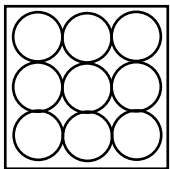
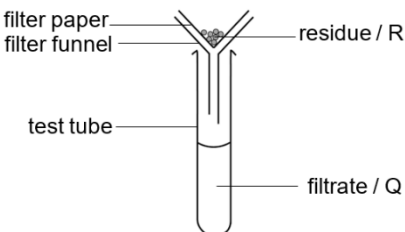
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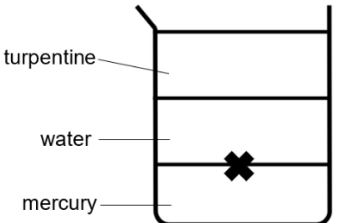
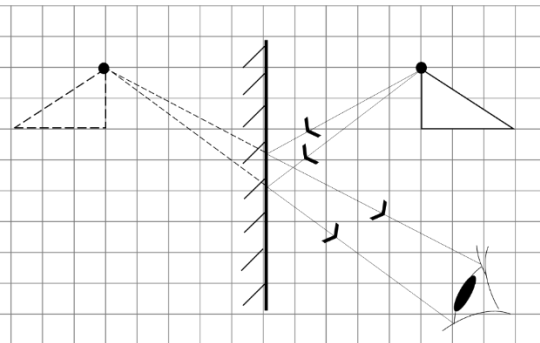
SECTION A (20 MARKS)

1	2	3	4	5	6	7	8	9	10
D	B	D	B	A	C	B	C	A	A
11	12	13	14	15	16	17	18	19	20
B	C	D	C	A	D	C	D	D	B

SECTION B (30 MARKS)

Qn		Ans	Marks	
			[M]	Ttl
1	(a)	Independent variable: initial height / height at which he dropped the ball. Dependent variable is the <u>maximum height reached</u> by the ball <u>after the first bounce</u>. Constant variable: <i>Any of the following</i> • Direction the ball bounced • Type of bouncing surface • Size of ball • Whether the same ball was used • Point on ball from which the initial height was measured • Wind speed • Material of ball • Location/Place of experiment • Mass of ball • Force applied on ball Marker's note Others accepted: air pressure in ball, type of ball, speed of ball, weight of ball [2]: all 3 correct, [1]: only 2 correct, [0]: 1 or less correct	2	4
	(b)	The greater the initial height, the greater the maximum height reached after the first bounce. Accepted alternative reasonable hypothesis e.g. The maximum height after one bounce will always be shorter than the initial height. Rejected: answers that are conclusions (quoting data)	1	
	(c)	96 cm	1	

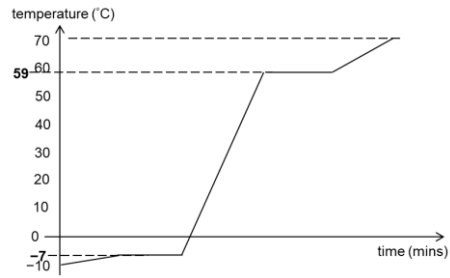
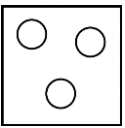
Qn	Ans	Marks	
		[M]	Ttl
2	(a)  (a) [1]: type of flame [1]: both correct colours Marker's Note: [1] given if only one layer is drawn AND the colour (blue) is accurately labelled.	2	3
	(b) Non-luminous (no marks), stable flame / strong heating [1] Marker's note: - Also accepted – does not produce as much soot - AWW - No name / wrong name (e.g. stable flame) stated but gave correct reason [0] – Name given and reason is a mismatch (e.g. luminous flame becoss it is hotter)	1	
3	(a) Contraction [1]. As solid X cool down, the particles <u>lose energy</u> and begin to <u>come closer together</u>. [1]	2	4
	(b)  [1]: 9 particles [1]: particles are close together and orderly arranged	1	
	(c) Any temperature above 150 °C.	1	
4	(a)(i) Y [1] Any one of the following explanation [1]: 7g of Q can dissolve in 20 cm³ of Y while R cannot (0g). - Q is able to completely dissolve in Y while R is not. - Q is soluble in Y but R is not.	1	8
	(a)(ii)  1 mark: Drawing is clear 1 mark: Labels of filter funnel, filter paper 1 mark: Labels of filtrate and residue ECF allowed from (a)(i)	3	

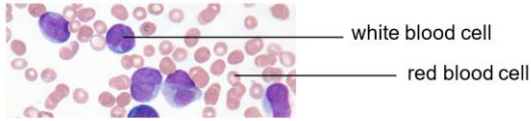
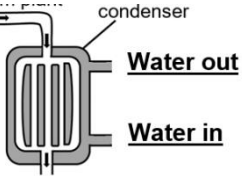
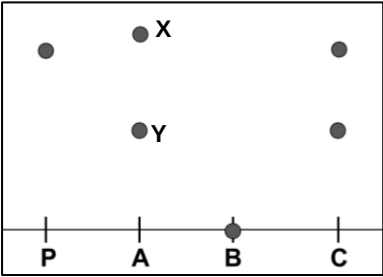
Qn	Ans	Marks	
		[M]	Ttl
	(a)(iii) Q	1	
	(b) Solvent Z [1]. Explain [1]: - P has the <u>highest solubility/ most soluble</u> in solvent Z. - Although not all of P will dissolve, most of P/10 g will dissolve. Alternative Answer: 20 cm³ of Solvent Y and 20 cm³ of solvent Z. [1] Explain [1]: 20 cm³ of Y would dissolve 5 g of P and 20 cm³ of Z would dissolve 10 g of P, removing the stain of 15 g completely.	2	
5	(a) 18 cm³	1	6
	(b) $\text{density} = \frac{22.5}{18}$ *ECF from (a) $= 1.25 \text{ g/cm}^3 \text{ [1]}$	1	
	(c)  (c)(i) 1 mark: correct order for turpentine, water and mercury (c)(ii) 1 mark: solid X sink in water, float in mercury	2	
	(d) Density remains the same [1]. Density does not change with size or shape of an object [1].	2	
6	(a)  (a)(i) 1 mark: Object is 5 squares away from mirror on correct side (a)(ii)	1	5
		2	

