

2017

Secondary 1 Science

1.	Ang Mo Kio Secondary	SA1
2.	Broadrick Secondary	SA1
3.	Dunearn Secondary	SA1
4.	Jurong West Secondary	SA1
5.	Manjusri Secodary	SA1
6.	New Town Secondary	SA1
7.	Assumption English School	SA2
8.	Bedok South Secondary	SA2
9.	Hillgrove Secondary	SA2
10.	Pasir Ris Crest Secondary	SA2
11.	Queensway Secondary	SA2
12.	Woodlands Secondary	SA2

Name	Class	Index Number
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**ANG MO KIO SECONDARY SCHOOL
MID YEAR EXAMINATION 2017
SECONDARY ONE EXPRESS**

SCIENCE

Total Mark: 100

02 May 2017 / Tuesday

Setter: Mrs Luei Sin Yen Joselyn

2 hours

Additional Materials: OTAS Paper, Writing Papers

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces at the top of this paper.
You may use a soft pencil for any diagrams, graphs or rough working.
You should show the essential steps in any calculations and leave your answers in 3 significant figures.

No marks will be awarded for answers that are NOT clearly shown.

Do **not** use paper clips, highlighters, glue or correction fluid/tape.

Section A

Answer **all** the questions in Section A on the OTAS paper provided. Write your name, class and index number on the OTAS paper in the spaces provided. **Use only 2B pencil on the OTAS paper.**

Section B

Answer **all** the questions in Section B in the spaces provided on the question paper.

Additional papers attached will not be marked.

Section C

Answer any **4 out of 5** questions. Begin each question on a **FRESH** page of the writing paper.

At the end of the examination, staple your writing paper for answers to Section C.
Hand in the OTAS, question paper, Section B and Section C separately.

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

	For Examiner's use	
	Section A	
	Section B	
	Section C	
	TOTAL	

This document consists of **21** printed pages, including the cover page.

Section A: Multiple-Choice Questions (30 marks)

For each of the questions, four suggested answers are given. You are to choose the most appropriate ONE and indicate your answer on the OTAS sheet provided.

A1. What does 'open-mindedness' of a good scientist refer to?

- A. To stick to the truth until the scientist's discovery is proven.
- B. To want to know more about the unexpected results that may be observed.
- C. To be willing to accept that something could happen contrary to popular belief.
- D. To follow the facts and not be influenced by what is widely believed by others.

A2. A container of a substance displays the hazard symbols as shown in the figure.
The substance could be _____.

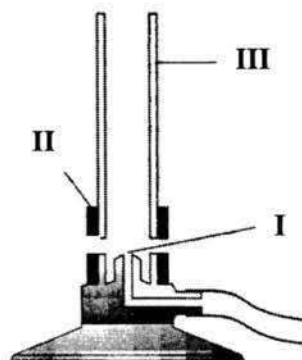


- A. acid
- B. alcohol
- C. mercury
- D. uranium

A3. The volume of water in a measuring cylinder should be read at the _____ of the meniscus in order to prevent _____ error.

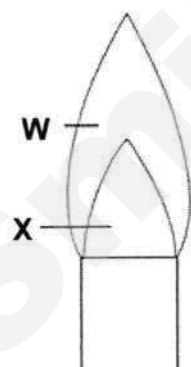
- A. top, zero
- B. bottom, zero
- C. top, parallax
- D. bottom, parallax

- A4.** The picture shows a Bunsen burner. Which one of the following alternatives given below correctly represents **I**, **II** and **III**?

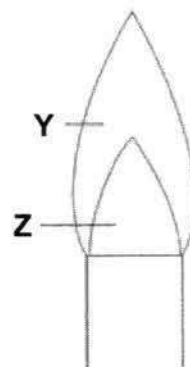


	I	II	III
A.	gas jet	collar	barrel
B.	collar	barrel	gas jet
C.	barrel	collar	gas jet
D.	barrel	gas jet	collar

- A5.** The air-hole of a Bunsen burner can be opened or closed to obtain two types of flame. The colours of the flame are labelled in the diagram below.



flame of a Bunsen burner
with the air-hole open



flame of a Bunsen burner
with the air-hole closed

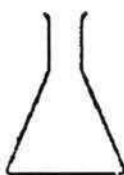
Which of the following option correctly states the colours of **W**, **X**, **Y** and **Z**?

	W	X	Y	Z
A.	dark blue	orange	dark blue	orange
B.	orange	dark blue	orange	dark blue
C.	orange	dark blue	blue	dark blue
D.	blue	dark blue	orange	dark blue

A6. Which of the following options correctly states the disadvantage of a technology that benefits society.

- A.** Taking X-ray photographs too often may cause cancerous tumours.
- B.** Too many motor vehicles on the roads pollute the water.
- C.** Antibiotics increase our bodies' resistance to superbugs.
- D.** Styrofoam pollutes the environment when it decomposes naturally.

A7. The apparatus shown below is commonly found in the laboratory.



What is the function of the apparatus?

- A.** For isolating setups from the outside.
- B.** To contain and mix chemicals and liquids.
- C.** To mix and heat chemicals and liquids evenly.
- D.** To collect gases released from chemical reactions.

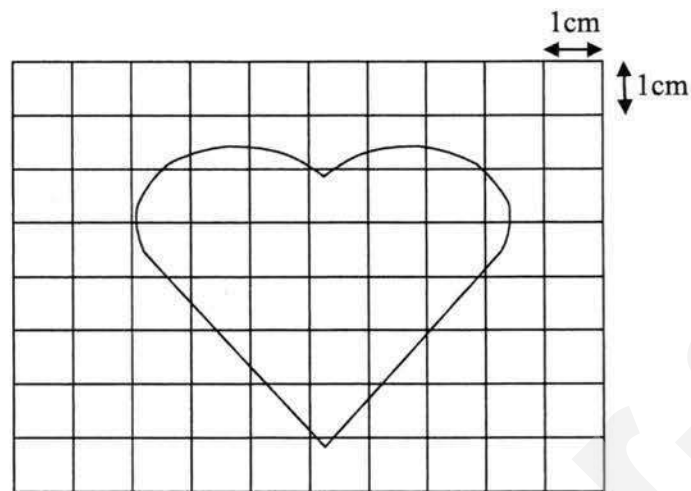
A8. Which one of the following has the same value as 75 cm^2 ?

- A.** 0.0075 m^2
- B.** 0.075 m^2
- C.** 0.75 m^2
- D.** 75 m^2

A9. What are the smallest lengths that can be measured by a pair of vernier calipers and micrometer screw gauge?

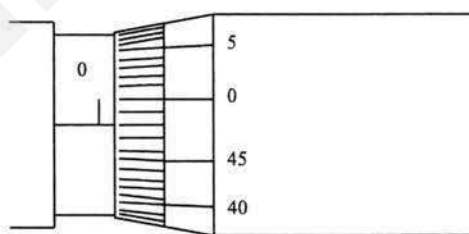
	Vernier calipers	Micrometer screw gauge
A.	0.1 mm	0.01 mm
B.	0.01 mm	0.001 mm
C.	0.1 cm	0.01 cm
D.	0.01 cm	0.001 cm

A10. What is the estimated area for the diagram shown below?



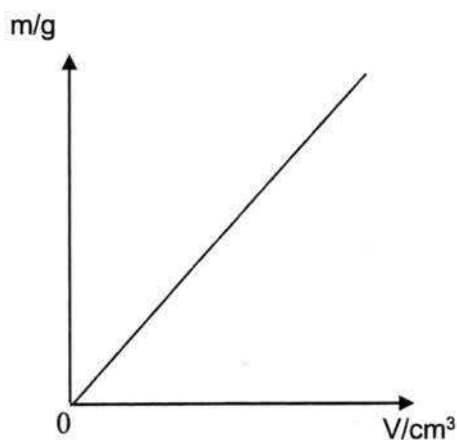
- A. 16 cm²
- B. 18 cm²
- C. 20 cm²
- D. 22 cm²

A11. The diagram below shows the reading on a micrometer screw gauge when its jaws are closed. What is the zero error of the instrument?



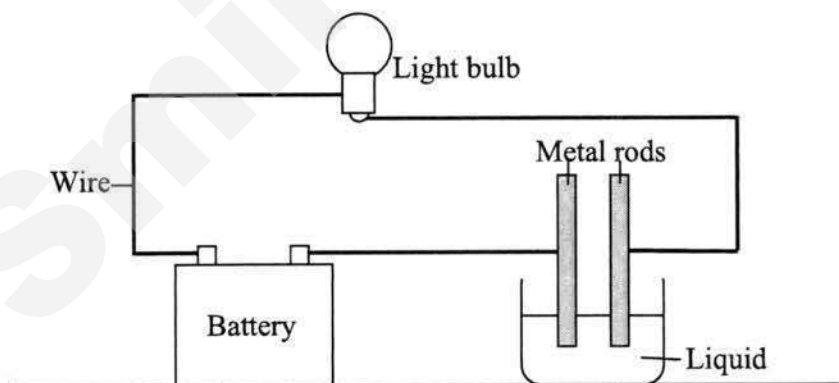
- A. + 0.02 mm
- B. - 0.02 mm
- C. - 0.20 mm
- D. + 0.48 mm

- A12.** The graph below shows the variation of the mass, m , of an object with its volume, V .



Which of the following statements about the graph above is correct?

- A.** The density of the object varies as volume increases.
 - B.** The density of the object remains constant as volume increases.
 - C.** The density of the object increases as volume increases.
 - D.** The density of the object decreases as volume increases.
- A13.** The diagram below shows an experiment to test a certain property of liquids.



Which of the following property is being tested?

- A.** density
- B.** electrical conductivity
- C.** magnetism
- D.** solubility

A14. Most metals such as copper and iron have high melting points. Which of the following is an advantage of this property?

- A. It prevents machine parts made of metal from rusting.
- B. It allows metal parts to be reshaped more easily.
- C. It keeps cars from becoming too hot on sunny days.
- D. It enables people to use pots and pans made of metal to cook food.

A15. According to the data in the table below, which sample of matter is most likely to be a plastic?

Sample	Characteristics		
	Lustre (shiny)	Flexible	Electrical Conductivity
1	No	No	Conductor
2	High	No	Insulator
3	High	Yes	Conductor
4	Low	Yes	Insulator

- A. sample 1
- B. sample 2
- C. sample 3
- D. sample 4

A16. Elements can be classified into _____.

- A. metals and non-metals
- B. mixtures and solutions
- C. solutions and suspensions
- D. chemical formulae and symbols

A17. Which of the following is a mixture of elements only?

- A. air
- B. brass
- C. chalk
- D. water

A18. When sugar is heated, decomposition occurs, forming carbon and water vapour. Which of the following statements about decomposition is true?

- A. Compounds are broken down into simpler substances.
- B. Elements are broken down into simpler substances.
- C. Compounds combine to form new compounds.
- D. Elements combine to form compounds.

A19. How many different types of elements are present in ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$?

- A. 3
- B. 4
- C. 10
- D. 15

A20. The rate of dissolving of a solute refers to _____.

- A. how much a solute dissolves in a fixed volume of solvent
- B. how much a solute dissolves in any volume of solvent
- C. how fast a solute dissolves in a fixed volume of solvent
- D. how fast a solute dissolves in any volume of solvent

A21. Which of the following pair of substances forms a solution with water?

- A. glass and carbon
- B. glass and plastic
- C. plastic and sugar
- D. sugar and common salt

A22. Which of the following applications does not depend on water as the solvent?

- A. Making alcoholic drinks.
- B. Making cooking oil.
- C. Making detergent.
- D. Making shampoo.

A23. Which of the following will form a suspension with water?

- A. ethanol
- B. bread crumbs
- C. carbon dioxide gas
- D. ribena syrup

A24. Which of the following mixtures can be separated by magnetic attraction?

- A. bronze and brass buttons
- B. copper and gold coins
- C. iron and zinc pins
- D. silver and aluminium foil

A25. What is the correct order of steps to separate salt from a mixture of soluble salt and insoluble pepper?

- A. filtration → dissolving → evaporation
- B. dissolving → filtration → evaporation
- C. filtration → evaporation → dissolving
- D. evaporation → dissolving → filtration

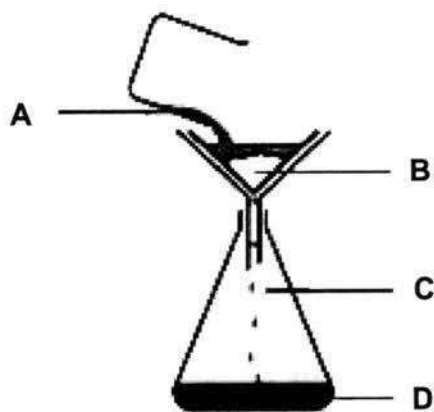
A26. Which of the following can be separated by simple distillation?

- A. alcoholic beverages
- B. pulp from orange juice
- C. pen ink
- D. seawater

A27. Which property of a mixture enables paper chromatography to be used as a suitable separation technique?

- A. Different extent of solubility of the substances in the mixture.
- B. Different melting point of the substances in the mixture.
- C. Different electrical conductivity of the substances in the mixture.
- D. Different density of the substances in the mixture.

- A28.** The diagram below shows the process of filtration. At which point, **A**, **B**, **C** or **D**, represents the residue of the filtration?



- A29.** When a mixture undergoes evaporation, _____.
- A.** both the solvent and solute are left behind
 - B.** both the solvent and solute are completely evaporated
 - C.** the solute is completely evaporated while only the solvent is left behind
 - D.** the solvent is completely evaporated while only the solute is left behind
- A30.** In an experiment, a student mixed some sand, water and an unknown substance in a beaker. He then filtered the mixture. The student observed that the filtrate was a clear liquid that did not contain any solids. The only residue obtained was sand.

Which of the following conclusions can the student make?

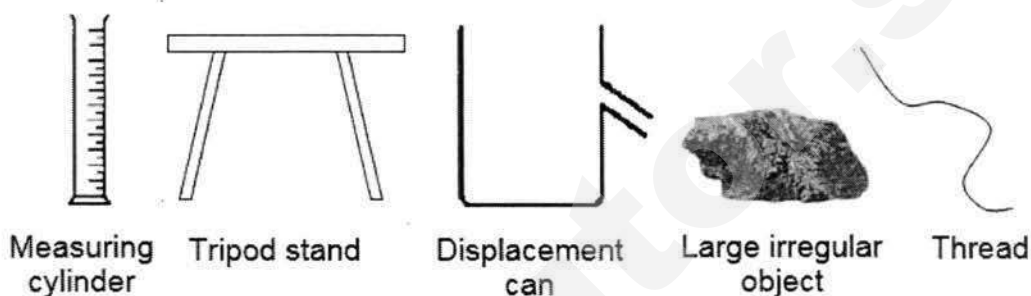
- A.** The filtrate is pure water.
- B.** The filtrate contains dissolved sand.
- C.** The unknown substance is soluble in water.
- D.** The unknown substance is a liquid at room temperature.

~ End of Section A ~

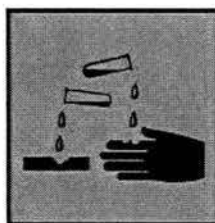
Section C: Free Response Questions (40 marks)

Answer any four questions on the writing papers provided. Begin each question on a fresh page of the writing paper.

- C1. (a) (i) Draw a **well-labelled diagram** to show how you would measure [3]
the volume of a **large irregular object**. You may use the
apparatus provided below.

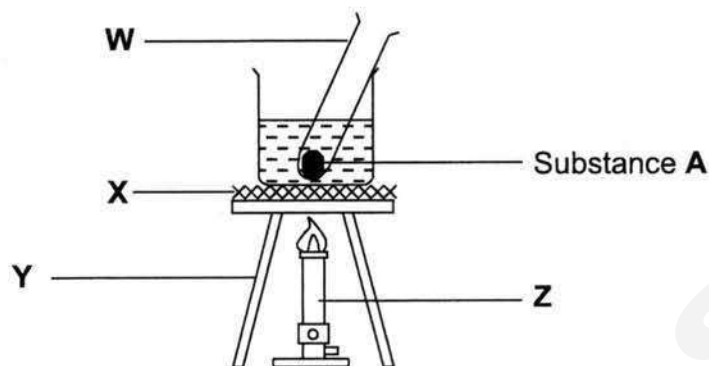


- (ii) Describe how the displacement can should be filled at the start [1]
of the experiment.
- (iii) In this experiment, explain how the measuring cylinder can be [3]
used to determine the volume of the large irregular object.
- (b) In a school laboratory, a bottle with the following symbol is placed on the bench.



- (i) What is the meaning of this symbol? [1]
- (ii) What could the substance in the bottle be? [1]
- (iii) Give **one** safety precaution when handling this bottle. [1]

C2. (a) The diagram below shows the set-up of an experiment.



- (i) Substance **A** in **W** is a solid. Suggest a reason why substance **A** is heated in a water bath. [1]
 - (ii) State the function of **W** and **Y**. [2]
 - (iii) State two safety precautions that should be followed when using **Z**. [2]
- (b) A piece of gold with a mass of 120 g and density of 19.3 g/cm^3 is melted together with a piece of brass of mass 400 g and density 8.5 g/cm^3 .
- (i) Calculate the volume of gold. Show your workings clearly. [1]
 - (ii) Calculate the volume of brass. Show your workings clearly. [1]
 - (iii) Calculate the total volume of the alloy formed. Show your workings clearly. [1]
 - (iv) Hence, calculate the overall density of the alloy formed. Show your workings clearly. [2]

C3. (a) Read the descriptions below:

W is a silvery solid with shiny surface at room temperature. It melts at a fixed temperature and is made up of only 1 type of atom.

X is a yellowish gas and cannot be further broken down into simpler substances.

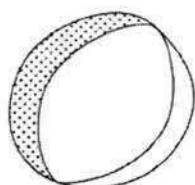
Substance **W** and **X** chemically reacts to produce **U**, a white solid.

Substance **U** readily dissolves in water to form a homogeneous solution **T**.

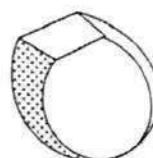
- (i) Which of the above substances is an element? Briefly explain your answer. [2]
- (ii) Which of the above substance is a compound? Briefly explain your answer. [2]
- (iii) State two differences between compounds and mixtures. [2]
- (iv) Which of the above substances is a mixture of compounds? [1]

- (b) Ann learnt that in making jewellery, copper, which is a cheaper metal, is often mixed with gold. The amount of gold present in the mixture is indicated by the number of 'carats'. A 24-carat ring is pure gold with no copper present.

She did an experiment on density using two rings, where ring A is 18-carat gold and ring B is 9-carat gold. She measured the mass and volume of the two rings.



Ring A
mass = 35.8 g
volume = 2.0 cm³



Ring B
mass = 36.0 g
volume = 3.3 cm³

(i) Find the density of ring A. Show your workings clearly. [1]

(ii) Find the density of ring B. Show your workings clearly. [1]

(iii) If pure gold has a density of 19.3 g/cm^3 and pure copper has a density of 8.9 g/cm^3 , which ring has a higher percentage of copper? [1]

C4. Jason was given a mixture of sugar, chalk and food colouring. He was given the following information about the components of the mixture.

Substance	Solubility in Water	Solubility in Alcohol
Sugar crystals	Soluble	Soluble
Chalk dust	Insoluble	Insoluble
Food colouring powder	Insoluble	Soluble

To separate them, the mixture is first added to water.

(a) (i) List two ways to increase the rate of dissolving of sugar crystals. [2]

(ii) Explain why the mixture is heterogeneous before chalk powder and food colouring powder are removed. [1]

(iii) Describe one characteristic of the nature of the mixture described in **4a(ii)**. [1]

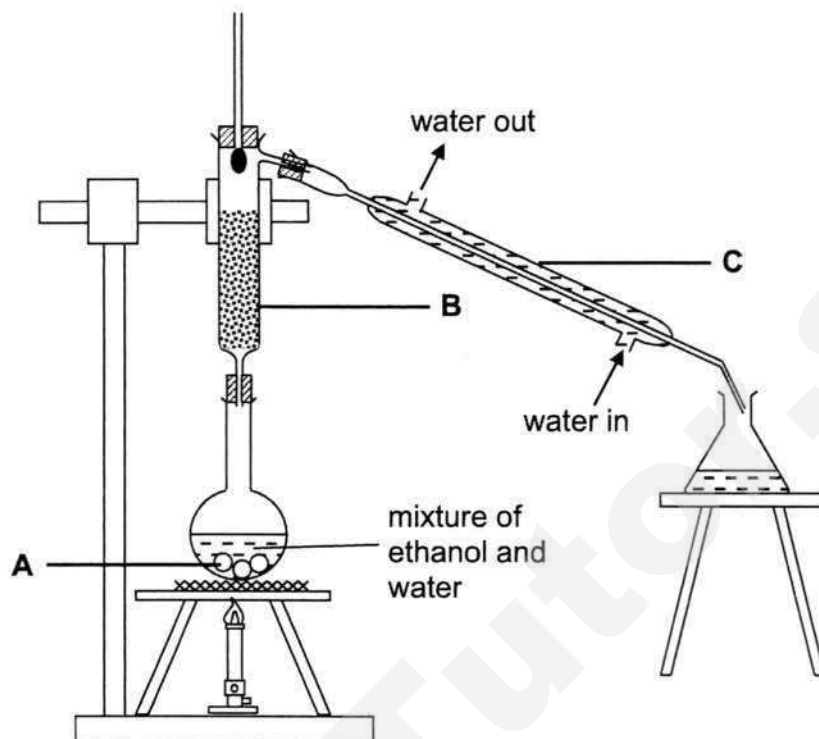
(b) How could Jason obtain a pure dry sample of the different components of

(i) sugar crystal, [3]

(ii) chalk dust and [2]

(iii) food colouring powder respectively? [1]

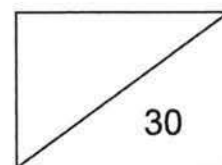
- C5. (a) The diagram below shows the experimental set-up for the separation of a mixture of ethanol and water.



- (i) Name the separation method which uses the set-up above. [1]
 - (ii) Identify the parts labelled **A**, **B** and **C** in the diagram. [2]
 - (iii) What is the function of **B**? [1]
 - (iv) What is the function of **C**? [1]
 - (v) State one industrial usage of this separation technique. [1]
- (b) Which material is the most suitable for making the following applications?
Using their physical properties, explain your choice of answer.
- (i) Wire in electrical appliances. [2]
 - (ii) Drinking straws. [2]

~ End of Section C ~

Ang Mo Kio Secondary School
Mid Year Examination 2017
Secondary One Express Science



Name: _____ ()

Class: _____

Section B: Structured Questions (30 marks)

Answer **ALL** the questions in the space provided.

B1. In the Science laboratory, Ariel carried out an experiment involving heating of a solid in a test tube.

- (a) Ariel thought that test tubes should not be made of glass as glass is [2]
 fragile and breaks easily. Give **two** reasons why most scientific
 apparatus are made of glass even though glass breaks easily.

- (b) Ariel was taught that to be a good scientist, she has to use her [1]
 senses to make accurate observations. However, why should the
 sense of taste never be used when investigating chemicals?

- (c) What type of flame should Ariel use when she is temporarily not [2]
 heating anything? Provide a reason to support your answer.

B2. Convert each of the following to the required unit.

[3]

(a) $378 \text{ mm} = \underline{\hspace{2cm}} \text{ m}$

(b) $135 \text{ g} = \underline{\hspace{2cm}} \text{ kg}$

(c) $0.004 \text{ km}^2 = \underline{\hspace{2cm}} \text{ m}^2$

B3. The thickness of a metal coin is measured twice using the vernier callipers. The figures below show the two readings on the scale.

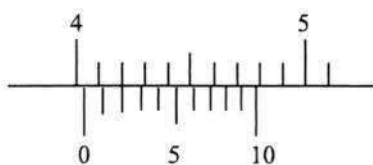


Figure 1

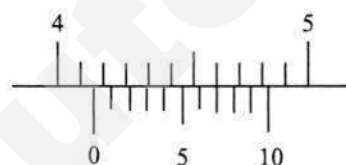


Figure 2

(a) Write down the two readings of the thickness of the metal coin.

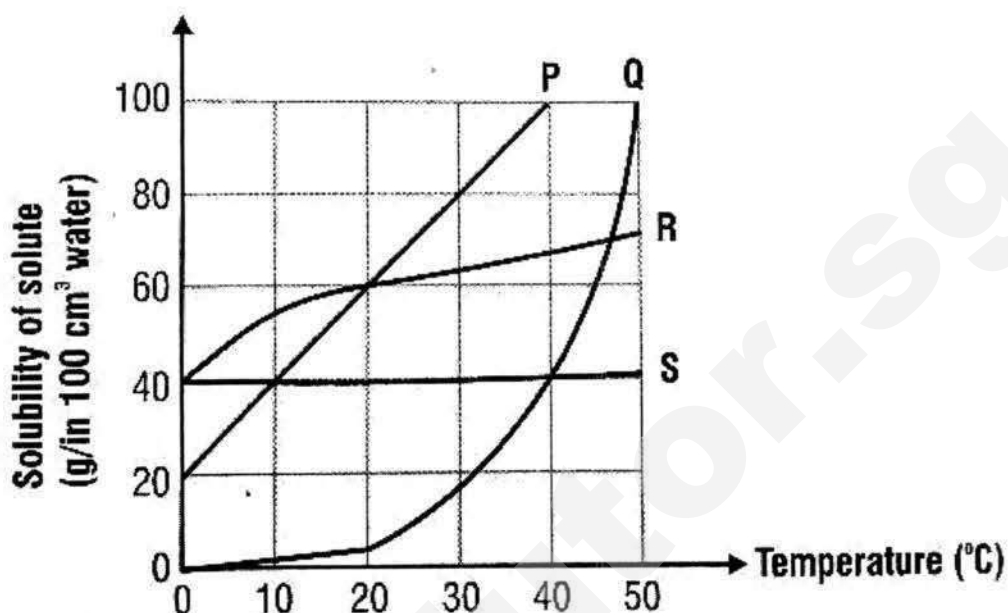
[2]

Readings	
Figure 1	Figure 2

(b) Find the average, **correct to 2 decimal places**, of the thickness of the metal coin.

[1]

- B4.** The graph below shows the solubility of four different substances against temperature in water.



- (a) From the graph, state the substance that has solubility **most** affected [2]
by temperature. Explain your answer.

- (b) From the graph, state the substance that has solubility **least** affected [2]
by temperature. Explain your answer.

- (c) Which two substances have the same solubility in water at 20°C? [1]

- (d) From the graph, predict the amount of substance Q that can dissolve [1]
in 100 cm³ of water at 35°C.

B5. (a) Define the term 'element'.

[1]

(b) State **one** characteristic of the elements in:

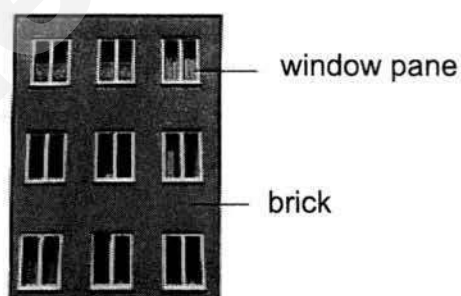
(i) the same group; and

[1]

(ii) the same period.

[1]

B6. The picture below shows the physical appearance of an apartment.



(a) What is meant by the **strength** of a substance?


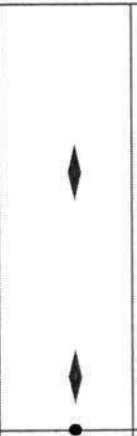
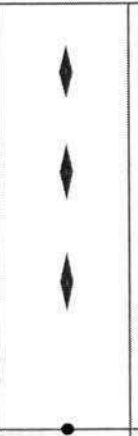
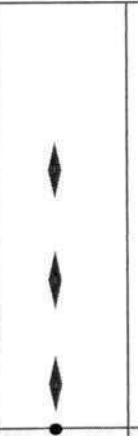


[1]

(b) Why is the strength of material important to the structure of the apartment? [1]

- (c) With reference to the picture of the apartment, complete the following table. [3]
- table.

Structure	Material	Physical property	Reason
Window pane	Glass		
Wall	Brick	Poor conductor of heat	

- B7.** A school principal had received an anonymous note from a student in Secondary 1, demanding for longer recess time. The principal appointed Mr Lim, the Head of Chemistry, to analyse the note to find the culprit. Mr Lim carried out a chromatographic separation of ink samples from different students whom he suspected might have written the note. His results are shown in the following chromatogram.

					
Note of suspect	Sammy	Cheryl	Brian	Tim	Karen

- (a) How many colours are there in the suspect's ink? [1]

- (b) Which two students have the same number of colours, as the suspect, [1]
in their inks?

- (c) Which student is most likely to be guilty? Explain your answer. [2]

- (d) State one other industrial usage of this separation technique. [1]

~ End of Section B ~

Sec 1E Science SA1 2017 – Answers and Markers Report

Section A

1	C	11	B	21	D
2	B	12	B	22	B
3	D	13	B	23	B
4	A	14	D	24	C
5	D	15	D	25	B
6	A	16	A	26	D
7	B	17	B	27	A
8	A	18	A	28	B
9	D	19	B	29	D
10	C	20	C	30	C

Section B

Qn	Answers	Remarks
B1a	<p>Glass is <u>transparent</u> and allows us to <u>observe chemical change in the test tube</u>. [1] Glass has <u>high melting point / heat resistance</u> which allows <u>heating of chemicals</u> to take place without melting. [1]</p>	<p>Reject:</p> <ul style="list-style-type: none"> Poor/ bad conductor or insulator of electricity or heat (poor conductor of heat, so when someone touch it, it will not burn them) Insulator of heat High melting point to store hot liquids Glass is transparent allowing us to see through (see inside the test tube). Glass is transparent, allows reading to be made easily. Glass is light. Glass is cheap. Glass has a high melting point, will not melt easily (when heated). <p>Accepted:</p> <ul style="list-style-type: none"> Glass do not react with most chemicals. Thus, suitable for storing chemicals for experiments. Glass does not corrode easily, thus able to store corrosive substances like acid. Glass is transparent, allows us to see what is inside the test tube.

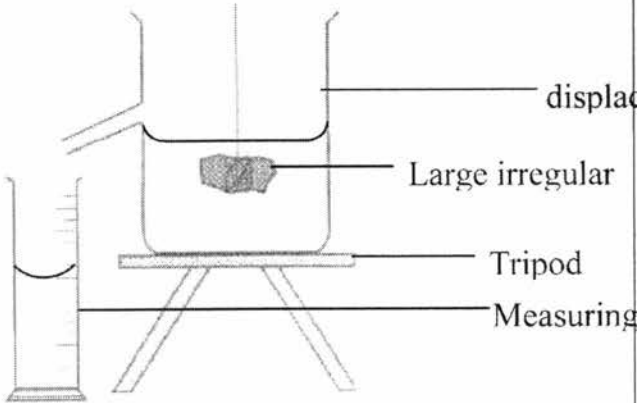
B1b	Most chemicals in the laboratory are <u>poisonous/toxic/harmful</u> . Therefore, tasting chemicals is dangerous. [1]	Reject: <ul style="list-style-type: none">Tasting chemicals might lead to death.Substances are bad for you.It may have negative effective. Accept: <ul style="list-style-type: none">Most substances in the laboratory are safe for consumption.						
B1c	Luminous flame [1] A luminous flame is <u>easily seen</u> [1] and can prevent the other users from being burnt accidentally.	Reject: <ul style="list-style-type: none">Not as hot as luminous flame and will not scald anyone who put their hand over the flame.Air hole is closed so a strike back will not occur. No ECF if student wrote non-luminous flame.						
B2a	0.378 m [1]							
B2b	0.135 kg [1]							
B2c	4000 m ² [1]							
B3a	<table border="1"><thead><tr><th colspan="2">Reading</th></tr><tr><th>Figure 1</th><th>Figure 2</th></tr></thead><tbody><tr><td>4.02 cm [1]</td><td>4.17 cm [1]</td></tr></tbody></table>	Reading		Figure 1	Figure 2	4.02 cm [1]	4.17 cm [1]	Common errors: 4.17- 4.02 = 0.15 (take difference) 0.15/2= 0.75cm Did not leave answer in 2dp. No units , wrong units
Reading								
Figure 1	Figure 2							
4.02 cm [1]	4.17 cm [1]							
B3b	Average $= \frac{4.02 + 4.17}{2} = 4.10 \text{ cm (2 d.p) [1]}$	<ul style="list-style-type: none">						
B4a	Q. [1].Solubility of Solute Q increases the most as temperature increases.[1]	Reject : <ul style="list-style-type: none">It changes the most as temperature increases.What is it? Substance Q or solubility of substance Q. OR <ul style="list-style-type: none">Substance Q increases a lot from temperature increases.						
B4b	S. [1] The <u>solubility remains constant when the temperature increases</u> . [1]							

B4c	P and R [1]	<ul style="list-style-type: none">Reject:All values outside of acceptable range.Wrong units E.g. g/in										
B4d	26-28 g [1]	<ul style="list-style-type: none">Many students missed out "chemical methods"										
B5a	An element is a substance that cannot be broken down into two or more simpler substances by chemical methods. [1]	Reject: <ul style="list-style-type: none">Same chemical propertiesSame or similar physical propertiessimilar propertieselements in the group are metals or non-metals. (grp 4 is a mixture of metals and non-metals)										
B5bi	They have similar chemical properties. [1]	Reject: <ul style="list-style-type: none">They are all metals or non-metals.They share the same state of matter.All elements in the group are either good or poor conductors of heat.All elements have the same symbolmelting point decreases from left to right.similar chemical properties.										
B5bii	Their properties gradually change from those of metals to those of non-metals moving from left to right of the period. / Their proton numbers are in increasing order. / Their atom size gets larger. [1]											
B6a	Strength is the ability of a substance <u>to support a heavy load without breaking</u> . [1]	Accept: It is the amount of force it can withstand before breaking.										
B6b	The apartment needs to <u>withstand heavy load from the weight of people and furniture residing in it</u> . [1]	Reject: <ul style="list-style-type: none">Heavy winds or winds.Withstand heavy weight w/o making reference to contents of building.structure of the building (from stem of question)										
B6c	<table><tr><th>Structure</th><th>Material</th><th>Physical property</th><th>Reason</th><th></th></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>		Structure	Material	Physical property	Reason						
Structure	Material	Physical property	Reason									

	Window pane	Glass	<u>Transparent</u> [1]	<u>It allows light to enter the room.</u> [1]	Reject: <ul style="list-style-type: none"> • high melting point • hard • poor conductor of heat • waterproof • poor conductor of light Accept: <ul style="list-style-type: none"> • Transparent – see through /look in / look out.
	Wall	Brick	Poor conductor of heat	It does not conduct heat well, the <u>apartment can be kept cool</u> on a hot day. [1]	Reject: <ul style="list-style-type: none"> • Prevent building from getting too hot (w/o elaboration about condition outside E.g. hot day, summer) • House will not catch on fire. • Link heat to humidity • People will not get scalded • Bricks will not expand and crack.
B7a	Two [1]			Reject : 1	
B7b	Sammy and Tim [1]			Common errors: Tim and Karen	
B7c	Tim. [1] The colour spots on Tim's chromatogram have travelled to the same position/ same level as the suspect's chromatogram.[1]			Reject: <ul style="list-style-type: none"> • Same solubility • Fit perfectly • Identical • Same colour 	
B7d	Checking for harmful food colouring [1]			Accept: <ul style="list-style-type: none"> • Identify harmful substances in food • Sports doping • Drug testing Reject: <ul style="list-style-type: none"> • Ink or forgery related (question asks for other examples) 	

- | | | |
|--|--|--|
| | | <ul style="list-style-type: none">• Police investigation• Food processing• Find out what colours used in ink• Separating food colouring• Separating dyes |
|--|--|--|

Section C

Qn	Answers	Remarks
C1ai	 <p>[3m for well labelled diagram]</p> <ul style="list-style-type: none"> - Thread and object submerged in water [1] - Displacement can on top of tripod stand [1] - Correct positioning of measuring cylinder. [1] 	<p>1 mark is deducted if students did not label the diagram.</p> <p>Reject:</p> <ul style="list-style-type: none"> • Did not indicate hanging object is submerged in water • No tripod is used to lift the beaker
C1aii	<p><u>Fill the displacement can with water until it overflows.</u> [1]</p> <p>The measuring cylinder collects the water that overflows.</p> <p>When water stops flowing out from the spout, remove the measuring cylinder.</p>	<p>Generally many of them did not mention the need to fill to the brim.</p> <p>Reject:</p> <ul style="list-style-type: none"> • Fill up to opening/spout/hole • Fill below the hole
C1aiii	<ol style="list-style-type: none"> 1. Place the dry measuring cylinder beneath the spout of the displacement can. [1] 2. Lower the large object slowly into the displacement can until it is completely submerged in the water. [1] 3. The volume of water collected in the measuring cylinder is equal to the volume of the large object. [1] 	<p>Many of them lost marks for not describing the preparation required.</p> <p>Reject:</p> <ul style="list-style-type: none"> • some water displaced into can • amount of water (did not specify it is the <u>volume</u> of water which is being measured.

	4.	
C1bi	The substance is <u>corrosive</u> . [1]	Some suggested substance is acidic, eat away another substance. Specific term is required for this hazard symbol.
C1bii	acid / alkali [1]	
C1biii	Do not taste or inhale it. / Store it in a safe place./ Wear safety goggles when handling it. / Wear hand gloves when handling it. [1]	Accept: <ul style="list-style-type: none"> do not use bare hands use test tube holder/ tongs <p>Question emphasized the need to <u>handle</u> the bottle so the following were rejected.</p> <ul style="list-style-type: none"> Inform teacher of spillage Experiment must be carried out under supervision Prevent spillage Avoid contact with skin
C2ai	Substance A may be <u>flammable / volatile/ will decompose</u> if heated in direct flame [1]	Accept: <ul style="list-style-type: none"> To be heated evenly <p>Reject:</p> <ul style="list-style-type: none"> Prevent from burning
C2aii	W (test tube): For containing small amounts of chemicals for heating/ mixing [1] Y(tripod stand): To support / hold up the apparatus that is being heated [1]	Reject: <p>(W)</p> <ul style="list-style-type: none"> Heat and mix small amount of substance Melt and boil faster <p>(Y)</p> <ul style="list-style-type: none"> Stabilize the set-up Carry the set-up
C2aiii	Adjust the air hole opening to obtain the desired flame / Light up match right before turning on the gas or shortly after turning on gas / turn off gas after use / make sure air hole is closed before lighting the flame/ Safety goggles must be worn [either 2, 2m]	Reject: <ul style="list-style-type: none"> Close air hole when temporarily not using Do not place near flammable substances Wear safety goggles (spelling error) Gas tube to be connected properly Do not touch the barrel when hot

C2bi	Volume of gold = $(120 / 19.3) = 6.21762 \text{ cm}^3$ [1]	<ul style="list-style-type: none"> Working to be shown. Answers to be round off to 3 significant figures with unit.
C2bii	Volume of brass = $(400 / 8.5) = 47.059 \text{ cm}^3$ = 47.1 (3 sf) [1]	
C2biii	Total Volume of alloy formed = $(120 / 19.3) + (400 / 8.5)$ = 6.22 + 47.1 = 53.3 cm^3 [1]	
C2biv	Density of alloy = $(120 + 400) / 53.276$ [1] = 9.76 g/cm^3 [1]	Allow ecf
C3ai	<p><u>Substance W [1]</u> is an element as it contains only <u>one type of atoms</u>. [1]</p> <p>OR</p> <p><u>Substance X [1]</u> is an element as it <u>cannot be broken down into simpler substance</u>. [1]</p>	<p>Generally did well. Many of them state both substance W and X and provide explanation.</p> <p>Reject:</p> <ul style="list-style-type: none"> Fixed temperature (this only indicate pure substance, not necessarily element)
C3aii	<p><u>Substance U [1]</u> is a compound because it is <u>formed when W and X reacts together</u>/ it is <u>not the simplest substance as it contains W and X</u>. [1]</p>	<p>Reject:</p> <ul style="list-style-type: none"> Chemically mixed together No mention about substance contain W and X.

C3aiii		Compounds	Mixture
	Composition	Elements are in fixed proportion by mass	Elements are mixed in variable proportion
	Melting/Boiling points	Have fixed melting and boiling points	Melts/ boils over a range of temperature
	Properties	Different physical and chemical properties from constituent elements	Have the properties of the substances that make them up
	Separation	Can only be separated by chemical/electrical methods	Can be separated by physical means
	Energy Changes	Usually involve heat or light energy	Usually do not involve heat or light energy
[any 2 difference, 2m]			
Reject: <ul style="list-style-type: none"> Mixture can be physically or chemically broken down. Compound is chemically combined while mixture is physically combined. (Need to state that 'the elements' are chemically/ physically combined) 			
C3aiv	<u>Substance T</u> is a mixture of compound. [1]		Generally well answered.
C3bi	Density of ring A $= 35.8 \text{ g} / 2 \text{ cm}^3$ $= 17.9 \text{ g/cm}^3$ [1m]		Generally well answered.
C3bii	Density of ring B $= 36.0 \text{ g} / 3.3 \text{ cm}^3$ $= 10.9 \text{ g/cm}^3$ [1m]		Generally well answered.
C3biii	Ring B has a higher percentage of copper. [1]		Generally well answered. ECF allowed.

C4ai	<u>Increase the temperature of water / stir the mixture / crush the sugar into finer powder</u> [2] to dissolve sugar at a faster rate.	Generally well answered. Reject: - Increase volume of water. - Increase temperature of solute (sugar) → decomposition will take place if sugar is heated
C4aii	The mixture is <u>not evenly mixed</u> because <u>chalk powder and food colouring powder do not dissolve / insoluble in water.</u> [1]	Reject: - mixture is milky
C4aiii	The mixture <u>does not allow light to pass through / cloudy / solute settles to the bottom when left to stand.</u> [any 1, 1m]	Reject: - can be separated by physical methods. - unclear - opaque - translucent - not clear in colour
C4bi	<u>Add water to mixture and stir to dissolve sugar. Filter the mixture to obtain sugar solution as filtrate [1], chalk dust and food colouring powder as residue. Evaporate to obtain saturated solution [1]. Cool and crystallise the saturated solution to obtain sugar crystal.</u> [1]	Badly done. Reject: - if pupils did not mention sugar solution obtained as filtrate. - sugar and water mixture
C4bii	<u>Add alcohol to the residue of chalk dust and food colouring.</u> [1] <u>Filter to obtain chalk powder as the residue [1] and food colouring as filtrate.</u>	Reject: - if pupils did not mention chalk powder collected as residue.
C4biii	<u>Gently warm the filtrate / leave the filtrate to evaporate</u> naturally to obtain the food colouring powder. [1]	Generally well answered.
C5ai	Fractional distillation [1]	Reject: - if fractional is not provided
C5aii	A – boiling chips / porcelain chips / calcium carbonate chips / marble chips B – fractionating column C – condenser [3 correct -2m; 2 correct- 1m; 1 correct – 0m]	Badly done.
C5aiii	Fractionating column provides a <u>larger surface area for condensation of vapour</u> to take place. [1]	Badly done. Reject: - large area - if vapour is not stated

C5aiv	Condenser allows <u>maximum condensation of vapour</u> into a liquid, which will then be collected as distillate in conical flask. [1]	Generally well answered.
C5av	Fractional distillation of liquefied air / fractional distillation of crude oil [1]	Badly done. Accept: - Making perfume - desalination plant - obtain mint oil from leaves Reject: - obtaining water from sea water.
C5bi	Metal / copper [1]. Metals are <u>good conductor of electricity</u> which allows current to flow through easily / <u>ductile</u> so it can be pulled into wires / <u>good conductor of heat</u> to within the heat given off when current flow through the wire. [1]	Generally well answered. Reject: - Malleable - Flexible **Mark not awarded if redundant properties are written.
C5bii	Plastic [1]. Plastics are <u>light / can be bent into shapes / cannot corrode / flexible / waterproof / durable</u> [1], which is suitable for making straws for drinking.	Generally well answered. Reject: - Poor conductor of heat - High melting point - strong **Mark not awarded if redundant properties are written.

Section A (30 marks)

Answer **all** questions.
Shade your answers in the OTAS provided.

- 1 Which of the symbols should be printed on a bottle of alcohol?



A



B



C

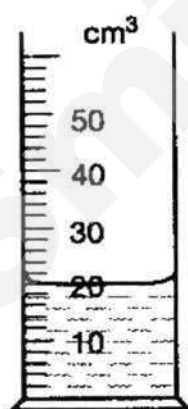


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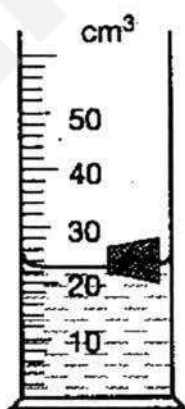
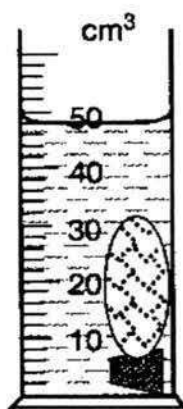
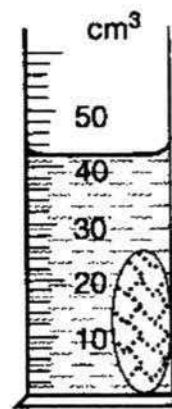
- 2 Which of the following is a property of a luminous flame?

- A It is invisible at a distance.
B It does **not** produce soot.
C It is produced when the air-hole is closed.
D It is hotter than the non-luminous flame.

- 3 Justin wants to find the volume of a cork by using a measuring cylinder. He uses a stone to keep the cork under water. The results of each stage of the experiment are shown below.



water

water and
corkwater, cork
and stonewater and
stone

What is the volume of the cork?

- A 2 cm³ B 6 cm³ C 22 cm³ D 28 cm³

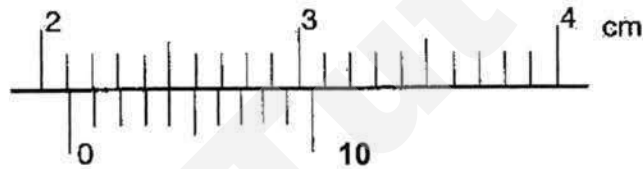
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- 4 Which of the following SI units are correctly matched?

	quantity	SI unit
I	length	metre (m)
II	time	minutes (min)
III	temperature	Kelvin (K)

- A I and II only
 B I and III only
 C II and III only
 D I, II and III
- 5 Huimin used a pair of vernier calipers to measure the diameter of a test tube. The diagram below shows the enlargement of part of the vernier calipers.

How large is the diameter of the test tube?



- A 2.14 cm B 2.15 cm C 2.45 cm D 2.54 cm
- 6 A student aims to investigate how an egg of the same density will behave in liquids of different densities.



P



Q



R



S

List the **liquids** P to S from the densest to the least dense.

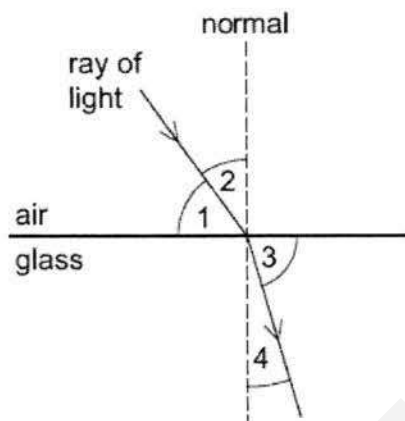
- A P, Q, R, S
 B S, R, Q, P
 C R, Q, P, S
 D S, P, Q, R
- 7 An object is placed 5 m in front of a mirror. A boy sits between the object and the mirror and viewed that the image of the object is 7 m away from him.

What is the distance between the boy and the object?

- A 2 m B 3 m C 4 m D 5 m

5

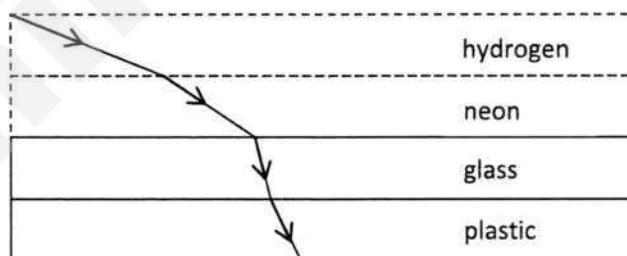
- 8 The diagram shows a ray of light entering a block of glass.



Which numbered angles are the angles of incidence and of refraction?

	angle of incidence	angle of refraction
A	1	3
B	1	4
C	2	3
D	2	4

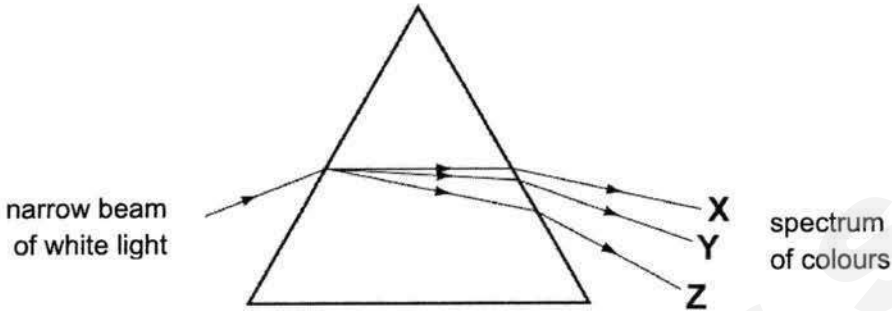
- 9 The following diagram shows the path of light as it passes through four substances.