Qn	Ans	Marks	
		[M]	Ttl
	1 mark: real lines from object to eye 1 mark: imaginary lines from image to mirror -1 mark: no arrows / not from one point.		
(b)	Image will be magnified / bigger / distorted (AWW) [1] Reject: wider	1	
(c)	Light rays are reflected in all directions [1] when bouncing off a rough surface. Thus no image could be observed. AWW: the light rays have different angles of incidence / different angles of reflection (hence resulting in reflected rays in all directions)	1	

SECTION C (30 MARKS)

Qn		Ans	Marks							
			[M]	Ttl						
1	(a)(i)	Group: <u>17</u> Period: <u>4</u> *Both to get 1 mark	1	10						
	(a)(ii)	<table border="1"><tr><td>number of protons</td><td>number of neutrons</td><td>number of electrons</td></tr><tr><td>35</td><td>45</td><td>35</td></tr></table> *all correct for 1 mark	number of protons		number of neutrons	number of electrons	35	45	35	1
number of protons	number of neutrons	number of electrons								
35	45	35								
	(a)(iii)	Bromine has 35 protons (positively charged particles) and 35 electrons (negatively charged particles) Marker's note: Also accepted – same number of protons and electrons Rejected: Positive charge cancels out negative charge (no identification of which particle is positive or negative).	1							
	(a)(iv)	Any one of the following ideas [1]: • The mass of electrons are negligible • Mass of proton and neutron is 1 but electron is negligible/1/1840. Marker's note: AWW - mass of electrons is 1/1840, weight of electrons are light (cancelled out weight to indicate mass) to contribute Rejected: Electrons are lighter than protons and neutrons, Electrons are too light to be measured, electrons have no mass	1							

Qn	Ans	Marks	
		[M]	Ttl
	(b)(i)	 1 mark for the shape 1 mark correct labels for mp and bp (text and/or value indicated both accepted)	2
	(b)(ii)	 1 mark: gas arrangement	1
	(b)(iii)	The movement of bromine particles are sliding past each other . [1] The arrangement of chlorine particles is closely packed and disorderly arranged . [1]	2
	(c)	Any temperature between 59 to -188 °C (59°C and -188°C not inclusive) Actual boiling point is - 34 °C. Marker's note: AWW – If value given falls between 50°C to 58°C or -170°C to -188°C	1
2	(a)(i)	State: Animal cell. [1] Explain [1]: - Absence of cell wall - Absence of chloroplasts - Absence of large central vacuole	2
	(a)(ii)	Increase in SA [1] Increase/faster/more absorption of water and nutrients. [1]	2
	(a)(iii)	Property: partially permeable [1] Function: controls movement of substances entering (and exiting) the cell [1]. Accept: - ONLY allows some/certain/particular substances to pass through but not others Reject: - allows substances to pass through - allows certain substances to pass through (incomplete)	2

Qn	Ans	Marks	
		[M]	Ttl
	(b)(i) 	1	
	(b)(ii) Lesser [1] Lesser surface area to absorb/transport/carry oxygen [1].	2	
	(b)(iii) Tissue	1	
3	(a)(i) 100 °C	1	10
	(a)(ii) To provide a low enough temperature to ensure that all gases / vapours are converted / condensed to liquid state. Also accept: for maximum cooling efficiency. AWW: Only described steam to water only or evaporated oil to oil only.	1	
	(a)(iii)  1 mark: correct label for both	1	
	(a)(iv) Essential oil has a low boiling point / decomposes easily / is not heat stable	1	
	(b)(i) 	1	
	(b)(ii) B is insoluble in ethanol [1] <i>Reject: B is pure</i> Reject: B is inaccurate.	1	
	(b)(iii) No (no marks) Explanation [1]: - dye C contains P - cannot tell if B is safe as there was no separation / unable to identify the substances in B. Reject: - A and C contains P - B contains P	1	

Qn	Ans	Marks	
		[M]	Ttl
	(c)(i) $C_{10}H_{16}$ OR $H_{16}C_{10}$	1	
	(c)(ii) Molecule of compound [1]. Made up of more than one type of atom/element chemically combined [1]. Reject: - element as it is made up of more than two types of atoms. - perfume A contains 2 components.	2	

THE PERIODIC TABLE OF ELEMENTS

Group																															
1	2											13	14	15	16	17	18														
Key proton (atomic) number atomic symbol name relative atomic mass							1 H hydrogen 1										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														
		3 4 5 6 7 8 9 10 11 12																													
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	58	59	60	61	62	63	64	65	66	67	68	69	70	71
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
lanthanum	cerium	praseodymium	neodymium	promethium	samarium	europium	gadolinium	terbium	dysprosium	holmium	erbium	thulium	ytterbium	lutetium
139	140	141	144	–	150	152	157	159	163	165	167	169	173	175
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
actinium	thorium	protactinium	uranium	neptunium	plutonium	americium	curium	berkelium	californium	einsteinium	fermium	mendelevium	nobelium	lawrencium
–	232	231	238	–	–	–	–	–	–	–	–	–	–	–

actinoids

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).