Which of the following options ranks the four substances in increasing order of density?

- A** glass, plastic, neon, hydrogen
- B** hydrogen, neon, glass, plastic
- C** hydrogen, neon, plastic, glass
- D** plastic, glass, neon, hydrogen

- 10 A student shines a narrow beam of white light into a prism as shown in the diagram. He sees a spectrum of colours emerging from the prism.

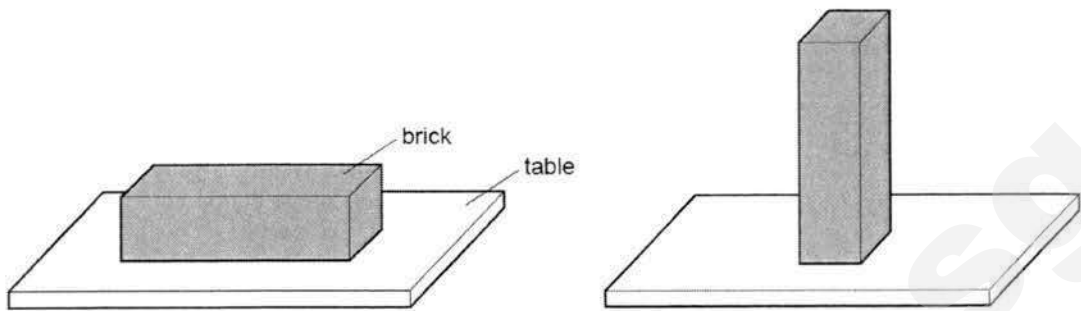


Which three colours does he see at X, at Y and at Z?

	X	Y	Z
A	violet	yellow	red
B	red	violet	yellow
C	red	yellow	violet
D	yellow	red	violet

- 11 Which of the following statements is true?
- A A magenta object appears red in blue light.
 - B A blue object appears blue only in blue light.
 - C A green object appears yellow in white light.
 - D A black object appears black in light of any colour.
- 12 A car is travelling at an average speed of 60 km/h.
- Calculate how far it would travel if the motorist starts at 0800 h and ends his journey at 0940 h.
- A 84 km B 100 km C 140 km D 600 km
- 13 Mountain bike tires are specially designed to provide good grip on the ground. Four methods are suggested below.
- add tread pattern on the tires
 - apply lubricating oil on tires
 - increase the width of tires
 - use a smooth material to make tires
- How many method(s) will effectively improve the grip of mountain bike tires?
- A 1 B 2 C 3 D 4

- 14 A brick with flat rectangular sides rests on a table. The brick is then turned so that it rests on the table on its smallest surface.



Which row correctly shows how the force and pressure exerted by the brick on the table changed?

	force	pressure
A	increased	increased
B	increased	unchanged
C	unchanged	increased
D	unchanged	unchanged

- 15 Which are the correct units for friction, weight and pressure?

	friction	weight	pressure
A	N	N	Pa
B	kg	kg	Pa
C	kg	g	kg/m ²
D	N	N	kg/m ²

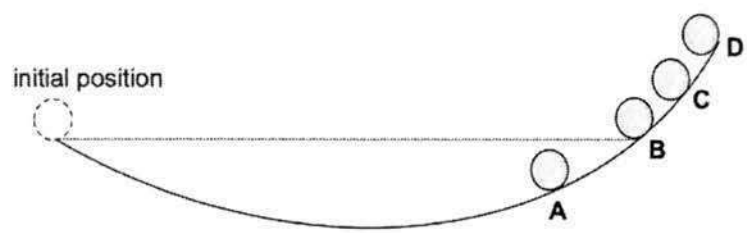
- 16 A boy holds a 40-newton dumbbell at arm's length for 10 seconds. His arm is 1.5 metres above the ground.

What is the work done by the force of the boy on the 40-newton dumbbell when he is holding it?

- A 0 J B 40 J C 60 J D 400 J

- 17 A ball rolls down a ramp as shown below.

Assuming there is no friction, what is the highest possible position the ball can reach?



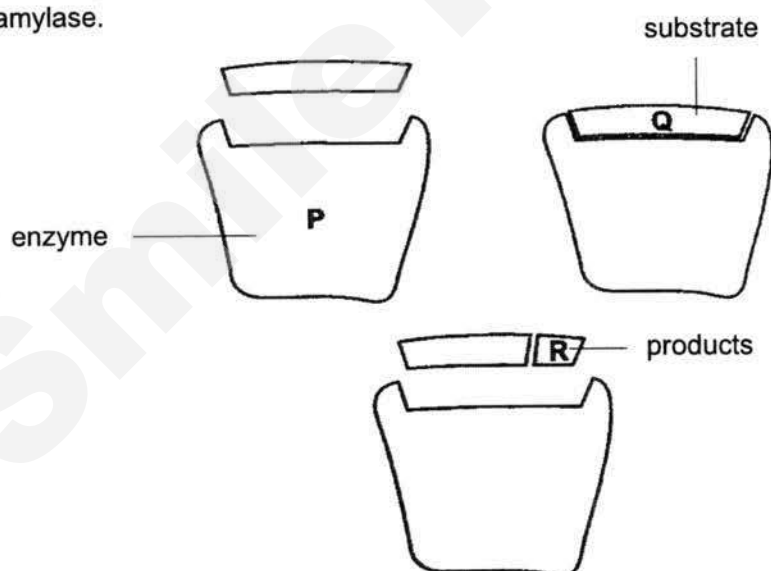
- 18 Which of the following is a correct classification of an organelle, a cell, a tissue or an organ?

	classification	example
A	cell	chloroplast
B	organ	nucleus
C	organelle	kidney
D	tissue	blood

- 19 The table below shows the composition of four foods in grams per 100 g portion. Which food would be most useful for providing an immediate source of energy?

food	carbohydrate /g	fat /g	protein /g
A	69.2	0.0	0.5
B	8.6	49.0	28.1
C	0.0	0.9	18.0
D	4.8	3.8	3.3

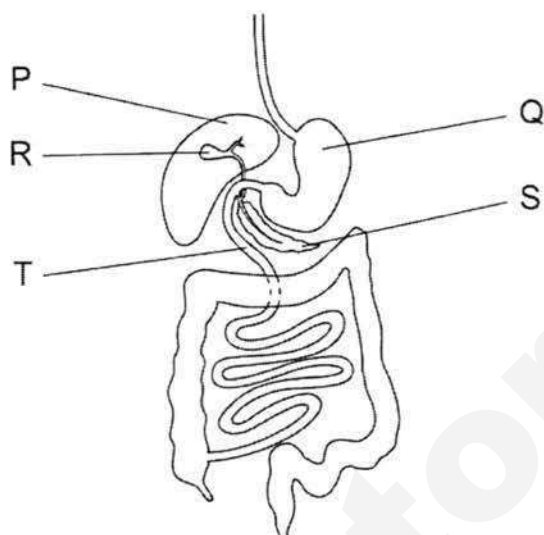
- 20 The diagram represents stages in the breakdown of starch to maltose by the enzyme amylase.



Which line is correct?

	starch	maltose	amylase
A	P	R	Q
B	Q	R	P
C	Q	P	R
D	R	Q	P

- 21** The diagram shows the human digestive system.



Where is bile made, where is it stored and where does it act?

	where it is made	where it is stored	where it acts
A	P	Q	R
B	P	R	T
C	Q	S	P
D	Q	T	S

- 22** In the outline of the Periodic Table shown below some elements are represented by numbers.

Which two of these are non-metals in the same Period?

The grid-in response area consists of a large grid with 6 rows and 20 columns. Above the grid are two boxes for writing answers: one labeled "Answer" and another labeled "Show your work". The grid contains several bubbles for marking answers, with some numbers already filled in:

- Row 1, Column 1: 1
- Row 2, Column 2: 2
- Row 3, Column 8: 3
- Row 4, Column 17: 4
- Row 4, Column 18: 5
- Row 5, Column 18: 6

- A** 1 and 3 **B** 2 and 6 **C** 4 and 5 **D** 5 and 6

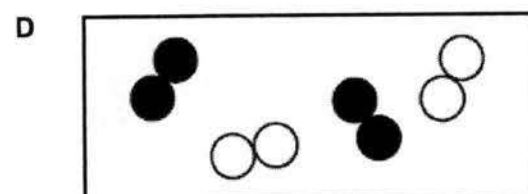
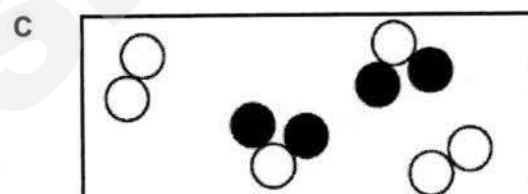
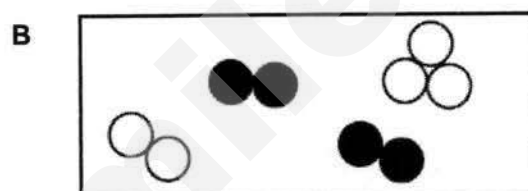
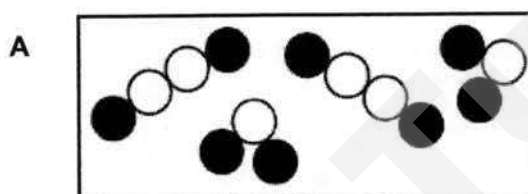
- 23 The table below gives the melting points, densities and electrical conductivities of four elements.

Which element is copper?

	melting point (°C)	density (g/cm ³)	electrical conductivity
A	-38.9	13.6	good
B	-7.2	3.12	poor
C	97.8	0.97	good
D	1083	8.96	good

- 24 The symbols  and  represent particles of different elements.

Which diagram shows a mixture of an element and a compound?



- 25 Cobalt chloride has a chemical formula of CoCl_2 .

Four statements are made about cobalt chloride.

- 1 Cobalt chloride is a mixture of elements.
- 2 Cobalt chloride can only be broken down by chemical methods.
- 3 The constituent elements of cobalt chloride are carbon, oxygen and chlorine.
- 4 There are two chlorine particles in cobalt chloride.

Which of the statements are **correct**?

- A 1 and 2 only
 B 2 and 3 only
 C 2 and 4 only
 D 2, 3 and 4
- 26 A mixture can be classified as a solution or a suspension.

Which of the following methods will **not** allow you to distinguish between a solution and a suspension?

- A allow the mixture to stand for a period of time
 B shine a beam of light through the mixture
 C filter the mixture
 D heat the mixture strongly
- 27 A very old painting has been vandalised with new paint. The solubilities of the old and new paints in different solvents **A**, **B**, **C** and **D** are shown in the table below.

Which solvent could be used to remove the vandalism without damaging the original paint?

solvent	old paint	new paint
A	insoluble	insoluble
B	insoluble	soluble
C	soluble	insoluble
D	soluble	soluble

- 28** Singapore uses reverse osmosis as one of the separation techniques in the process of producing NEWater.

Which one of the following best describes the process of reverse osmosis?

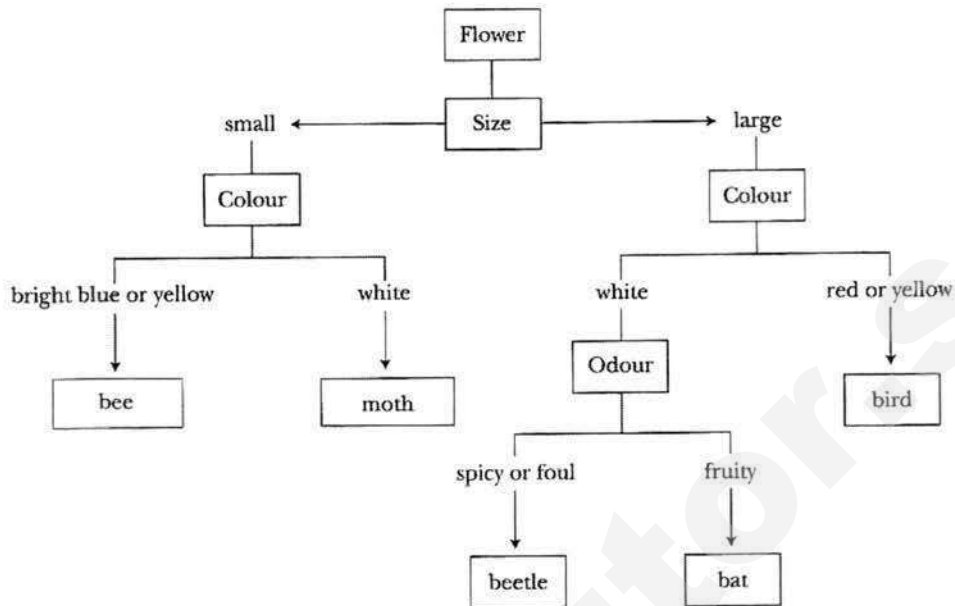
- A** A high pressure is used to push a solvent through a partially permeable membrane.
 - B** A low pressure is used to push a solvent through a partially permeable membrane.
 - C** A high pressure is used to force bacteria and viruses through a partially permeable membrane so that they are removed from the solution.
 - D** A low pressure is used to force bacteria and viruses through a partially permeable membrane for removal from the solution.
- 29** The table shows steps that are used to separate a mixture containing iron filings, chalk powder and table salt. The steps are not in correct sequence.

step	description
1	heating to dryness
2	using a bar magnet
3	dissolving in water
4	filtering

Which of the following shows the correct sequence to obtain these substances separately?

- A** 1 → 2 → 3 → 4
- B** 4 → 1 → 2 → 3
- C** 2 → 3 → 4 → 1
- D** 3 → 2 → 1 → 4

- 30 The key shows one way to classify flowers according to the animals that they attract.



Which animal would be attracted by a large, brightly coloured flower?

- A** bat **B** bee **C** bird **D** moth

Section B (40 marks)

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

- B1** Read the following passage below and answer the question that follows.

Marie Curie was the first woman who was awarded a Nobel Prize in Physics for her discovery of radioactivity and in Chemistry for the discovery of two new elements Polonium (named after Marie's native country, Poland) and Radium (meaning "ray").

The discovery of new elements was not easy during the 18th century due to the limitations of technology then, and due to limited research background knowledge on the properties of substances. Marie's and her husband's work was thus met with many set backs and critics. They spent many of their years proving their work was accurate.

After overcoming many trials, Marie finally gained recognition through the Nobel Prize.

State **one** quality that Marie had that led her to success. Support with reason(s) from the passage.

.....

[2]

- B2** A launderette owner is testing the effectiveness of some solvents **A**, **B** and **C** on two types of stains **X** and **Y**.

type of stain	mass of stain that dissolves in 100 cm ³ of solvent / g					
	solvent A		solvent B		solvent C	
	10 °C	70 °C	10 °C	70 °C	10 °C	70 °C
X	17.0	20.2	1.2	3.0	5.0	17.6
Y	15.0	29.9	1.3	2.5	19.0	31.2

- (a) Identify the control variable in the test.

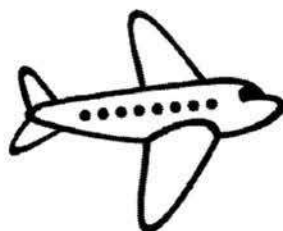
.....[1]

- (b) Which solvent is most effective in removing stains caused by **Y**? [1]

- (c) A garment marked 'cold wash only', is stained with **X**.
Which solvent should be used? [1]

- (d) How does the temperature affect the effectiveness of the solvents?
[1]

- B3** Aluminium is a commonly used element. Aluminium can be mixed with other elements to make aeroplanes.



- (a) Explain what is meant by an *element*.

.....
[1]

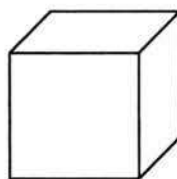
- (b) Identify the Period and Group of aluminium in the Periodic Table.

Period : Group : [2]

- (c) State **two** physical properties of aluminium that are important in the manufacturing of aeroplanes.

.....
[2]

- (d) Isaac carried out an experiment to determine the density of an aluminium cube measuring 0.03 m on each side. He measured the mass of the cube in the laboratory and it was 72.9 g.



0.03 m

- (i) Name the instrument that Isaac used to measure the mass of the aluminium cube.

.....[1]

- (ii) Calculate the density of the aluminium cube.
 Leave your answer in kg/m^3 .

(iii) The force of gravity on the Moon is about 1/6 (one sixth) that on Earth.

What is mass of the aluminium cube on the Moon?
Explain your answer.

.....
.....[2]

B4 (a) State the energy conversions that take place in a wind-up toy car.

kinetic energy → → + [2]
energy energy energy

(b) A car is initially at rest on a level road. The car begins to move and travels a distance of 2 kilometres.

State what has happened to the car's (*increase/decrease/remain unchanged*)

- (i) gravitational potential energy
- (ii) kinetic energy[2]

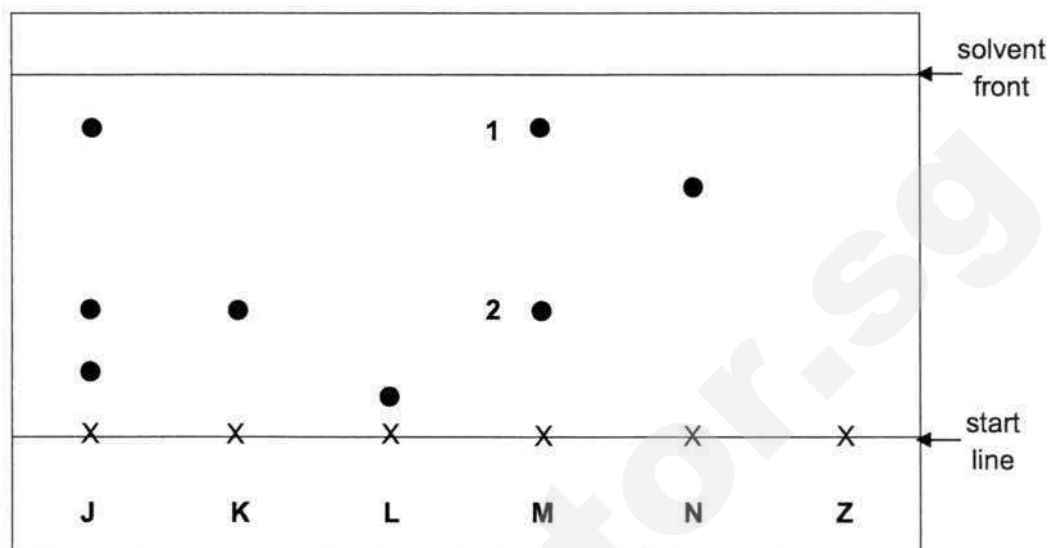
(c) (i) Suggest a practical renewable source of energy for Singapore.

.....[1]

(ii) Give **one** environmental advantage of using the energy source stated in **c(i)** in producing energy.

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

- B5** The figure below shows the chromatogram produced for all the six substances **J**, **K**, **L**, **M**, **N** and **Z** using ethanol as the solvent.



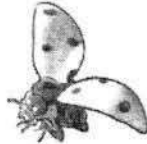




- (a) State which substances are made up of pure substances only.
[1]
- (b) (i) **Z** is a mixture containing substances **M** and **N**.
 On the figure, draw the result you would expect for substance **Z**. [1]
- (ii) Explain the difference in the results for substances **K** and **N**.

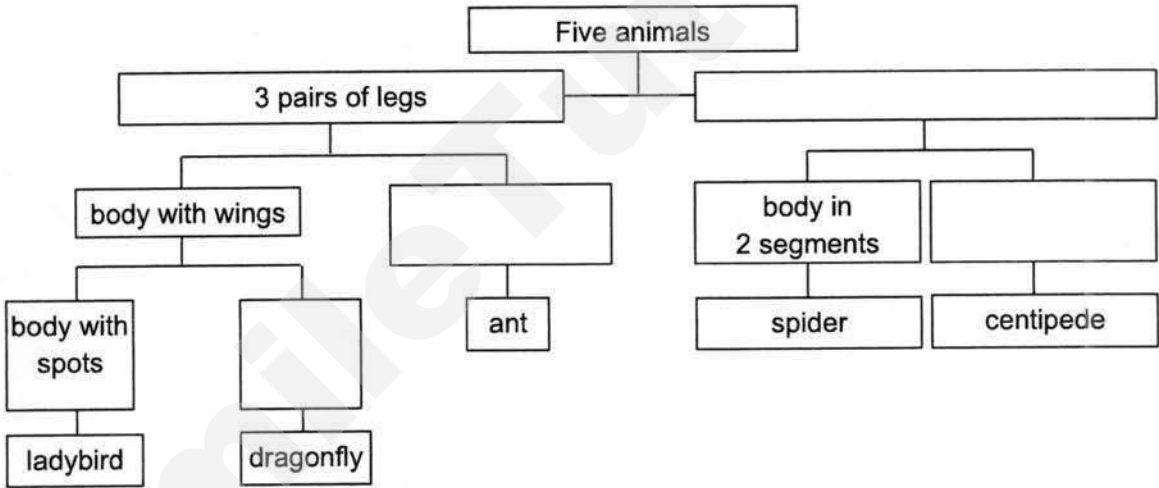
[2]
- (c) Explain why the start line is drawn in pencil and not in ink.

[2]
- (d) Chromatography is used in the detection of counterfeit drugs.
 State **one** advantage of chromatography.
[1]

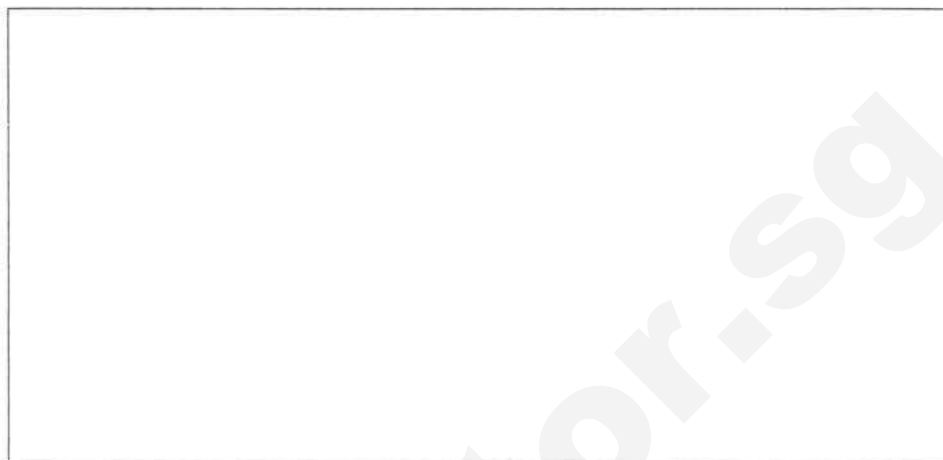
B6 During an ecology field trip, a group of students caught the five animals as shown below.

ant	dragonfly	ladybird	spider	centipede
				
3 pairs of legs	3 pairs of legs	3 pairs of legs	4 pairs of legs	more than 4 pairs of legs

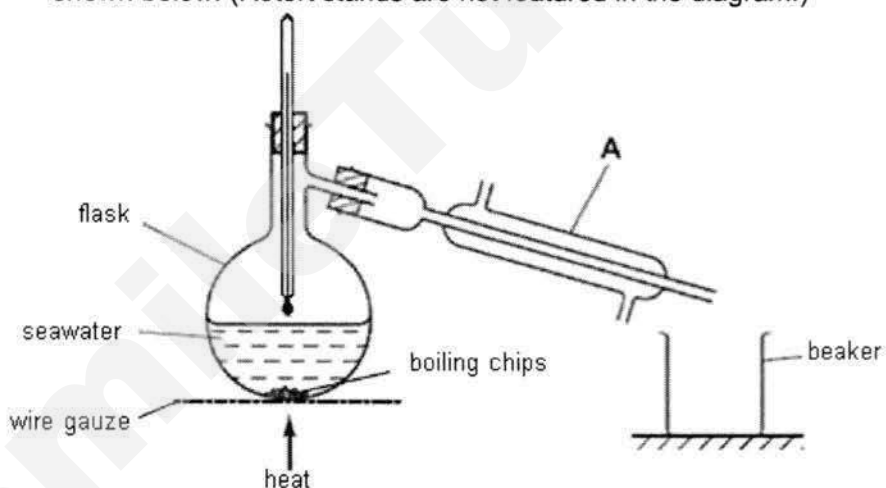
Complete the following dichotomous key with the observable characteristics of the animals caught. [4]



- B7 (a)** Draw a neat, **labeled** scientific diagram of the set up used to separate sand from seawater. [2]



- (b)** Pure water can be obtained by distilling the seawater using the apparatus shown below. (Retort stands are not featured in the diagram.)



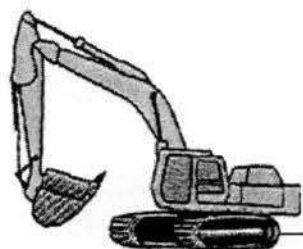
- (i) State the name of the apparatus labelled **A**.
[1]
- (ii) Draw **two** arrows to show the direction of water flow to cool the vapour in **A**. Label 'water in' and 'water out'. [1]
- (iii) What is the purpose of boiling chips?
[1]
- (iv) Identify a mistake made in the drawing of the above apparatus and how it should be corrected.
[1]

Section C (30 marks)

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

- C1 (a) The diagram shows two different types of excavators of the same mass.

Excavator A



caterpillar
tracks

Excavator B



wheels

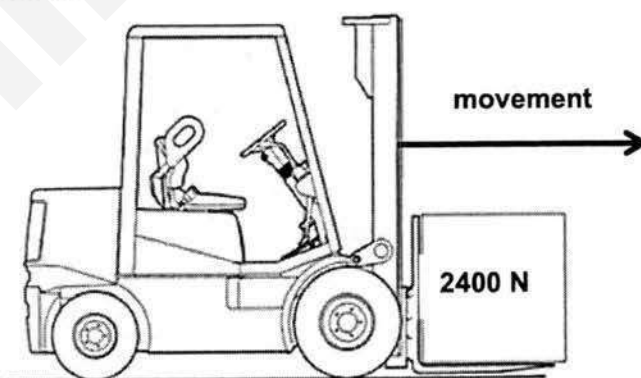
Which excavator is more suitable for operating on soft, muddy ground? Explain your answer using the concept of pressure.

.....

.....

.....[2]

- (b) The figure below shows a fork-lift truck with a mass of 3000 kg transporting a load of 2400 N.



- (i) Draw **two** labelled arrows to show the forces acting on the fork-lift truck in the figure above. [2]
- (ii) Calculate the total weight of the fork-lift and load, given gravitational field strength is 10 N/kg.

- (iii) The contact area of a wheel is 0.8 m^2 .

Calculate the pressure exerted on the floor by the fork-lift and load if the fork-lift truck has 4 wheels.

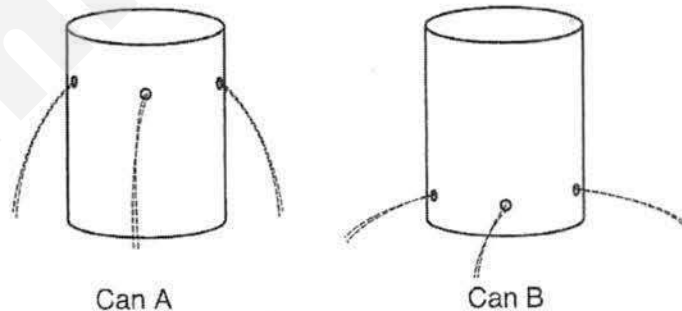
pressure =[2]

- (iv) Calculate work done if the load is lifted to a height of 2 m and the fork-lift truck has travelled 1.5 m.

Show clearly how you work out the answer.

work done =[2]

- (c) Two identical soft drink cans were taken and three holes were made on can **A** and **B** at different levels on each of the can.



Explain why the liquid shoots out further in can **B** compared to can **A**.

.....
[1]

C2 Fig. A below shows a diagram of the human alimentary canal.

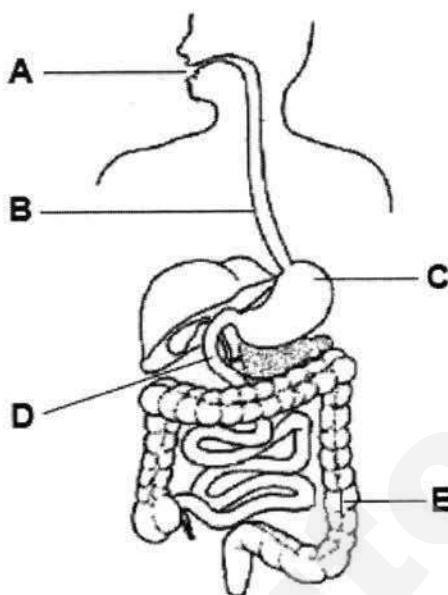


Fig. A

- (a) On **Fig. A**, draw a line and **name** the accessory organ that produces digestive enzymes. [1]

- (b) Both chemical and physical digestion takes place in the alimentary canal.
Explain why physical digestion is important.

.....
.....[2]

- (c) *Food is not digested in part B.*

Do you agree with the statement above? Explain your reasoning.

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

- (d) The glands in part **C** produce a digestive juice which contains hydrochloric acid to kill bacteria. Describe one **other** function of the acid in part **C**.

.....[1]

- (e) Fig. B shows three different mixtures of starch, protein and fat molecules in different parts of the human alimentary canal.

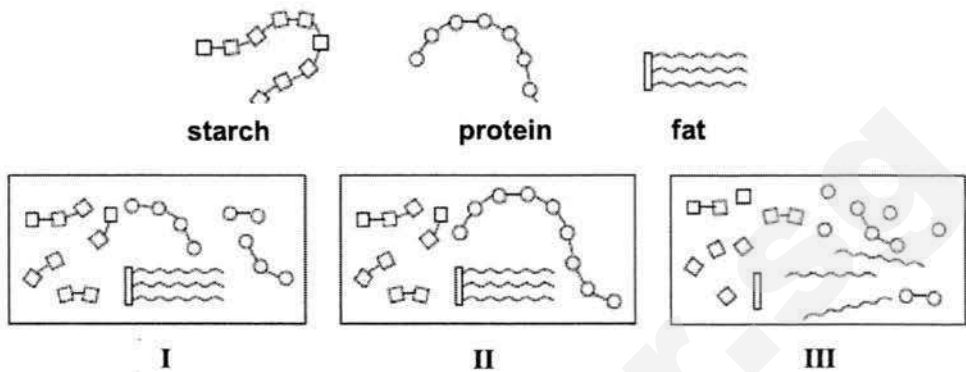
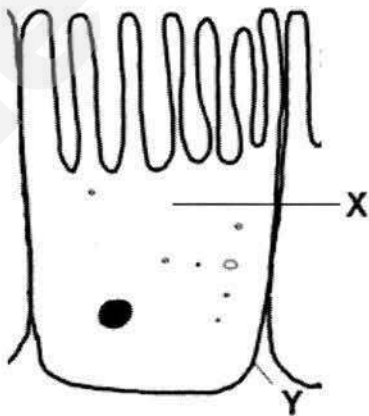


Fig. B

Which of the mixtures (I, II or III) in Fig. B would be found at part A, C and D?

A : C : D : [1]

- (f) The diagram below shows a specialised cell found in part D. The function of this cell is to absorb nutrients from the digestive tract into the blood stream efficiently.



Identify the labelled cell structures X and Y, and write down their respective functions. [4]

	cell structure	function
X		
Y		

C3 (a) State the Law of Reflection.

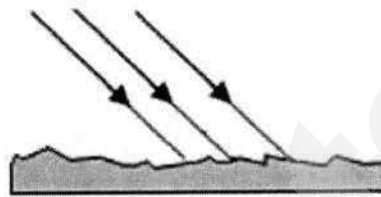
.....[1]

(b) Light falling on a sheet of white paper is reflected but no image is produced.

(i) State the type of reflection that would occur on a sheet of white paper.

.....[1]

(ii) Complete the path to show the reflection of light rays that fall on a sheet of white paper. [1]



(c) A man looks at his reflection in a vertical mirror. This is shown from the side in Fig.X.



Fig. X

A simplified diagram of the above set up is shown in Fig. Y.

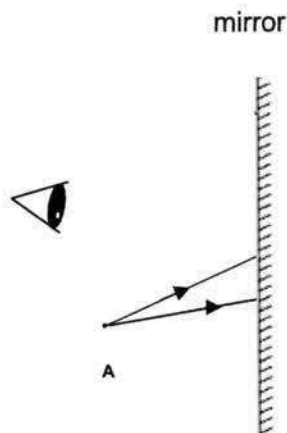
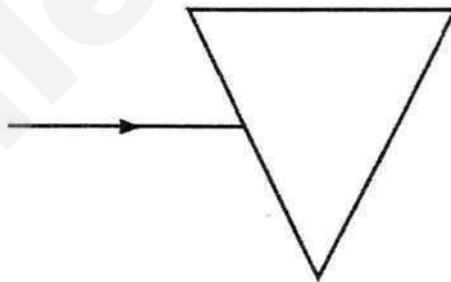


Fig. Y

- (i) On Fig. Y, accurately mark with a clear dot labelled **B** where the image of the tip of the man's beard, **A**, will be. [1]
- (ii) On Fig. Y, complete the ray diagram to show how the man sees the image of the tip of his beard. [2]
- (iii) The man can see the image, but it cannot be formed on a screen.
What is the name given to this type of image?
.....[1]
- (d) (i) State whether a convex or concave mirror should be used to make cars' side mirrors.
.....[1]
- (ii) State **one** advantage of using the mirror suggested in part (d) (i) as compared to a plane mirror.
.....[1]
- (e) The figure below shows red light from the air entering a glass block.
Complete the figure by drawing the path of light through and out of the glass block. [1]



End of Paper

Section A (30 marks)

Answer **all** questions.
Shade your answers in the OTAS provided.

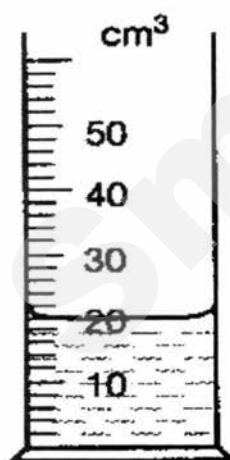
- 1 Which of the symbols should be printed on a bottle of alcohol?

**A****B****C****D**

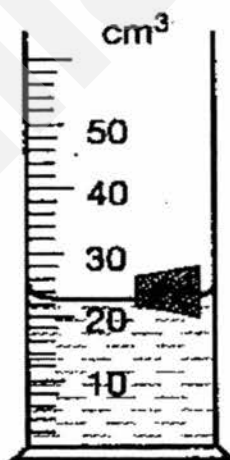
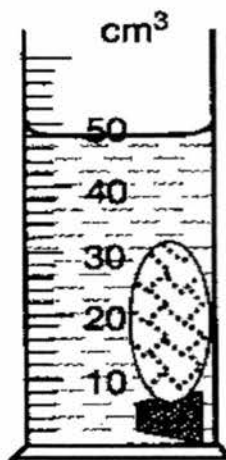
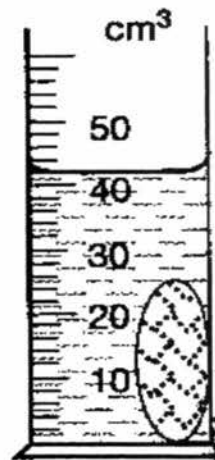
- 2 Which of the following is a property of a luminous flame?

- A** It is invisible at a distance.
B It does **not** produce soot.
C It is produced when the air-hole is closed.
D It is hotter than the non-luminous flame.

- 3 Justin wants to find the volume of a cork by using a measuring cylinder. He uses a stone to keep the cork under water. The results of each stage of the experiment are shown below.



water

water and
corkwater, cork
and stonewater and
stone

What is the volume of the cork?

- A** 2 cm³ **B** 6 cm³ **C** 22 cm³ **D** 28 cm³

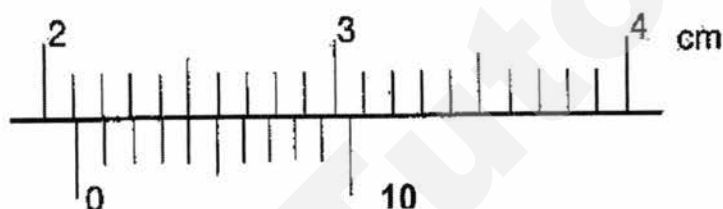
- 4 Which of the following SI units are correctly matched?

	quantity	SI unit
I	length	metre (m)
II	time	minutes (min)
III	temperature	Kelvin (K)

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

- 5 Huimin used a pair of vernier calipers to measure the diameter of a test tube. The diagram below shows the enlargement of part of the vernier calipers.

How large is the diameter of the test tube?



- A 2.14 cm B 2.15 cm C 2.45 cm D 2.54 cm

- 6 A student aims to investigate how an egg of the same density will behave in liquids of different densities.



P



Q



R



S

List the liquids P to S from the densest to the least dense.

- A P, Q, R, S
 B S, R, Q, P
 C R, Q, P, S
 D S, P, Q, R

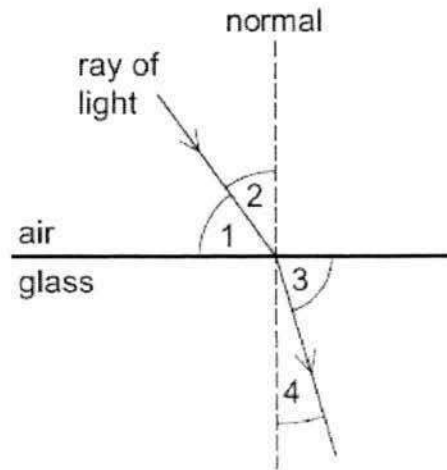
- 7 An object is placed 5 m in front of a mirror. A boy sits between the object and the mirror and viewed that the image of the object is 7 m away from him.

What is the distance between the boy and the object?

- A 2 m B 3 m C

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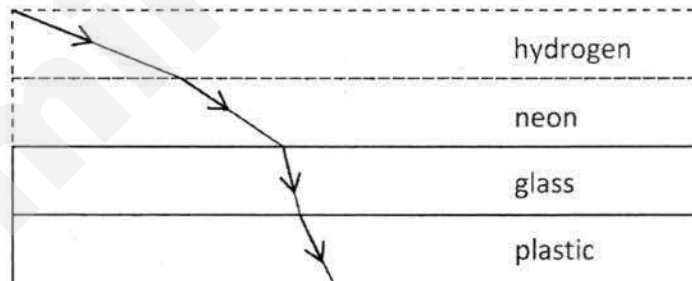
- 8 The diagram shows a ray of light entering a block of glass.



Which numbered angles are the angles of incidence and of refraction?

	angle of incidence	angle of refraction
A	1	3
B	1	4
C	2	3
D	2	4

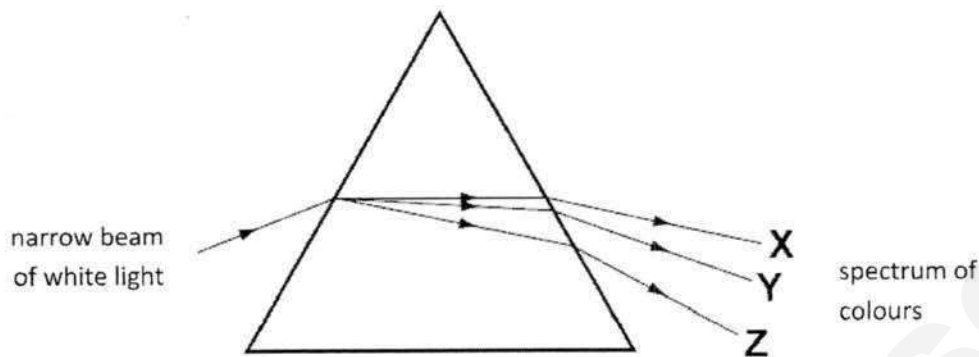
- 9 The following diagram shows the path of light as it passes through four substances.



Which of the following options ranks the four substances in increasing order of density?

- A glass, plastic, neon, hydrogen
- B hydrogen, neon, glass, plastic
- C hydrogen, neon, plastic, glass
- D plastic, glass, neon, hydrogen

- 10 A student shines a narrow beam of white light into a prism as shown in the diagram. He sees a spectrum of colours emerging from the prism.



Which three colours does he see at X, at Y and at Z?

	X	Y	Z
A	violet	yellow	red
B	red	violet	yellow
C	red	yellow	violet
D	yellow	red	violet

- 11 Which of the following statements is true?
- A A magenta object appears red in blue light.
- B A blue object appears blue only in blue light.
- C A green object appears yellow in white light.
- D A black object appears black in light of any colour.

- 12 A car is travelling at an average speed of 60 km/h.

Calculate how far it would travel if the motorist starts at 0800 h and ends his journey at 0940 h.

- A 84 km B 100 km C 140 km D 600 km

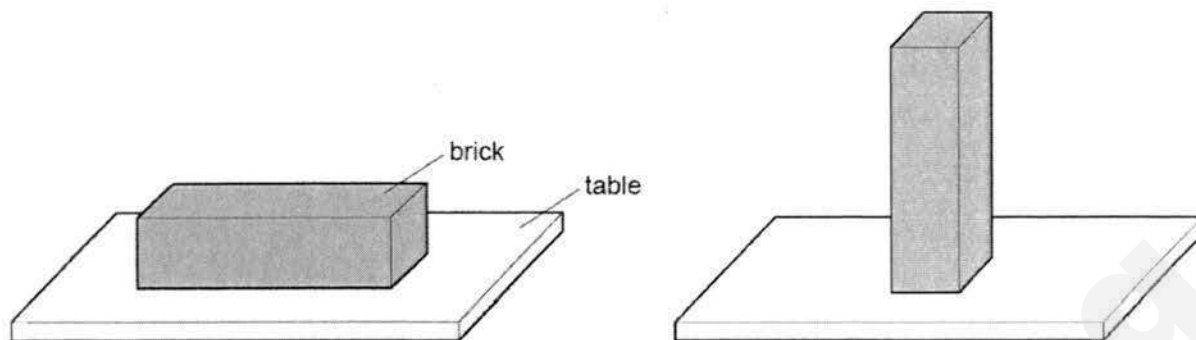
- 13 Mountain bike tires are specially designed to provide good grip on the ground. Four methods are suggested below.

- add tread pattern on the tires
- apply lubricating oil on tires
- increase the width of tires
- use a smooth material to make tires

How many method(s) will effectively improve the grip of mountain bike tires?

- A 1 B 2 C 3 D 4

- 14 A brick with flat rectangular sides rests on a table. The brick is then turned so that it rests on the table on its smallest surface.



Which row correctly shows how the force and pressure exerted by the brick on the table changed?

	force	pressure
A	increased	increased
B	increased	unchanged
C	unchanged	increased
D	unchanged	unchanged

- 15 Which are the correct units for friction, weight and pressure?

	friction	weight	pressure
A	N	N	Pa
B	kg	kg	Pa
C	kg	g	kg/m ²
D	N	N	kg/m ²

- 16 A boy holds a 40-newton dumbbell at arm's length for 10 seconds. His arm is 1.5 metres above the ground.

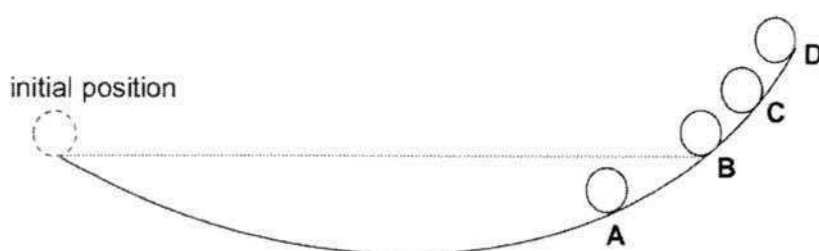
What is the work done by the force of the boy on the 40-newton dumbbell when he is holding it?

- A 0 J B 40 J C 60 J D 400 J

- 17 A ball rolls down a ramp as shown below.

Assuming there is no friction, what is the highest possible position the ball can reach?

B



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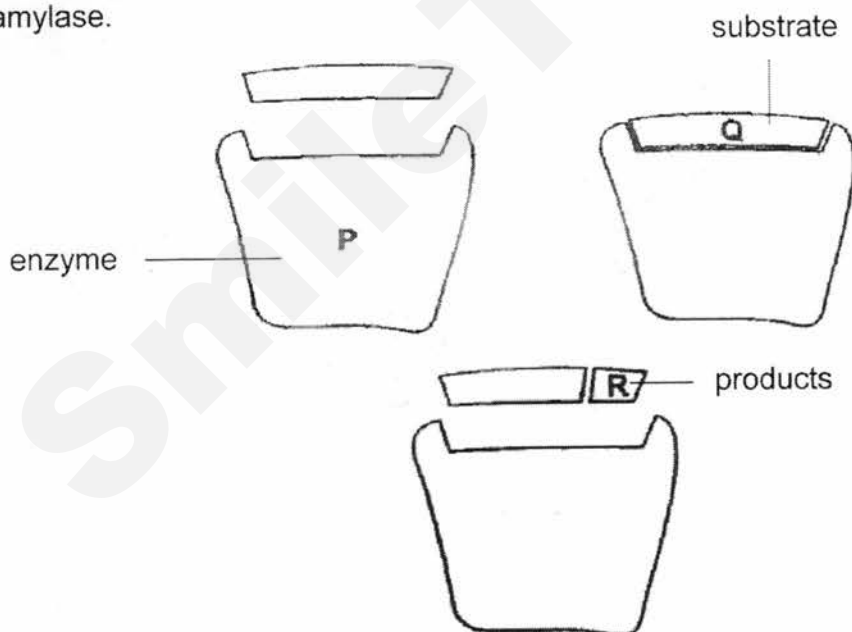
- 18 Which of the following is a correct classification of an organelle, a cell, a tissue or an organ?

	classification	example
A	cell	chloroplast
B	organ	nucleus
C	organelle	kidney
D	tissue	blood

- 19 The table below shows the composition of four foods in grams per 100 g portion. Which food would be most useful for providing an immediate source of energy?

food	carbohydrate /g	fat /g	protein /g
A	69.2	0.0	0.5
B	8.6	49.0	28.1
C	0.0	0.9	18.0
D	4.8	3.8	3.3

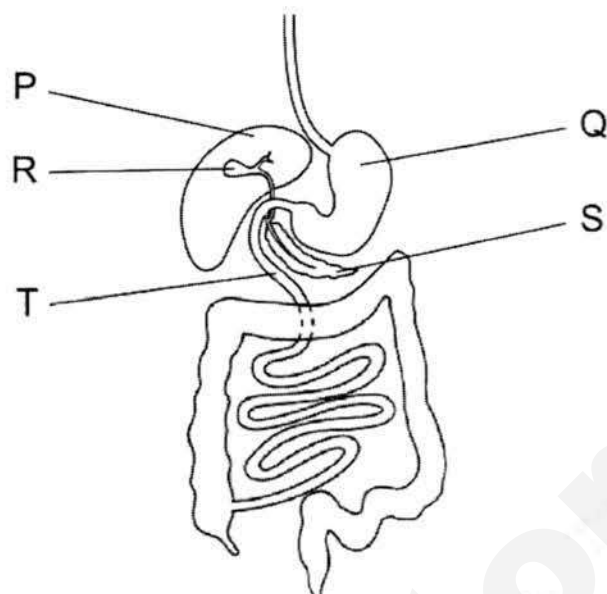
- 20 The diagram represents stages in the breakdown of starch to maltose by the enzyme amylase.



Which line is correct?

	starch	maltose	amylase
A	P	R	Q
B	Q	R	P
C	Q	P	R
D	R	Q	P

- 21** The diagram shows the human digestive system.



Where is bile made, where is it stored and where does it act?

	where it is made	where it is stored	where it acts
A	P	Q	R
B	P	R	T
C	Q	S	P
D	Q	T	S

- 22** In the outline of the Periodic Table shown below some elements are represented by numbers.

[illegible]

- A** 1 and 3 **B** 2 and 6 **C** 4 and 5 **D** 5 and 6

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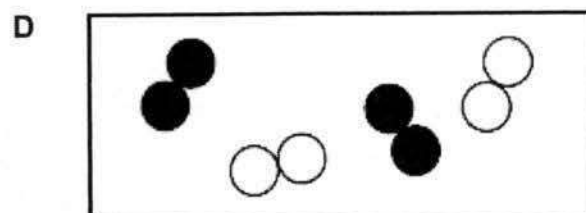
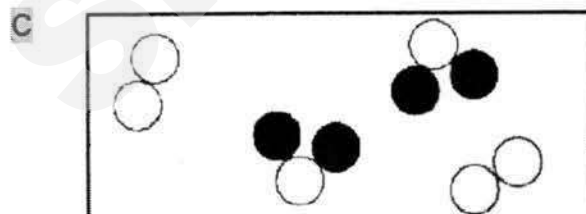
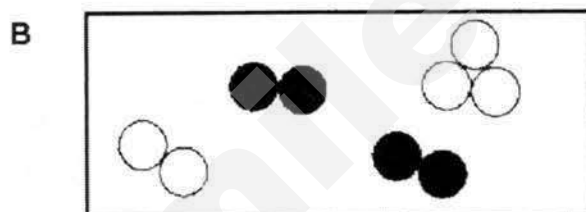
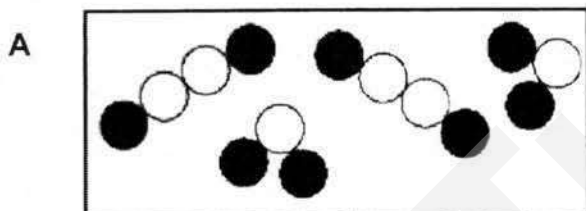
- 23 The table below gives the melting points, densities and electrical conductivities of four elements.

Which element is copper?

	melting point (°C)	density (g/cm ³)	electrical conductivity
A	-38.9	13.6	good
B	-7.2	3.12	poor
C	97.8	0.97	good
D	1083	8.96	good

- 24 The symbols  and  represent particles of different elements.

Which diagram shows a mixture of an element and a compound?



- 25 Cobalt chloride has a chemical formula of CoCl_2 .

Four statements are made about cobalt chloride.

- 1 Cobalt chloride is a mixture of elements.
- 2 Cobalt chloride can only be broken down by chemical methods.
- 3 The constituent elements of cobalt chloride are carbon, oxygen and chlorine.
- 4 There are two chlorine particles in cobalt chloride.

Which of the statements are **correct**?

- A 1 and 2 only
 B 2 and 3 only
 C 2 and 4 only
 D 2, 3 and 4

- 26 A mixture can be classified as a solution or a suspension.

Which of the following methods will **not** allow you to distinguish between a solution and a suspension?

- A allow the mixture to stand for a period of time
 B shine a beam of light through the mixture
 C filter the mixture
 D heat the mixture strongly

- 27 A very old painting has been vandalised with new paint. The solubilities of the old and new paints in different solvents **A**, **B**, **C** and **D** are shown in the table below.

Which solvent could be used to remove the vandalism without damaging the original paint?

solvent	old paint	new paint
A	insoluble	insoluble
B	insoluble	soluble
C	soluble	insoluble
D	soluble	soluble

- 28 Singapore uses reverse osmosis as one of the separation techniques in the process of producing NEWater.

Which one of the following best describes the process of reverse osmosis?

- A** A high pressure is used to push a solvent through a partially permeable membrane.
- B** A low pressure is used to push a solvent through a partially permeable membrane.
- C** A high pressure is used to force bacteria and viruses through a partially permeable membrane so that they are removed from the solution.
- D** A low pressure is used to force bacteria and viruses through a partially permeable membrane for removal from the solution.

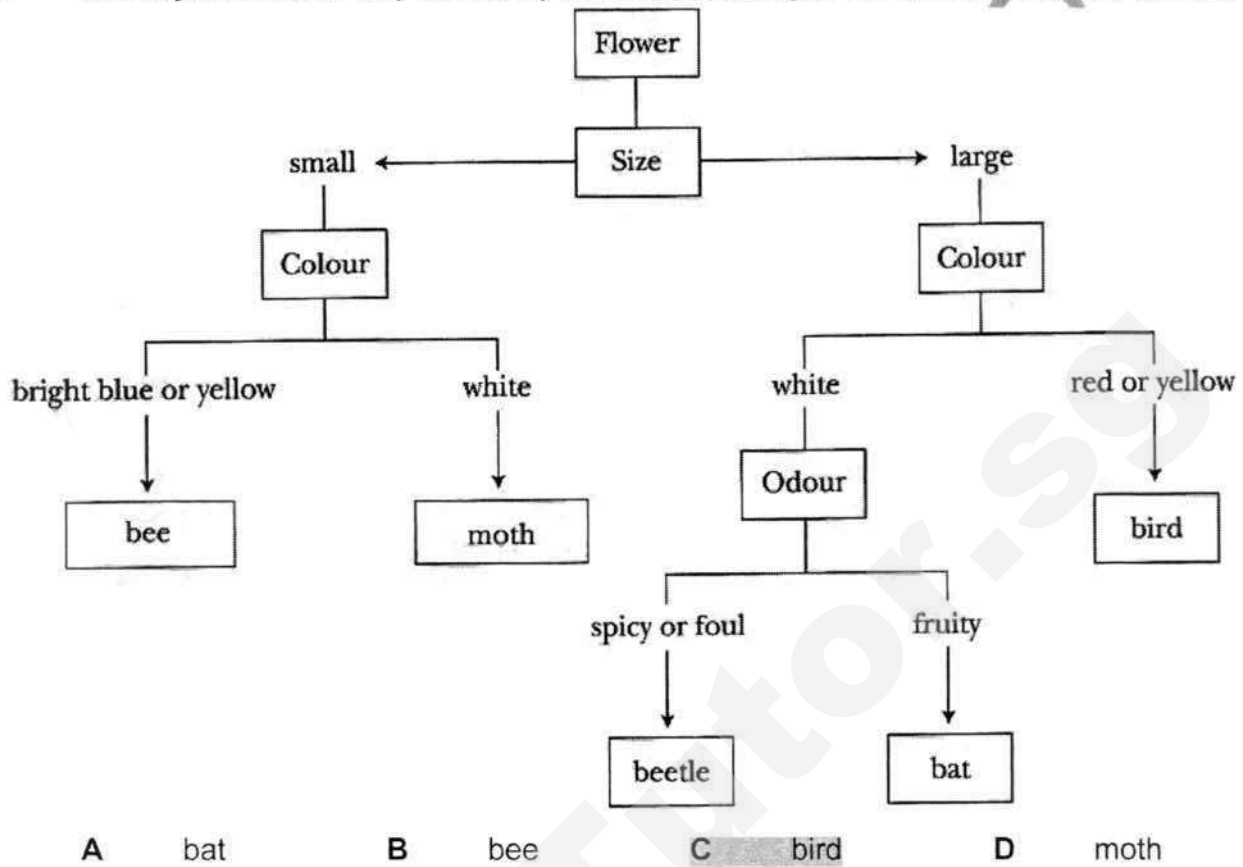
- 29 The table shows steps that are used to separate a mixture containing iron filings, chalk powder and table salt. The steps are not in correct sequence.

step	description
1	heating to dryness
2	using a bar magnet
3	dissolving in water
4	filtering

Which of the following shows the correct sequence to obtain these substances separately?

- A** 1 → 2 → 3 → 4
- B** 4 → 1 → 2 → 3
- C** 2 → 3 → 4 → 1
- D** 3 → 2 → 1 → 4

- 30 The key shows one way to classify flowers according to the animals that they attract.



Section B (40 marks)

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

B1 Read the following passage below and answer the question that follows.

Marie Curie was the first woman who was awarded a Nobel Prize in Physics for her discovery of radioactivity and in Chemistry for the discovery of two new elements Polonium (named after Marie's native country, Poland) and Radium (meaning "ray").

The discovery of new elements was not easy during the 18th century due to the limitations of technology then, and due to limited research background knowledge on the properties of substances. Marie's and her husband's work was thus met with many set backs and critics. They spent many of their years proving their work was accurate.

After overcoming many trials, Marie finally gained recognition through the Nobel Prize.

State **one** quality that Marie has that lead her to success. Support with reason(s) from the passage.

persistence [1] spent many years proving their work despite set backs and critics[1]

[2]

B2 A launderette owner is testing the effectiveness of some solvents **A**, **B** and **C** on two types of stains **X** and **Y**.

type of stain	mass of stain that dissolves in 100 cm ³ of solvent / g					
	solvent A		solvent B		solvent C	
	10 °C	70 °C	10 °C	70 °C	10 °C	70 °C
X	17.0	20.2	1.2	3.0	5.0	17.6
Y	15.0	29.9	1.3	2.5	19.0	31.2

(a) Identify the control variable in the test.

Volume of solvent

[1]

(b) Which solvent is most effective in removing stains caused by **Y**?

C

[1]

(c) A garment marked 'cold wash only', is stained with **X**.
Which solvent should be used?

A

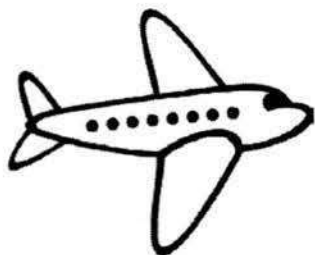
[1]

(d) How does the temperature affect the effectiveness of the solvents?

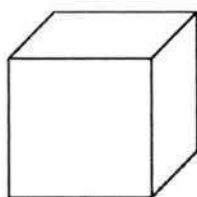
The higher the temperature, the more effective the solvent in dissolving the stain.

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- B3** Aluminium is a commonly used element. Aluminium can be mixed with other elements to make aeroplanes.



- (a) Explain what is meant by an *element*.
Substance that cannot be broken down into simpler substances by chemical or physical methods.....[1]
- (b) Identify the Period and Group of aluminium in the Periodic Table.
 Period : 3..... Group : III..... [2]
- (c) State **two** physical properties of aluminium that are important in the manufacturing of aeroplanes.
Low density/ corrosion resistant/ durable/ strong.....[2]
- (d) Isaac carried out an experiment to determine the density of an aluminium cube measuring 0.03 m on each side. He measured the mass of the cube in the laboratory and it was 72.9 g.



0.03 m

- (i) Name the instrument that Isaac used to measure the mass of the aluminium cube.
Electronic balance/beam balance.....[1]
- (ii) Calculate the density of the aluminium cube.
 Leave your answer in kg/m³.

$$D = 0.0729 \text{ kg} \div (0.03 \times 0.03 \times 0.03) \text{ m}^3 = 2700 \text{ kg/ m}^3$$

Correct unit conversion [1]

Correct method [1]

Correct answer [1]

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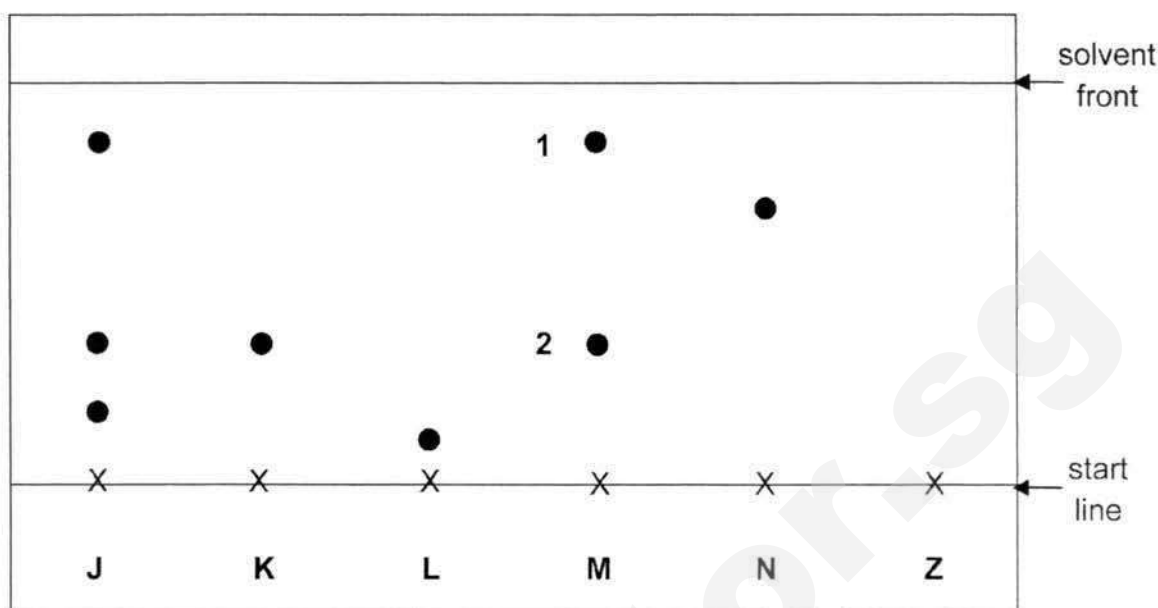
- [2]

[2]

- ..[1]

- ..[1]

- B5** The figure below shows the chromatogram produced for all the six substances **J**, **K**, **L**, **M**, **N** and **Z** using ethanol as the solvent.



- (a) State which substances are made up of pure substances only.
K, L N[1]
- (b) (i) **Z** is a mixture containing substances **M** and **N**.
On Fig. 3.1, draw the result you would expect for substance **Z**. [1]
- (ii) Explain the difference in the results for substances **K** and **N**.
N is more soluble than K in the solvent[1],
.....
so travels faster and further up the paper [1]
.....[2]
- (c) Explain why the start line is drawn in pencil and not in ink.
Pencil is insoluble in the solvent, pen is soluble. [1]
.....
Pencil will not interfere with the results [1]
.....[2]
- (d) Chromatography is used in the detection of counterfeit drugs.
State **one** advantage of chromatography.
Sensitive/only require a small sample/quick test
.....[1]

- B6** During an ecology field trip, a group of students caught the five animals as shown below.

ant



3 pairs of legs

dragonfly



3 pairs of legs

ladybird



3 pairs of legs

spider



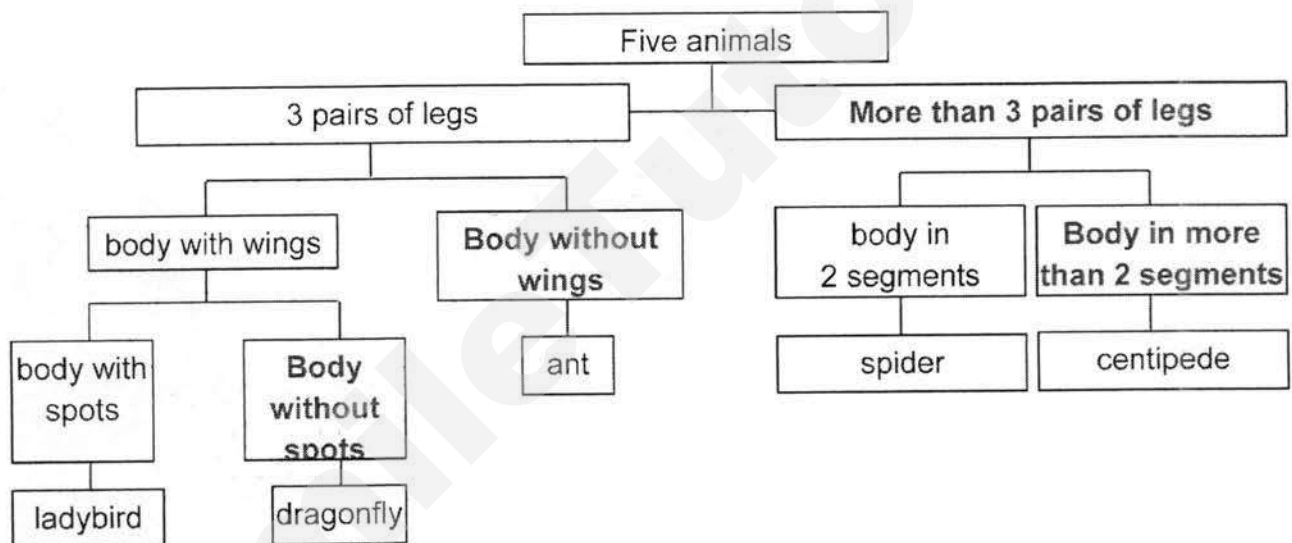
4 pairs of legs

centipede

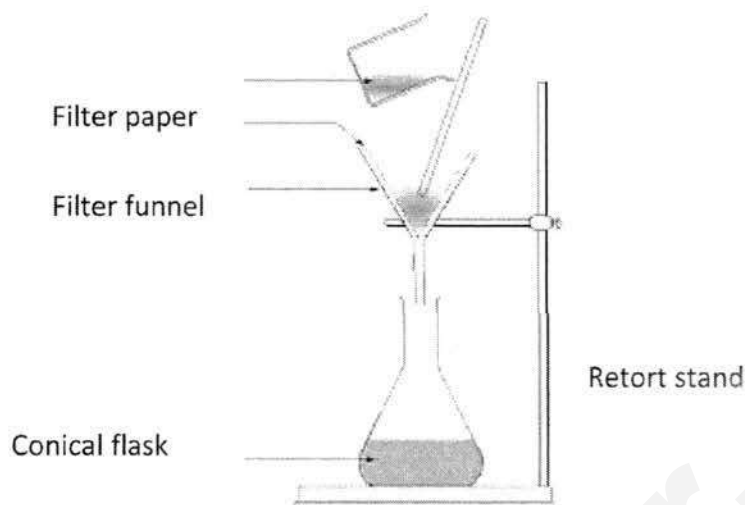
more than
4 pairs of legs

Complete the following dichotomous key with the observable characteristics of the animals caught.

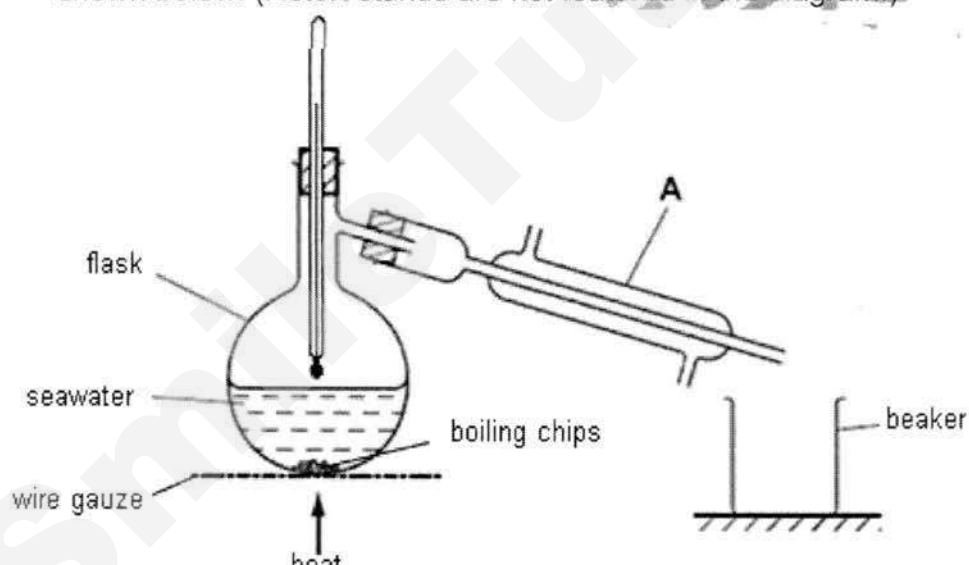
[4]



- B7 (a)** With the help of suitable apparatus below, draw a neat, labeled scientific diagram of the set up used to separate sand from seawater. [2]



- (b)** Pure water can be obtained by distilling the seawater using the apparatus shown below. (Retort stands are not featured in the diagram.)



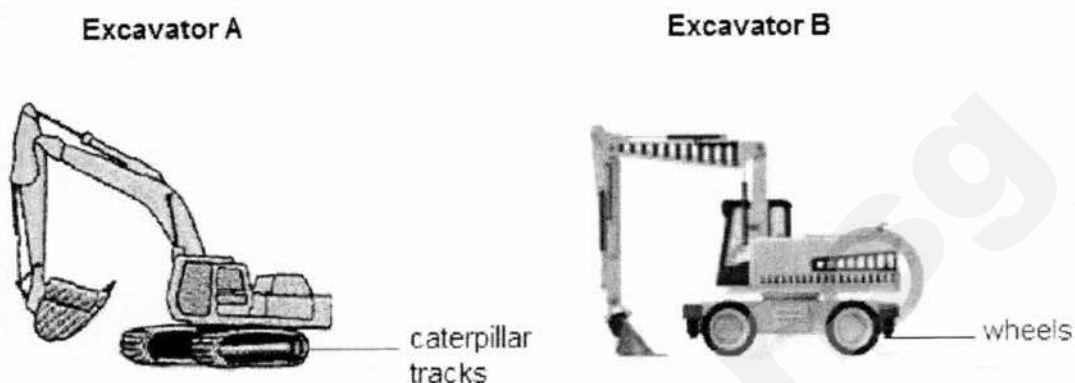
- (i) State the name of the piece of apparatus labelled **A**.
condenser[1]
- (ii) Using arrows, show the direction of water flow to cool the vapour in **A**. [1]
- (iii) What is the purpose of boiling chips?
To ensure smooth boiling[1]
- (iv) Identify a mistake made in the drawing of the above apparatus and how it should be corrected.
The thermometer bulb should be placed next to opening to condenser[1]

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Section C (30 marks)

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

- C1 (a)** The diagram shows two different types of excavators of the same mass.



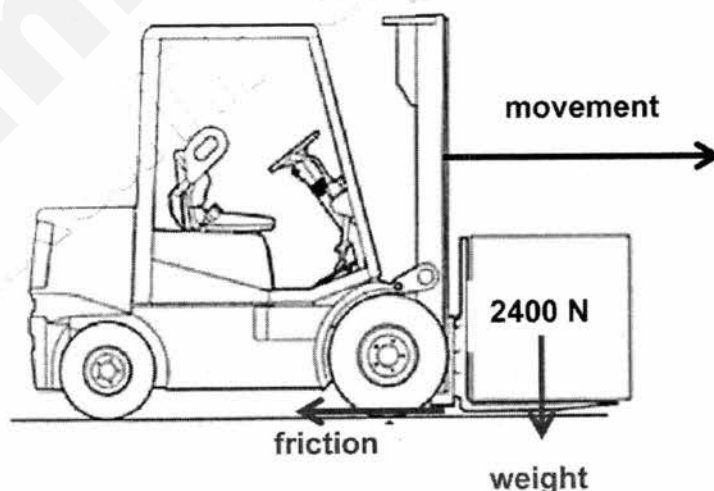
Which excavator is more suitable for operating on soft muddy ground? Explain your answer using the concept of pressure.

A. [1] Caterpillar tracks provide larger surface area in contact with ground,

So decreasing pressure, excavator won't sink into ground so easily. [1]

.....[2]

- (b)** The figure below shows a fork-lift truck with a mass of 3000 kg transporting a load of 2400 N.



- (i)** Draw **two** labelled arrows to show the forces acting on the fork-lift truck in the figure above. [2]
- (ii)** Calculate the total weight of the fork-lift and load, given gravitational field strength is 10 N/kg.

$$W = (3000 \times 10) + 2400 = 32400 \text{ N}$$

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- (iii) The contact area of a wheel is 0.8 m^2 .

Calculate the pressure exerted on the floor by the fork-lift and load if the fork-lift truck has 4 wheels.

$$P = 32400 \text{ N} \div (4 \times 0.8) \text{ m}^2 [1] = 103680 \text{ N/m}^2 [1]$$

pressure =[2]

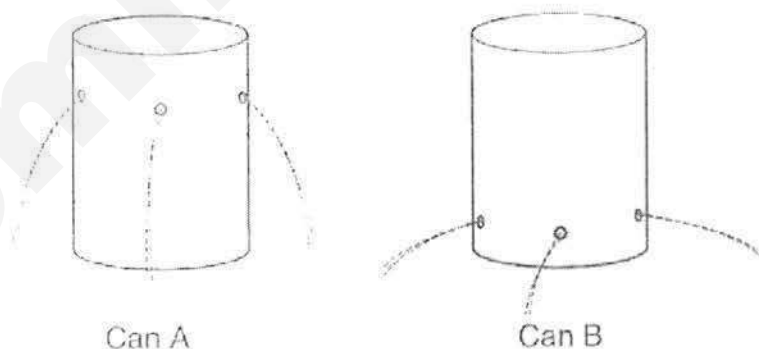
- (iv) Calculate work done if the load is lifted to a height of 2 m and the fork-lift truck has travelled 1.5 m.

Show clearly how you work out the answer.

$$\text{Work done} = 2400 \times 2 [1] = 4800 \text{ Nm or J [1]}$$

work done =[2]

- (c) Two identical soft drink cans were taken and three holes were made on can **A** and **B** at different levels on each of the can.



Explain why the liquid shoots out further in can **B** compared to can **A**.
Higher water pressure at greater depths

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

C2 Fig. A below shows a diagram of the human alimentary canal.

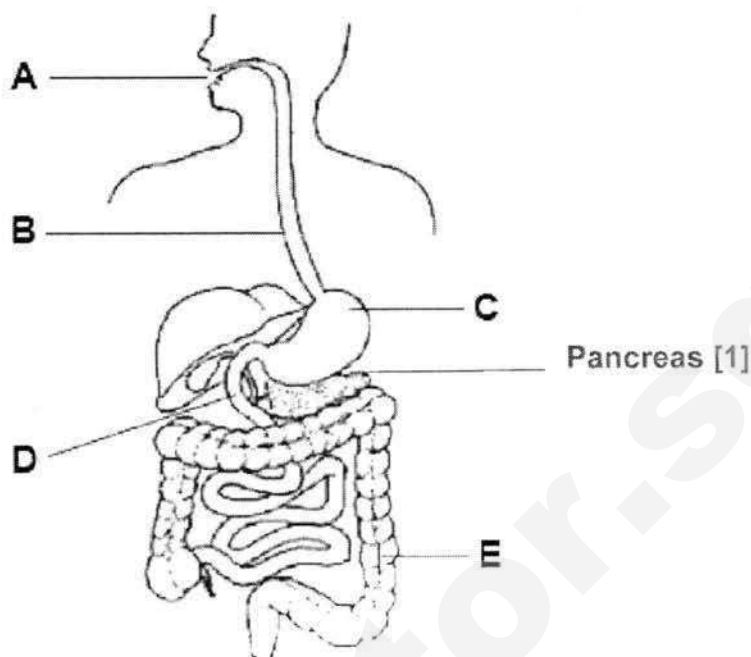


Fig. A

- (a) On **Fig. A**, draw a line and name the accessory organ that produces digestive enzymes. [1]

- (b) Both chemical and physical digestion takes place in the alimentary canal.

Explain why physical digestion is important.

To break down food into smaller pieces to increase surface area [1]

So that rate of digestion by enzymes is faster [1]

.....[2]

- (c) *Food is not digested in part B.*

Do you agree with the statement above? Explain your reasoning.

Agree, no enzymes produced by oesophagus OR

Disagree, enzymes from saliva can continue digestion in oesophagus

.....[1]

- (d) The glands in part **C** produce a digestive juice which contains hydrochloric acid to kill bacteria. Describe one **other** function of the acid in part **C**.

Activate protease/ provide suitable condition for protease to work

.....[1]

- (e) Fig. B shows three different mixtures of starch, protein and fat molecules in different parts of the human alimentary canal.

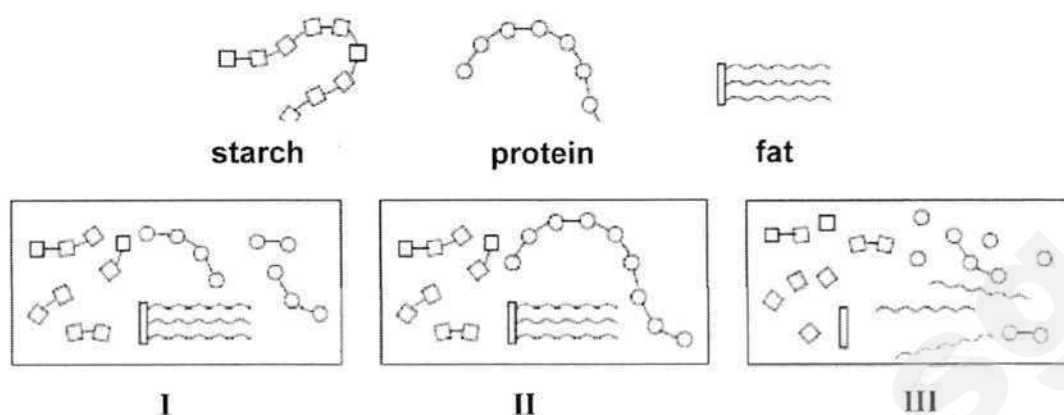
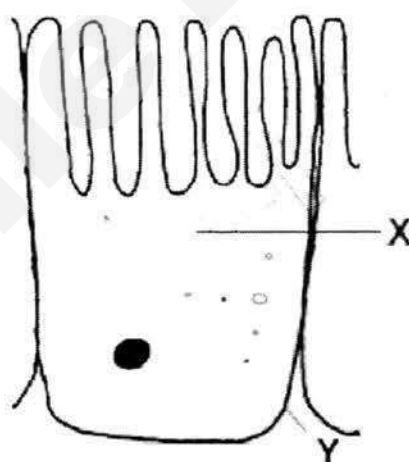


Fig. B

Which of the mixtures (I, II or III) in **Fig. B** would be found at part **A**, **C** and **D**?

A : **C** : **D** : [1]

- (f) The diagram below shows a specialised cell found in part **D**. The function of this cell is to absorb nutrients from the digestive tract into the blood stream efficiently.



Identify the labelled cell structures **X** and **Y**, and write down their respective functions. [4]

	cell structure	function
X	Cytoplasm	Site of chemical reactions
Y	Cell membrane	Allow some but not all substances to move in and out of the cell

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- C3 (a) State the Law of Reflection.

Angle of incidence is equal to angle of reflection

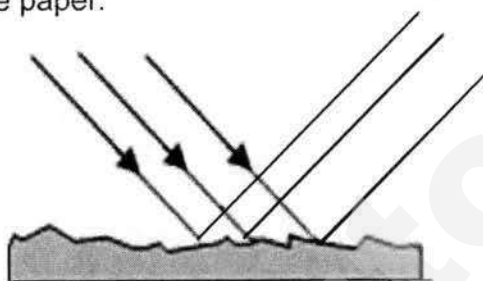
.....[1]

- (b) Light falling on a sheet of white paper is reflected but no image is produced.

- (i) State the type of reflection that would occur on a sheet of white paper.
Irregular/diffused

.....[1]

- (ii) Complete the path to show the reflection of light rays that fall on a sheet of white paper. [1]



- (c) A man looks at his reflection in a vertical mirror. This is shown from the side in Fig.A.



Fig. A

A simplified diagram of the above set up is shown in Fig. B.

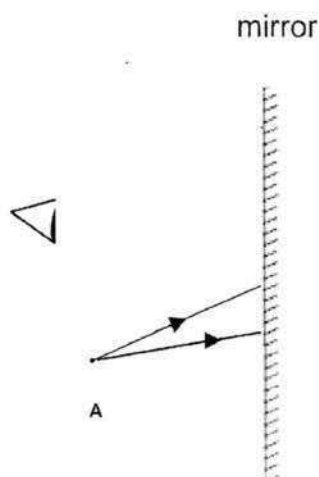
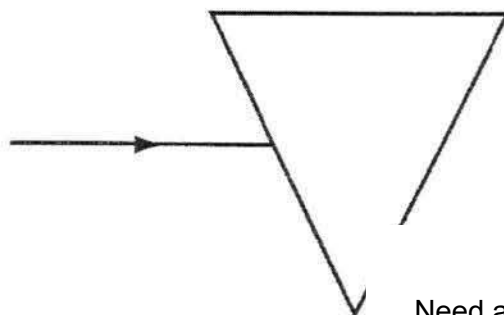


Fig. B

- (i) On Fig. B, accurately mark with a clear dot labelled **B** where the image of the tip of the man's beard, **A**, will be. [1]
- (ii) On Fig. B, complete the ray diagram to show how the man sees the image of the tip of his beard. [2]
- (iii) The man can see the image, but it cannot be formed on a screen.
What is the name given to this type of image?
virtual[1]
- (d) (i) State whether a convex or concave mirror should be used to make cars' side mirrors.
Convex[1]
- (ii) State **one** advantage of using the mirror suggested in part (d) (i) as compared to a plane mirror.
Larger range of view[1]
- (e) The figure below shows red light from the air entering a glass block.
Complete the figure by drawing the path of light through and out of the glass block. [1]



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DUNEARN SECONDARY SCHOOL MID-YEAR EXAMINATION 2017

LOWER SECONDARY SCIENCE

Secondary One Express

3th May 2017 (Wednesday)

0800 – 1000

2 hours

INSTRUCTIONS TO CANDIDATES

Write in dark blue or black pen for your answers.
You may use a pencil for diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **ALL** the questions in Section A.

For each of the question, there are 4 possible answers, **A, B, C** and **D**.

Choose the **one** you consider correct and shade the answers in the OTAS sheet provided.

Answer **ALL** questions in Section B and C by writing in the spaces provided.

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

If needed, take $g = 10 \text{ N/kg}$.

Candidates are reminded that **all** quantitative answers should include appropriate units and rounded off to appropriate significant figures or decimal places.

Candidates are advised to show all their workings in a clear and orderly manner.

Section B Q1	Section B Q2	Section B Q3	Section B Q4	Section B Q5	Section B Q6	Section B Q7	Section B Q8		Section C Q9	Section C Q10	Section C Q11
Parent's Signature: _____ Setter: Miss Sandy Tan and Mr Chen Zhiyong								Section	Marks		
								A	/30		
								B	/40		
								C	/30		
								Penalties			
								Overall Marks	/100		

This question paper consists of **25** printed pages (including this cover page)

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2

Section A [30 marks]

Answer **all** questions in this section in the OTAS provided.

- 1 How can the abuse and misuse of science and technology be **reduced**?
- A by adopting positive attitudes in science like responsibility and integrity
 - B by using skills and processes to inquire about the objects in the environment
 - C by using the scientific method
 - D by working together in a team
- 2 Which of the following is the correct order of the steps to be carried out for a scientific method of investigation?
- I analysing
 - II experimenting
 - III making a conclusion
 - IV making a hypothesis
 - V observing
- A I, III, II, IV, V
 - B III, IV, II, I, V
 - C V, II, I, III, IV
 - D V, IV, II, I, III
- 3 Joan carried out an experiment to test the hypothesis that plants grow slower when rock music is played to them. She used two young identical plants of the same height and placed one of them with rock music. Both plants were left **untouched** for one week. She then measured the increase in height of both plants at the end of the week.
- Which of the following is the variable to be measured (dependent variable) in this experiment?
- A increase in height of each plant at the end of the week
 - B length of time that the plants were left untouched
 - C presence of rock music
 - D type of plants used

3

- 4 The diagram below shows a safety hazard symbol. The symbol was displayed on a bottle.



Which of the following correctly describes the chemical found in the bottle?

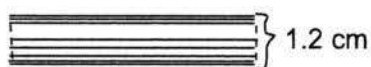
- A explosive
 B flammable
 C harmful
 D oxidising
- 5 Which of the following differences between a luminous and a non-luminous flame is **incorrect**?

	Luminous	Non-luminous
A	easy to see from far	not easy to see from far
B	flame is orange	flame is blue
C	obtained when the air-hole is open	obtained when the air-hole is closed
D	produces a lot of soot	does not produce soot

- 6 Why is the handle of a cooking pan made of plastic?

- A Plastic has a high melting point.
 B Plastic has low electrical conductivity.
 C Plastic is a bad conductor of heat.
 D Plastic is resistant to corrosion.

- 7 A stack of 100 identical sheets of plain A4-sized papers has a thickness of 1.2 cm.

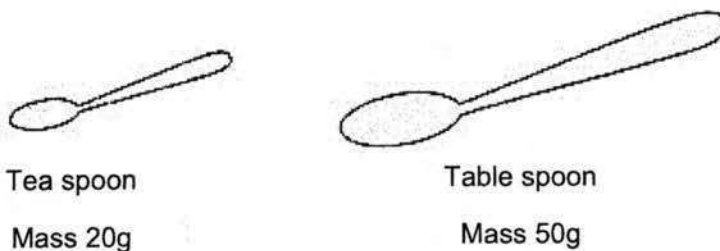


What is the thickness of each sheet of paper?

- A 0.12 mm
 B 1.2 mm
 C 12 mm
 D 120 mm

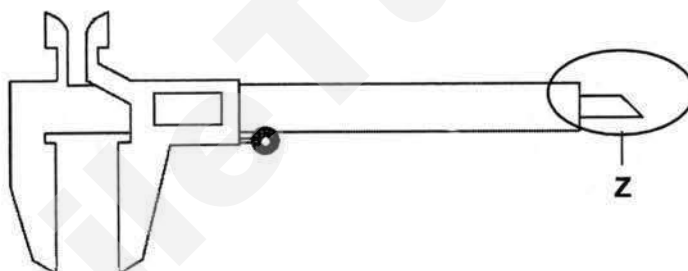
4

- 8 The diagram below shows a teaspoon and a tablespoon that are made from pure iron.



Which of the following statements is correct about the densities of the two types of spoon?

- A Both types of spoon have the same density.
 - B The densities of the teaspoon and the tablespoon are 20 g/cm^3 and 50 g/cm^3 respectively.
 - C The tablespoon has a higher density than the teaspoon.
 - D The teaspoon has a higher density than the tablespoon.
- 9 The diagram below shows a pair of vernier calipers.

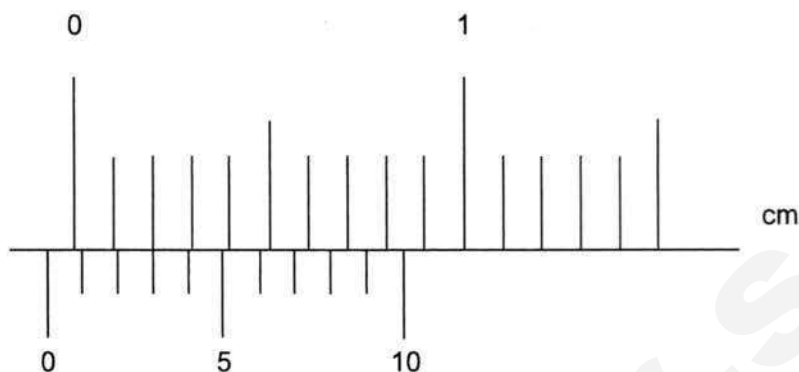


What is a possible use of the part labelled Z?

- A to measure the circumference of a coin
- B to measure the depth of a hole
- C to measure the inner diameter of a tube
- D to measure the thickness of a wire

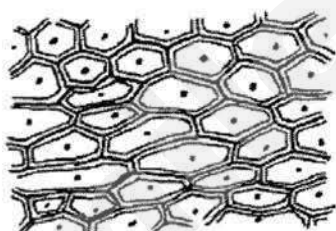
5

- 10 The diagram below shows the zero error reading on a pair of vernier calipers with closed jaws.

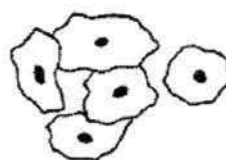


What is the zero error?

- A - 0.07 cm
 - B - 0.03 cm
 - C + 0.03 cm
 - D + 0.07 cm
- 11 The diagrams below show onion cells and human cheek cells examined under a microscope.



Onion cells



Human cheek cells

Which of the following structures is/are seen in both cells?

- I cell membrane
 - II cell wall
 - III chloroplast
 - IV nucleus
- A I only
 - B I and IV only
 - C II and III only
 - D II and IV only

6

- 12 Which part of the plant cell is responsible for controlling substances entering or leaving the cell?
- A cell membrane
 - B cell wall
 - C chloroplast
 - D vacuole
- 13 Which of the following is an organelle?
- A lung
 - B muscle
 - C nucleus
 - D plant cell
- 14 Which part of the microscope is used to focus and sharpen images?
- A coarse adjustment knob
 - B eyepiece
 - C fine adjustment knob
 - D objectives
- 15 The eyepiece of a microscope has a magnification of 10X. The objective lens has a magnification of 4X.
- What is the total magnification of the microscope?
- A 4X
 - B 10X
 - C 14X
 - D 40X
- 16 Which of the following actions will increase the rate of vibrations of particles in a piece of metal?
- A bending the metal
 - B heating the metal
 - C stretching the metal
 - D stroking the metal with a magnet

- 17 Which of the following statements about matter are **true**?
- I Forces of attraction hold the particles in all solid matter together.
 - II Matter is made up of small discrete particles.
 - III The particles in all matter are the same.
 - IV There are no forces of attraction between gas particles.
- A I and II only
B II and III only
C II and IV only
D I, II and III
- 18 Pollen grains suspended in water appear to move on their own. Which of the following statements correctly explains this observation?
- A The pollen grains collide with dissolved gas particles from the air.
B The pollen grains collide with one another.
C The pollen grains collide with the water particles.
D The water particles move towards an area of low concentration.
- 19 What happens to the particles of an object during freezing?
- A decrease in speed and move closer together
B decrease in speed and move further apart
C increase in speed and move closer together
D increase in speed and move further apart
- 20 Which of the following substances contains particles that move the **fastest** at 28 °C?
- A ice
B oxygen
C petrol
D water
- 21 Gas particles at room temperature are able to move at very high speeds. However, when a bottle of perfume is opened at the end of a large room, it might take several minutes before its smell can be detected at the other end.
- Which of the following explains this phenomenon?
- A Perfume particles move slower than the gas particles in the air.
B Random collisions occur among perfume particles.
C Random collisions occur between perfume particles and gas particles.
D Strong attractive forces exist between perfume particles and gas particles.

22 Which of the following statements about boiling water is **incorrect**?

- A The forces of attraction between water particles become weaker.
- B The spaces between the water particles increase.
- C The water particles changes into a state with no definite volume.
- D The water particles expand.

23 The table below shows the melting points and boiling points of five different substances P, Q, R, and S.

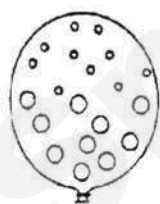
Substance	Melting point / °C	Boiling point / °C
P	95	280
Q	24	74
R	-26	37
S	31	140

Which substance(s) would be a solid at 22 °C but is a liquid at 100 °C?

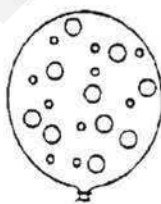
- A P only
- B P and Q
- C P and S
- D P, Q and R

24 Which diagram shows the arrangement of particles inside a balloon filled with a mixture of helium and argon?

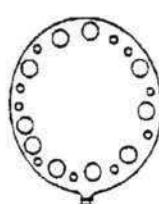
◦ helium atom
○ argon atom



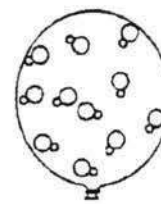
A



B



C

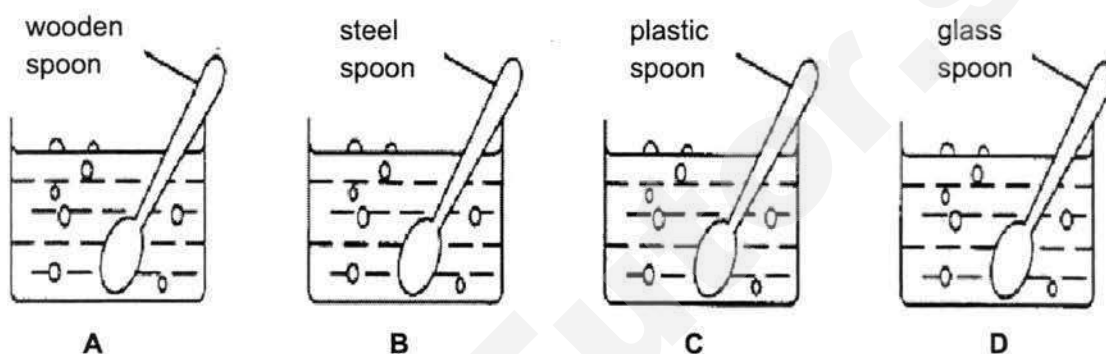


D

25 Which of the following will expand the **least** in volume when its temperature rises by 5 °C?

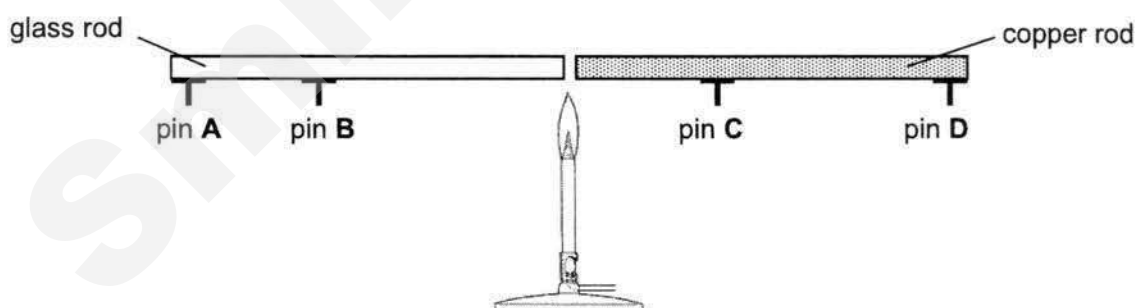
- A 100 cm³ of hydrogen
- B 100 cm³ of oil
- C 100 cm³ of water
- D 100 cm³ of wood

- 26 A freshly baked cake is placed on a table. Which of the following describes the way the cake loses heat?
- A by conduction only
 - B by convection only
 - C by conduction and convection
 - D by conduction, convection and radiation
- 27 Four spoons of different materials were used to stir an equal amount of boiling water in a pot. Which spoon will heat up **most** quickly?



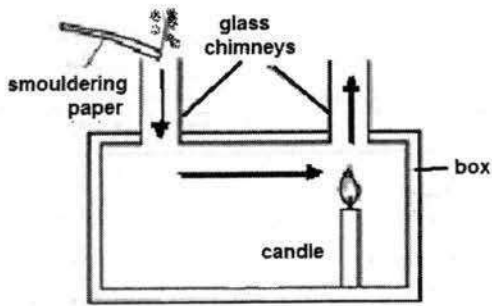
- 28 An experimental setup is shown in the diagram below. The glass rod and the copper rod are of equal lengths. Each pin is attached to a rod with an equal amount of wax.

Which pin will drop off **last**?

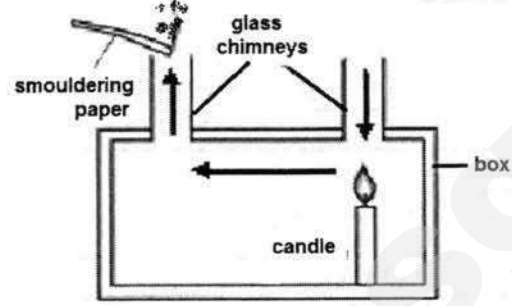


- 29 Which of the following statements about radiation is **incorrect**?
- A Black surfaces are good emitters of radiation.
 - B Objects with higher temperature emit radiation at a lower rate.
 - C Objects with larger surface area absorb radiation at a higher rate.
 - D Radiation can travel through a vacuum.

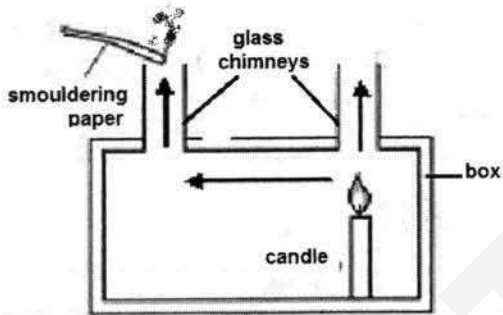
- 30 Which of the following diagrams shows the correct direction of the convection current set up in the box?



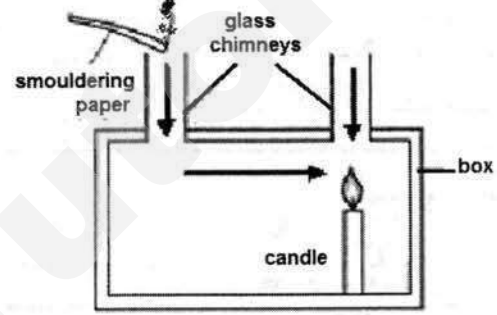
A



B



C



D

Section B [40 marks]

Answer *all* questions in this section in the space provided.

- 1 (a) Fig. 1.1 shows a scene inside a science laboratory.

For Examiner's
Use



Fig. 1.1

State two **unsafe** actions shown in the situation above and suggest what should be done instead.

	Unsafe action	What should be done
1.	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
2.	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>

[4]

(b) Table 1.1 shows the results from an experiment.

For Examiner's Use

Table 1.1

Test	Volume of water / cm ³	Number of similar ice cubes	Temperature of water / °C	Time taken for the ice cubes to melt completely / s
A	20	4	30	40
B	20	4	40	30
C	20	4	50	20
D	20	5	60	25

(i) State the hypothesis of this experiment.

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

(ii) Which of the test results **cannot** be used for the conclusion? Give a reason.

.....
..... [2]

[Total: 7]

2 Fig. 2.1 shows a Bunsen burner.

For Examiner's Use

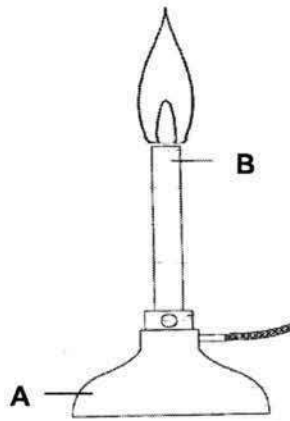


Fig. 2.1

- (a) Label parts **A** and **B** of the Bunsen burner.
- A: B: [2]
- (b) State the functions of parts **A** and **B**.
- Function of **A**:
.....
Function of **B**:
..... [2]
- (c) Label the hottest point of the flame with the letter '**X**' on **Fig. 2.1**. [1]
- (d) Sam needs to boil a beaker of water during an experiment. Draw the scientific diagram and name the lab apparatus which he will use to support the beaker during heating when conducting the experiment.

Drawing of lab apparatus	
Name of lab apparatus drawn

[2]

[Total: 7]

- 3 (a) Fig. 3.1 shows a \$1 coin.



Fig. 3.1

Samantha decided to use a pair of vernier calipers to measure the diameter of the \$1 coin. The measurements are shown in Fig. 3.2.

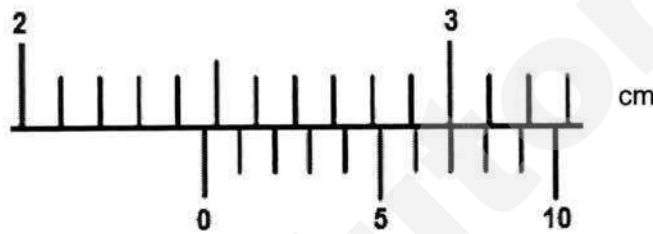


Fig. 3.2

- (i) State the diameter of the \$1 coin.

Diameter of the \$1 coin: cm [1]

- (ii) Suggest why the pair of vernier calipers is a more suitable measuring instrument than the ruler.

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

- (b) Write down the S.I. units for the following physical quantities.

Physical quantity	S.I. unit
mass	
temperature	

 [2]

[Total: 4]

- 4 Cheryl wanted to find the density of an unknown substance **P**.

For Examiner's
Use

- (a) Cheryl used an electronic balance shown in Fig. 4.1 to find the mass of substance **P**. She saw that the reading on the instrument was 0.30 g before putting substance **P** on it.

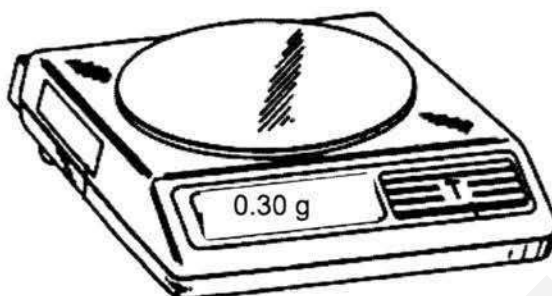


Fig. 4.1

- (i) State the step that Cheryl should take before using the electronic balance.

.....
.....

[1]

- (ii) If Cheryl did not take the step in a(i) and obtained a reading of 137.50 g, what should be the corrected reading for the mass of substance **P**?

.....

[1]

- (b) Cheryl then used a measuring cylinder to find the volume of substance **P**. She filled the measuring cylinder with 30 cm³ of water and saw that the water level rose to the level as shown in Fig. 4.2.

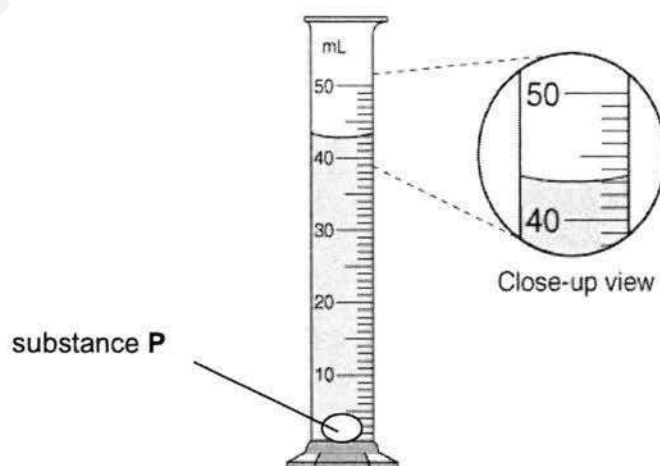


Fig. 4.2

16

What is the volume of substance **P**?

Volume of substance **P** = cm³

[1]

For Examiner's
Use

- (c) Calculate the density of substance **P**.

Density = g/cm³ [2]

- (d) Table 4.1 shows the densities of several common substances.

Table 4.1

Substance	Density (g/cm ³)
Glass	2.50
Aluminum	2.70
Diamond	3.21
Titanium	4.43
Iron	7.87
Copper	8.96
Silver	10.49
Lead	11.36

- (i) Using **Table 4.1**, suggest a possible identity of substance **P**.

..... [1]

- (ii) State how substance **P** will behave if it is dropped into a bowl of water (density of water = 1 g/cm³).

.....

..... [1]

[Total: 7]

- 5 (a) Describe how the particles of water and oxygen differ in their **movement** and **arrangement** at room temperature and pressure.

For Examiner's Use

	Water	Oxygen
Movement	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Arrangement	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>

[4]

- (b) Explain why solids have a definite shape.

[1]

[Total: 5]

- 6 Fig. 6.1 shows two experimental set-ups, X and Y. The air inside both round-bottomed flasks is initially at 90 °C. An ice bag is placed on top of the round-bottomed flask in set-up X. The set-ups are left alone for 30 minutes.

For Examiner's Use

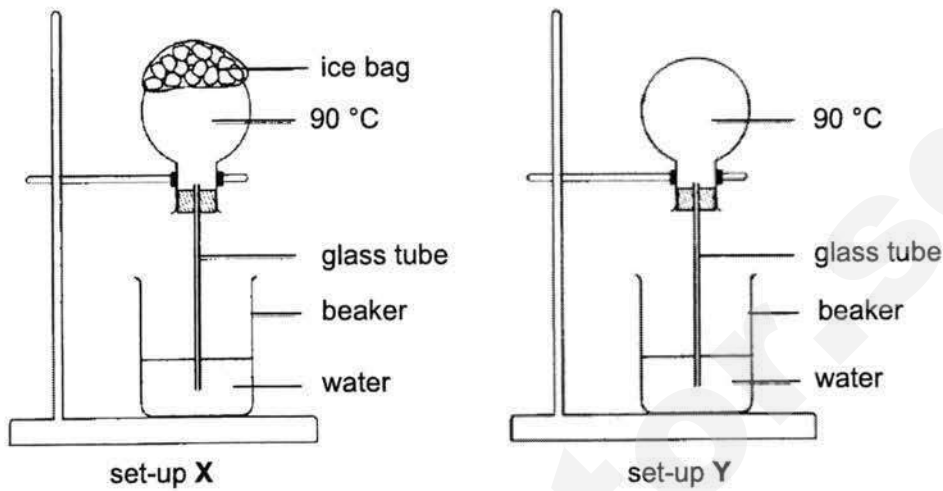


Fig. 6.1

- (a) After 30 minutes, which set-up (X or Y) would have a **higher** water level in the glass tube?

Set-up:

[1]

- (b) Explain your answer in part (a).

.....
.....
.....

[2]

[Total: 3]

- 7 Fig. 7.1 shows two beakers of water, beaker **A** and beaker **B**. Each beaker contains an ice cube. The ice cube in beaker **A** is wrapped in wire gauze, which keeps it at the bottom of the beaker at all times.

For Examiner's
Use

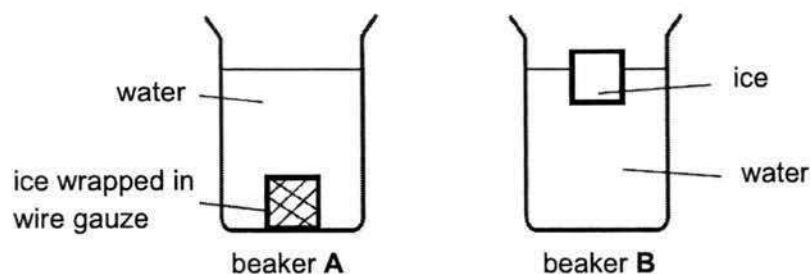


Fig. 7.1

- (a) By which method of heat transfer is the water in the beaker **B** cooled?

[1]

- (b) Explain why ice, when placed at the bottom of the beaker **A**, does **not** cool the water as effectively as when it is floating on the water.

[2]

[Total: 3]

8 Explain the following.

(a)

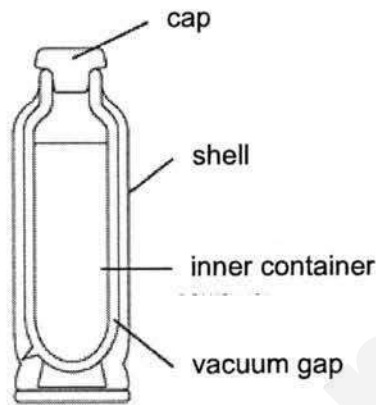


Fig. 8.1

In a vacuum flask, there is a vacuum gap between the inner container of hot water and the other shell as shown in Fig. 8.1.

.....

.....

.....

[2]

(b) A cement floor is cooler to the touch than a carpet floor, even though both are at the same temperature.

.....

.....

.....

[2]

[Total: 4]

For Examiner's
Use

Section C [30 marks]

Answer **all** questions in this section in the space provided.

- 9 (a) Fig. 9.1 below shows a cell.

For Examiner's
Use

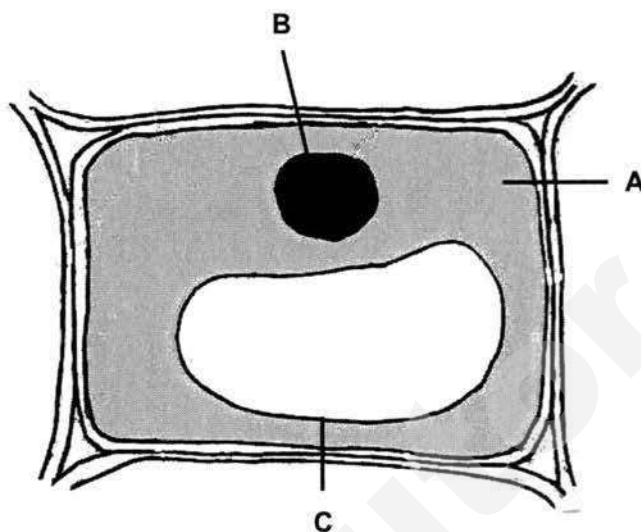


Fig. 9.1

- (i) Name the parts of the cell labelled **A** and **B**.

A: **B:** [2]

- (ii) State the main function of the cell part labelled **C**.

..... [1]

- (iii) Is the cell in **Fig. 9.1** an animal cell or plant cell? Give a reason to explain your answer.

..... [2]

- (b) The amoeba is a unicellular organism which can be found in a pond.

- (i) Explain the term '*unicellular organism*'.

..... [1]

- (ii) Name the instrument which can be used to observe unicellular organisms.

..... [1]

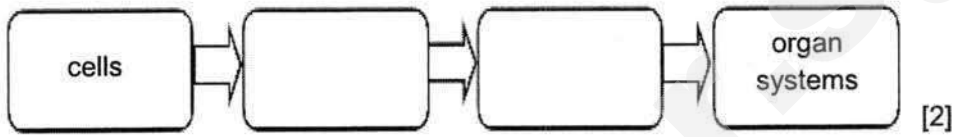
- (c) The human body is made up of many specialised cells. In multicellular organisms, these cells carry out division of labour.

For Examiner's Use

- (i) Name an advantage of division of labour within an organ.

.....
 [1]

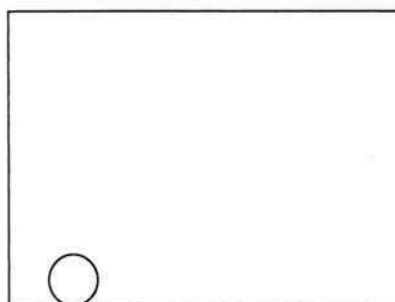
- (ii) Complete the diagram below to show how cells are organised in a multicellular organism.



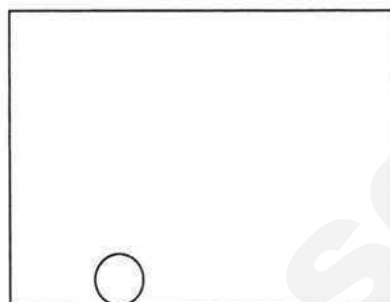
[Total: 10]

- 10 (a) (i) Sketch the arrangement of particles in the following physical states in Fig. 10.1.
(Use ○ to represent a particle.)

For Examiner's
Use



Solid



Gas

[4]

Fig. 10.1

- (ii) Explain why liquids **cannot** be compressed.

.....
.....

[1]

- (b) Ken took out a small container of ice cream from the freezer.

- (i) Describe the movement of particles in the frozen ice cream.

.....
.....

[1]

- (ii) What happens when the ice cream is left on the table for two hours?

.....

[1]

- (iii) Using the particulate nature of matter, explain what happened in part (b)(ii).

.....
.....
.....
.....
.....

[3]

[Total: 10]

- 11 Fig. 11.1 shows a solar panel used to heat water. Fig. 11.2 shows the cross-sectional diagram of the copper pipe.

For Examiner's
Use

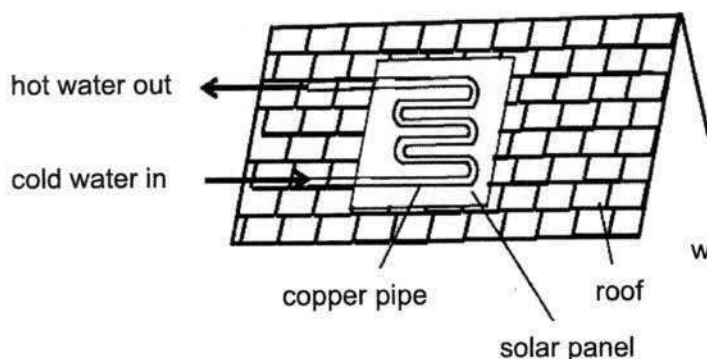


Fig. 11.1

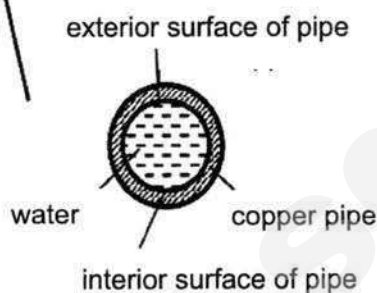


Fig. 11.2

- (a) (i) State the mode of heat transfer from the sun to the exterior surface of the pipe in the solar panel.
..... [1]
- (ii) Why are the solar panel and copper pipes painted black?
.....
..... [1]
- (b) (i) State the mode of heat transfer from the exterior surface of the copper pipe to the interior surface.
..... [1]
- (ii) Using the particulate theory of matter, explain how heat is transferred from the exterior surface of the copper pipe to the interior surface.
.....
.....
.....
..... [3]
- (c) Why are there bends in the structure of the copper pipe?
.....
..... [2]

25

- (d) State one advantage and one disadvantage of using solar panels to heat up water.

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Use

Advantage:

[1]

Disadvantage:

[1]

[Total: 10]

End of Paper

MID-YEAR EXAMINATION 2017
Science Secondary 1 Express
Marking Scheme

Section A: MCQ (30 MARKS)

1	A	11	B	21	C
2	D	12	A	22	D
3	A	13	C	23	C
4	D	14	C	24	B
5	C	15	D	25	D
6	C	16	B	26	D
7	A	17	A	27	B
8	A	18	C	28	A
9	B	19	A	29	B
10	A	20	B	30	A

Section B: Structured Questions (40 MARKS)

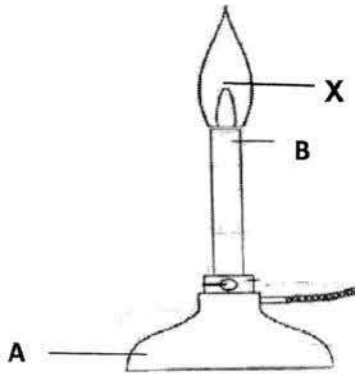
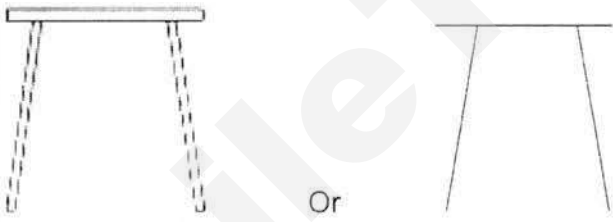
Note: Deduct **1 m** from the whole paper if student did not state the correct units/significant figures under penalty.

Question	Answers	Marks	Remarks
1(a)	<p><i>Unsafe practice:</i></p> <ol style="list-style-type: none"> 1. Girl is <u>not paying attention</u> while conducting her experiment / a measuring cylinder with a substance inside is knocked over 2. Boy is pointing the heated test tube towards his classmate / the girl 3. Table top is <u>messy</u>: loose paper may be a fire hazard 4. Safety goggles are not worn 5. Test tubes are not placed in test tube rack 6. Long hair is not tied up <p><i>What should be done instead:</i></p> <ol style="list-style-type: none"> 1. Students should always stay alert or work thoughtfully / purposefully 2. He should point the test tube away from his classmate 3. Table top should be organized neatly / Any loose paper should be kept away 4. Safety goggles should be worn at all times when conducting an heating experiment 5. Test tubes should be <u>placed in a test tube rack</u> for safekeeping 6. Long hair should be tied up when in the lab 	[4]	<p>1 m – 1 correctly filled blank</p> <p>No mark is awarded when apparatus is named wrongly in explanation e.g test tube holder instead of test tube rack.</p>
1(b)	(i)	The <u>higher</u> the water temperature, the <u>shorter</u> the time taken for or <u>faster</u> the ice cubes to melt completely	[1]
	(ii)	Test D Number of ice cubes is not the same / not kept constant	[1] [1]

Marker's comments:

1a) common mistakes - test tubes are to be placed in test tube rack, not test tube holders.

1b)i) Many of them did not suggest higher temperature how it affects the time taken or rate of melting. You cannot simply state the hypothesis as temperature of water affecting the time taken only.

1bii) Most of the students did well.				
2(a)	A: Base B: Barrel		[1] [1]	
2(b)	A: To support the burner so that it will not fall over B: To allow the flame to be at a suitable height for burning		[1] [1]	
2(c)			[1]	
2(d)	 <p>Tripod stand</p>		[1] [1]	Drawing : Clean lines Proportionate size Drawing must be 2D
Marker's comments: 2a) Some students mixed up the answers to A and B ; Some did not revise the parts of Bunsen burner and gave strange answers. 2b) A: many of them wrote 'support the burner', some wrote 'hold the burner'. B: Not many have written the expected answer for barrel. 2c) Some labelled X at below the tip of the inner cone. Some did not label/did not attempt totally. 2d) some drew 3D, a few used pen to draw; a few drew the complete set up including the beaker and Bunsen flame. A few stated 'tripod' as the name of the apparatus. Some wrote retort stand.				
3(a)	(i)	Diameter of the \$1 coin: 2.47 cm	[1]	
	(ii)	Vernier calipers can read up to 0.01 cm or 2		

		<u>decimal places</u> compared to 0.1 cm or 1 decimal place for a ruler. Vernier calipers is <u>more precise</u> in measuring the length.	[1]					
3(b)	Mass: kg		[1]					
	Temperature: K		[1]					
Marker's comments:								
3ai) Some could not read the Vernier calipers correctly.								
3aii) Many of them wrote Vernier calipers is more accurate which is not a good answer.								
3b) A few wrote grams or both grams and kilograms as answers. No marks were awarded. A few wrote degree Celsius for temperature.								
4(a)	(i)	Press the zero / tare button to zero or reset the balance	[1]	A Reset				
	(ii)	137.20 g	[1]	To 2 d.p.				
4(b)	13		[1]					
4(c)	Density = Mass / Volume = $137.20 \text{ g} / 13.0 \text{ cm}^3$ $= 10.6 \text{ g} / \text{cm}^3$		[1] [1]	Allow ecf To 3 s.f.				
4(d)	(i)	Silver	[1]	Allow ecf				
	(ii)	It will sink	[1]					
Marker's comments:								
4ai) Most of the students did not get the mark. Many of them did not mention about pressing the zero button or state to zero or reset the balance. Students should not state 'ensure' the balance is at 0 g or 'adjust' or 'restart' the balance.								
4aii) A few wrote 137.2 g or wrote answer without the unit. They were penalised for decimal place or unit.								
4b) Many of them did not read the question carefully and wrote 43 as the answer.								
4c) Many of them were penalised for leaving the answers in more than 3 s.f. Many were awarded error carried forward mark due to mistakes in part b.								
4di) and 4dii) Most of the students were awarded the mark.								
5(a)	<table border="1"> <tr> <td><u>Movement (Water)</u> Particles are able to <u>slide</u> <u>past</u> one another</td> <td><u>Movement (Oxygen)</u> Particles <u>move about</u> <u>freely</u> at <u>high speeds</u> in <u>all</u> <u>directions</u></td> </tr> <tr> <td><u>Arrangement (Water)</u> Particles are <u>packed</u> <u>closely together</u> in a</td> <td><u>Arrangement (Oxygen)</u> Particles are <u>far apart</u> <u>from each other</u> in a</td> </tr> </table>		<u>Movement (Water)</u> Particles are able to <u>slide</u> <u>past</u> one another	<u>Movement (Oxygen)</u> Particles <u>move about</u> <u>freely</u> at <u>high speeds</u> in <u>all</u> <u>directions</u>	<u>Arrangement (Water)</u> Particles are <u>packed</u> <u>closely together</u> in a	<u>Arrangement (Oxygen)</u> Particles are <u>far apart</u> <u>from each other</u> in a		1 m – 1 correctly filled blank
<u>Movement (Water)</u> Particles are able to <u>slide</u> <u>past</u> one another	<u>Movement (Oxygen)</u> Particles <u>move about</u> <u>freely</u> at <u>high speeds</u> in <u>all</u> <u>directions</u>							
<u>Arrangement (Water)</u> Particles are <u>packed</u> <u>closely together</u> in a	<u>Arrangement (Oxygen)</u> Particles are <u>far apart</u> <u>from each other</u> in a							

	<u>random arrangement</u>	<u>random arrangement</u>	[4]	
5(b)	Particles in solids are <u>in fixed positions</u> and cannot move around freely		[1]	
Marker's comments: 5a) For movement: some did not mentioned moving at high speed for oxygen, For arrangement: Many just stated packed closely together for water and further apart for oxygen. 5b) Some did not mentioned about fixed position and unable to be awarded the mark.				
6(a)	X		[1]	
6(b)	The ice bag will cool the air in the flask of set-up X <u>more than</u> that of set-up Y The cooler air <u>contracts more</u> , <u>more water enters the glass tube</u> to fill up the space, so the water level in set-up X is higher.		[1] [1]	
Marker's comments: 6a) Some awarded mark, some didn't. 6b) For those who chosen X in 6a, they were unable to state the expected reasons. Some thought that the flask contracted and did not mentioned about the contraction of air and spaces that allow water to enter. Some wrote about set Y which has expansion of flask or air taking place and hence allow spaces to let water to fill in.				
7(a)	Convection		[1]	
7(b)	The cooled water contracts, becomes denser, and remains at the bottom As such, it is not possible to set up convection current to cool water effectively		[1] [1]	
Marker's comments: 7a) Some wrote conduction or radiation instead of convection. 7b) Few students are able to produce the correct answers. Many of them explain about what happened in beaker B which is not required.				
8(a)	The vacuum gap <u>prevents/stops heat loss or heat transfer</u> from the hot water via <u>conduction</u> and <u>convection</u>		[1] [1]	1m for: - only conduction or convection stated - only state reduce heat loss


8(b)	<u>Cement is a better conductor</u> than carpet (or air trapped by the carpet)	[1]	
	The cement floor will <u>conduct heat away from the hand</u> more quickly than a carpet floor	[1]	

Marker's comments:

8a) Most students did not answer this question completely. Some thought air is found inside vacuum. Some did not know that the process such as conduction and convection should be mentioned in the answer.

8b) Some wrote that the cement are poor conductor or good reflector. Most students did not understand heat is conducted away from the hand so that we will feel cool. Most students did not know they need to state the comparison of the two materials.

Section C: Free Response Questions (30 MARKS)

9(a)	(i)	A: cytoplasm B: nucleus	[1] [1]	
	(ii)	C: <u>Store</u> water / food / wastes / other materials needed by the cell	[1]	
	(iii)	Plant cell Presence of cell wall / <u>one central large vacuole</u>	[1] [1]	
9(b)	(i)	An organism with only one / single cell	[1]	
	(ii)	Microscope	[1]	
9(c)	(i)	Function efficiently	[1]	
	(ii)		[2]	1 m – 1 correctly filled blank

Marker's comments:

9a) Quite ok. Most students identified **B** correctly but not **A**.

9b) Generally well done. Accepted 'contain' instead of 'store'.

9c) Quite well done. Most students managed to identify the cell as plant cell. However, some of them lost marks as they mention "one large" vacuole only. Some of them thought the cell is an animal cell as chloroplasts are absent from the diagram.

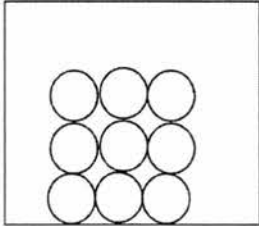
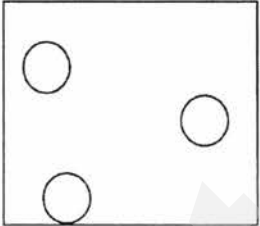
9d) (i) Quite ok. Some students wrote that it contains one type of cell. They need to know that containing one type of cell does not mean it contains 1 single cell. One type of cells can be formed by many cells of the same type.

9d) (ii) Generally well done.

9e) (i) Poorly attempted. Some of them thought 'division of labour' is cell division. A

number of them stated the meaning of 'division of labour' instead of giving the advantage.

9e) (ii) Quite ok. Some of them gave muscle instead of organs. They seemed to think that the question is asking for an example of organs or misunderstood that muscle is a general term used for organs.

10 (a)	(i)	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Solid</p>  </div> <div style="text-align: center;"> <p>Gas</p>  </div> </div> <p>Solid – min 6 circles, regularly arranged in layers, all circles touching.</p> <p>Gas – min 3 circles drawn, spread out across the box and far apart.</p>	[2] [2]	For each drawing, deduct 1 m for every mistake.
	(ii)	Particles in liquids are <u>closely packed</u> / have no space to move into	[1]	
10 (b)	(i)	Particles are <u>vibrating about their fixed positions</u>	[1]	R move
	(ii)	It melts / turn into liquid state	[1]	
	(iii)	The solid particles in the ice cream <u>gain heat energy</u> and <u>vibrates more rapidly</u> Heat energy is used to <u>overcome the attractive forces</u> between the solid particles Particles are now further apart and able to <u>move around freely</u> . The solid ice cream melts to its liquid state	[1] [1] [1]	

Marker's comments:

10a) (i) Quite ok. Some students drew the solid particles a little too far apart while for the gas particles a little too many and too close together. A number of students were penalised due to difference in the particle size drawn.

10a) (ii) Quite ok. Some students gave answers like definite volume which does not explain why liquids cannot be compressed.

10b) (i) Generally ok. Many students stopped at vibrating and did not mention fixed positions. Their answer is also rejected if they use 'move' instead of 'vibrate'.

10b) (ii) Poorly attempted. Many did not mention that solid particles need to gain heat

energy first before they can vibrate more rapidly. Quite a number did not show the comparison between the speed of vibration of the particles before and after gaining heat energy. Many failed to realise the importance of stating 'move around freely' to explain the change of states from solid to liquid. They stopped at 'particles are now further apart' which also happens during expansion.

11 (a)	(i)	Radiation	[1]	
	(ii)	Black surfaces are good absorbers of radiation	[1]	
11 (b)	(i)	Conduction	[1]	
	(ii)	Heat from the sun causes the particles at the exterior surface to <u>vibrate more rapidly</u> These particles <u>collide with the neighbouring/ surrounding particles</u> until the particles at the interior surface also <u>increases the speed of vibration</u>	[1] [1] [1]	
11 (c)		The bends <u>allow the copper pipe to expand</u> on a hot day <u>without damage/bursting</u> OR The bends <u>increase the surface area exposed</u> for the absorption of <u>radiation</u> from the sun	[1] [1]	
11 (d)		Advantage: Renewable/ sustainable/ reduces electricity costs/ silent /low maintenance/ more environmentally friendly (Any one)	[1]	
		Disadvantage: Expensive/ Intermittent / Require space (Any one)	[1]	

Marker's comments:

- (a) (i) Generally okay. Some students are unable to state the correct mode of heat transfer.
(ii) Most students stated heat instead of radiation. It is accepted this time round.
- (b) (i) Many students are unable to state the correct mode of heat transfer.
(ii) Very poorly done. Most students did not use the particle theory to explain and those who attempted are unable to explain heat transfer by conduction fully.
- (c) Generally okay. A number of students mentioned that the bends prevent the damage of the pipes but never mentioned what is the cause of the damage that can be avoided.
- (d) Generally okay. For advantages, accept: "save electricity/ energy/ money". For

disadvantages, accept "cannot be used at night/ without sunlight/ on rainy day" (intermittent).

End of Marking Scheme

Name: _____

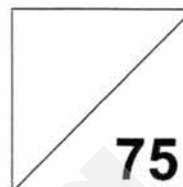
Class

Index Number



Jurong West Secondary School

Mid-Year Examinations 2017



LOWER SECONDARY SCIENCE

Secondary One Express

05 May 2017

0800 – 0930

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

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

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs, tables or rough working.

Do not use staples, paper clips, glue or correction fluid.

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

You may lose marks if you do not show your working or if you do not use appropriate units.

Section A

There are **twenty** questions. 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. **Read the instructions on the Answer Sheet very carefully**. Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Any rough working should be done in this question paper.

Section B and C

Answer **all** questions in the spaces provided. The number of marks is given in brackets [] at the end of each question or part question.

At the end of the examination, **hand in each section separately**.

After checking of answer script		
Checked by Student	Signature	Date

Section A (20 marks)

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 multiple choice answer sheet.

- A1** A container with the labels **X** and **Y** pasted on it.
Which of the following correctly identifies **X** and **Y**?



	X	Y
A	corrosive	irritant
B	irritant	corrosive
C	explosive	irritant
D	irritant	acutely toxic

- A2** Which of the following statements about scientific method is **incorrect**?

- A** After an experiment, results are recorded and analysed.
- B** An experiment is created to test the hypothesis.
- C** Scientist shares the results of the experiment with others.
- D** Scientist can change his hypothesis after the experiment.

- A3** A student discovered a new type of plant on his way back home. He did some research to find out more about the plant. Which scientific attitude does this student shows?

- A** curiosity
- B** integrity
- C** open-mindedness
- D** perseverance

A4 Which of the safety precautions should be taken when heating liquids in a test tube over a Bunsen flame?

- I** Wear safety goggles
- II** Wear gloves to hold the test tube
- III** Point the test tube towards people
- IV** Point the test tube away from people

A I and **III** only

B I and **IV** only

C **II** and **III** only

D **II** and **IV** only

A5 A teacher would like to conduct an experiment to investigate the rate to dissolve sugar in water of different temperatures.

Which of the following apparatus are needed?

- I** thermometer
- II** stopwatch
- III** glass rod
- IV** Bunsen burner
- V** micrometer

A I, **II**, **III** and **IV** only

B I, **III**, **IV** and **V** only

C I, **III** and **V** only

D I, **IV** and **V** only

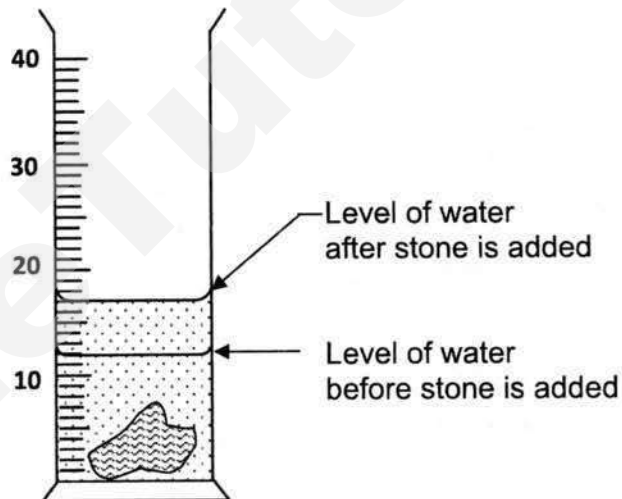
A6 Which of the instruments would you use for the following measurements?

(i) Diameter of a football

(ii) Mass of a bag of sand

	(i)	(ii)
A	vernier calipers	electronic mass balance
B	micrometer	weighing scale
C	metre rule	electronic mass balance
D	metre rule	weighing scale

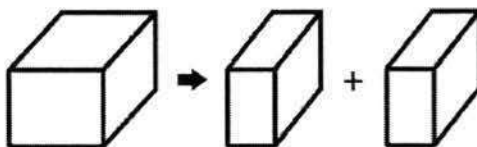
A7 A stone is lowered into a measuring cylinder containing some water as shown below.



What is the volume of the stone?

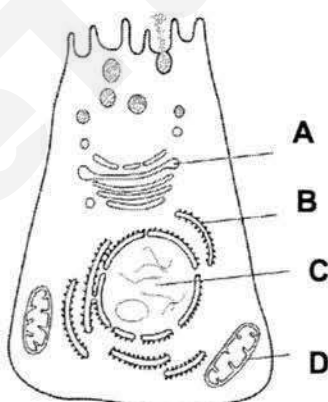
- A** 5 cm³
- B** 12 cm³
- C** 17 cm³
- D** 29 cm³

- A8** A metal block has a density of 2.7 g/cm^3 and it is then cut into **two equal pieces**.



The density of the two smaller pieces will _____.

- A** be 2.7 g/cm^3
 - B** be 1.35 g/cm^3
 - C** less than 2.7 g/cm^3 and more than 1.35 g/cm^3
 - D** less than 2.7 g/cm^3 and less than 1.35 g/cm^3
- A9** The diagram below shows a cell.
Which of the following correctly identifies the organelle where aerobic respiration takes place?



- A10** Why is it important to have division of labour in an organism?
- A** It improves the appearance of the organism.
 - B** It improves the efficiency of the organism.
 - C** It improves the relationship between two organisms.
 - D** It improves the structure of the organism.

A11 Which of the following describes an organ?

- A** different organs working together
- B** different systems working together
- C** different tissues working together
- D** similar cells working together

A12 Which row in the table lists the structure from the simplest to the most complex?

	simplest			most complex
A	Cells	Organs	Organ systems	Tissues
B	Cells	Tissues	Organs	Organ systems
C	Organ systems	Organs	Tissues	Cells
D	Tissues	Cells	Organs	Organ systems

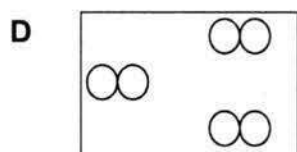
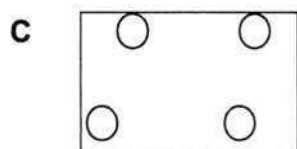
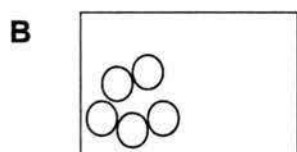
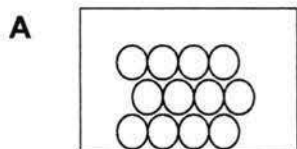
A13 Which of the following represents the physical state of a material just below its melting point?

- A** solid
- B** liquid
- C** gas
- D** solid and liquid

A14 When a substance is heated, the particles in the substance _____.

- A** move slowly
- B** move at the same speed
- C** move faster
- D** do not move

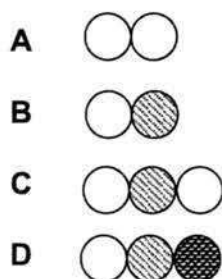
- A15** Which diagram shows the arrangement of atoms inside a gas jar containing helium gas?
(O – helium atom)



- A16** Which of the following involves a change of state from liquid to gas?

- A** freezing
- B** condensation
- C** melting
- D** evaporation

- A17** Which of the following represents an element?



A18 In a chemical reaction, element **X** combines with element **Y** to form compound **Z**.

Which statement is **not** true about compound **Z**?

- A** Elements **X** and **Y** can be separated from compound **Z** by physical means.
- B** It has properties that are different from elements **X** and **Y**.
- C** It is made up of two elements.
- D** It has fixed composition by mass.

A19 Which of the following statements about a suspension is **not** true?

- A** Cloudiness or insoluble particles are observed.
- B** Light can pass through a suspension easily.
- C** Particles settle at the bottom when a suspension is left to stand.
- D** Residue is obtained when a suspension is filtered.

A20 A student wants to dissolve some sugar in water to make a drink. Which of the following actions will slow down the rate of dissolving?

- A** using powdered sugar instead of sugar cubes
- B** using hot water instead of cold water
- C** stirring the water after sugar is added
- D** adding ice to the mixture to make it cold

Section B (35 marks)

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

All essential workings must be shown.

- B1** Hydrogen gas is formed when a metal reacts with an acid. A student wanted to test out her hypothesis that the greater the amount of metal used, the larger the volume of hydrogen gas produced.

- (a) Identify the controlled, independent and dependent variable of this experiment.

(i) controlled variable[1]

(ii) independent variable[1]

(iii) dependent variable[1]

- (b) **Fig. 1** shows the experimental set up to collect hydrogen gas in the experiment.

- (i) Label the apparatus that are labelled **X** and **Y** in **Fig. 1**. [2]

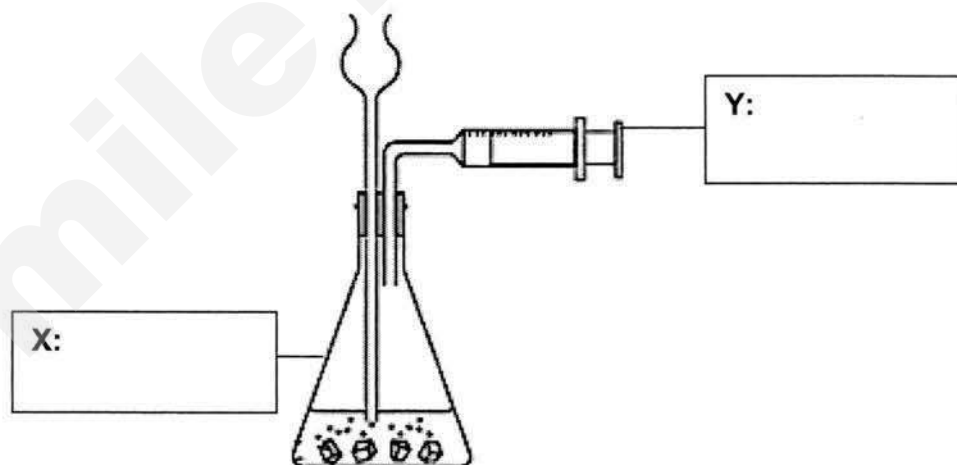


Fig. 1

- (ii) In **Fig. 1**, draw a retort stand to hold the apparatus **Y**. [1]

- (c) Suggest a way to ensure that the volume of gas collect is accurate.

..... [1]

B2 A student wanted to find out the thickness of the copper pipe to replace the pipes in the kitchen.

- (a) **Fig. 2a** shows the reading of the external diameter of the copper pipe and **Fig. 2b** shows the reading of the inner diameter of the copper pipe taken using vernier calipers.

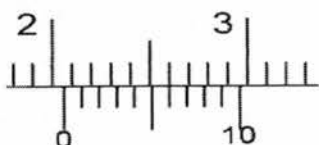


Fig. 2a

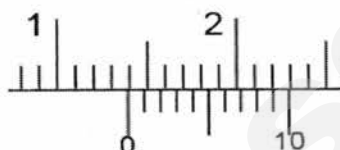


Fig. 2b

State the readings shown in **Fig. 2a** and **Fig. 2b**.

(i) External diameter:cm [1]

(ii) Internal diameter:cm [1]

(iii) Hence, calculate the thickness of the copper pipe.

..... [1]

- (b) Three balls have densities of 0.7 g/cm^3 , 1.4 g/cm^3 and 2.8 g/cm^3 respectively. They are immersed in four beakers carrying transparent liquids **A**, **B**, **C** and **D**. The liquids are of different densities. **Fig. 2c** shows the result for each of the liquids.

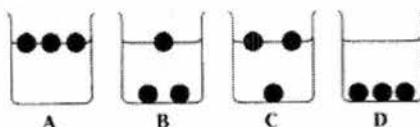


Fig. 2c

- (i) Given that the density of liquid **C** is 2.0 g/cm^3 , deduce the density of the ball sinking in the liquid. Explain how you derive at your answer.

.....

 [2]

- (ii) One of the liquids **A**, **B** or **D** has a density of 3.0 g/cm^3 . State the identity of the liquid and explain how you derive at your answer.

.....
 [2]

B3 Fig 3 shows two cells, **P** and **Q**.

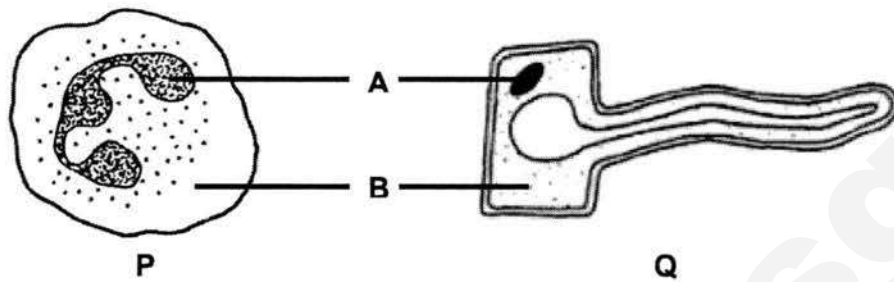


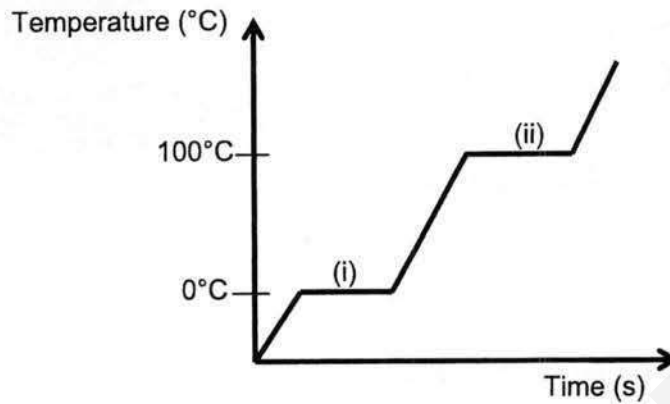
Fig 3

- (a) Identify which of the cells **P** or **Q** is found in plants.
 [1]
- (b) Provide a reason for your answer in (a).

 [1]
- (c) Identify the structures **A** and **B** that are found in both cells **P** and **Q** and explain the functions of these structures.
- (i) Name of structure **A**:
 Function of structure **A**:
 [2]
- (ii) Name of structure **B**:
 Function of structure **B**:
 [2]
- (d) Explain what does partially permeable means.

 [1]

B4 Refer to the graph for questions (a) to (d).



- (a) Name the processes occurring at (i) and (ii).
[2]
- (b) Describe the change in the arrangement of the molecules at (i).

[2]
- (c) Describe the change in the movement of the molecules at (ii).

[2]
- (d) Why were there no observable changes in temperature at (i)?

[1]

B5 The table shows the composition of inhaled air and exhaled air.

Gas	Inhaled air (%)	Exhaled air (%)
Oxygen (O_2)	20	16
Nitrogen (N_2)	78	78
Carbon dioxide (CO_2)	0.03	4
Water vapour (H_2O)	variable	variable

(a) What is the definition of a mixture?

.....
 [1]

(b) With the help of the table provided above, name **one** element that is found in air.

.....[1]

(c) With the help of the table provided above, name **one** compound that is found in air.

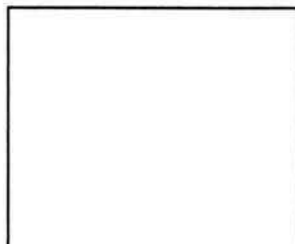
.....[1]

(d) Describe **two** physical properties that can be used to differentiate between a compound and a mixture.

.....

 [2]

(e) In the box below, draw the particles that represent gas mixtures of molecule of an element and a compound. Label clearly the molecule of an element and a compound respectively.



[2]

Name: _____

Class

Index Number

Section C (20 marks)Answer **all** the questions in this section in the spaces provided.

All essential workings must be shown.

- C1 (a)** Describe an experiment to determine the density of a small irregular-shaped solid. Identify the required apparatus for the experiment.

Apparatus

.....
 [2]

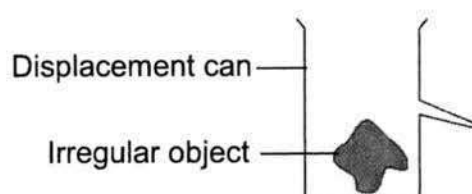
- (b)** Suggest the steps taken to conduct the experiment to find out the density of the irregular solid using correct phrases/words.

Experimental Procedures**Step 1:** Fill up**Step 2:** Lower the**Step 3:** Record the new as V_2

Step 4: Measure the mass of the using
 a/an and record its mass.

Step 5: Density is calculated. [2]

- (c)** Complete the set-up to show how volume of irregular solid is measured using a displacement can. Diagram of displacement can has been drawn.



- (d) If the irregular solid floats on water, discuss how you would modify your experiment in (a).

.....
.....
..... [2]

- (e) After carrying out the experiment mention in part (a), it was found that the mass of the small irregular-shaped solid is 680 g and the volume is 40 cm³.

Calculate the density of the small irregular-shaped solid in g/cm³. Show your working clearly.

Density=.....g/cm³ [2]

- (f) State **one** precaution to ensure accuracy of the results while conducting the experiment in part (a).

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

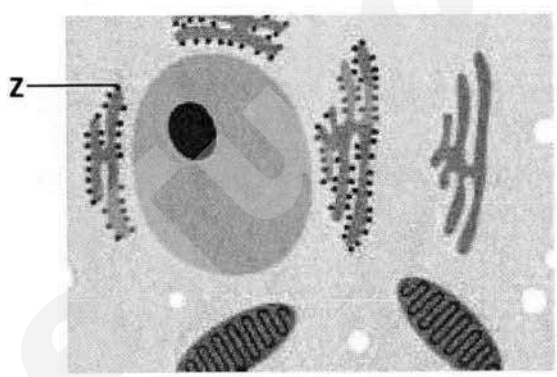
C2 (a) Root and leaf are parts of a plant. State the difference between these two parts if the cells from root and leaf are placed under a microscope.

..... [1]

(b) Plants can make their own food but animals need to eat other organisms for energy. Explain why this is so.

.....
.....
..... [2]

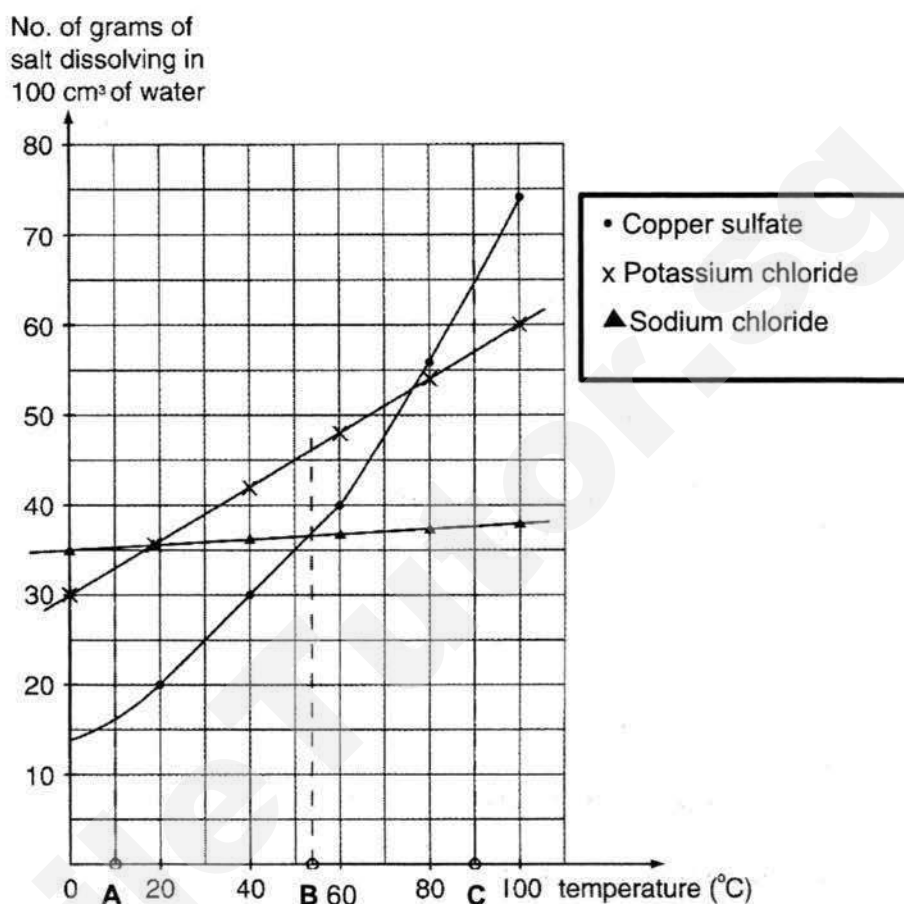
(c) The plant cell is placed under electron microscope.



(i) Identify the organelle that is labelled **Z** in the diagram above.
..... [1]

(ii) What is the function of the organelle mention in **C2(c)(i)**?
..... [1]

- C3** The diagram shows the solubility of three salts, namely: copper sulfate, potassium chloride and sodium chloride in 100 cm³ of water.



- (a) At 10 °C (point A),
- (i) the **most** soluble salt is [1]
- (ii) the **least** soluble salt is [1]
- (b) Using the above diagram, predict the amount of potassium chloride that can dissolve in 100 cm³ of water at 110 °C.
- [1]
- (c) Describe the solubility of the three salts at 53.5 °C (point B).
-
-
- [2]

End of Paper

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	0
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	2 He helium 4
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 -	113 Nh nihonium -	114 Fl flerovium -	115 Lv livermorium -	116 Ts tennessine -	117 Oh oganeson -	118 Og oganesson -

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 -

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



Jurong West Secondary School

Mid-Year Examination 2017

Secondary 1 Express
SCIENCE

Total:75

Marking Scheme

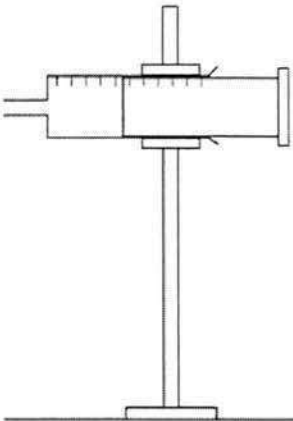
Section A

	Answer
1	B
2	D
3	A
4	B
5	A
6	C
7	A
8	A
9	D
10	B

	Answer
11	C
12	B
13	A
14	C
15	C
16	D
17	A
18	A
19	B
20	D

Section B

Question	Suggested answer	Marks
B1	(a)(i) Type of metal / volume of acids / type of acids/ temperature of acid Accepted answers: The same metal/amount of acid Rejected answers: Location/place of the experiment/metal/acid	1 mark
	(a)(ii) Amount of metal Accepted answers: How much metal was used Rejected: Metal used/metal	1 mark
	(a) (iii) Volume of hydrogen gas produced Accepted answers: Amount of hydrogen gas/amount of gas produced Rejected: Hydrogen/hydrogen gas produced	1 mark
	(b)(i) Gas syringe Minor spelling errors accepted Rejected ans: Syringe/ gas string Conical flask Minor spelling errors accepted Rejected ans: Conel flask	1 mark 1 mark

	(b)(ii)	 <p>Accept if student draws almost similar diagram of retort stand.</p> <p>Accepted diagrams:</p> <p>Retort stand with clamp positioned at the syringe not the plunger</p> <p>Rejected diagrams:</p> <p>Retort stand without clamp/ retort stand with clamp positioned in the plunger(will not allow the gas to be collected)</p>	1 mark
	(c)	<p>Do the experiment multiple times to get more than one reading.</p> <p>Accepted answers:</p> <p>Repeat the experiment/ Test the experiment again/try the experiment a few times</p> <p>Make sure no gas went into Y/gas syringe before the experiment</p> <p>Make sure the gas syringe is set at 0ml</p> <p>Rejected answers:</p> <p>See the volume of gas at eye level</p> <p>Seal any gaps</p> <p>There should be any gas in the conical flask before the experiment.</p>	1 mark

B2	(a)(i)	2.06cm	1 mark
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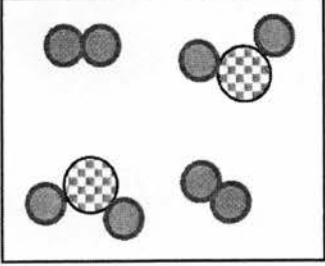
(a)(ii)	1.39cm	1 mark
(a)(iii)	$2.06 - 1.39 = 0.67\text{cm}$ $0.67/2 = 0.34\text{cm}$ ECF allowed if answers for (a)(i) and (ii) are incorrect.	1 mark
(b)(i)	Density of the ball is 2.8 g/cm^3 Density of the ball sinking in liquid C must be more than density of the liquid. Accepted answers: The liquid has a lower density than the ball. Density of the ball higher than 2.0g/cm^3 . Rejected answers: The ball has higher density than water.(liquid C is not water)	1 mark 1 mark
(b)(ii)	The liquid is A As the density of the liquid is greater than the densities of the 3 balls, it must be the liquid in which all the balls will float Accepted answers: The balls are less dense than the liquid/ 3.0g/cm^3 /ball's density do not exceed 3.0g/cm^3 Liquid must have higher density than 2.8g/cm^3	1 mark 1 mark

B3	(a)	Q	1 mark
	(b)	<p>Cell Q has cell wall but not cell P./</p> <p>Cell Q has one large vacuole but cell P have many small vacuoles.</p> <p>Accepted answers:</p> <p>Plant cell have cell wall</p> <p>Rejected answers:</p> <p>Plant cell has chloroplast/ Q has chloroplast</p>	1 mark
	(c)	<p>(i) A:</p> <p>Structure: <u>nucleus</u></p> <p>Function: <u>Controls the activities of the cell such as cell growth.</u></p> <p>Accepted answers:</p> <p>Contains genetic information</p> <p>Contains DNA/chromosomes</p> <p>Controls the activities going inside the cell</p> <p>(ii) B:</p> <p>Structure: <u>cytoplasm</u></p> <p>Function: <u>Chemical reaction known as metabolism takes place here.</u></p> <p>Accepted answers:</p> <p>Chemical reactions takes place</p> <p>Chemical activities takes place/ most activities in the cell takes place</p> <p>Performs metabolism</p> <p>Metabolism takes place here</p> <p>Rejected answers:</p> <p>All chemical changes takes place</p> <p>Suspension of organelles/ organelles stored in here/ contain proteins</p>	<p>1 mark</p> <p>1 mark</p> <p>Penalised for wrong spelling of nucleus</p> <p>1 mark</p> <p>1 mark</p> <p>Penalised for wrong spelling of cytoplasm</p>

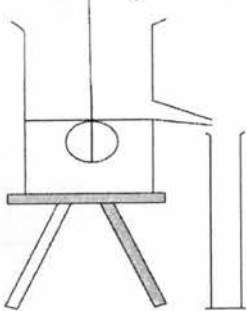
	(d)	<p>It allows small substances to <u>enter/leave/pass through</u> the cells.</p> <p>Accepted answers:</p> <p>Only allow some/certain substances to pass through.</p> <p>Some particles are able to pass through</p> <p>Rejected answers:</p> <p>Allow some things/objects/items/materials to pass through</p>	1 mark
--	-----	--	--------

B4	(a)	<p>(i) melting</p> <p>(ii) boiling</p> <p>Reject: melting point</p> <p>Boiling point</p>	1m
			1m
	(b)	<p>At (i), the particles are initially arranged in <u>orderly and packed arrangement</u> and held in fixed positions.</p> <p>As the particles gain energy/temperature increase, the particles are <u>closely packed but not in an orderly/disorderly manner</u>.</p> <p>Accepted answers:</p> <p>Arranged closely together in orderly arrangement(1m)</p> <p>Orderly to disorderly arrangement(1m)</p>	1m
			1m
	(c)	<p>At (ii), the particles <u>slide over one another/move</u> in between each other and throughout the liquid, as it gains energy, the particles <u>move in any direction (random) at high speed(rapidly)</u>.</p> <p>Accepted answers:</p>	1m
			1m

		Move freely and rapidly/ move fast and random (1m)	
	(d)	<p>The heat energy taken in by the solid particles is used to <u>overcome</u> the <u>strong forces of attraction</u> holding them in fixed positions.</p> <p>Accepted answers: Break apart strong attractive forces of attraction/ overcome forces of attraction between molecules.</p> <p>Rejected answers: No observable change/ lessen forces of attraction between molecules</p>	1m
B5	(a)	<p>A mixture consists of <u>two or more different elements or compounds not chemically combined together.</u></p> <p>Accepted answers: two or more different substances/different substances/ combination of element and/ or compounds not chemically combined/physically combined</p>	1m
	(b)	<p>Any one: nitrogen, oxygen</p> <p>Accepted N₂, O₂</p>	1m
	(c)	<p>Any one: carbon dioxide and water vapour</p> <p>Accepted CO₂, H₂O</p>	1m
	(d)	<p>Any two:</p> <ul style="list-style-type: none"> in mixture, constituents are not combined in fixed proportion by mass whereas in compound, constituents are combined in fixed proportion by mass in mixture, the constituent gases can be separated by physical means but in compound, the molecules can be separated by chemical means. A mixtures are impure substances, they melt and boil over a range of temperatures, but compound are pure substances that boils at a fixed temperature. <p>Accepted answers:</p>	2m

		A mixture does not have fixed proportion/ratio of its components but a compounds has. Compound is formed by heat change but mixture is formed without a heat change	
	(e)		1m for molecule of element with label 1m for molecule of compound with label -1 mark if no label

Section C

C1	(a)	<u>Apparatus:</u> <ul style="list-style-type: none"> • electronic (mass) balance or beam balance • measuring cylinder OR displacement can AND measuring cylinder 	[1] [1]
	(b)	<u>Experimental Procedure</u> Step 1: Fill up the measuring cylinder (with water) to $V_1 \text{ cm}^3$. Step 2: lower the (irregular) solid (in the measuring cylinder of water.) Step 3: Record the new volume as $V_2 \text{ cm}^3$ Step 4: Measure the mass of the (irregular) solid using a beam balance /an electronic balance and record its mass. Step 5: Density is calculated. ECF if wrong measuring apparatus mentioned in (a) is used in answers	All correct – 2 marks 3-4 correct – 1 mark 2 and below – no marks
	(c)	Drawing of displacement can set-up to find volume. 	[1] No need tripod stand. Must have both correct water level and measuring cylinder to get the mark
	(d)	<u>Select a sinker/rock and find its volume V_3 by calculating the volume of water displaced in the cylinder.</u>	[1] – find volume of sinker

	<p><u>Attach this sinker/rock to the irregular solid and find the volume of water displaced in the cylinder V_4. Thus, volume of the irregular solid is obtained by calculating $V_4 - V_3$.</u></p> <p>OR</p> <p>Use an apparatus to push down the object and deduct the volume of the apparatus from the final volume</p> <p>REJECT use a heavier sinker without elaboration of the sinker being able to cause the irregular solid to sink</p>	<p>[1] – find volume of sinker with irregular object and deduct the volume</p> <p>[1]</p> <p>[1]</p>
(e)	$D = \frac{M}{V} = \frac{680g}{40cm^3} = 17g/cm^3$	<p>[1] – method</p> <p>[1] – correct</p>
(f)	<ul style="list-style-type: none"> Read the volume readings at eye level to avoid parallax error. Ensure to tare the electronic balance. No wind is blowing on the electronic balance. 	<p>Any possible answer. [1]</p> <p>Reject repeats and constant water volume since experiment did not mention repeats</p>

C2	(a)	Root cell does not have chloroplast while leaf cell have chloroplasts.	[1]
	(b)	<p>Plant cells have <u>chloroplast/chlorophyll</u> which <u>absorbs energy</u> from the sun to make food during photosynthesis.</p> <p>Animal cells <u>do not have chloroplast</u> to make food, therefore animals need to eat other organisms to obtain energy.</p> <p>OR</p> <p>Animals can move around to obtain their own food. Plants cannot move around therefore have to depend on photosynthesis to make their own food</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p>
	(c)(i)	Ribosomes	[1] Penalise for wrong spelling
	(c)(ii)	They are needed to <u>make/produce/synthesise proteins</u> in the cell.	[1]

C3	(a)	(i) Sodium chloride	[1]
		(ii) Copper sulfate	[1] Penalise for wrong spelling
	(b)	63g (± 1 g)	[1]
	(c)	Potassium chloride is more soluble than the copper sulfate and sodium chloride/Potassium chloride is the most soluble The solubility of copper sulfate and sodium chloride is the same at point B.	[1] [1]

Name	Register Number	Class	Calculator Model



MANJUSRI SECONDARY SCHOOL

文殊中學

MID YEAR EXAMINATION 2017

Subject: Lower Secondary Science
 Paper: Physics and Chemistry
 Level: Secondary 1 Express
 Date: 08 May 2017
 Duration: 2 hours
 Setter: Mr Sulaiman and Mr Qamarul

Additional Materials: Optical Answer Sheet (OTAS)

READ THESE INSTRUCTIONS FIRST

Write your Name, Register Number and Class on all the work you hand in.
 Write in dark blue or black pen in the spaces provided on the Question Paper.
 You may use a pencil for any diagrams or graphs.
 Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A: Multiple Choice Question [40 marks]

Write in soft pencil.

There are **forty** questions in this section.

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 provided.

Section B: Short Answer Questions [40 marks]

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

Section C: Free Response / Structured Questions [20 marks]

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

The number of marks is given in brackets [] at the end of each question or part question.
 The total number of marks for this paper is **100**.

A copy of the Periodic Table is printed on page 28.

For Examiner's Use		
Section	Phy	Chem
A	/ 20	/20
B	/ 20	/20
C	/ 10	/10
Sub-total	/ 50	/50
Total	/100	

Section A: Multiple Choice Questions [40 marks]Answer **all** questions**A1** The scientific method usually involves the following skills.

- I. making meaning of information and evidence
- II. communicating
- III. engaging with an event
- IV. collecting and presenting evidence

What is the correct sequence in which the four skills are applied in the scientific method?

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

A2 Objectivity is an attitude of scientific enquiry.

What do you understand by this term?

- A** influenced by what is widely believed by others
- B** not influenced by what is widely believed by others
- C** follow the facts and be influenced by what is widely believed by others
- D** follow the facts and not be influenced by what is widely believed by others

A3 Which property of a substance indicates whether it is a liquid or solid at room temperature?

- A** flexibility
- B** solubility
- C** melting Point
- D** heat conductivity

Refer to the table below to answer questions A4 and A5.

mass of falling object (kg)	height from which object was released (m)	time taken for object to reach ground (s)
-----------------------------	---	---

- A4** Marie carried out an experiment involving falling objects. The table above shows the variables of the experiment.

Which of the statements below could be the hypothesis / hypotheses Marie tested through the experiment?

- I. The greater the mass of an object, the longer the time it takes to fall to the ground.
- II. The larger the volume of an object, the longer the time it takes to fall to the ground.
- III. The greater the mass of a falling object, the greater the distance it falls before it reaches the ground.

- A** I only
- B** I and II
- C** II and III
- D** none of the above

- A5** To improve the experiment, Marie's teacher told her that she should ask herself some questions before carrying out the experiment.

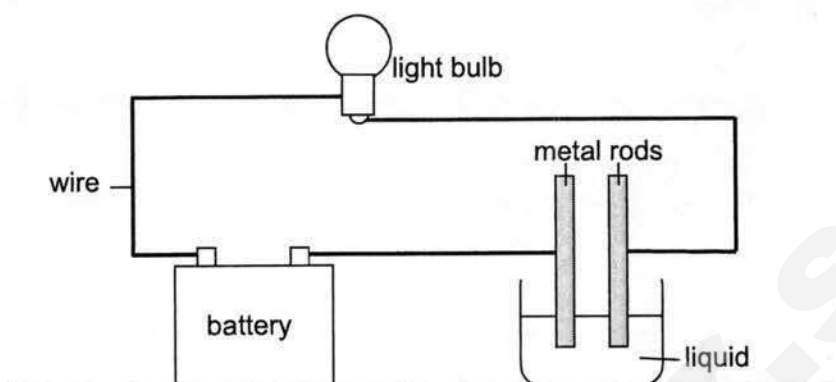
Which of the following questions should Marie?

- A** How does the shape of the falling object affect the time taken?
- B** Should the release height be measured in centimetres instead of metres?
- C** Should the mass of the object be measured again after it reaches the ground?
- D** Should the mass of the object be measured using a beam balance or spring balance?

- A6** As a supplement to some diets, iron is consumed in tablet form. The mass of iron in these tablets is often measured in

- A** grams
- B** calories
- C** millilitres
- D** milligrams

A7 The diagram below shows an experiment to test a certain property of liquids.



Which property is being tested?

- A** density
 - B** solubility
 - C** magnetism
 - D** electrical conductivity
- A8** Gold, silver, platinum and copper are metals that are commonly used in manufacturing processes. The table below shows the melting points and densities of these metals.

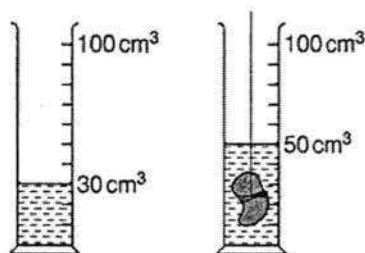
Liquid	Melting point ($^{\circ}\text{C}$)	Density (g/cm^3)
Gold	1063	19.31
Silver	961	14.50
Platinum	1773	21.42
Copper	1083	8.96

Which of the following statements describes the relationship between the melting point and density of a material?

- A** The densest material has the lowest melting point.
- B** The melting point of a material is 100 times its density.
- C** The melting point of a material is independent of density.
- D** The melting point of a material decreases as density decreases.

5

- A9** A stone of mass 60 g is lowered into a measuring cylinder. The water level rises as shown in the diagram below.



What is the density of the stone?

- A** 0.6 g/cm³
 - B** 1.2 g/cm³
 - C** 2.0 g/cm³
 - D** 3.0 g/cm³
- A10** Which of the following is not an effect of a force?
- A** It changes the size of an object.
 - B** It changes the mass of an object.
 - C** It changes the speed of a moving object.
 - D** It changes the direction of a moving object.
- A11** What is the resultant force acting on the box shown below?

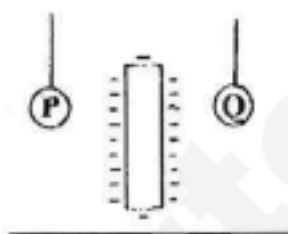


- A** 2 N to the left
- B** 2 N to the right
- C** 8 N to the left
- D** 8 N to the right

A12 Which of the following is a contact force?

- A** magnetic force
- B** frictional force
- C** electrostatic force
- D** gravitational force

A13 Two metal balls, **P** and **Q**, each hangs from a nylon thread as shown below. A negatively charged rod is then placed between them. **P** is repelled by the rod while **Q** is attracted to it.



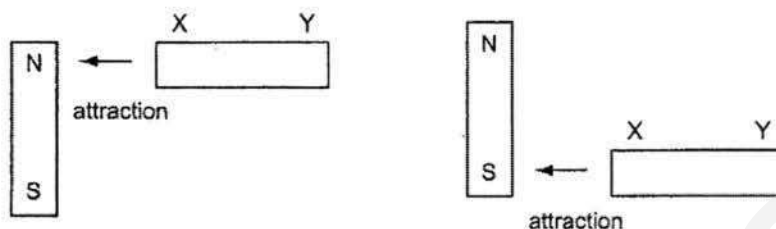
What are the charges of **P** and **Q**?

	P	Q
A	Positive	Positive
B	Positive	Negative
C	Negative	Positive
D	Negative	Negative

A14 Which material is magnetic?

- A** wood
- B** brass
- C** steel
- D** aluminum

- A15** A metal rod XY is placed near a magnet. End X is attracted when it is placed near to the north pole of the magnet, and also when it is placed near to the south pole.



How does end Y behave when it is placed, in turn, near to the two poles of the magnet?

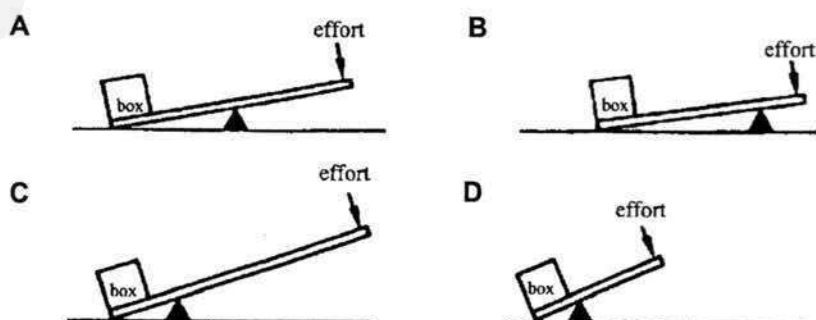
	Y near north pole	Y near south pole
A	attraction	attraction
B	attraction	repulsion
C	repulsion	attraction
D	repulsion	repulsion

- A16** Which of the following is the most likely to exert the greatest amount of pressure on the ground?

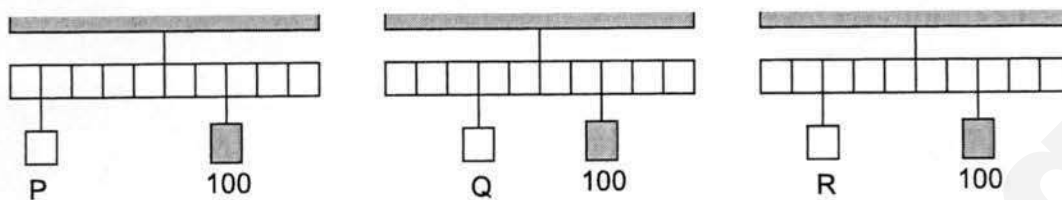
- A** a loaded lorry with four identical wheels
- B** a loaded lorry with six identical wheels
- C** an empty lorry with four identical wheels
- D** an empty lorry with six identical wheels

- A17** Four methods of lifting a heavy box using a lever are shown below.

Which method would lift the box most easily?



A18 Which of the following shows the weight of objects in **increasing** order?

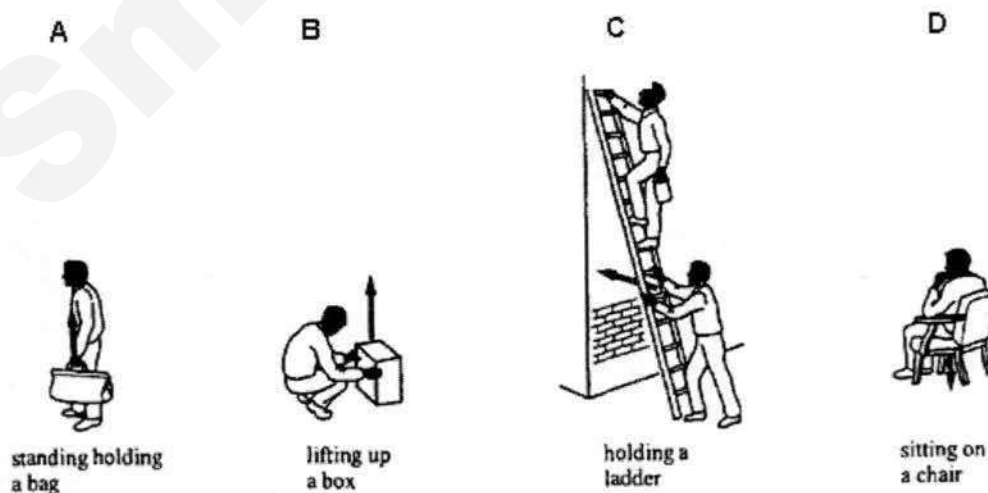


- A P, R, Q
- B R, P, Q
- C Q, R, P
- D R, Q, P

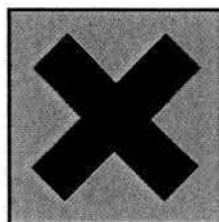
A19 Which of the following does not use chemical potential energy?

- A car
- B blender
- C torchlight
- D handphone

A20 The arrow in each picture show the direction of force exerted by a person.
Which picture shows work being done?



- A21** During an experiment in a school laboratory, Klein accidentally spilled a chemical with the following hazard symbol on his arm.



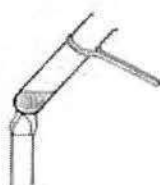
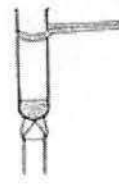
What should Klein do first?

- A** call the ambulance
 - B** raise his hand to inform the teacher
 - C** wipe his arm with a clean piece of cloth
 - D** wash his arm thoroughly under running water
- A22** Which of the following apparatus should Ryan use to measure exactly 31.4 cm^3 of a liquid?
- A** beaker
 - B** burette
 - C** pipette
 - D** test-tube
- A23** The steps to lighting up a Bunsen burner are shown below.
- I** Turn on the gas tap
 - II** Open the air-hole
 - III** Light it up with a lighter
 - IV** Close the air-hole

Which is the correct order of steps for lighting up a Bunsen burner to obtain a non-luminous flame?

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

A24 Which one of the following diagrams shows the correct way of heating a liquid in a test-tube?

**A****C****B****D**

A25 After outdoor cooking in Scouts camp, Jing Han realised that the bottom of his cooking pot was covered with soot. Which of the following statements correctly describes his observation?

- A** The flame was too hot.
- B** The food in the pot was burnt.
- C** The camp fire was a luminous flame.
- D** The camp fire was a non-luminous flame.

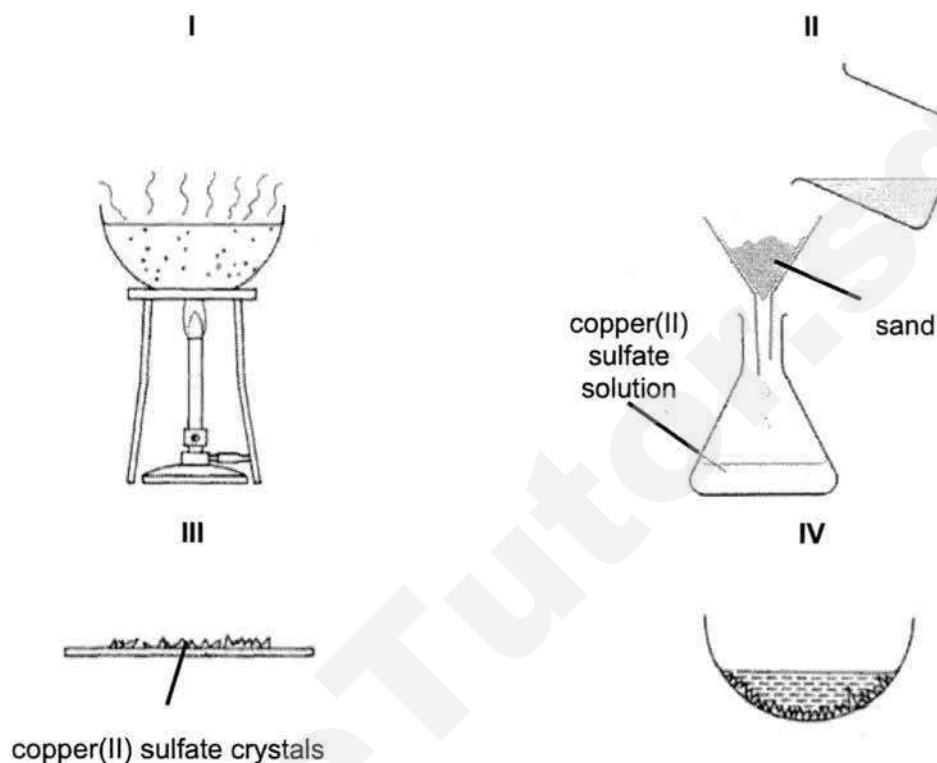
A26 Gina accidentally poured salt into a bowl of rice grains. To prevent wastage, she decided to use some of the separation techniques she has learnt. She listed down the necessary steps below.

- I** Pour the mixture down a filter funnel fitted with filter paper
- II** Add water to the mixture and stir
- III** Heat the mixture until all the water has evaporated

Which is the correct order of the steps she must carry out?

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

A27 Pure copper(II) sulfate crystals can be obtained from an impure mixture of copper(II) sulfate and sand. The following diagrams represent the stages of the preparation.



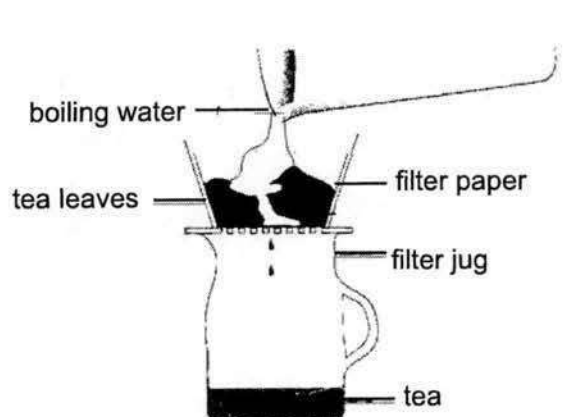
In which order should these stages be?

	first stage → last stage			
A	I	IV	II	III
B	II	I	IV	III
C	II	I	III	IV
D	IV	I	II	III

A28 Which statement must be true in order for two substances to be separated by chromatography?

- A** They have different colours.
- B** They have different densities.
- C** They have different boiling points.
- D** They are soluble in the same solvent.

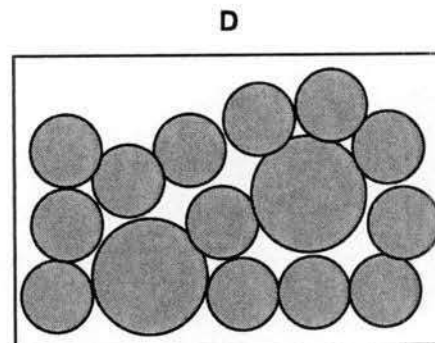
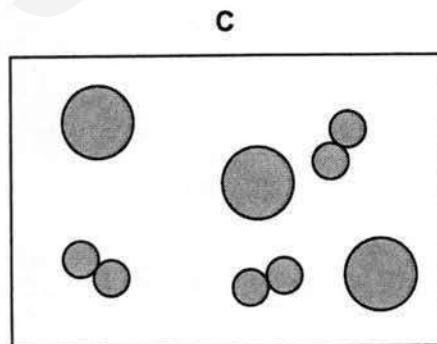
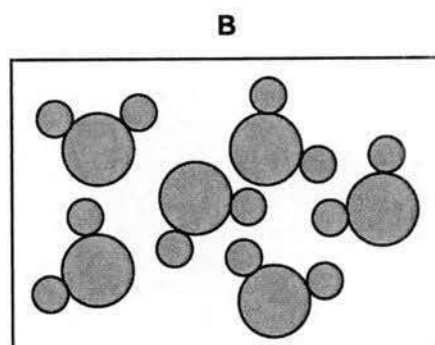
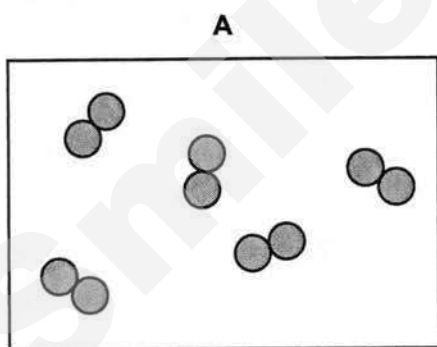
A29 The diagram shows a separation technique used to obtain tea.



Which of the following statements is correct?

- A** The tea leaves dissolve in water to make tea.
- B** The boiling water cannot pass through the filter paper.
- C** The tea is the filtrate and the tea leaves are the residue.
- D** The tea leaves are the filtrate and the tea is the residue.

A30 Which of the following diagrams represent an element?



A31 In the 18th century, a chemist named Henry Cavendish carried out an experiment which showed that hydrogen burns with the oxygen in the air to form water. Which statement(s) can be inferred from this observation alone?

- I Air is an element
- II Water is an element
- III Water is a compound
- IV Water is formed from the reaction between hydrogen and oxygen

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

A32 Which of the following shows an element, a compound and a mixture??

	element	compound	mixture
A	carbon monoxide	magnesium oxide	sugar solution
B	mercury	Milo	sodium chloride
C	nitrogen	carbon dioxide	air
D	steel	mud	tin

A33 In 2004, a group of Japanese scientists discovered a new element with proton number 113. The new element was given the name nihonium, is a metal, and was found to have 3 electrons in its outermost electron shell. Which statement regarding nihonium is **true**?

- A Its chemical symbol is Ni.
- B It belongs to Group I of the Periodic Table.
- C It belongs to Period 4 of the Periodic Table.
- D It is predicted to be between the elements copernicium and flerovium in the Periodic Table.

A34 Which statement is **true** for all metals?

- A They have a silvery appearance.
- B They can be attracted by magnets.
- C They can conduct electricity in the solid state.
- D They are solids at room temperature and pressure.

A39 Which of the following substances is a compound?

- A** C_{60}
- B** HF
- C** O_2
- D** S_8

A40 Which of the following statements is **true**?

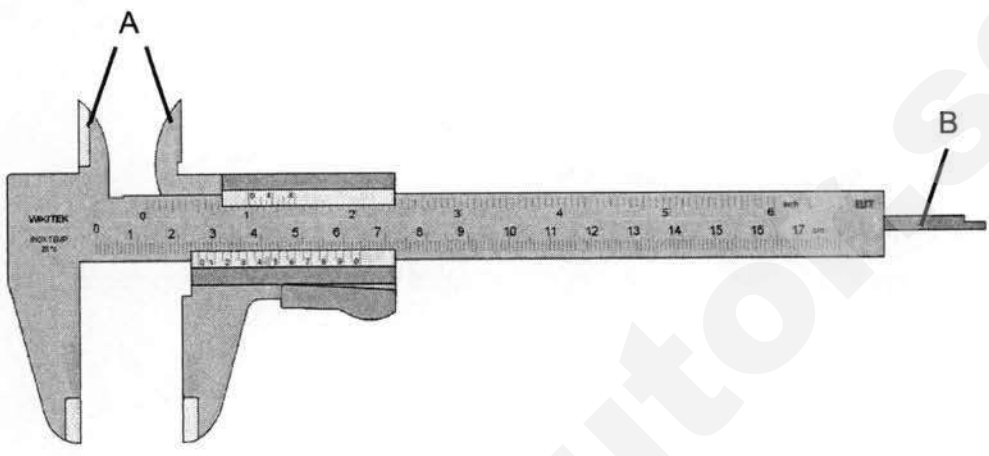
- A** A compound has the properties of the elements it is made up of.
- B** A compound can be formed by chemical processes such as combustion.
- C** A compound can be broken down into simpler substances by physical methods.
- D** A compound made up of two or more different elements with different composition by mass.

Section B: Short Answer Questions [40 marks]

Answer **all** questions.

Write your answers in the spaces provided

B1 The diagram below shows a vernier caliper.



(a) Name parts A and B of the vernier caliper and state their function.

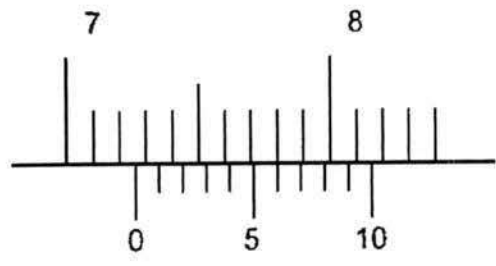
Name of part A: [1]

Function of part A: [1]

Name of part B: [1]

Function of part B: [1]

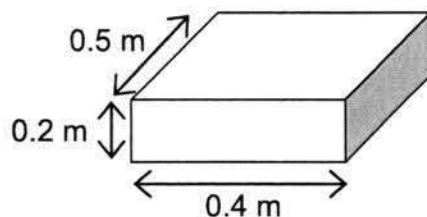
(b) State the reading of the vernier caliper below.



Reading: cm [1]

17

- B2** The diagram below shows an object of dimension 0.5 m x 0.4 m x 0.2 m lying on the ground. Its weight is 100 N.



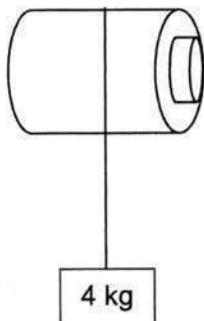
- (a) Calculate the pressure exerted by the object on the ground.

pressure= Pa [3]

- (b) If the object is made to stand on the shaded area, the pressure exerted on the ground will be greater. Explain why this is so.

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

- B3** An electric motor is used to lift a box of mass 4 kg as shown in the diagram below. The box moves vertically up through a distance of 2 m in 5 s.



- (a) State the energy conversion in raising the box.

[1]

- (b) Calculate the average speed of the box

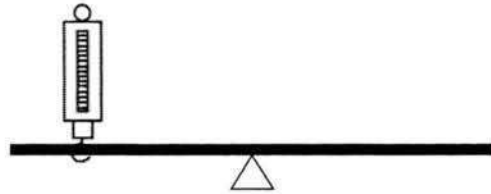
average speed = m/s [1]

- (c) Calculate the work done in raising the box. (Take g to be 10 N/kg)

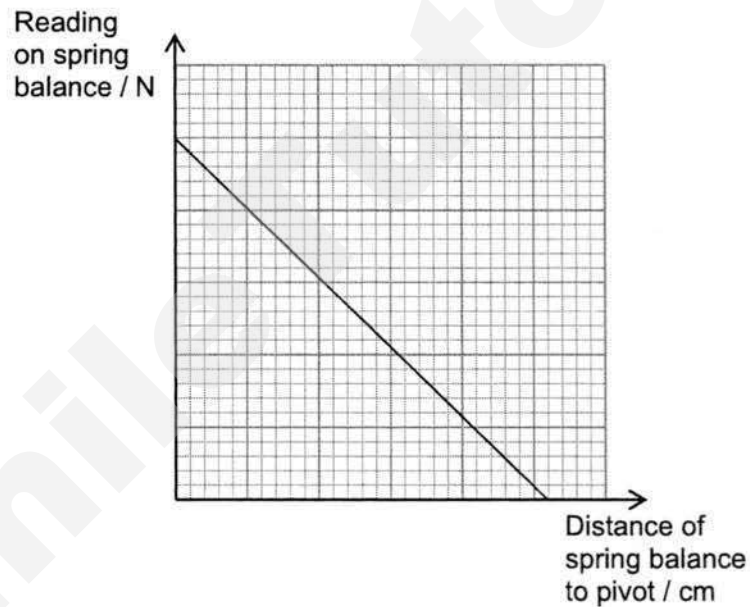
work done = [3]

19

- B4** A student carried out an experiment by balancing a light beam horizontally on a pivot using a spring balance as shown in the diagram below. The pivot is placed in the middle of the beam.



- (a) The student concluded his findings through the graph shown below and it proved that his hypothesis for the experiment was accurate.



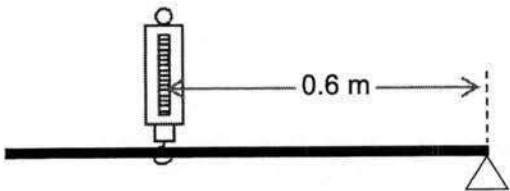
State the student's hypothesis for the experiment.

.....

.....

[1]

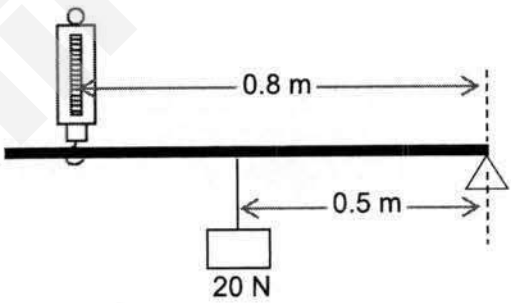
- (b) The arrangement was adjusted such that the spring balance was 0.6 m away from the pivot, and it showed a reading of 7.5 N.



Calculate the moment produced by the spring balance about the pivot.

M\moment = Nm [2]

- (c) The student then positioned the spring balance 0.8 m away from the pivot and added a box in the middle of the beam as shown in the diagram below.

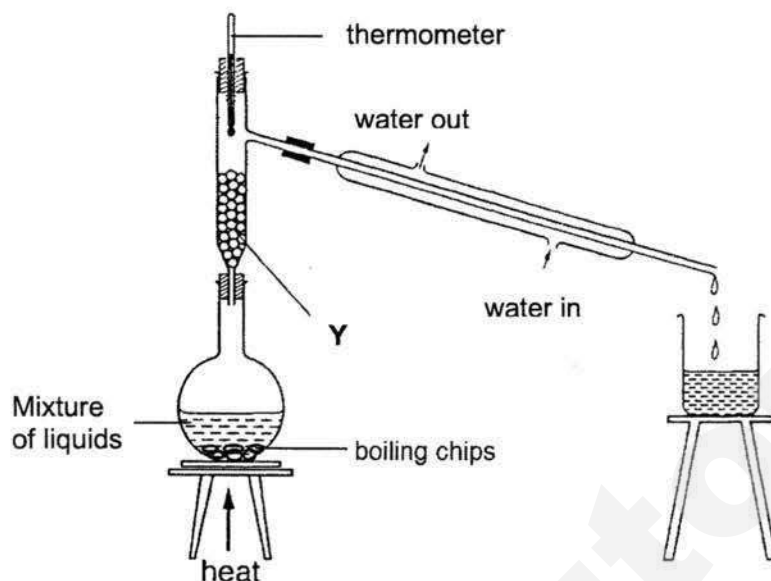


If the weight of the box is 20 N, calculate the new reading on the spring balance.

reading on spring balance =

21

- B5** Giselle used the experimental set up shown below to separate a mixture of three liquids, **P**, **Q** and **R**.



- (a) State the name of apparatus **Y**.

[1]

- (b) The boiling points of liquids **P**, **Q**, and **R** are 156 °C, 118 °C, and 79 °C respectively. State which distillate will be the **last** to be collected? Explain your answer.

[2]

- (c) What is the function of the boiling chips?

[1]

- (d) Can Giselle use the same experimental set-up to separate a mixture of oil and water? Explain your answer.

[2]

- B6** The table below shows the properties of five elements, **A**, **B**, **C**, **D**, and **E**. These letters do **not** represent their chemical symbols.

Element	Melting point (°C)	Boiling point (°C)	Density (g/cm ³)	Electrical conductivity	Reaction with water
A	- 39	630	13.5	good	No reaction
B	98	883	0.97	good	Reacts violently
C	- 189	- 186	0.0018	poor	No reaction
D	1085	2652	8.96	good	No reaction
E	- 101	- 34	0.0032	poor	Forms an acid

- (a) Which of the above five elements is most likely a Group I element. Support your answer with the information given in the table shown above.

.....

.....

.....

.....

[3]

- (b) Rubidium is also a Group I element and it lies further down the group as compared to the element in part (a). How would you expect the melting point, density, and reactivity in water of rubidium to differ compared to the element in (a)?

.....

.....

.....

.....

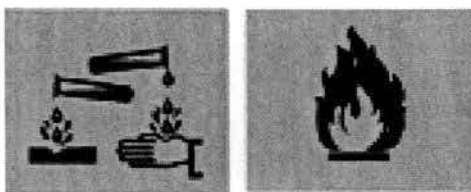
[3]

- (d) State the identity of Element **A**.

.....

[1]

- B7** Ethanoic acid is a colourless liquid with a pungent smell and has a chemical formula of $C_2H_4O_2$. A bottle of ethanoic acid has the two labels shown below.



- (a) State what the two labels represent.

[1]

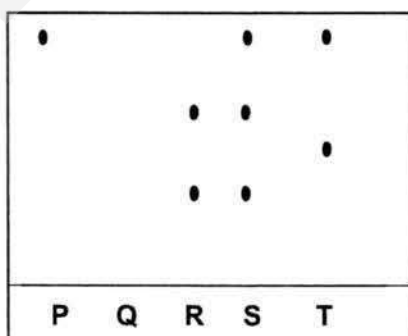
- (b) Based on the labels, state **two** precautions that should be taken when using this chemical.

[2]

- (c) State the number of atoms of each element present in a molecule of ethanoic acid.

[1]

- B7** A paper chromatography was performed on substances **P**, **Q**, **R**, **S** and **T** as shown.



- (a) Which substance is pure? Explain your answer.

[2]

- (b) Suggest an explanation for the results of substance **Q**.

Section C: Free Response / Structured Questions [20 marks]

Answer **all** questions.

C1 A cuboid of length 5.0 cm, breadth 3.0 cm and height 2.5 cm has a density of 70 g/cm³. Taking gravitational field strength on Earth and the Moon to be 10 N/kg and 1.6 N/kg respectively,

(a) Calculate the cuboid's,

(i) mass on Earth,

mass = g [3]

(ii) weight on the Moon.

weight = N [3]

(b) Suggest an instrument used to measure the cuboid's

(i) Mass, [1]

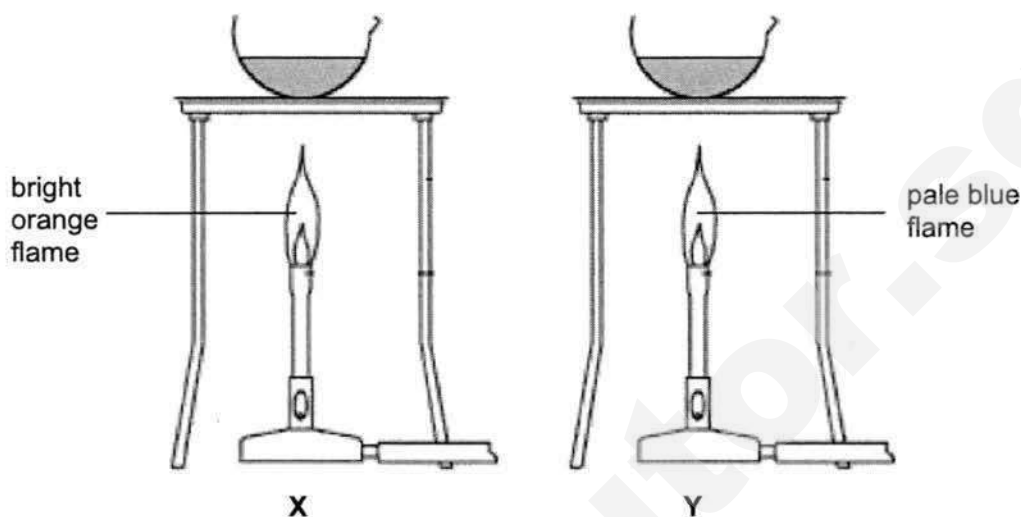
(ii) Weigh.: [1]

(c) The density water is 1 g/cm³. Will the cuboid sink or float in water? Explain.

.....
.....

25

- C2 (a)** In an experiment, Ethan was given a sample of a colourless liquid. He separated it into two equal portions and heated them over two different types of flame as shown below.



- (i) In which set-up, **X** or **Y**, would you expect the liquid to evaporate completely first? Explain your answer.

.....
..... [2]

- (ii) After all the liquid has evaporated completely, a residue of a white solid was left behind in both **X** and **Y**. State, with a reason, whether the colourless solution was an element, a mixture, or a compound.

.....
..... [2]

(b) Iron(III) chloride, FeCl_3 , is a reddish brown solid and is made up of the elements iron and chlorine. Steel is made up of the elements iron and carbon.

- (i) Explain why heat was given out when iron(III) chloride was formed but this does not happen when iron filings and chlorine gas are mixed.

.....

.....

.....

..... [2]

- (ii) Explain why some iron filings remained when the mixture of iron filings and chlorine gas was heated to form iron(III) chloride.

.....

.....

.....

..... [2]

- (iii) Explain why steel can be attracted by magnets but not iron(III) chloride.

.....

.....

.....

..... [2]

I		II		Group																III	
3 Li lithium 7	4 Be beryllium 9	<div> <div>1 H hydrogen 1</div> <div> <div>proton (atomic) number</div> <div>atomic symbol</div> <div>name</div> <div>relative atomic mass</div> </div> </div>																5 B boron 11			
11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27																	14 Si silicon 28		
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 —	113 Nh nihonium —	114 Fl flerovium —	115 Mc moscovium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganesson —				
lanthanoids																					
actinoids																					

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MARKING SCHEME



MANJUSRI SECONDARY SCHOOL 文殊中學

MID-YEAR EXAMINATION 2017

Subject: Lower Secondary Science
Paper: Physics and Chemistry
Level: Secondary 1 Express
Date: 08 May 2017
Duration: 2 hours
Setter: Mr Sulaiman and Mr Qamarul

Additional Materials: Optical Answer Sheet (OTAS)

READ THESE INSTRUCTIONS FIRST

Write your Name, Register Number and Class on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A: Multiple Choice Question [40 marks]

Write in soft pencil.

There are **forty** questions in this section.

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 provided.

Section B: Structured Questions [40 marks]

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

Section C: Structured Questions [20 marks]

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

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

The total number of marks for this paper is **100**.

A copy of the Periodic Table is printed on page **24**.

For Examiner's Use		
Section	Phy	Chem
A	/ 20	/20
B	/ 20	/20
C	/ 10	/10
Sub-total	/ 50	/50

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Section A: Multiple Choice Questions [40 marks]Answer **all** questions

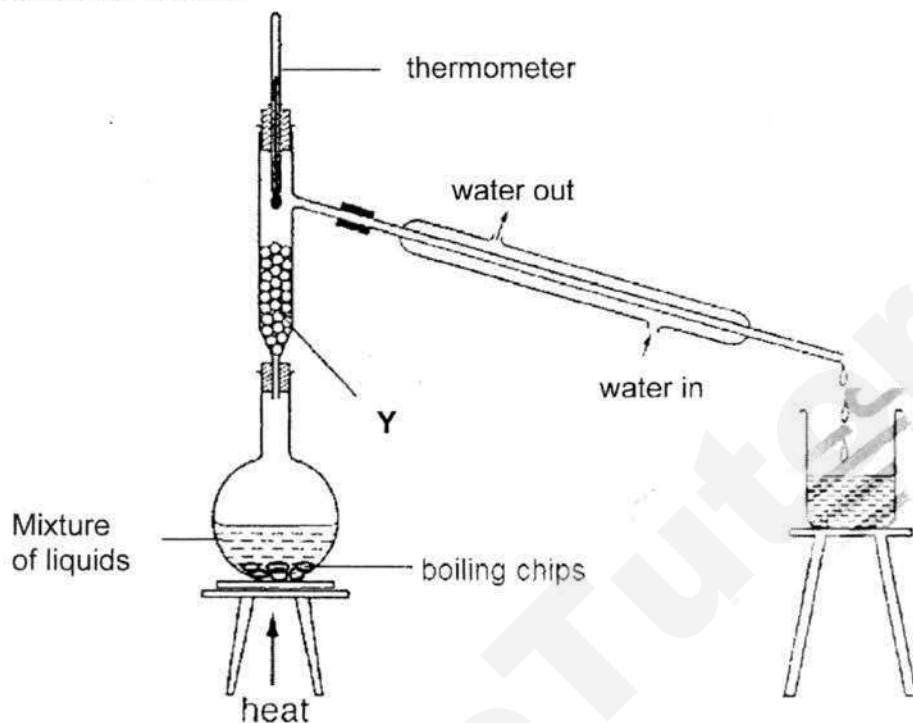
Write your answers in the spaces provided

A21	A22	A23	A24	A25	A26	A27	A28	A29	A30
D	B	C	A	C	C	B	D	C	A
A31	A32	A33	A34	A35	A36	A37	A38	A39	A40
D	C	D	C	D	C	A	A	B	B

Section B: Short Answer Questions [40 marks]Answer **all** questions.

Write your answers in the spaces provided

- B5** Giselle used the experimental set up shown below to separate a mixture of three liquids, **P**, **Q** and **R**.



- (a) State the name of apparatus **Y**.

Fractionating column (wrong spelling not accepted)

[1]

- (b) If liquid **P** boils at 156 °C, liquid **Q** boils at 118 °C and liquid **R** boils at 79 °C, which liquid will be the **last** to be collected? Explain your answer.

Liquid P [1m]. It has the highest boiling point / its boiling point is higher than the other two liquids [1m]

[2]

("high boiling point" or "high temperature" not accepted.)

- (c) What is the function of the boiling chips?

To ensure smooth boiling

[1]

- (d) Can Giselle use the same experimental set-up to separate a mixture of oil and water? Explain your answer.

No [1m]. Oil and water are immiscible/insoluble in each other and cannot be separated by fractional distillation [1m].

[2]

- B5** The table below shows the properties of five elements, **A**, **B**, **C**, **D**, and **E**. These letters do **not** represent their chemical symbols.

Element	Melting point (°C)	Boiling point (°C)	Density (g/cm ³)	Electrical conductivity	Reaction with water
A	- 39	630	13.5	good	No reaction
B	98	883	0.97	good	Reacts violently
C	- 189	- 186	0.0018	poor	No reaction
D	1085	2652	8.96	good	No reaction
E	- 101	- 34	0.0032	poor	Forms an acid

- (a) Which of the above five elements is most likely a Group I element. Support your answer with the information given in the table shown above.

B is a Group I metal [1m] since it has a low melting and boiling point, low density [1m] , conducts electricity and reacts violently with water [1m].

[3]

(2 correct data = 1m)

- (c) Rubidium is also a Group I element and it lies further down the group as compared to the element in part (a). How would you expect the melting point and reactivity in water of rubidium to differ compared to the element in (a)?

The melting point is lower than the element in (a) [1m].

It reacts more violently with water compared to the element in (a) [1m].

[3]

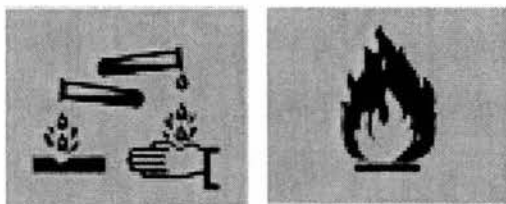
Its density is higher than the element in (a) [1m]

- (d) State the identity of Element **A**.

Mercury (the only example of a metal that is liquid at room temperature)

[1]

- B6** Ethanoic acid is a colourless liquid with a pungent smell and has a chemical formula of $C_2H_4O_2$. A bottle of ethanoic acid has the two labels shown below.



- (a) State what the two labels represent.

corrosive and flammable

[1]

- (b) Based on the labels, state two precautions that should be taken when using this chemical.

Wear protective gloves/lab coat [1m].

Keep away from a flame OR use a water bath when heating it. [1m]

[2]

MUST BE SPECIFIC TO THE LABELS SHOWN

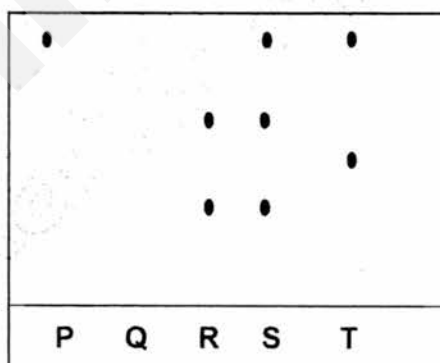
- (c) State the number of atoms of each element present in a molecule of ethanoic acid.

2 carbon atoms, 4 hydrogen atoms, and 2 oxygen atoms.

[1]

[NOT ASKING FOR TOTAL, MANY CARELESS MISTAKES]

- B7** A paper chromatography was performed on substances P, Q, R, S and T as shown.



- (a) Which substance is pure? Explain your answer.

P [1m]. There is only one spot in the chromatogram for P, hence there is only one substance present in P [1m].

[2]

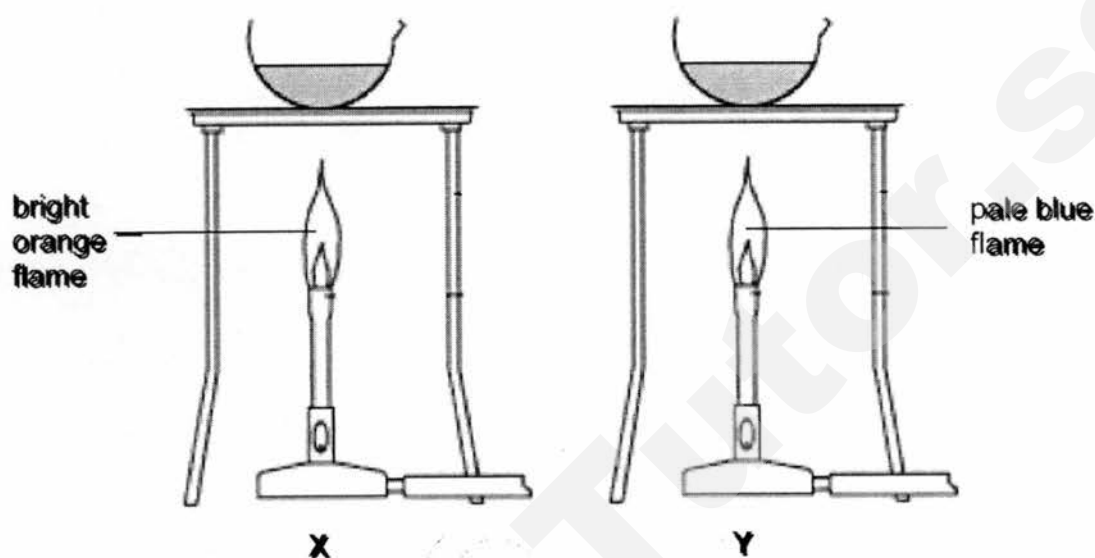
- (b) Suggest an explanation for the results of substance Q.

Substance Q is not soluble in the solvent used.

Section C: Free Response / Structured Questions [20 marks]Answer **all** questions.

Write your answers in the spaces provided

- C2 (a)** In an experiment, Ethan was given a sample of a colourless liquid. He separated it into two equal portions and heated them over two different types of flame as shown below.



- (i) In which set-up, **X** or **Y**, would you expect the liquid to evaporate completely first? Explain your answer.

Y [1]. A non-luminous flame was used, which produces more heat than the luminous flame in X [1].

[2]

- (ii) After all the liquid has evaporated completely, a residue of a white solid was left behind in both **X** and **Y**. State, with a reason, whether the colourless solution was an element, a mixture, or a compound.

It is a mixture [1] since it is made up of two different substances that can be separated by a physical method [1].

[2]

(b) Iron(III) chloride, FeCl_3 , is a reddish brown solid and is made up of the elements iron and chlorine. Steel is made up of the elements iron and carbon.

- (i) Explain why heat was given out when iron(III) chloride was formed but this does not happen when iron filings and chlorine gas are mixed.

When the compound iron(III) chloride is formed, a chemical reaction occurs and heat is given out[1]. When iron is mixed with chlorine gas, no chemical change takes place hence there is no energy change [1].

[2]

- (ii) Explain why some iron filings remained when the mixture of iron filings and chlorine gas was heated to form iron(III) chloride.

The elements in the compound iron(III) chloride combine in a fixed proportion[1]. If the proportion of iron filings in the mixture is greater than what is required in forming the compound, there would be extra iron filings that remain unchanged [1].

- (iii) Explain why steel can be attracted by magnets but not iron(III) chloride.

A mixture has similar properties as the substances that it is made up of.

Therefore, steel can be attracted by magnets like iron [1]. However, a compound have different properties compared to its constituent elements, hence iron(III) chloride cannot be attracted by a magnet like iron. [1]

[2]

Name	Register Number	Class	Calculator Model



MANJUSRI SECONDARY SCHOOL

文殊中學

MID YEAR EXAMINATION 2017

Subject: Lower Secondary Science
 Paper: Physics and Chemistry
 Level: Secondary 1 Express
 Date: 08 May 2017
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A	/ 20	/20
B	/ 20	/20
C	/ 10	/10
Sub-total	/ 50	/50
Total	/100	

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This paper consists of **27** printed pages and **1** blank page, including the cover page.

2

Section A

Answer **all** questions

A1 The scientific method usually involves the following skills.

- I making meaning of information and evidence
- II communicating
- III engaging with an event
- IV collecting and presenting evidence

What is the correct sequence in which the four skills are applied in the scientific method?

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

A2 Objectivity is an attitude of scientific enquiry.

What do you understand by this term?

- A** influenced by what is widely believed by others
- B** not influenced by what is widely believed by others
- C** follow the facts and be influenced by what is widely believed by others
- D** follow the facts and not be influenced by what is widely believed by others

A3 Which property of a substance indicates whether it is a liquid or solid at room temperature?

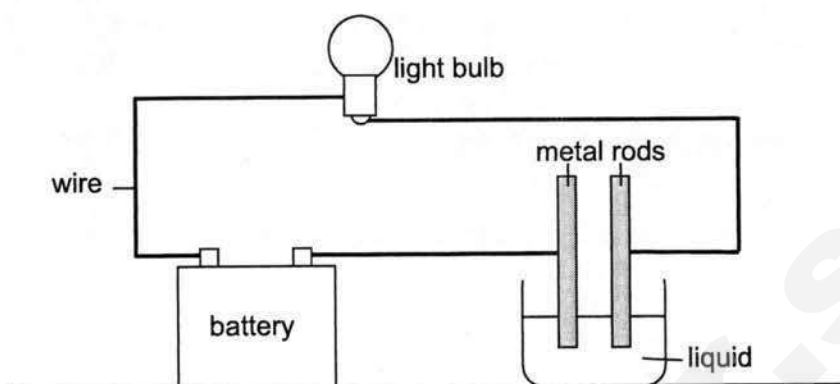
- A** flexibility
- B** solubility
- C** melting point
- D** heat conductivity

For questions A4 and A5, refer to the table below.

mass of falling object (kg)	height from which object was released (m)	time taken for object to reach ground (s)
-----------------------------	---	---

- A4** Marie carried out an experiment involving falling objects. The table above shows the variables of the experiment.
- Which of the statements below could be the hypothesis / hypotheses Marie tested through the experiment?
- I The greater the mass of an object, the longer the time it takes to fall to the ground.
 - II The larger the volume of an object, the longer the time it takes to fall to the ground.
 - III The greater the mass of a falling object, the greater the distance it falls before it reaches the ground.
- A** I only
 - B** I and II
 - C** II and III
 - D** none of the above
- A5** To improve the experiment, Marie's teacher told her that she should ask herself some questions before carrying out the experiment.
- Which of the following questions should Marie ask?
- A** How does the shape of the falling object affect the time taken?
 - B** Should the release height be measured in centimetres instead of metres?
 - C** Should the mass of the object be measured again after it reaches the ground?
 - D** Should the mass of the object be measured using a beam balance or spring balance?
- A6** As a supplement to some diets, iron is consumed in tablet form. The mass of iron in these tablets is often measured in
- A** grams
 - B** calories
 - C** millilitres
 - D** miligrams

A7 The diagram below shows an experiment to test a certain property of liquids.



Which property is being tested?

- A** density
 - B** solubility
 - C** magnetism
 - D** electrical conductivity
- A8** Gold, silver, platinum and copper are metals that are commonly used in manufacturing processes. The table below shows the melting points and densities of these metals.

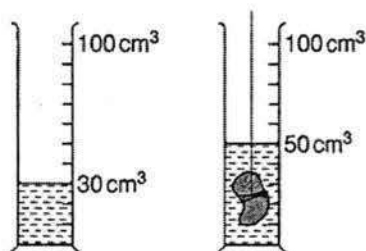
Liquid	Melting point ($^{\circ}\text{C}$)	Density (g/cm^3)
Gold	1063	19.31
Silver	961	14.50
Platinum	1773	21.42
Copper	1083	8.96

Which of the following statements describes the relationship between the melting point and density of a material?

- A** The densest material has the lowest melting point.
- B** The melting point of a material is one hundred times its density.
- C** The melting point of a material is independent of density.
- D** The melting point of a material decreases as density decreases.

5

- A9** A stone of mass 60 g is lowered into a measuring cylinder. The water level rises as shown in the diagram below.



What is the density of the stone?

- A** 0.6 g/cm³
 - B** 1.2 g/cm³
 - C** 2.0 g/cm³
 - D** 3.0 g/cm³
- A10** Which of the following is not an effect of a force?
- A** It changes the size of an object.
 - B** It changes the mass of an object.
 - C** It changes the speed of a moving object.
 - D** It changes the direction of a moving object.
- A11** What is the resultant force acting on the box shown below?



- A** 2 N to the left
- B** 2 N to the right
- C** 8 N to the left
- D** 8 N to the right

A12 Which of the following is a contact force?

- A** magnetic force
- B** frictional force
- C** electrostatic force
- D** gravitational force

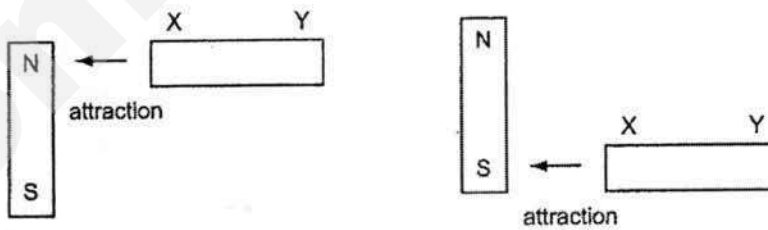
A13 The electrostatic force between two charged particles

- A** attracts if they are like charges.
- B** repels each other if they are like charges.
- C** is zero if they both have negative charges.
- D** repels each other if they are unlike charges.

A14 Which material has magnetic properties?

- A** wood
- B** brass
- C** steel
- D** aluminum

A15 A metal rod XY is placed near a magnet. End X is attracted when it is placed near to the north pole of the magnet, and also when it is placed near to the south pole.



How does end Y behave when it is placed, in turn, near to the two poles of the magnet?

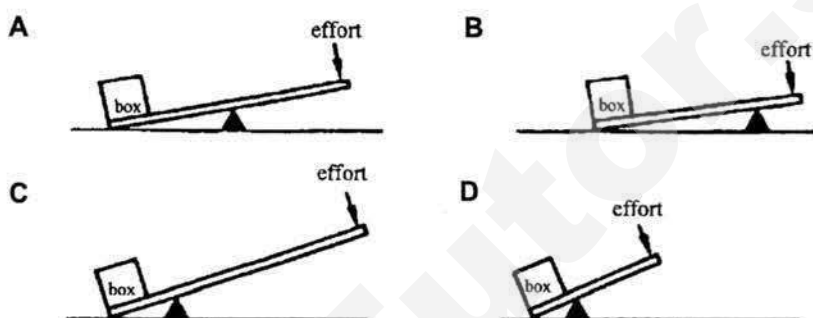
	Y near north pole	Y near south pole
A	attraction	attraction
B	attraction	repulsion
C	repulsion	attraction
D	repulsion	repulsion

A16 Which of the following is the most likely to exert the greatest amount of pressure on the ground?

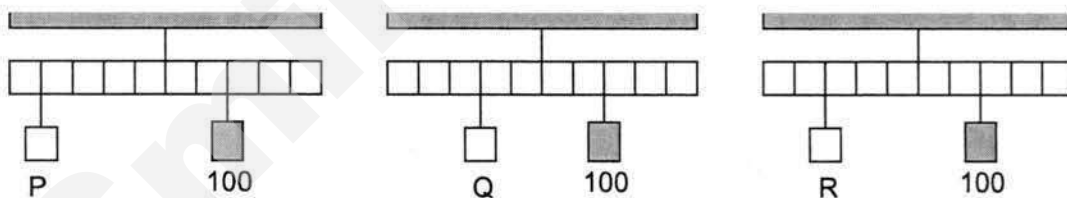
- A** a loaded lorry with four identical wheels
- B** a loaded lorry with six identical wheels
- C** an empty lorry with four identical wheels
- D** an empty lorry with six identical wheels

A17 Four methods of lifting a heavy box using a lever are shown below.

Which method would lift the box most easily?



A18 Which of the following shows the weight of objects in increasing order?

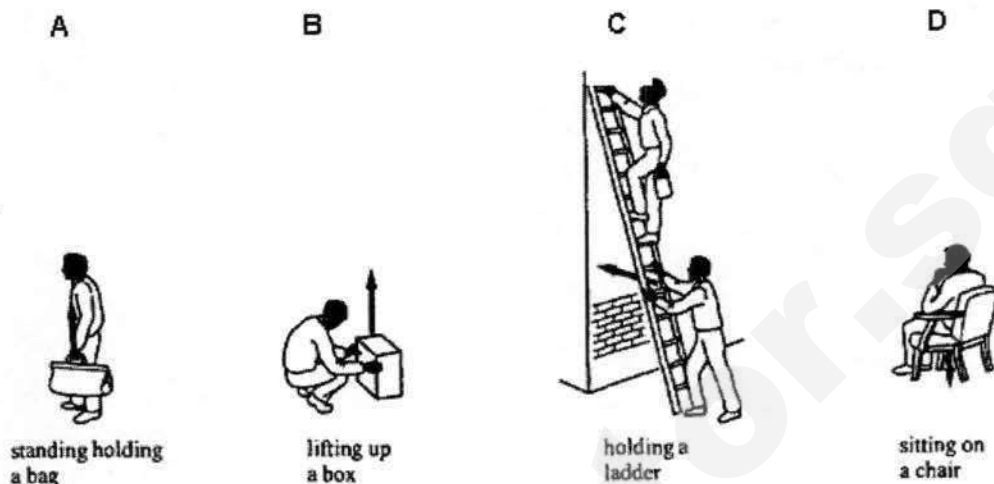


- A** P, R, Q
- B** R, P, Q
- C** Q, R, P
- D** R, Q, P

A19 Which of the following does not use chemical potential energy?

- A** car
- B** blender
- C** torchlight
- D** handphone

A20 The arrow in each picture show the direction of force exerted by a person.
Which picture shows work being done?



A21 During an experiment in a school laboratory, Klein accidentally spilled a chemical with the following hazard symbol on his arm.



What should Klein do first?

- A** call the ambulance
- B** raise his hand to inform the teacher
- C** wipe his arm with a clean piece of cloth
- D** wash his arm thoroughly under running water

A22 Which of the following apparatus should Ryan use to measure exactly 31.4 cm^3 of a liquid?

- A** beaker
- B** burette
- C** pipette
- D** test-tube

A23 The steps to lighting up a Bunsen burner are shown below.

- I Turn on the gas tap
- II Open the air-hole
- III Light it up with a lighter
- IV Close the air-hole

Which is the correct order of steps for lighting up a Bunsen burner to obtain a non-luminous flame?

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

A24 Which one of the following diagrams shows the correct way of heating a liquid in a test-tube?



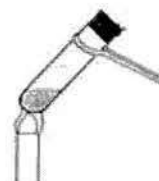
A



C



B



D

A25 After outdoor cooking in Scouts camp, Jing Han realised that the bottom of his cooking pot was covered with soot. Which of the following statements correctly describes his observation?

- A** The flame was too hot.
- B** The food in the pot was burnt.
- C** The camp fire was a luminous flame.
- D** The camp fire was a non-luminous flame.

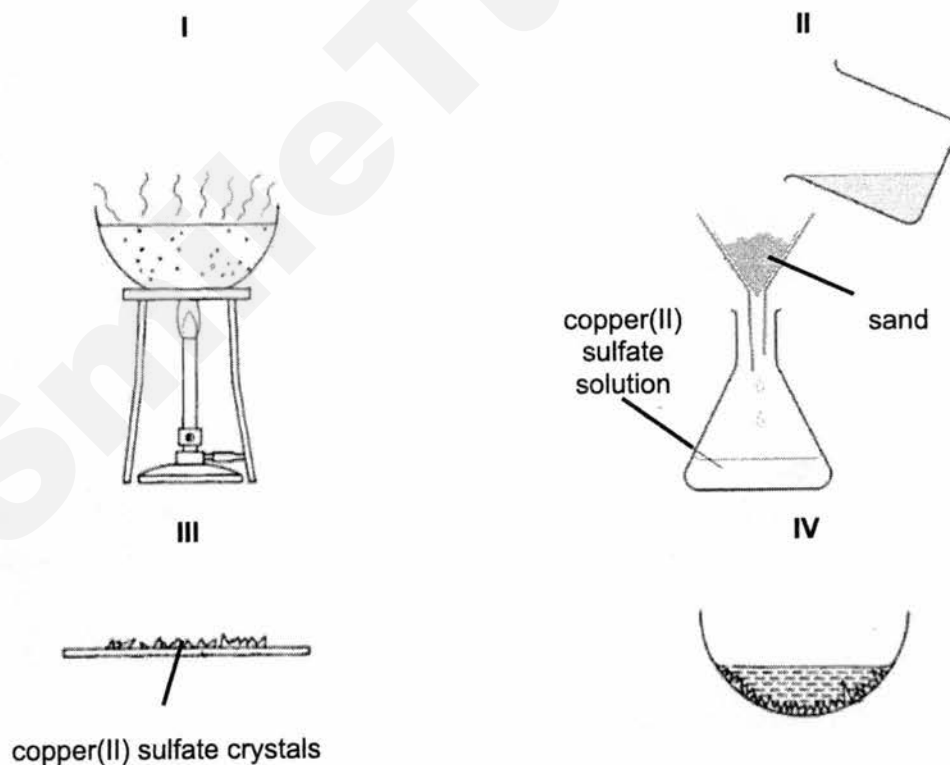
A26 Gina accidentally poured salt into a bowl of rice grains. To prevent wastage, she decided to use some of the separation techniques she has learnt. She listed down the necessary steps below.

- I Pour the mixture down a filter funnel fitted with filter paper
- II Add water to the mixture and stir
- III Heat the mixture until all the water has evaporated

Which is the correct order of the steps she must carry out?

- A I, II, III
- B I, III, II
- C II, I, III
- D II, III, I

A27 Pure copper(II) sulfate crystals can be obtained from an impure mixture of copper(II) sulfate and sand. The following diagrams represent the stages of the preparation.



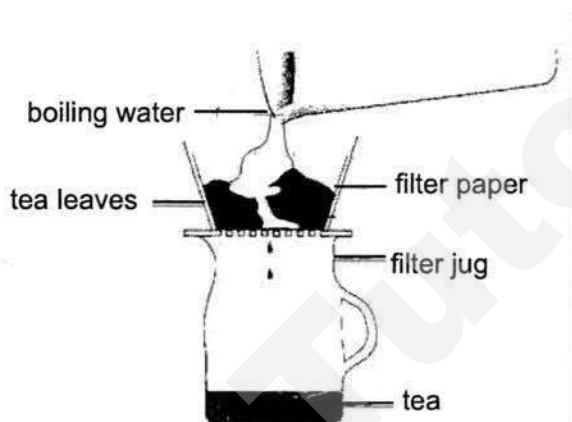
In which order should these stages be?

	first stage	→			last stage
A	I	IV	II	III	
B	II	I	IV	III	
C	II	I	III	IV	
D	IV	I	II		

A28 Which statement must be **true** in order for two substances to be separated by chromatography?

- A** They have different colours.
- B** They have different densities.
- C** They have different boiling points.
- D** They are soluble in the same solvent.

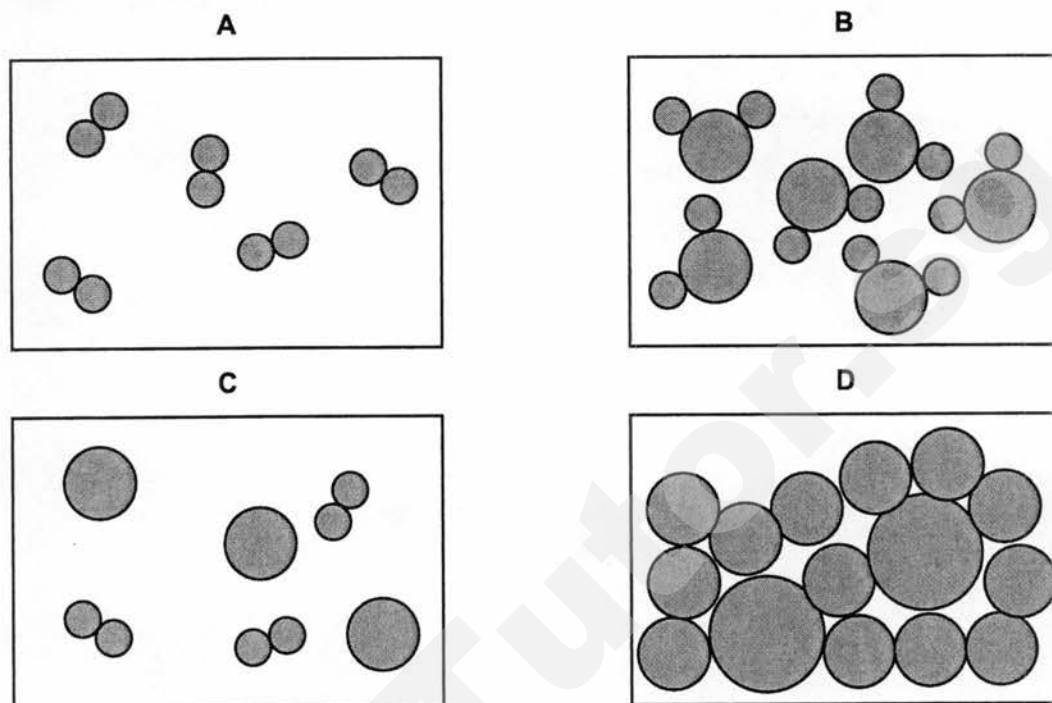
A29 The diagram shows a separation technique used to obtain tea.



Which of the following statements is **correct**?

- A** The tea leaves dissolve in water to make tea.
- B** The boiling water cannot pass through the filter paper.
- C** The tea is the filtrate and the tea leaves are the residue.
- D** The tea leaves are the filtrate and the tea is the residue.

A30 Which of the following diagrams represent an element?



A31 In the 18th century, a chemist named Henry Cavendish carried out an experiment which showed that hydrogen burns with the oxygen in the air to form water. Which statement(s) can be inferred from this observation alone?

- I Air is an element
- II Water is an element
- III Water is a compound
- IV Water is formed from the reaction between hydrogen and oxygen

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

A32 Which of the following shows an element, a compound and a mixture??

	element	compound	mixture
A	carbon monoxide	magnesium oxide	sugar solution
B	mercury	clay	sodium chloride
C	nitrogen	carbon dioxide	air
D	steel	mud	tin

A36 Which pair of elements react violently in water?

- A T and U
- B V and Y
- C W and Z
- D X and Y

A37 Which pair of elements have the same number of electron shells?

- A T and U
- B V and Y
- C W and Z
- D X and Y

A38 Which of the following is a chemical reaction between elements only?

- A magnesium + oxygen \rightarrow magnesium oxide
- B methane + oxygen \rightarrow carbon dioxide + water
- C oxygen + nitrogen monoxide \rightarrow nitrogen dioxide
- D potassium + water \rightarrow potassium hydroxide + hydrogen

A39 Which of the following substances is a compound?

- A C₆₀
- B HF
- C O₂
- D S₈

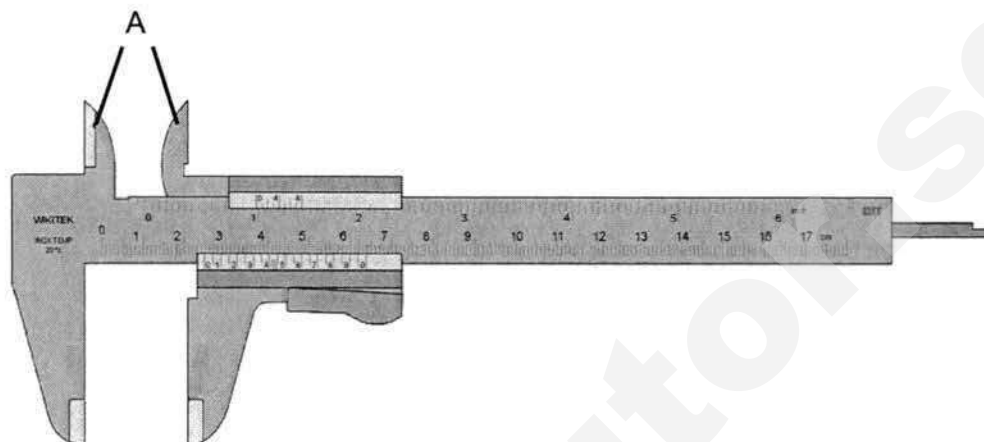
A40 Which of the following statements is **true**?

- A A compound has the properties of the elements it is made up of.
- B A compound can be formed by chemical processes such as combustion.
- C A compound can be broken down into simpler substances by physical methods.
- D A compound made up of two or more different elements with different composition by mass.

15

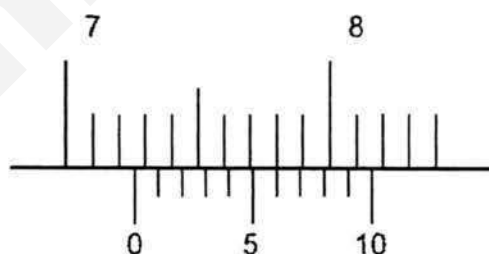
Section B: Short Answer Questions [40 marks]Answer **all** questions.

Write your answers in the spaces provided

B1 The diagram below shows a vernier caliper.**(a)** Name part A of the vernier caliper and state its function.

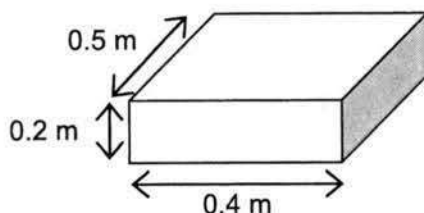
Name of part A: [1]

Function of part A: [1]

(b) State the reading of the vernier caliper below.

reading = cm [1]

- B2** The diagram below shows an object of dimension 0.5 m x 0.4 m x 0.2 m lying on the ground. Its weight is 10 kg. Taking gravitational field strength to be 10 N/kg,



- (a) Calculate the pressure exerted by the object on the ground.

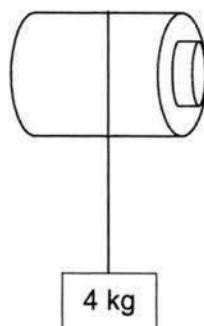
pressure = Pa [3]

- (b) The object is made to stand on the shaded area. State and explain how this affects the pressure of the box exerting on the ground.

.....
..... [2]

17

- B3** An electric motor is used to lift a box of mass 4 kg as shown in the diagram below. The box moves vertically up through a distance of 2 m in 5 s.



- (a) State the energy conversion in raising the box.

..... [1]

- (b) Calculate the average speed of the box.

average speed = m/s [1]

- (c) Calculate the work done in raising the box. (Take g to be 10 N/kg)

work done = J [2]

- (d) Determine the change in gravitational potential energy after it was raised 2m.

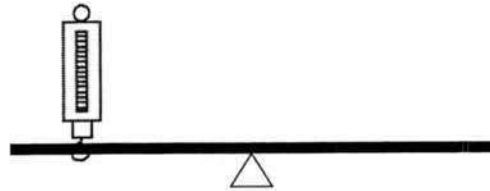
gravitational potential energy = J [1]

- (e) Determine the kinetic energy when it is stationary at the highest point.

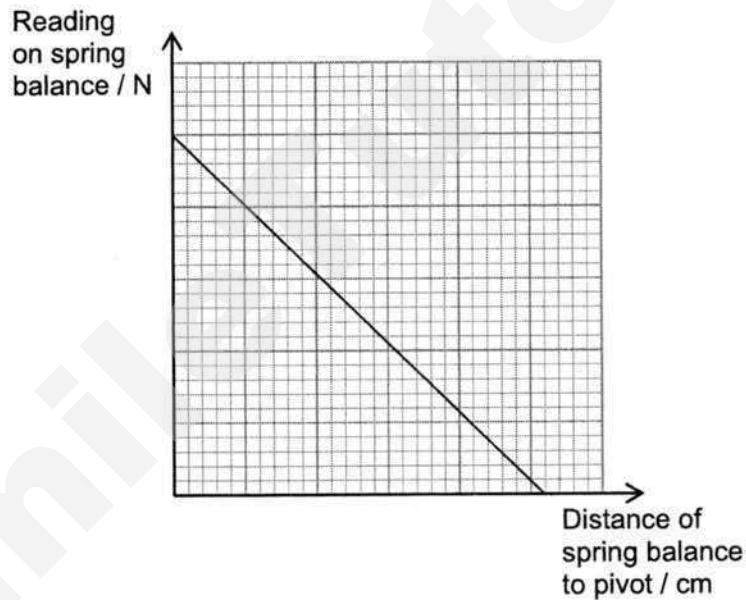
kinet

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- B4** A student carried out an experiment by balancing a light beam horizontally on a pivot using a spring balance as shown in the diagram below. The pivot was placed in the middle of the beam.



- (a) The student concluded his findings through the graph shown below and it proved that his hypothesis for the experiment was accurate.



State the student's hypothesis for the experiment.

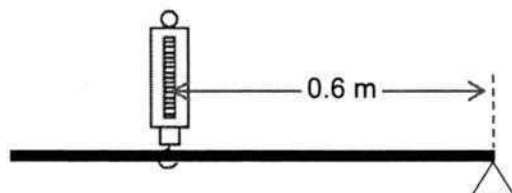
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[1]

19

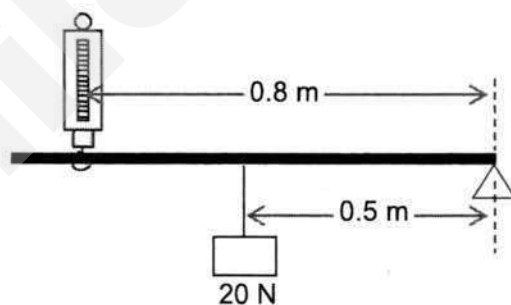
- (b) The arrangement was adjusted such that the spring balance was 0.6 m away from the pivot and it showed a reading of 7.5 N.



Calculate the moment produced by the spring balance about the pivot.

moment = Nm [2]

- (c) The student then positioned the spring balance 0.8 m away from the pivot and added a box in the middle of the beam as shown in the diagram below.

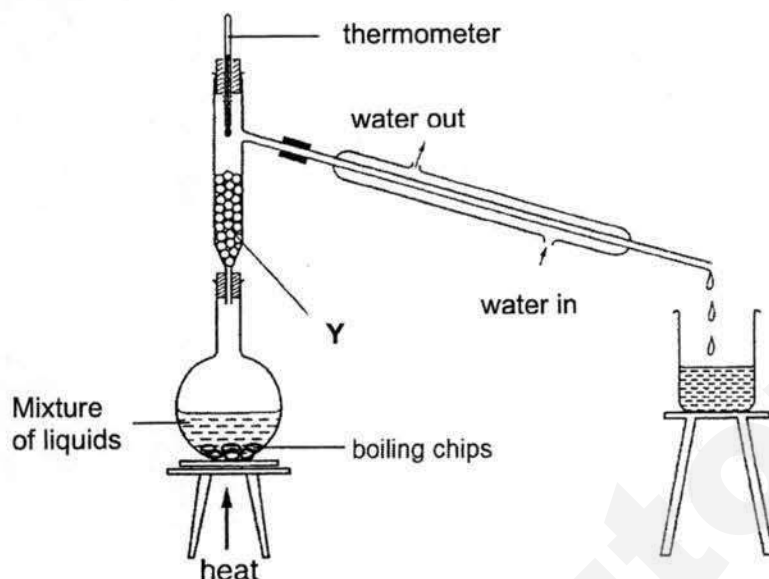


If the weight of the box is 20 N, calculate the new reading on the spring balance.

reading on spring

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- B5** Giselle used the experimental set up shown below to separate a mixture of three liquids, **P**, **Q** and **R**.



- (a) State the name of apparatus **Y**.

[1]

- (b) The boiling points of liquids **P**, **Q**, and **R** are 156 °C, 118 °C, and 79 °C respectively. State which distillate will be the **last** to be collected? Explain your answer.

[2]

- (c) What is the function of the boiling chips?

[1]

- (d) Can Giselle use the same experimental set-up to separate a mixture of oil and water? Explain your answer.

[2]

21

- B6** The table below shows the properties of five elements, **A**, **B**, **C**, **D**, and **E**. These letters do **not** represent their chemical symbols.

Element	Melting point (°C)	Boiling point (°C)	Density (g/cm ³)	Electrical conductivity	Reaction with water
A	– 39	630	13.5	good	No reaction
B	98	883	0.97	good	Reacts violently
C	– 189	– 186	0.0018	poor	No reaction
D	1085	2652	8.96	good	No reaction
E	– 101	– 34	0.0032	poor	Forms an acid

- (a) Which of the above five elements is most likely a Group I element. Support your answer with the information given in the table shown above.

.....

.....

.....

..... [3]

- (b) Rubidium is also a Group I element and it lies further down the group as compared to the element in part (a). How would you expect the melting point, density, and reactivity in water of rubidium to differ compared to the element in (a)?

.....

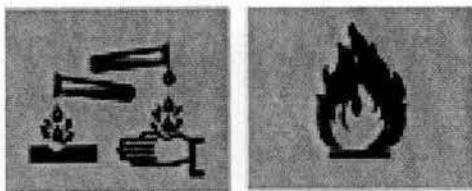
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..... [3]

- (c) State the identity of Element **A**.

..... [1]

- B7** Ethanoic acid is a colourless liquid with a pungent smell and has a chemical formula of $C_2H_4O_2$. A bottle of ethanoic acid has the two labels shown below.



- (a) State what the two labels represent.

[1]

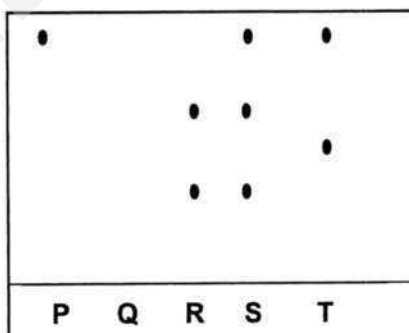
- (b) Based on the labels, state **two** precautions that should be taken when using this chemical.

[2]

- (c) State the number of atoms of each element present in a molecule of ethanoic acid.

[1]

- B8** A paper chromatography was performed on substances **P**, **Q**, **R**, **S** and **T** as shown.



- (a) Which substance is pure? Explain your answer.

[2]

- (b) Suggest an explanation for the results of substance **Q**.

Section C: Free Response / Structured Questions [20 marks]Answer **all** questions.

- C1** A large irregular-shaped object of volume 37.5 cm^3 has a density of 70 g/cm^3 . Taking gravitational field strength on Earth and on the Moon to be 10 N/kg and 1.6 N/kg respectively,

(a) Calculate the cuboid's,

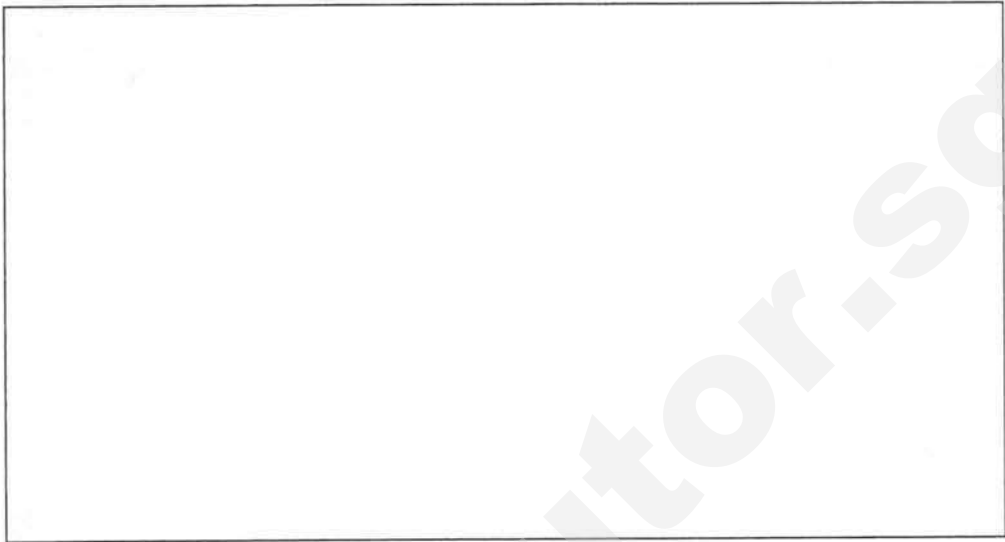
(i) mass on Earth,

mass = g [2]

(ii) weight on the Moon.

weight = N [2]

- (b) Describe, with the help of label and diagrams, the steps of an experiment to prove that the density of the large irregular-shaped object is 70 g/cm^3 . [6]



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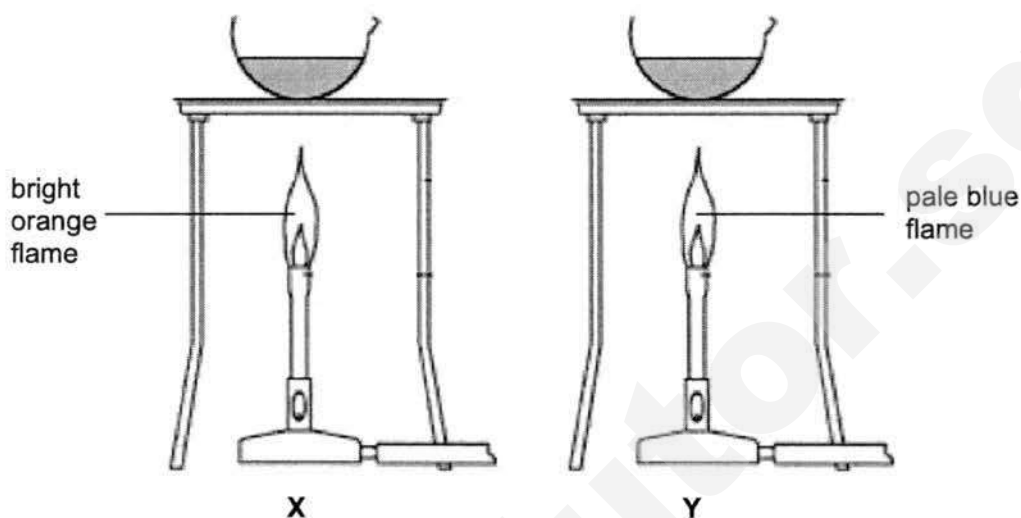
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- C2 (a)** In an experiment, Ethan was given a sample of a colourless liquid. He separated it into two equal portions and heated them over two different types of flame as shown below.



- (i) In which set-up, **X** or **Y**, would you expect the liquid to evaporate completely first? Explain your answer.

.....
..... [2]

- (ii) After all the liquid has evaporated completely, a residue of a white solid was left behind in both **X** and **Y**. State, with a reason, whether the colourless solution was an element, a mixture, or a compound.

.....
..... [2]

(b) Iron(III) chloride, FeCl_3 , is a reddish brown solid and is made up of the elements iron and chlorine. Steel is made up of the elements iron and carbon.

- (i) Explain why heat was given out when iron(III) chloride was formed but this does not happen when iron filings and chlorine gas are mixed.

.....

.....

.....

..... [2]

- (ii) Explain why some iron filings remained when the mixture of iron filings and chlorine gas was heated to form iron(III) chloride.

.....

.....

.....

..... [2]

- (iii) Explain why steel can be attracted by magnets but not iron(III) chloride.

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..... [2]

END OF PAPE

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DATA SHEET
The Periodic Table of the Elements

Group																											
I	II	Key										III	IV	V	VI	VII	0										
		<div>1 H hydrogen 1</div>																									
		<div>2 He helium 4</div>																									
		<div>3 Li lithium 7</div>																									
		<div>4 Be beryllium 9</div>																									
		<div>11 Na sodium 23</div>																									
		<div>12 Mg magnesium 24</div>																									
		<div>19 K potassium 39</div>																									
		<div>20 Ca calcium 40</div>																									
		<div>37 Rb rubidium 85</div>																									
		<div>38 Sr strontium 88</div>																									
		<div>55 Cs caesium 133</div>																									
		<div>56 Ba barium 137</div>																									
		<div>57 – 71 lanthanoids</div>																									
		<div>88 Ra radium</div>																									
		<div>89 – 103 actinoids</div>																									
		<div>87 Fr francium</div>																									
		<div>101 Md mendelevium</div>																									
		<div>102 No nobelium</div>																									
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The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

MANJUSRI SECONDARY SCHOOL

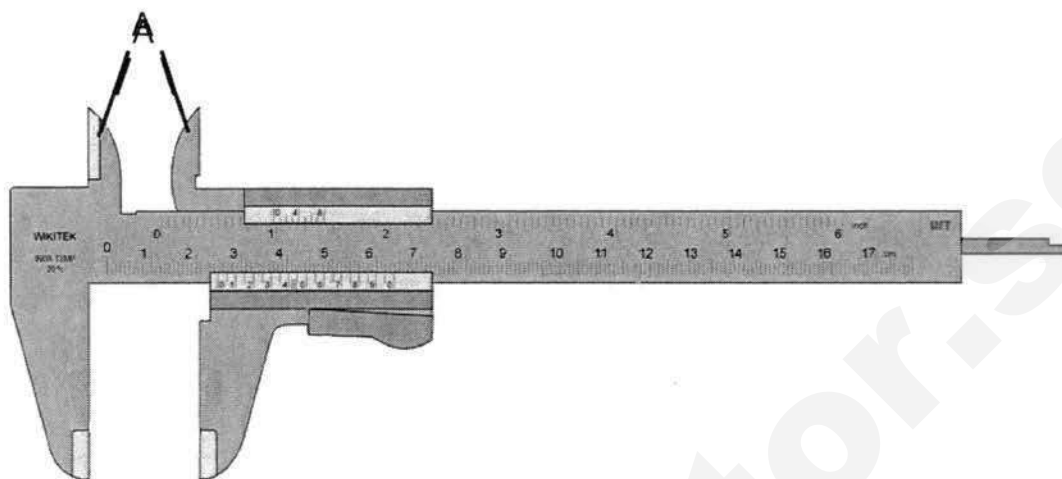
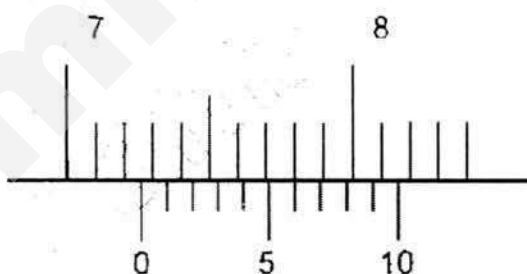
MID YEAR EXAMINATION 2017

Section A: Multiple Choice Question Answer

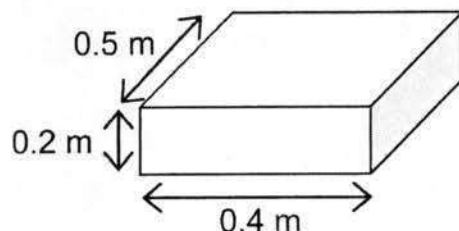
A1	B	A6	D	A11	B	A16	A
A2	D	A7	D	A12	B	A17	C
A3	C	A8	C	A13	B	A18	A
A4	A	A9	D	A14	C	A19	B
A5	A	A10	B	A15	A	A20	B

Section B: Short Answer Questions [40 marks]Answer **all** questions.

Write your answers in the spaces provided

B1 The diagram below shows a vernier caliper.**(a)** Name parts A and B of the vernier caliper and state their function.Name of part A: Inside jaws [1]Function of part A: To measure inner diameters [1]**(b)** State the reading of the vernier caliper below.Reading: 7.26 cm [1]

- B2** The diagram below shows an object of dimension 0.5 m x 0.4 m x 0.2 m lying on the ground. Its weight is 10 kg. Taking gravitational field strength to be 10 N/kg,



- (a) Calculate the pressure exerted by the object on the ground.

$$A = 0.4 \times 0.5$$

$$= 0.2 \text{ m}^2 \quad [1]$$

$$F = m \times g$$

$$= 10 \times 10$$

$$= 100 \text{ N} \quad [1]$$

$$P = F / A$$

$$= 100 / 0.2$$

$$= 500 \text{ N/m}^2 \quad [1]$$

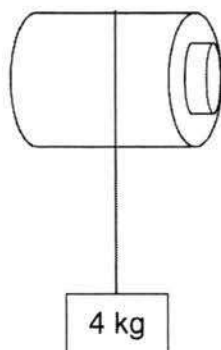
pressure = 500 Pa [3]

- (b) The object is made to stand on the shaded area. State and explain how this affects the pressure of the box exerting on the ground.

When it is standing, the **contact area is smaller** [1]. Hence its **pressure is**

Greater [1]. [2]

- B3** An electric motor is used to lift a box of mass 4 kg as shown in the diagram below. The box moves vertically up through a distance of 2 m in 5 s.



- (a) State the energy conversion in raising the box.

electrical energy to kinetic energy to gravitational potential energy [1]

- (b) Calculate the average speed of the box

$$\begin{aligned}\text{Speed} &= 2 \text{ m} / 5 \text{ s} \\ &= 0.4 \text{ m/s}\end{aligned}$$

average speed = 0.4 m/s [1]

- (c) Calculate the work done in raising the box. (Take g to be 10 N/kg)

$$\begin{aligned}F &= W = m \times g \\ &= 4 \times 10 \\ &= 40 \text{ N}\end{aligned} \quad [1]$$

$$\begin{aligned}Wd &= F \times d \\ &= 40 \times 2 \\ &= 80 \text{ J}\end{aligned} \quad [1]$$

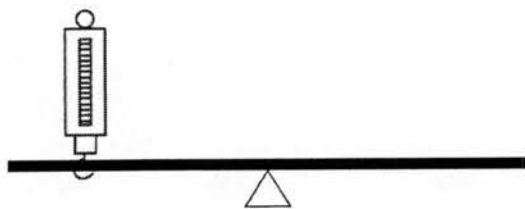
work done = 80 J [2]

- (d) Determine the change in gravitational potential energy after it was raised 2m.

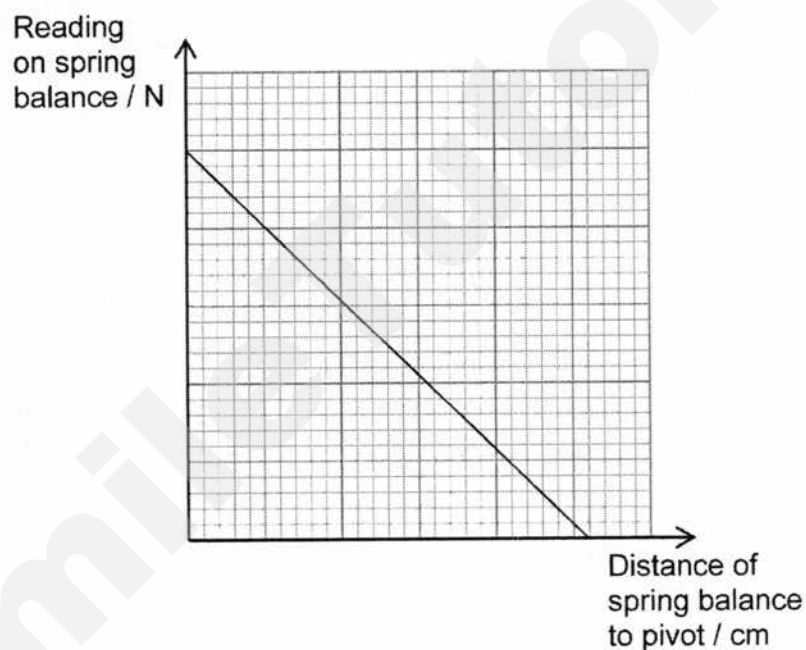
gravitational potential energy = 80 J [1]

- (e) Determine the kinetic energy when it is stationary at the highest point.

- B4** A student carried out an experiment by balancing a light beam horizontally on a pivot using a spring balance as shown in the diagram below. The pivot is placed in the middle of the beam.



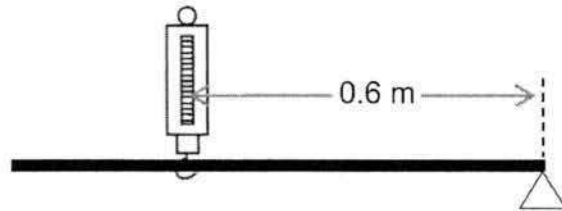
- (a) The student concluded his findings through the graph shown below and it proved that his hypothesis for the experiment was accurate.



State the student's hypothesis for the experiment.

The closer the spring balance is to the pivot, the more force is required to
balance the beam [1]

- (b) The arrangement was adjusted such that the spring balance was 0.6 m away from the pivot, and it showed a reading of 7.5 N.

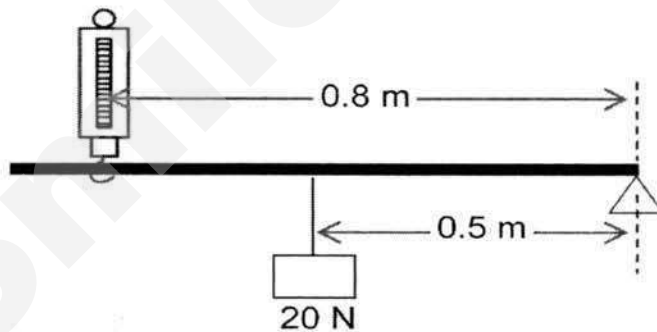


Calculate the moment produced by the spring balance about the pivot.

$$\begin{aligned} M &= F \times \text{perpendicular distance} \quad [1] \\ &= 7.5 \times 0.6 \\ &= 4.5 \text{ Nm} \quad [1] \end{aligned}$$

$$M_{\text{moment}} = \dots\dots\dots 4.5 \text{ Nm} \quad [2]$$

- (c) The student then positioned the spring balance 0.8 m away from the pivot and added a box in the middle of the beam as shown in the diagram below.



If the weight of the box is 20 N, calculate the new reading on the spring balance.

$$\text{ACWm} = \text{CWm} \quad [1]$$

$$20\text{N} \times 0.5\text{m} = F \times 0.8\text{m} \quad [1]$$

$$F = 12.5 \text{ N} \quad [1]$$

Section C: Free Response / Structured Questions [20 marks]Answer **all** questions.

- C1** A large irregular-shaped object of volume 37.5 cm^3 has a density of 70 g/cm^3 . Taking gravitational field strength on Earth and on the Moon to be 10 N/kg and 1.6 N/kg respectively,

(a) Calculate the cuboid's,

(i) mass on Earth,

$$\begin{aligned} \text{Mass} &= \text{Density} \times \text{volume} & [1] \\ &= 37.5 \times 70 \\ &= 2625 \text{ g} & [1] \end{aligned}$$

$$\text{mass} = \underline{\hspace{1cm} 2630 \hspace{1cm}} \text{ g} \quad [2]$$

(ii) weight on the Moon.

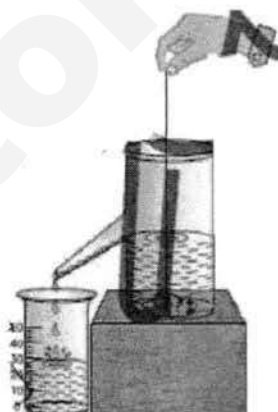
$$2625 \text{ g} = 2.625 \text{ kg} \quad [1]$$

$$\begin{aligned} W &= mg \\ &= 2.625 \times 1.6 \\ &= 4.2 \text{ N} & [1] \end{aligned}$$

$$\text{weight} = \underline{\hspace{1cm} 4.2 \hspace{1cm}} \text{ N} \quad [2]$$

- (b) Describe, with the help of label and diagrams, the steps of an experiment to prove that the density of the large irregular-shaped object is 70 g/cm^3 . [6]

1. Use a beam balance to measure the mass of the object. [1]
 2. Fill up the displacement can until water overflows from its spout. Wait till the water stop flowing out from the spout [1]
 3. Tie the object with a string, and gently lower the object into the displacement can. [1]
 4. The volume of water collected in the measuring cylinder, is the volume of the irregular shaped object. [1]
 5. $\text{Density} = \text{mass} / \text{volume}$ [1]
- Diagram and label [1]



END OF PAPER



NEW TOWN SECONDARY SCHOOL
Mid-Year Examination
Secondary 1 Express

NAME

CLASS

INDEX
NUMBER

Lower Sec Science
Part 2 (Biology)

8 May 2017

0900-1030

1 hour 30 minutes

(For Parts 1 and 2)

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class in the spaces provided above.

Write in dark blue or black pen.

DO NOT use staples, highlighters, glue or correction fluid/tape.

Answer **both** Part 1 and Part 2.

Section A (10 marks)

Each question consists of four possible answers. Select the **most** appropriate answer and record its alphabet in the space provided on page 6.

Each correct answer will be awarded 1 mark. No marks will be deducted for incorrect answers.

Section B (30 marks)

Answer all questions in the spaces provided.

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

For Examiner's Use	
Section A	
Section B	
Total for Part 2	

This document consists of 1.

Setter: Mdm S.Valli

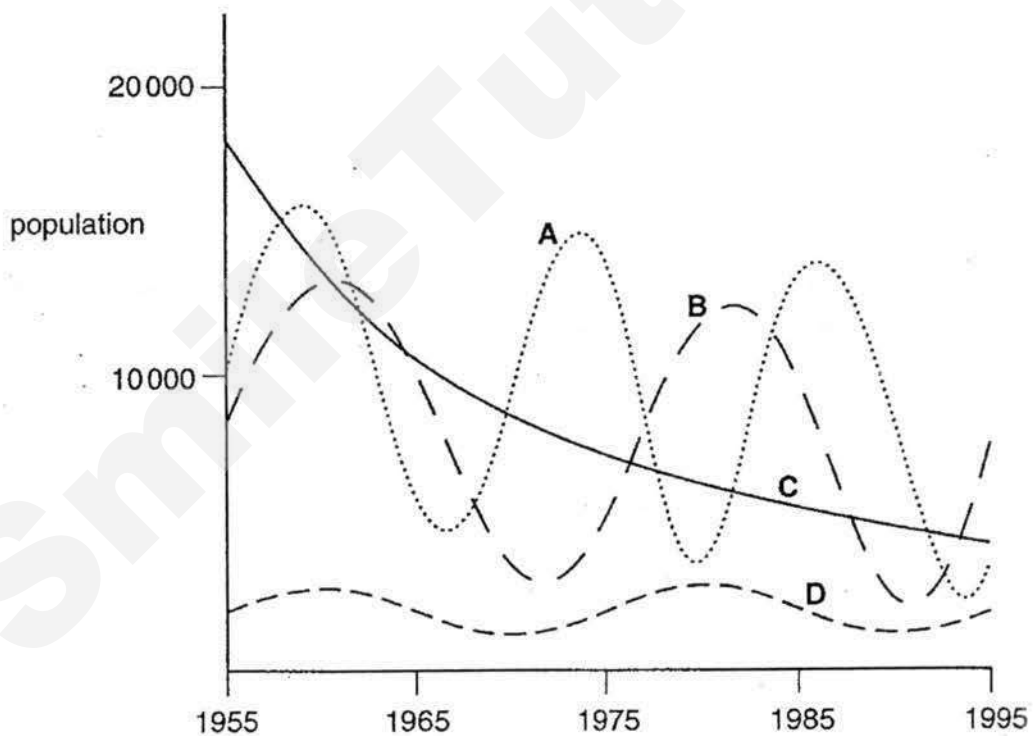
Section A (10 marks)

Select the **most** appropriate answer and record its alphabet in the space provided on page 6.

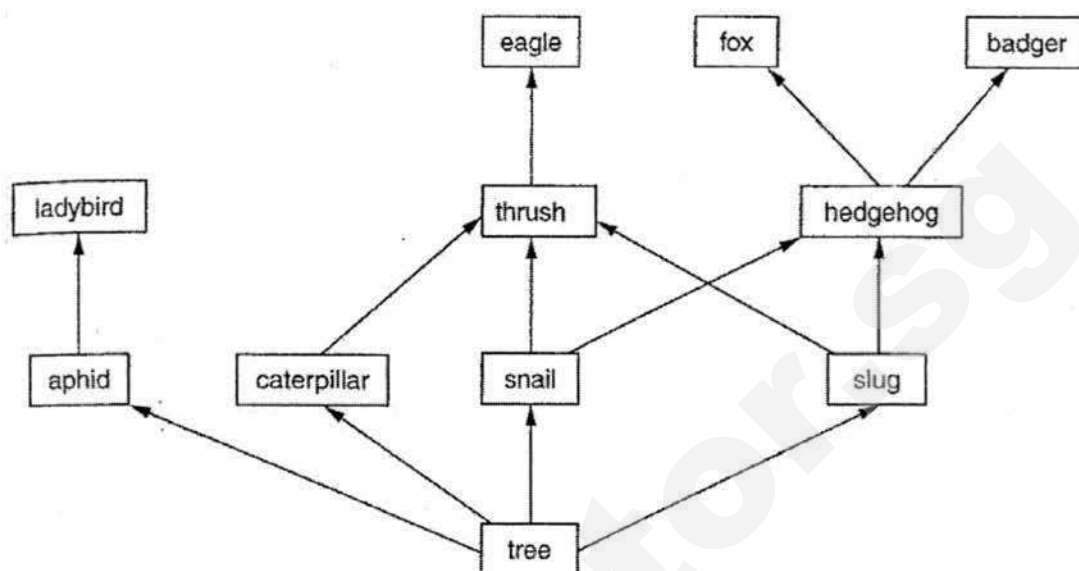
- 1 Which of the following represents an adaptation of a mangrove plant to oxygen-deficient soil?
 - A They photosynthesise at low tide.
 - B They secrete salt through the leaves.
 - C They have needle like leaves.
 - D They have **aerial** roots that stick out of the soil.

- 2 The population sizes of four different species of insect were monitored over a period of 40 years. The results are shown on the graph below.

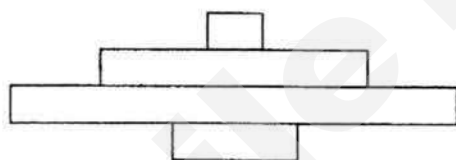
Which species is in the greatest danger of extinction?



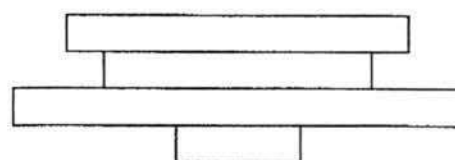
3 The diagram shows part of a food web.



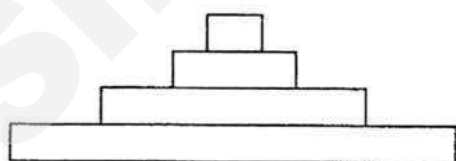
Which is a **pyramid of energy** based on this food web?



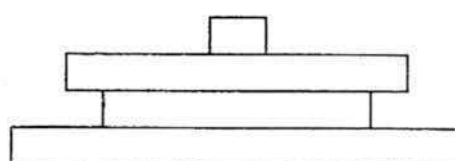
A



B



C



D

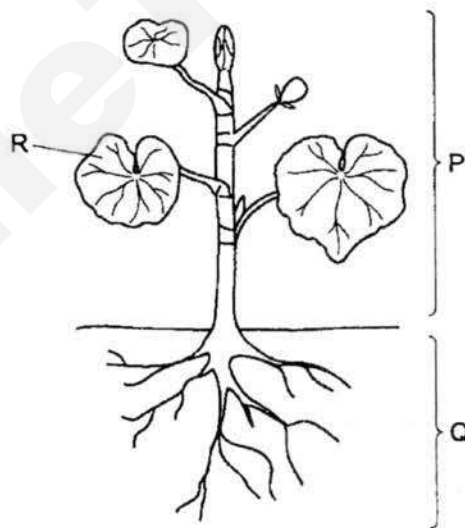
4 Humans affect the environment in the following ways.

1. felling of the tropical forest
2. harvesting of marine algae
3. reforestation
4. combustion of fuel
5. overuse of nitrate fertilizer

Which human activities lead to an increase in the level of carbon dioxide in the Earth's atmosphere?

- A** 1, 2 and 3
B 1, 2 and 4
C 2, 3 and 4
D 2, 3 and 5

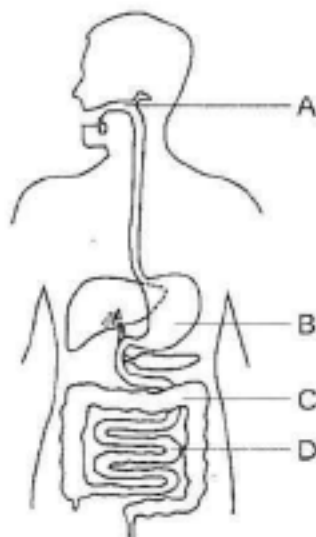
5 The diagram shows a flowering plant



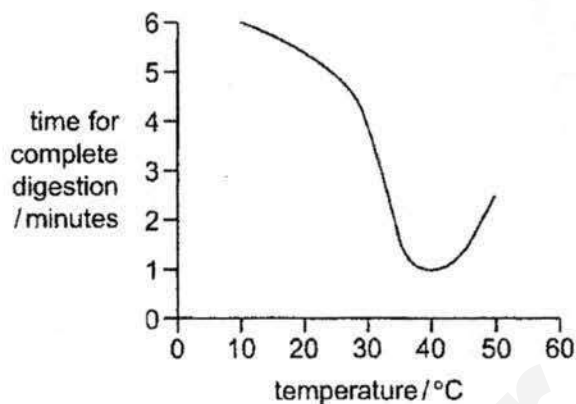
Which correctly identifies P, Q and R?

	P	Q	R
A	organ	organ	tissue
B	organ	organ system	organ
C	organ system	organ	tissue
D	organ system	organ system	organ

- 6 Which of the following represents the overall magnification of a microscope that has an eyepiece magnification of 10X and an objective magnification of 40X?
- A 10X
B 40X
C 400X
D 1000X
- 7 Which of the following is **true** for both **xylem** vessel and **red** blood cells?
- A large surface area to volume ratio
B no nucleus
C no cytoplasm
D thickened cell wall
- 8 Which chemical element forms part of **all** protein molecules?
- A calcium
B iron
C magnesium
D nitrogen
- 9 The diagram shows the human alimentary canal. In which part do **simpler food substances enter the blood stream**?



- 10 The graph shows the effect of temperature on the time taken for the complete digestion of starch.



At which temperature is the rate of digestion of starch the greatest?

- A 10 °C
- B 30 °C
- C 40 °C
- D 50 °C

Answers for Section A

1	2	3	4	5	6	7	8	9	10

Section B (30 marks)

Answer all questions in the spaces provided.

- 11 Identify the different types of dinosaurs shown by using the dichotomous key given in Fig. 11.1. [4]

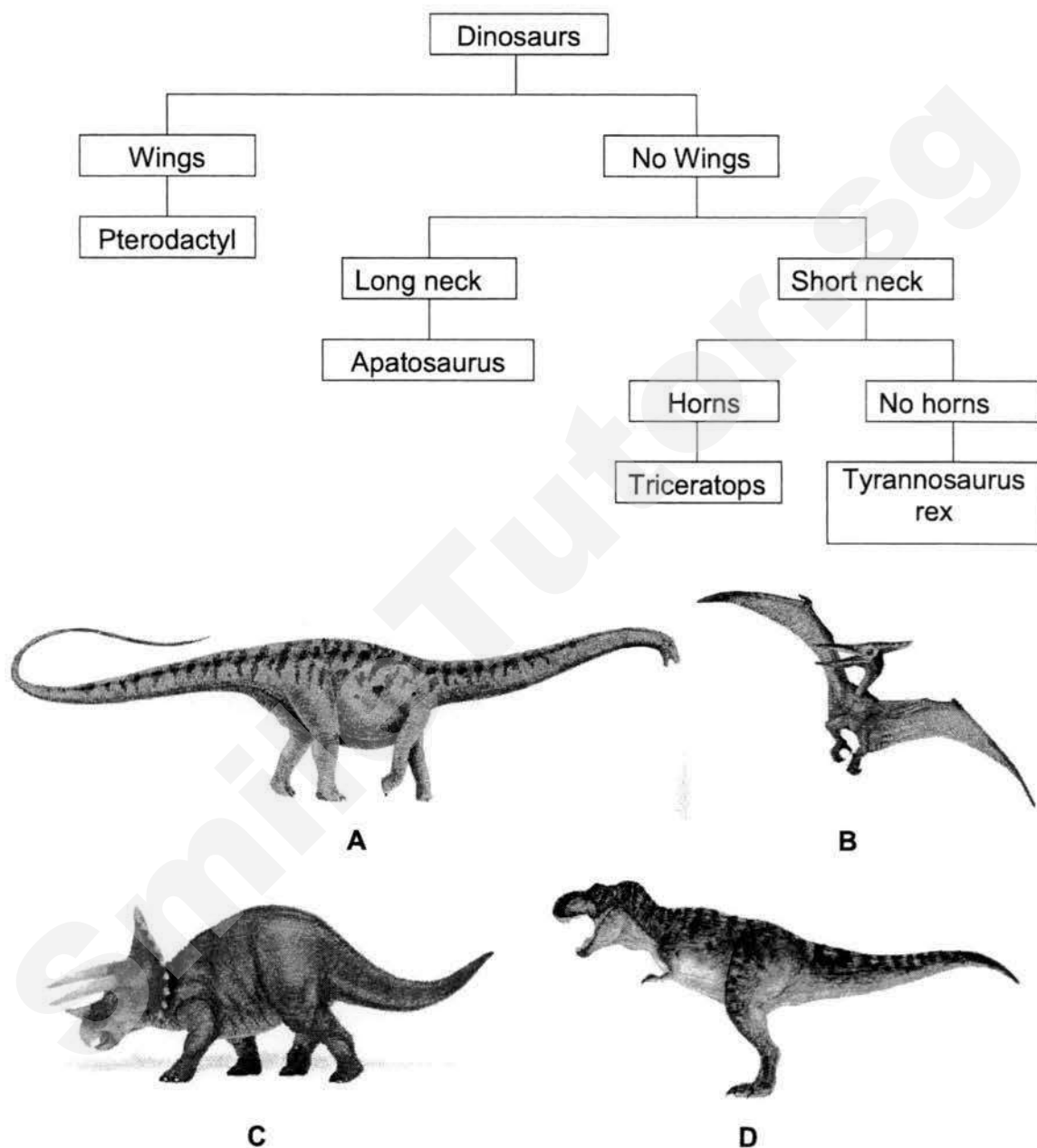


Fig. 11.1

A is B is

C is D is

12 Fig. 12.1 shows the energy flow in kilojoules (kJ) through a food chain.

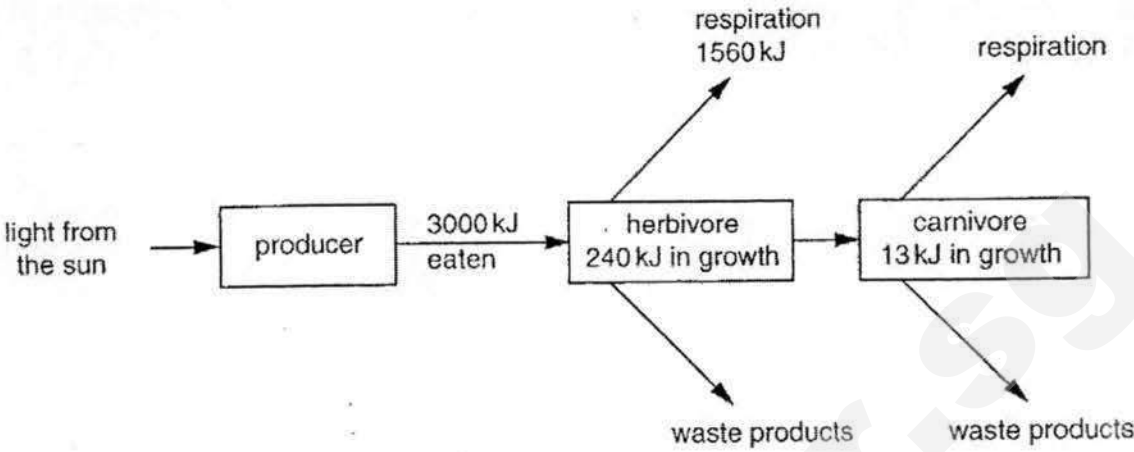


Fig. 8.1

(a) (i) How much energy is lost from the food chain as waste products from the herbivores? [1]

.....

(ii) Calculate the percentage of the energy taken in by the herbivore that is used in growth. [1]

(b) State the importance of chloroplasts in the food chain. [2]

.....
.....

(c) Suggest why this food chain could not have another trophic level. [2]

.....
.....
.....

13 Fig. 13.1 shows some muscle cells.

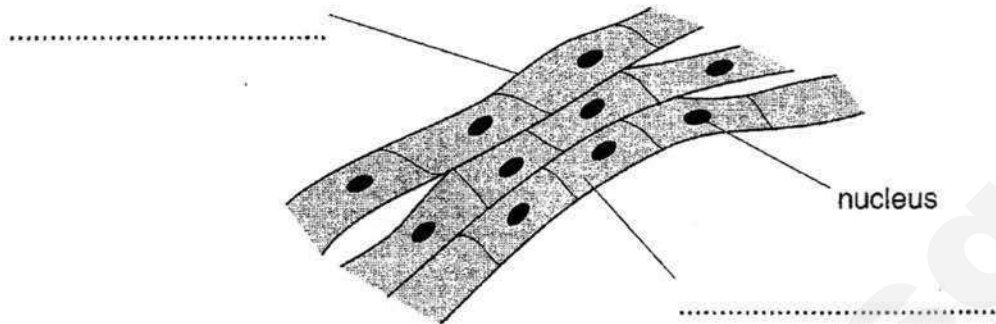


Fig. 13.1

- (a) Complete the labels in Fig. 13.1. [2]
- (b) Describe **two** ways Fig. 13.1 shows that these are animal cells and not plant cells. [2]

.....

.....

.....

.....

- (c) What does a group of muscle cells form? [1]

.....

14 Some cells are specialised to carry out specific functions.

Fig. 14.1 shows a specialised plant cell.

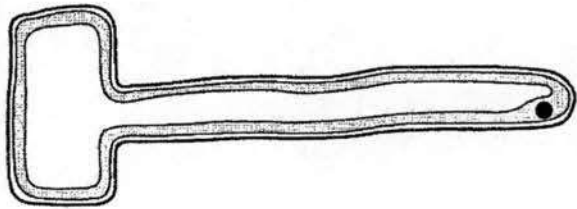


Fig. 14.1

(a) Name the cell shown in Fig. 14.1. [1]

.....

(b) What is the function of the cell shown in Fig. 14.1? [1]

.....

(c) Explain how the structure of cell shown in Fig. 14.1 is related to its function. [2]

.....

.....

15 Fig. 15.1 shows part of the alimentary canal.

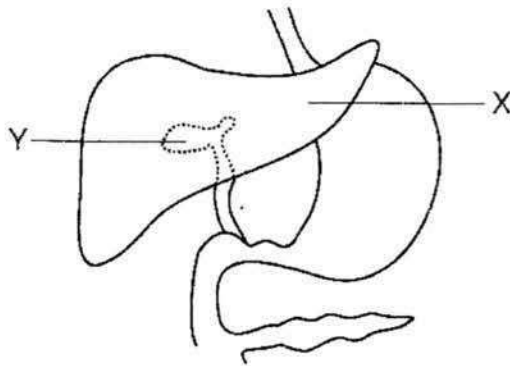


Fig. 15.1

(a) Name organs X and Y.

[2]

X

Y

(b) Describe briefly how organs X and Y increase the efficiency of digestion in the human alimentary canal.

[3]

.....

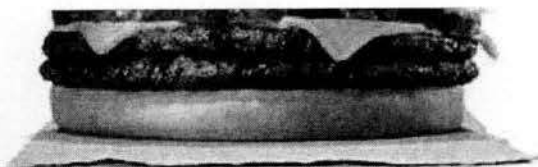
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16



for lunch.

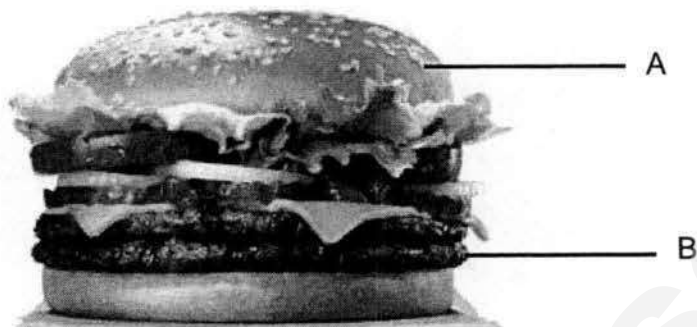


Fig. 16.1

- (a) Complete the table below to show the name and nutrient content of the food components of the burger shown in Fig. 16.1. [2]

food component of the burger	put a tick to show the main type of nutrient(s) present
A	<input type="checkbox"/> carbohydrates <input type="checkbox"/> proteins <input type="checkbox"/> fats
B	<input type="checkbox"/> carbohydrates <input type="checkbox"/> proteins <input type="checkbox"/> fats

- (b) Describe how the food component A and B will be digested in the alimentary canal. [4]

.....

.....

.....

.....

.....

.....

Section A

1	2	3	4	5	6	7	8	9	10
D	C	C	B	D	C	B	D	D	C

Section B

		<u>Marks</u>
11	A: Apatosaurus B: Pterodactyl C: Triceratops D: Tyrannasaurus	[1] [1] [1] [1]
12	(a)i 3000 – 1560 – 240 = 1200 kJ (working must be shown)	[1]
	(a)ii $240/3000 \times 100\% = 8\%$ (working must be shown)	[1]
	(b) the presence of chloroplasts enable green plants to photosynthesise and produce their own food; other organisms feed on plants directly or indirectly and get their energy;	[1] [1]
	(c) energy is lost at every trophic level and only a small amount / fraction of energy is passed on to the next trophic level; the amount of energy in the carnivore is too low to be passed on to another organism to sustain it;	[1] [1]
13	(a) Cell membrane; Cytoplasm:	[1] [1]
	(b) Absence of cell wall; Absence of chloroplasts; Absence of large central vacuole; (any two points)	[1] [1] [1] Max=[2]
	(c) muscle tissue	[1]
14	(a) root hair cell	[1]
	(b) absorb water and mineral salts from the soil	[1]
	(c) elongated structure / long protrusion; Increase surface area to volume ratio to increase rate / efficiency of absorption;	[1] ...

- 15 (a) X: liver [1]
Y: gall bladder [1]
- (b) liver produces bile; [1]
gall bladder stores bile; [1]
bile is released into small intestine to emulsify fats which increases the surface area of fats for digestion by enzymes / lipase; [1]
- 16 (a)
- | | | |
|----------------|---------------|-----|
| A: bread / bun | Carbohydrates | [1] |
| B: meat patty | Proteins | [1] |
- (b) carbohydrates partially digested in mouth by amylase into maltose; [1]
maltose is completely digested in the small intestine by maltase into glucose; [1]
proteins are partially digested in the stomach by protease into polypeptides; [1]
polypeptides are completely digested in the small intestine by protease into amino acids; [1]



NEW TOWN SECONDARY SCHOOL
Mid-Year Examination
Secondary 1 Express

NAME

CLASS

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INDEX
NUMBER

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Lower Sec Science
Part 1 (Chemistry)

8 May 2017

0900-1030

1 hour 30 minutes
(For Parts 1 and 2)

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class in the spaces provided above.

Write in dark blue or black pen.

DO NOT use staples, highlighters, glue or correction fluid/tape.

Answer **both** Part 1 and Part 2.

Section A (10 marks)

Each question consists of four options. Choose the best option for each question and write your answer in the **table provided on page 4**.

Each correct answer will be awarded 1 mark. No marks will be deducted for incorrect answers.

Section B (20 marks)

Answer all questions in the spaces provided.

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

A copy of The Periodic Table is provided on page 9.

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

For Examiner's Use	
Section A	
Section B	
Total for Part 1	

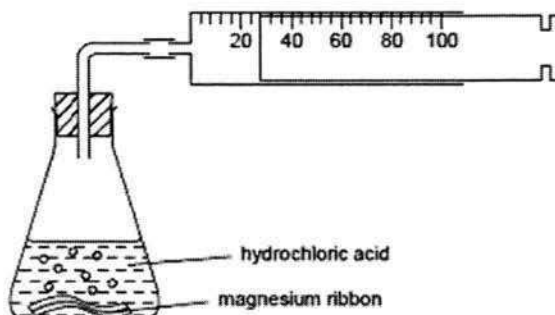
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Setter: Mr Mohamad Khirsyaban

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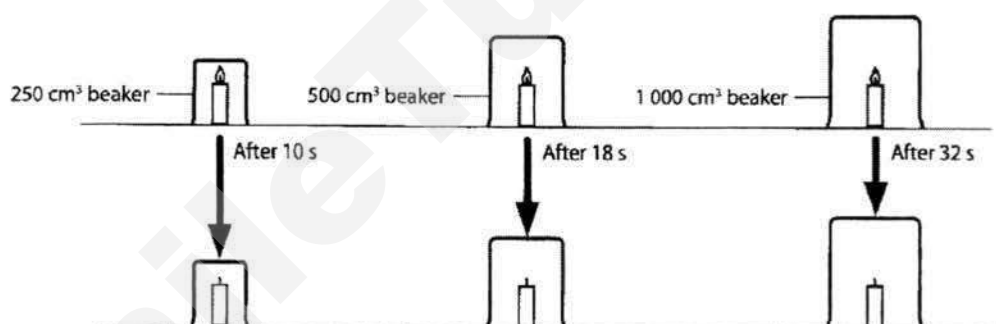
Section A: Multiple Choice Questions (10 marks)

- 1 A magnesium ribbon is dropped into hydrochloric acid and the gas produced is collected as shown in the diagram below.



Which statement is **not** an observation made during the experiment?

- A The magnesium ribbon became smaller.
 - B Hydrogen gas is produced.
 - C Bubbles are produced.
 - D 28 cm^3 of gas is produced.
- 2 Kelly performed an experiment as shown in the diagram below.



Which hypothesis could Kelly be testing?

- A More oxygen leads to a candle burning longer.
 - B The bigger the candle, the longer it burns.
 - C A candle stops burning when all the oxygen has been used up.
 - D The bigger the beaker, the hotter the temperature of the flame.
- 3 Leonard saw a colourless chemical labelled with the symbol shown below.



What special precaution should he take to when using this chemical?

- A He should heat the liquid before using it.
- B He should wear safety goggles when heating the liquid.
- C He should use a water bath to heat the liquid.
- D He should wear gloves when handling the liquid.

- 4 Hip joint implants are inserted into patients who have damaged or fractured their hips. These implants, which used to be made of stainless steel, are now manufactured using titanium alloys.

The table below compares the properties of stainless steel and titanium alloys.

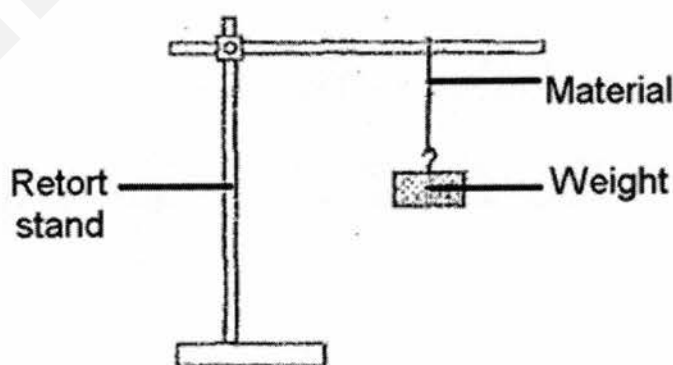
Properties	Stainless steel	Titanium alloy
strength	high	high
density	high	low
resistance to corrosion	high	high
thermal expansion	high	low
cost	low	high
magnetism	low	low

Based on the information, suggest why titanium alloys are used to make hip implants instead of stainless steel.

- A The hip implants are heavier.
 B The hip implants are more expensive to manufacture.
 C The hip implants do not rust or corrode after a long time.
 D The hip implants do not change lengths at different temperatures.
- 5 Which of these materials is correctly classified?

	Material	Classification
A	wood	ceramic
B	cotton	fibre
C	diamond	metal
D	steel	plastic

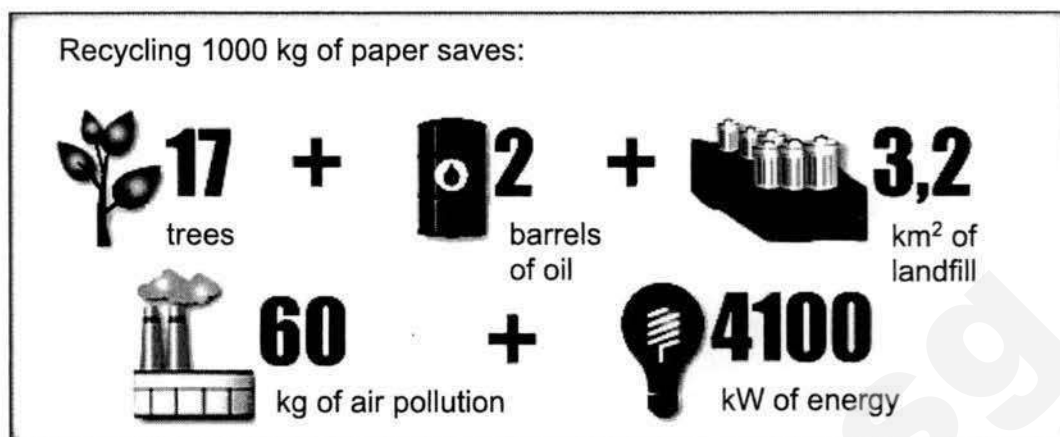
- 6 Tony set up the apparatus shown below to test the physical property of a material. He recorded the maximum weight he could attach to the material before it breaks.



Which physical property is he investigating?

- A Strength
 B Hardness
 C Flexibility
 D Malleability

- 7 The diagram below shows some information about recycling paper.



Based on the diagram above, which of the statements below is **not** true about recycling paper?

- A Recycling paper results in fewer forests being cleared.
- B Recycling paper reduces waste.
- C Recycling paper protects the environment.
- D Recycling paper uses up energy.

- 8 Which statement is true about compounds?

- A They are colourless solutions.
- B They can be separated by physical methods.
- C They have fixed proportion of elements.
- D They become a gas at 100 °C.

- 9 Which of the following is **not** true about a suspension?

- A It is a mixture.
- B It has the same colour throughout.
- C It contains both solid and liquid particles.
- D It is formed when substances cannot dissolve.

- 10 What is the chemical symbol for potassium?

- A K
- B Km
- C P
- D Po

Answers for Section A

Question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Answer										

Section B: Structured Questions (20 marks)

11 The table below shows physical properties of some substances.

substance	appearance	electrical conductivity	melting point
A	shiny	good	high
B	dull	poor	low
C	transparent	poor	high
D	dull	only conducts when it is a liquid but not solid	high
E	shiny	good	low

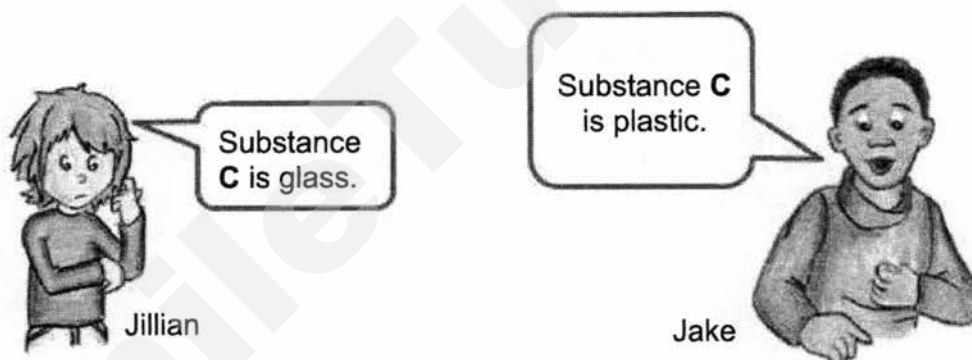
- (a) Which substance in the table above should be used to make wires? Provide reasons for your answer.

.....

.....

..... [2]

- (b) Study the cartoon below carefully.



Suggest a physical property that is missing from the table that might help Jake and Jillian with the identity of substance C. Describe how this property differs for glass and plastic.

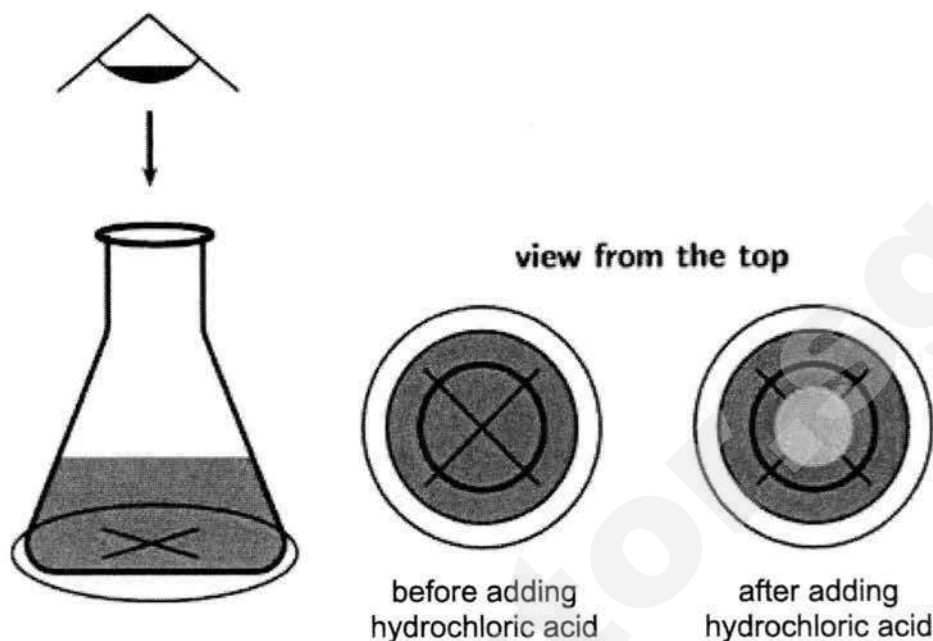
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.....

..... [2]

Total: [4 marks]

- 12 Steffi added 25 cm^3 of sodium thiosulfate solution into a conical flask, placed on top of a black cross, as shown below. She then added 10 cm^3 of hydrochloric acid into the conical flask and found that the cross could not be seen after some time.



- (a) Draw and name the apparatus Steffi should use to measure the volume of sodium thiosulfate and hydrochloric acid.



Name of apparatus: [2]

- (b) Steffi wrote this observation in her book.

"After addition of hydrochloric acid, a suspension is formed."

Using information from the diagram, state whether her observation is correct. Explain your answer.

.....

.....

.....

- (c) Steffi wants to investigate whether a higher temperature affects how fast the cross disappears.

i. State the independent and dependent variable of this investigation.

independent variable:

dependent variable: [2]

ii. List two variables that she should keep constant for this experiment.

.....

..... [2]

iii. Should Steffi open or close the air-hole of the Bunsen burner when heating the conical flask? Explain your answer.

.....

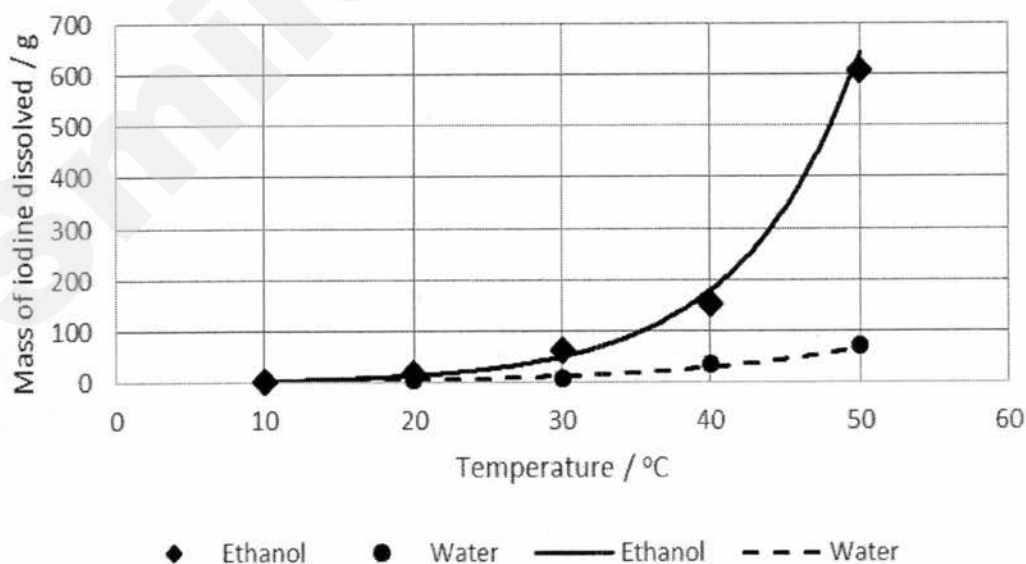
.....

..... [2]

Total: [10 marks]

- 13 The graph below shows the mass of iodine that can dissolve in 1000 cm³ of water and ethanol at different temperatures.

Solubility of iodine



- (a) What are the two factors affecting solubility shown in the graph above?

.....

..... [2]

(b) The solute in this experiment is an element.

i. Identify the solute in the experiment above.

..... [1]

ii. Explain what is meant by the term *element*.

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

(c) Martina spilled some brown iodine solution onto her dress. She soaked her dress in hot water but is unable to remove the stain.

Using information from the graph, suggest what she can do to remove the iodine stain. Explain your answer.

.....
.....
.....
..... [2]

Total: [6 marks]

The Periodic Table of Elements

Group																	
I	II	1 H hydrogen 1										III	IV	V	VI	VII	0
		<div>Key</div> <div>proton (atomic) number atomic symbol name relative atomic mass</div>															
3 Li lithium 7	4 Be beryllium 9																
11 Na sodium 23	12 Mg magnesium 24																
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 -
87 Fr francium -	88 Ra radium -	89 – 103 actinoids		104 Rf rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	114 Fl flerovium -		116 Lv livermorium -		-

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

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

PART 1: CHEMISTRY
ANSWER SCHEME

SECTION A

Question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Answer	B	A	C	D	B	A	D	C	B	A

SECTION B

11(a)	Substance A It is a good electrical conductor and has high melting point . [State both reasons for 1 m]	1 1
11(b)	Flexibility Glass is not flexible while plastic is flexible. [Accept other plausible answers]	1 1
12(a)	Measuring cylinder (Drawing of measuring cylinder)	1 1
12(b)	Yes her observation is correct. A suspension is formed since the cross cannot be seen after hydrochloric acid has been added. This shows that the mixture is opaque / there are solid particles / particles covering the cross , characteristic of a suspension.	1 1
12(c)i	Independent variable: Temperature of mixture Dependent variable: Time taken for cross to disappear	1 1
12(c)ii	Volume of hydrochloric acid / Volume of sodium thiosulfate / Size of cross [Any two variables]	2
12(c)iii	She should open the air-hole . This will allow her to get a non-luminous flame which is hotter.	1 1
13(a)	Temperature Nature of solvent	1 1
13(b)i	Iodine	1
13(b)ii	A pure substance that cannot be broken down in any simpler substance by chemical means .	1
13(c)	She should soak the dress in ethanol . Ethanol can dissolve more iodine than water at the same temperature.	1 1

Name: ()

Class:

ASSUMPTION ENGLISH SCHOOL END OF YEAR EXAMINATION 2017

LOWER SECONDARY SCIENCE BOOKLET A



ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL
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ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL

LEVEL: Sec 1 Express

DATE: 12 October 2017

CLASSES: Sec 1/1, 1/2

DURATION: 2 hours
(For Booklets A and B)

Additional Materials provided: 1 sheet of OAS paper

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your NAME, INDEX NUMBER and CLASS at the top of this page and on the OAS paper. **Shade your index number on the OAS paper.**

This paper consists of three sections.

Booklet A: Section A - Multiple Choice Questions

Booklet B: Section B - Short Structured Questions

Section C - Long Structured Questions

SECTION A (30 marks)

Multiple Choice Questions

There are thirty questions in this section. Answer **all** questions. For each question, there are four possible answers **A, B, C** and **D**. **Choose the correct answer and record your choice in soft or 2B pencil on the OAS paper provided. DO NOT fold or bend the OAS paper.**

At the end of the examination, hand in your OAS paper, Booklets **A** and **B** separately.

This Question Paper consists of 13 prints

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Section A: Multiple Choice Questions (30 marks)

There are **thirty** 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 on the OAS paper in soft pencil.

- 1 In 2006, a former Russian spy was hospitalized and died three weeks later. Autopsy of his body revealed that he had died due to radioactive poisoning.

Which symbol did he most likely ignore during one of his missions?

A



B



C



D



- 2 Which part of the Bunsen burner is responsible for controlling the type of flame produced?

- A barrel
- B collar
- C gas tap
- D rubber tubing

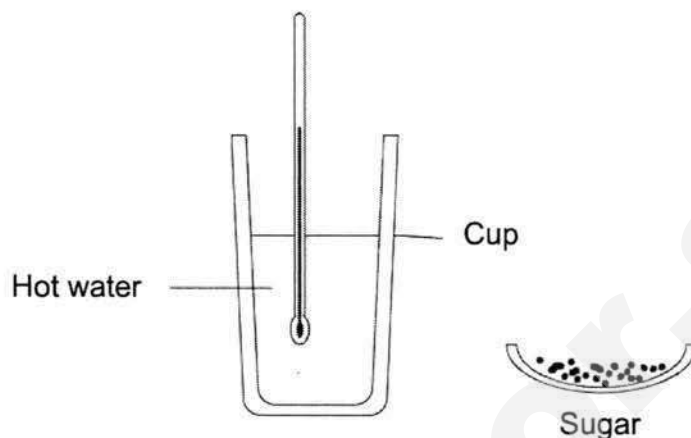
- 3 Drills operated in mining fields are used to remove rock formation blocking access to the valuable ores beneath. The intense drilling also generates high amount of frictional heat.

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

- A hardness, electrical conductivity, boiling point
- B hardness, strength, melting point
- C strength, electrical conductivity, thermal conductivity
- D strength, melting point, transparency

3

- 4 Mr Ng would like to perform an experiment to demonstrate how different temperatures affect the rate of dissolving sugar in water. He had to leave the hot water aside for 20 minutes while attending to questions from his pupils.

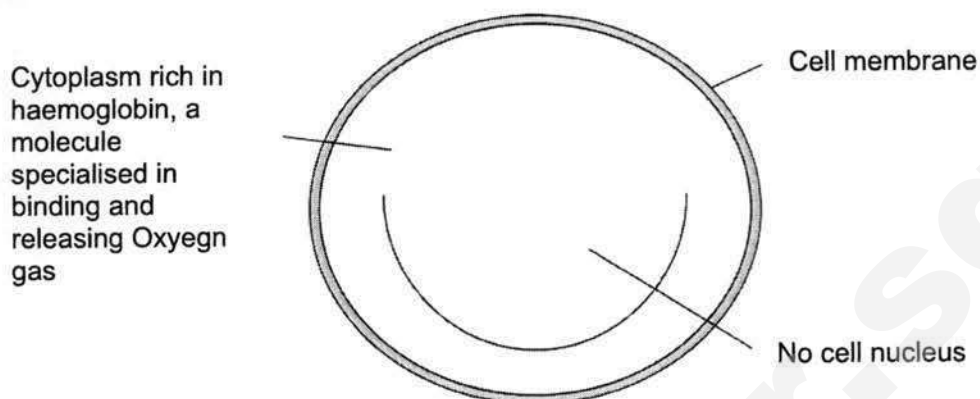


Which of following cup should he choose to contain the hot water considering its physical property?

	material	physical property
A	styrofoam	heat insulator
B	iron	high melting point
C	copper	heat conductor
D	plastic	low melting point

- 5 Which mixture can be separated using magnetic attraction?
- A a mixture of salt and sesame seed
 - B a solution of chlorophyll in water
 - C colour pigments found within an ink
 - D plastic waste containing bits of steel
- 6 Which cell structure prevents a plant cell from bursting when soaked in pure water?
- A cell membrane
 - B cell wall
 - C chloroplasts
 - D nucleus

- 7 Given below is the complete structure of a red blood cell.



Which of the following cellular activity cannot be performed by a red blood cell?

- A allow chemical reaction to take place within it
 - B carry oxygen gas
 - C control substance entering and leaving the cell
 - D repair any damage done to red blood cell effectively
- 8 Arrange the following body structure in the order of increasing complexity.
- I. red muscle tissue
 - II. muscle cells
 - III. circulatory system
 - IV. heart
- A I, II, III, IV
 - B I, IV, II, III
 - C II, I, IV, III
 - D II, III, I, IV
- 9 Which is the correct explanation as to why a plant wilts?

- A Osmosis stops as the root hairs have low concentration of water.
- B The cell wall of the leaves is broken down so the cell sap escapes.
- C The roots are absorbing less water than the leaves are losing water.
- D The roots stop absorbing water and the leaves stop losing water.

10 In a plant, water travels through the in a / an direction.

A phloem; upward

B phloem; downward

C xylem; upward

D xylem; downward

11 The diagram shows a specialized cell from a plant.



For which function is the cell modified?

A absorption of water

B fertilisation

C transport of food

D transport of oxygen

12 The rate of photosynthesis is dependent on certain conditions. Which of the following would reduce the rate?

A an increase in atmospheric carbon dioxide content

B an increase in mass of cloud covering the sky

C an increase in amount of water

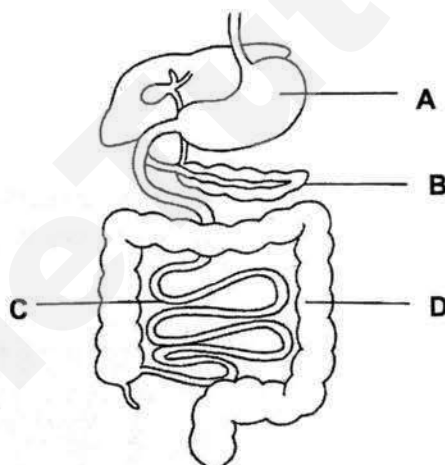
D an increase in the sunlight level

13 Which statement(s) are correct descriptions of the oesophagus?

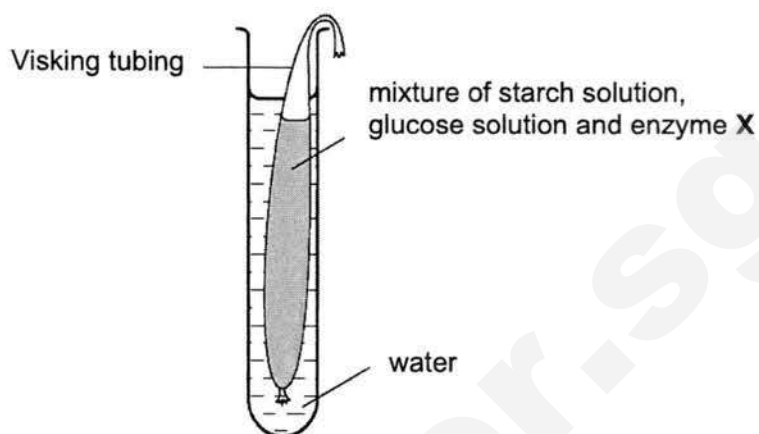
- 1 Digestive enzymes are present in the oesophagus.
- 2 Food moves along the oesophagus by peristalsis.
- 3 There is some digestion of food in the oesophagus.
- 4 There is no digestion of food in the oesophagus.

- A** 1 and 2 only
B 2 and 4 only
C 1, 2 and 4 only
D 1, 2 and 3 only

14 The diagram below shows a section of the human digestive system.
In which structure does the absorption of most food molecules occur?

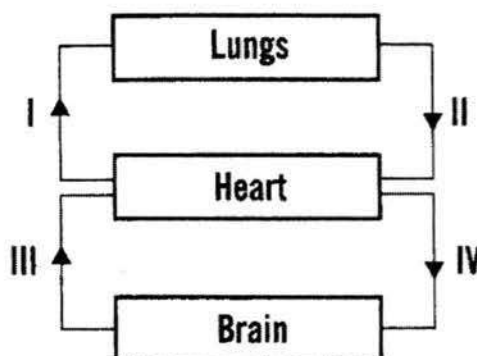


- 15 The diagram shows an experimental set-up to investigate the effect of enzyme **X** on digestion.



After one hour, a few drops of iodine solution were added to the solution in the Visking tubing. The iodine solution remained brown. Which is enzyme **X**?

- A amylase
 - B lipase
 - C maltase
 - D protease
- 16 The diagram below shows the simplified human circulatory system.



Which blood vessels carry deoxygenated blood?

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

17 Which statements are true?

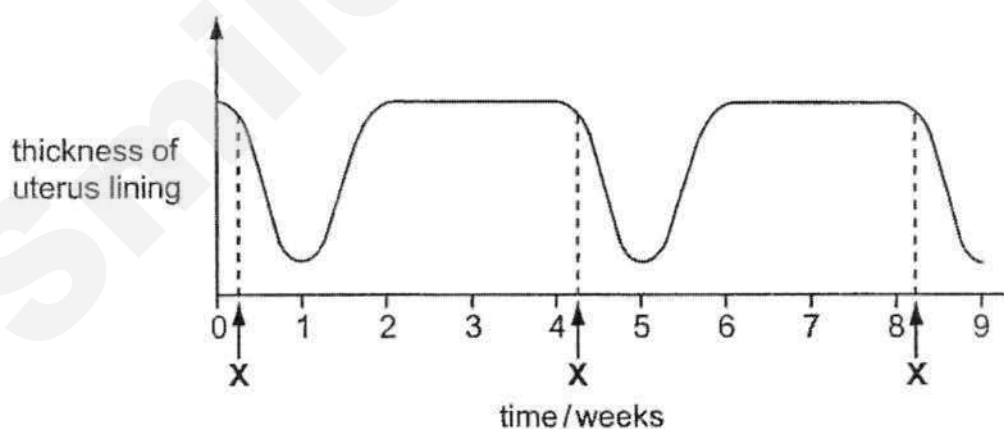
- I Plasma helps to carry dissolved substances.
- II Platelets help in the clotting of blood.
- III White blood cells help to transport oxygen.

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

18 The human circulatory system is made up of

- A arteries, veins and capillaries.
- B heart, blood vessels and blood.
- C heart, lungs and blood vessels.
- D plasma, red blood cells and white blood cells.

19 The graph below shows changes in the thickness of the uterus lining of a lady over a period of 9 weeks.



What happened at X?

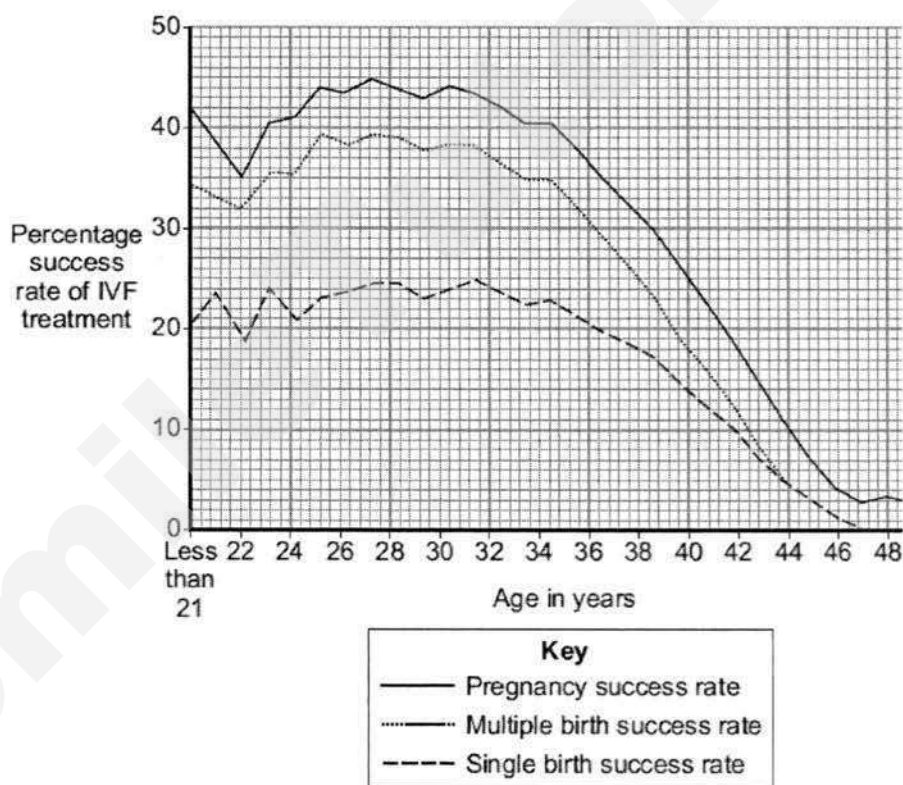
- | | |
|-----------------|----------------|
| A fertilisation | B implantation |
| C menstruation | D ovulation |

20 How can AIDS be spread?

- A sharing of food with an infected person
- B being sneezed on by an infected person
- C sharing of medical needles with an infected person
- D resting on the same bed previously used by an infected person

21 IVF (In-vitro fertilisation) is a method of fertilisation where the egg is fertilized by the sperm outside the body.

The graph shows the percentage success rates of IVF treatments for women of different ages.



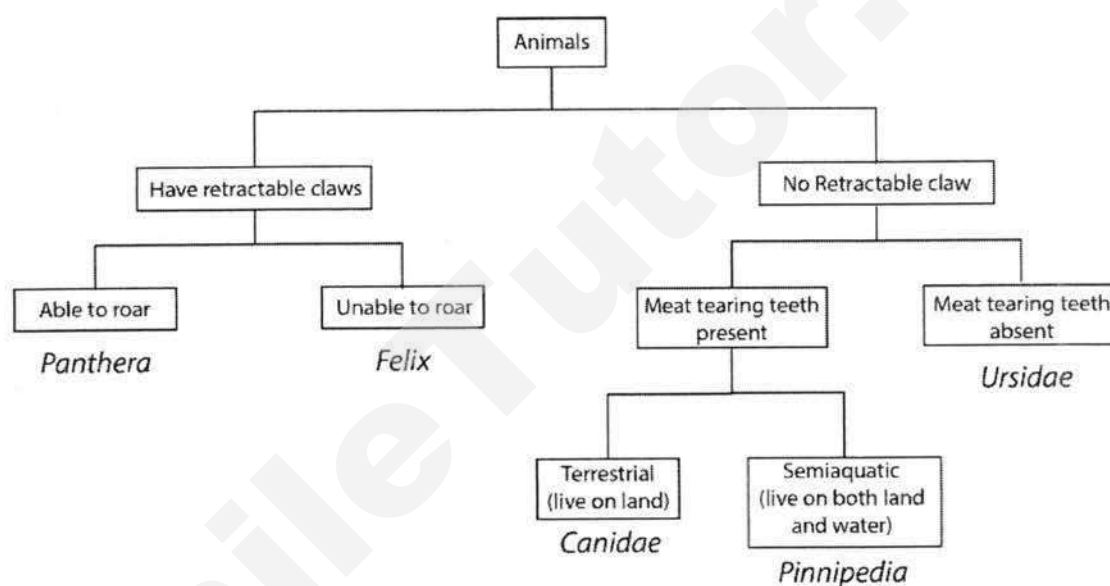
Which conclusion can be drawn from this data?

- A Women above 45 have a pregnancy rate of 10%.
- B Multiple and single births remained constant throughout a woman's life.
- C The pregnancy success rate falls significantly after the age of 34.
- D The pregnancy success rate is not affected by of the age of the woman.

22 Michael was tasked to group closely related animals together. Which pair has the two animals most distant and dissimilar from one another?

- A lion and tiger
- B shark and dolphin
- C snake and monitor lizard
- D rhinoceros and elephant

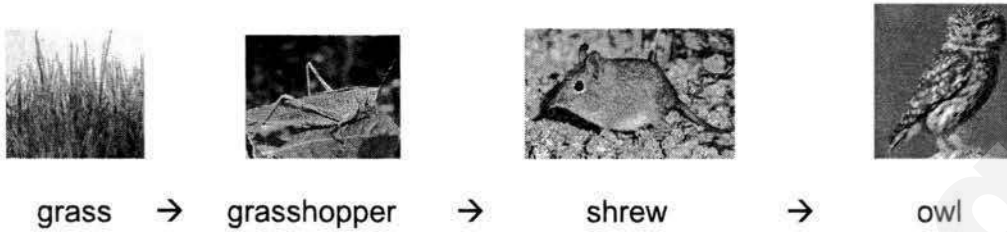
23 A dichotomous key of some animals is given below.



Domestic dogs do not have retractable claws and have meat tearing teeth. Which group of animals do they belong to?

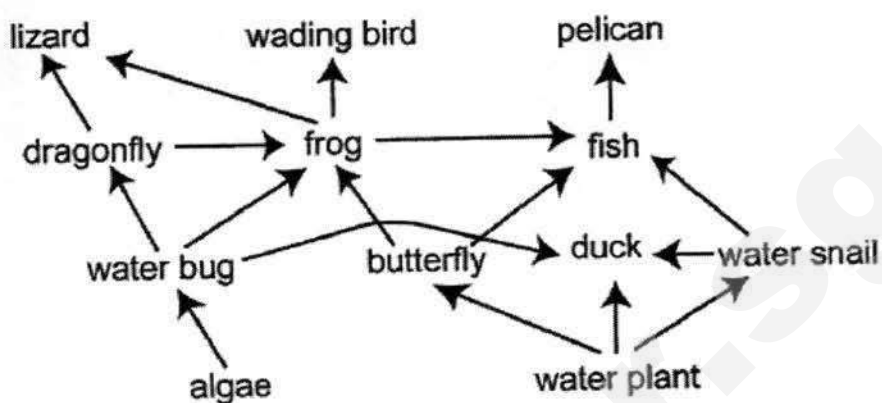
- A canidae
- B felix
- C panthera
- D ursidae

For questions 24 – 25, refer to the diagram shown below.



- 24** Which is the primary consumer of this food chain?
- A** grass **B** grasshopper
C owl **D** shrew
- 25** What would happen to the population of owls if the number of shrews decreased greatly?
- A** It will decrease in population size.
B It will expand greatly in population size.
C It will increase in population size.
D No change will be observed. It remains the same.
- 26** A couple of wild boars were recently found in Punggol HDB estates. Which is a possible cause of these incidents?
- A** The wild boars were overhunted.
B The wild boars lost their natural habitat.
C The wild boars were having an adventure.
D The wild boars were infected by a type of bacteria.

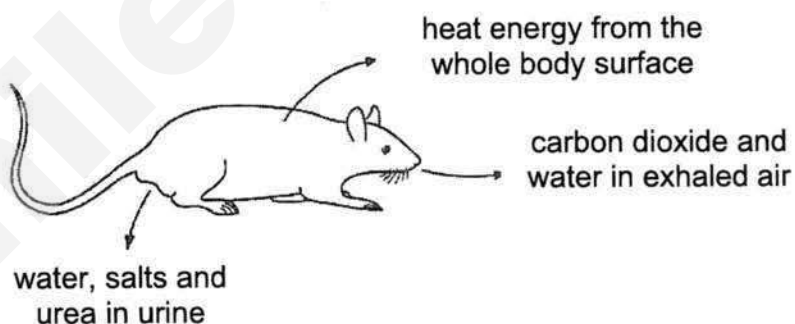
27 The diagram below shows a food web in a wetlands ecosystem.



Which organism is both a primary and a secondary consumer?

- | | |
|-----------------|--------------------|
| A duck | B frog |
| C lizard | D water bug |

28 The diagram shows losses from a rat to the environment.



What will **not** be returned to the ecosystem and recycled?

- | | |
|-------------------------|----------------------|
| A carbon dioxide | B heat energy |
| C salts | D urea |

- 29 Read the following paragraph to answer this question.

The ostrich always moves with a herd of zebras since it has a poor sense of hearing and smell, whereas zebras have very sharp senses. The ostrich has a keen sense of sight, which the zebra lacks. Hence, these two species depend on each other to warn one another of any nearby lurking dangers.

What is the relationship between the ostrich and zebras?

- | | |
|-----------------------|------------------------|
| A commensalism | B mutualism |
| C parasitism | D predator-prey |
- 30 Which statement best describes an ecosystem?
- A** A group of organisms of the same species that live in an area.
 - B** Many groups of organisms of different species that live in an area.
 - C** Many groups of organisms of different species interacting with each other and the environment in which they all live in.
 - D** The study of the interactions between many groups of organisms of different species and the environment in which they all live in.

- END OF BOOKLET A -

Name: ()

Class:

ASSUMPTION ENGLISH SCHOOL END OF YEAR EXAMINATION 2017

LOWER SECONDARY SCIENCE BOOKLET B



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LEVEL: Sec 1 Express**DATE:** 12 October 2017**CLASS(ES):** Sec 1/1, 1/2**DURATION:** 2 hours
(For booklets A and B)

Additional Materials provided: NIL

INSTRUCTIONS TO CANDIDATES**Do not open this booklet until you are told to do so.**

Write your NAME, INDEX NUMBER and CLASS at the top of this page This paper consists of 2 sections.

SECTION B (40 marks)**Short Structured Questions**

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

SECTION C (30 marks)**Long Structured Questions**

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

For Examiner's use:

Section A	/	30
Section B	/	40
Section C	/	30
Total	/	100

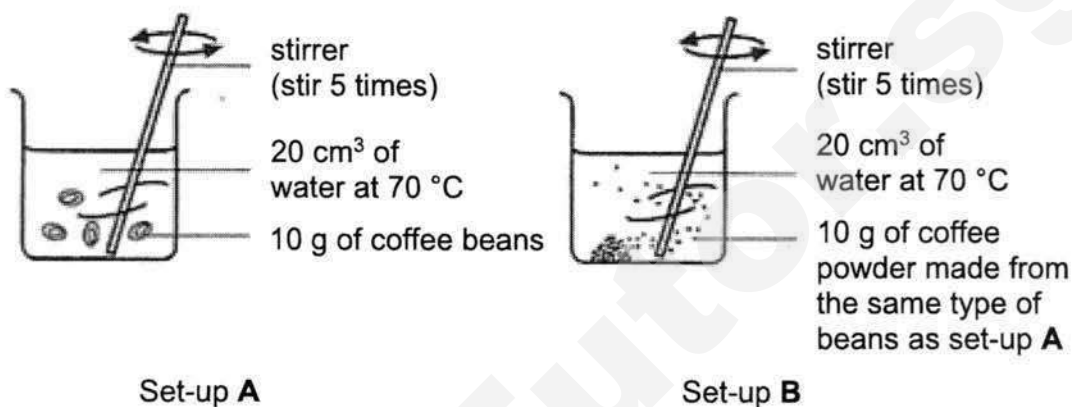
At the end of the examination, hand in your OAS paper, Booklets A and B separately.

This Question Paper consists of 14 prints

Section B: Short Structured Questions (40 marks)

Answer **ALL** the questions and show all workings clearly in the spaces provided.

- 1 Lexi conducted an experiment using coffee beans and finely ground coffee powder in two separate beakers to see which coffee can dissolve faster. He measured the result of his experiment using a stopwatch. The experimental set-up is shown below.



- (a) State the hypothesis of this experiment.

.....
 [1]

- (b) Identify 1 independent variable, 1 dependent variable and 2 controlled variables in the experiment.

independent :
 (changed) variable

dependent :
 (measured) variable

controlled variables : (1)
 (2) [4]

3

- 2 Moh's scale is used to compare the hardness of different materials. The Moh's values of some materials are listed in the table below, with 1 being the softest and 10 being the hardest.

Moh's value	materials
1	Talc
2	Gypsum
3	Calcite
4	Fluorite
5	Apatite
6	Orthoclase
7	Quartz
8	Topaz
9	Corundum
10	Diamond

An unknown material **Q** is rubbed with various materials to determine its Moh's value.

The observations are recorded in the table below.

	Observations
1	After rubbing with topaz, Q has many scratches.
2	After rubbing with fluorite, Q has no dents.
3	After rubbing with quartz, Q has less scratches than with topaz.

- (a) Define *hardness*.

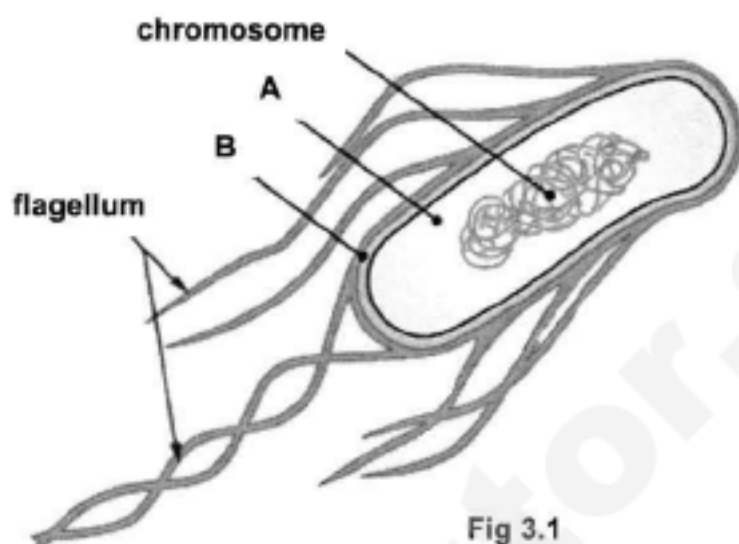
..... [1]

- (b) State one possible Moh's value of the unknown material **Q**. Explain your answer.

.....

 [2]

- 3 Fig. 3.1 shows a bacterial cell that is found in a pond. It has structures which are similar to a human sperm cell.



- (a) Name the structures labelled A and B in Fig. 3.1.

A:

B: [2]

- (b) Identify two differences between the bacterial cell and a typical animal cell.

1.

.....

2.

..... [2]

- (c) Suggest the function of flagellum in the bacterium cell.

..... [1]

- 4 Five discs of fresh potato (**A – E**), each weighing 10 grams were immersed in sugar solutions of different concentration for two hours, and then dried and reweighed. The change in the mass of each potato disc was recorded in a bar chart as shown in **Fig. 4.1**.

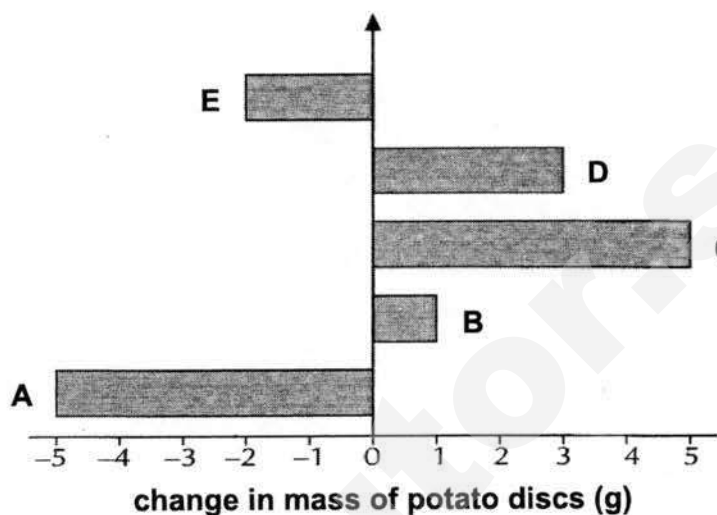


Fig 4.1

- (a) Name the process that caused the change in mass of the potato discs.

..... [1]

- (b) (i) Which potato was immersed in the solution with the highest and lowest sugar concentration? Give your answers using the letters (**A - E**).

sugar solution	potato discs
highest concentration	
lowest concentration	

[2]

- (ii) Describe and explain what caused the changes in potato disc **A**.

.....

 [3]

6

- 5 Nancy investigated the effect of temperature on the action of a human digestive enzyme, protease.

She placed 10 g of solid egg white into each of six test-tubes which all contained protease solution and a few drops of dilute hydrochloric acid. These test tubes were kept at different temperatures.

After 20 minutes, she filtered each solution and weighed the solid egg white which was left. Her results are shown in **Table 5.1**.

temperature / °C	10	20	30	40	50	60
mass of solid egg white left / g	7.6	4.5	3.1	2.7	4.8	9.4

Table 5.1

- (a) Egg white contains protein. In each experiment, the mass of the egg white became lesser than the initial mass.

Explain what caused the mass of the egg white to decrease.

.....

.....

..... [2]

- (b) Suggest the temperature at which the enzyme protease was the most active.

..... [1]

- (c) Suggest what happened to the protease at 60 °C.

.....

.....

..... [2]

- (d) Suggest a reason why dilute hydrochloric acid was added into all the test tubes with egg white and protease solution at the start of the investigation.

..... [1]

6 Fig. 6.1 shows a plant with *variegated leaves.

The plant was left in the dark for 48 hours to remove all starch in the leaves.

Leaf X had a strip of black paper attached to both the upper and lower surfaces.

Leaf Y also had a strip of black paper attached to both the upper and lower surfaces.

It was then sealed in a flask containing a solution of sodium hydroxide, a substance that absorbs carbon dioxide.

The plant was then placed in the light for 24 hours. At the end of the experiment, a starch test was carried out on leaf X and leaf Y.

*(of a plant) consisting of leaves that are edged or patterned in a second colour, especially white as well as green.

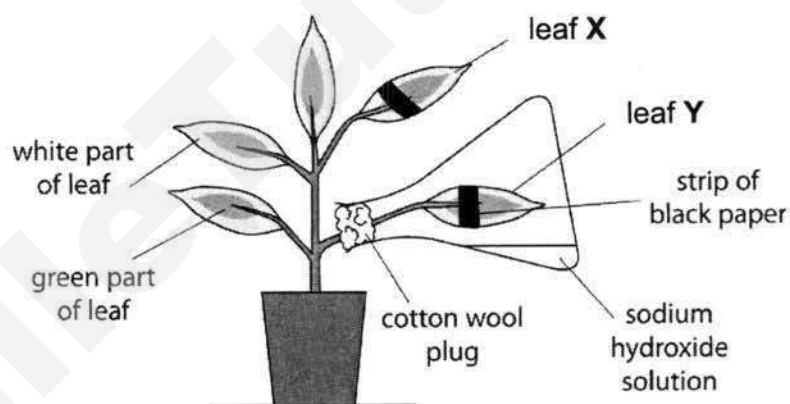
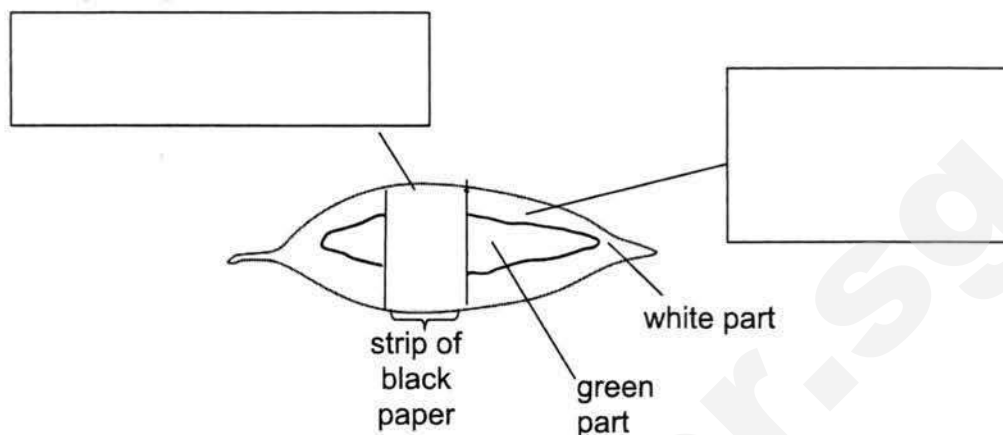


Fig. 6.1

(a) Write down the word equation for photosynthesis.

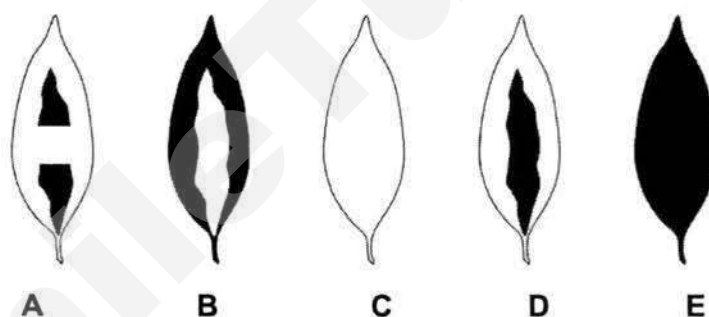
..... [2]

- (b) Identify the **missing** factor / factors for photosynthesis at various parts of leaf **Y** by filling in the blanks below.



[3]

Five leaves, **A** to **E**, show the possible appearance of leaf **X** and leaf **Y** after the starch test.



- ☐ = brown colour showing starch is absent
☒ = blue-black colour showing starch is present

- (c) Which of the leaves, **A** to **E**, matches the result you would obtain after testing leaf **X** and leaf **Y** for starch?

leaf **X**

leaf **Y**

[2]

- 7 A blood sample was spun under high-speed to analyse the contents of blood. Three distinct bands were obtained. Fig. 7 shows the results.

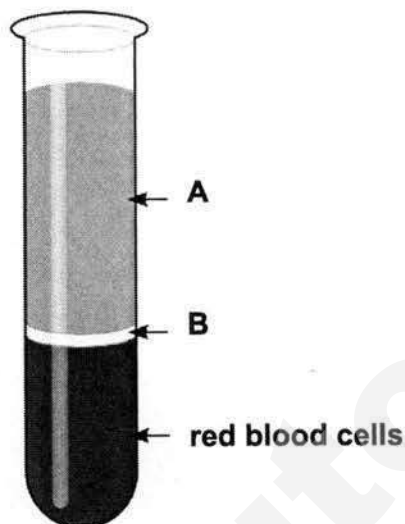


Fig. 7

- (a) Identify which blood component(s) is/ are represented by

A

B [2]

- (b) Why are the red blood cells found in the bottom of the test tube as compared to the other blood components?

..... [1]

- (c) Give one example of waste product found in band A.

..... [1]

- (d) Describe **two** features of red blood cells that enable them to transport oxygen around the body efficiently.

.....

Section C: Long Structured Questions (30 marks)

Answer **all** the questions and show all workings clearly in the spaces provided.

- 1 **Fig. 1** shows a graph that illustrates how the thickness of Mrs Filipe's uterine lining changes over the month of July. She noted that her menstruation started on 7th July.

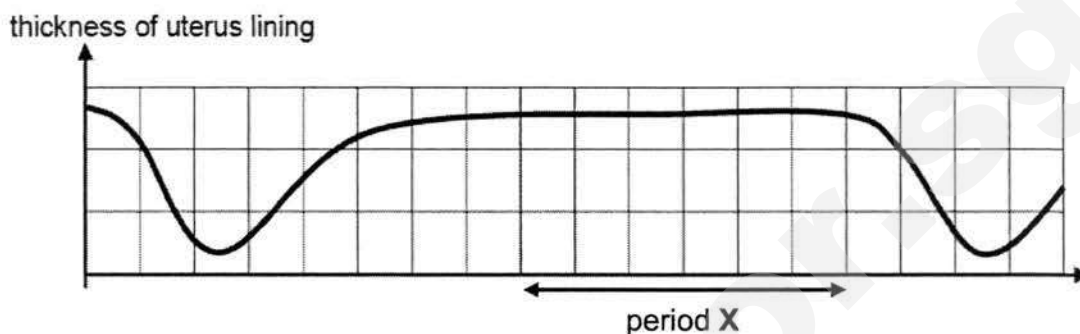


Fig. 1

- (a) (i) Define 'ovulation'.

.....

.....

[2]

- (ii) State the date in July when ovulation is expected.

.....

[1]

- (iii) Name a birth control method that prevents ovulation.

.....

[1]

- (b) From **Fig. 1**, determine if Mrs Filipe is pregnant. Give an evidence to support your answer

.....

.....

.....

[2]

(c) Fig. 1.2 shows the front cross-section view of the female reproductive system.

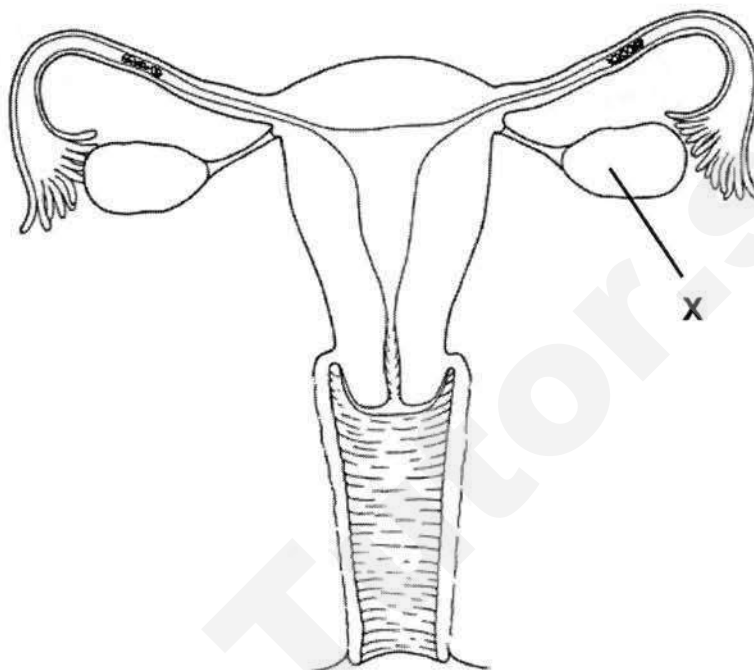


Fig. 1.2

(i) Describe the function of structure X.

[1]

(ii) On Fig. 1.2, label with a 'Y' where sperms is deposited.

[1]

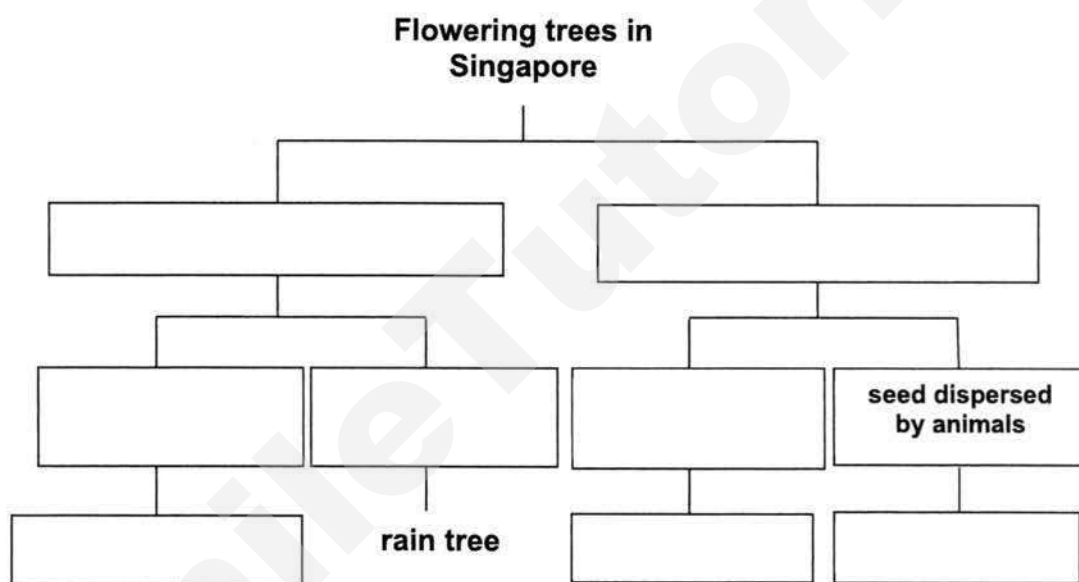
(iii) Using evidence from Fig. 1.2, suggest why this woman is infertile.

[2]

- 2 (a) Varun was given the following information about four common trees found in Singapore and was asked to organise the plants using a dichotomous key.

The rain tree is a flowering tree with an umbrella-shaped crown and its seeds are dispersed by animals. The trumpet tree is a flowering tree with a conical crown and the seeds are dispersed by splitting. The tembusu tree is a flowering tree with a conical crown and the seeds are dispersed by animals. The saga tree is a flowering tree with an umbrella-shaped crown and its seeds are dispersed by splitting.

Using the information given, complete the dichotomous key to classify the trees correctly.



[4]

- (b) What is a dichotomous key?

.....

[2]

- (c) List two characteristics of amphibians.

.....

[2]

- (d) What are the two similarities between a reptile and amphibian?

.....

[2]

3 Fig. 3.1 shows an Arctic ecosystem.

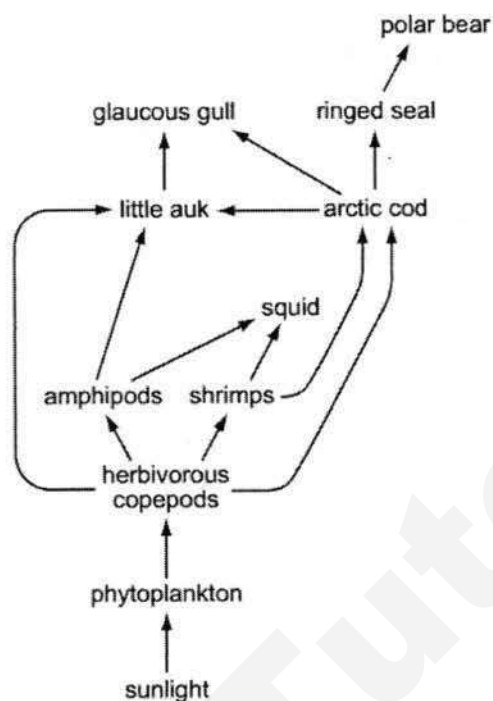


Fig. 3.1

(a) What is an ecosystem?

..... [2]

(b) Using information from Fig. 3.1, write down a food chain that ends with polar bear.

..... [1]

(c) The Arctic experiences 24-hour sunlight for six months and 24-hour darkness for another six months in a one-year cycle.
Explain why the polar bear goes into hibernation during the six months of darkness. Use food chain in (b) to support your explanation.

.....

 [2]

- (d) Grey squirrels which feed on seeds and grass are introduced into the community. The introduction of the grey squirrels may cause problems for the existing wildlife.



Describe two ways in which an introduced species may harm the existing wildlife.

.....

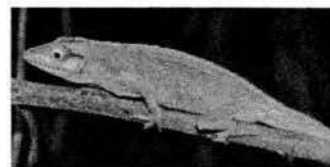
.....

.....

.....

[2]

- (e) The photograph below shows an *Anolis carolinensis* lizard (anolis lizard). This lizard lives on a tiny island. Scientists studied how the length of leg of the anolis lizard affected their survival. At the start of the study, the *anolis* lizards had a large range of leg lengths.



The scientists placed six *Leiocephalus carinatus* lizards (curly-tailed lizard) as an *alien species*. After one year the population of *anolis* lizards decreased by half and nearly all the remaining *anolis* lizards had long legs.

- (i) Suggest what is meant by the term *alien species*.

.....

.....

[1]

- (ii) State the relationship between the anolis lizard and the curly-tailed lizard.

.....

[1]

- (iii) Explain the decrease in population of anolis lizards.

.....

.....

[1]

-END OF BOOKLET-

ASSUMPTION ENGLISH SCHOOL
Sec 1 Express Science
EOY 2017

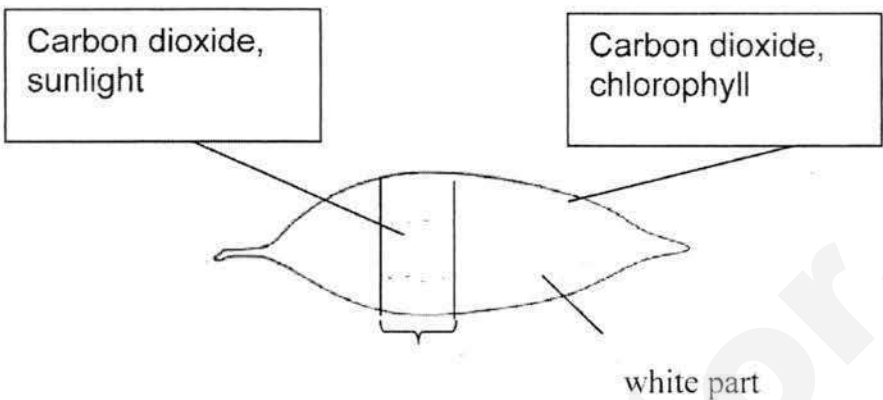
Section A (30 m)

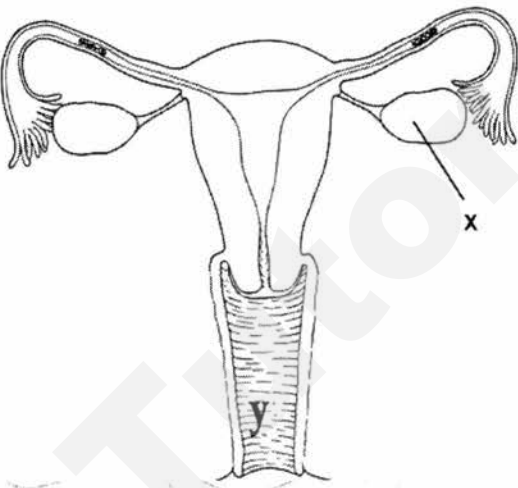
Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
A	B	B	A	D	B	D	C	C	C
Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
A	B	B	C	A	B	A	B	C	C
Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
C	B	A	B	A	B	A	B	B	C

Section A

1	a	Coffee powder dissolves faster than coffee beans. Coffee of smaller size will dissolve faster. Coffee of larger surface area will dissolve faster.	Or Or	1 Hypothesis is a smart guess of the results before doing the experiment
	b	Independent: Size of coffee beans Dependent: Time taken to dissolve completely Controlled: rate of stirring, temperature of water, volume of water, mass of coffee [any 2]	Reject type Reject rate, speed Reject: amount	1 1 2
2	a	Hardness is the ability to scratch another material.		1
	b	5 or 6. [any 1] It is harder than fluorite but softer than quartz.		1 1
3	a	A : cytoplasm B : cell membrane / cell wall		1 1

	b	1. Typical animal cell has <u>a nucleus which contains the chromosomes</u> while the bacterial cell has <u>chromosome in the cytoplasm (not in the nucleus)</u> 2. <u>Tiny vacuoles</u> are present in a typical animal cell but absent in bacterial cell. 3. <u>Flagellum</u> is present in bacterial cell but absent in a typical animal cell. 4. Typical animal cell have <u>no cell wall</u> but the bacterial cell does. Any 2 correct	2						
	c	To allow the bacterial cell to move from one place to another/swim/ be mobile	1						
4	a	Osmosis	1						
	bi	<table border="1"><thead><tr><th>sugar solution</th><th>potato discs</th></tr></thead><tbody><tr><td>highest concentration</td><td>A</td></tr><tr><td>lowest concentration</td><td>C</td></tr></tbody></table>	sugar solution	potato discs	highest concentration	A	lowest concentration	C	1 1
sugar solution	potato discs								
highest concentration	A								
lowest concentration	C								
	bii	The <u>water potential of cell sap of potato disc A is higher</u> than the sugar solution in the surrounding. Hence <u>water molecules move</u> from the cell sap of potato disc A to the sugar solution by osmosis. The potato disc A <u>becomes flaccid</u> due to <u>water loss</u> and thus <u>loss in mass</u> .	1 1 1						
5	a	<u>enzyme protease</u> digests / breaks down proteins in the egg white to simple proteins	1 1						
	b	40 ° C	1						
	c	Enzyme proteases were affected at higher temperature and lose its function	1 1						
	d	Enzyme proteases <u>work best in an acidic environment</u> .	1						

6	a	<p>water + carbon dioxide $\xrightarrow[\text{chlorophyll}]{\text{light}}$ glucose + oxygen</p>	1 m: correct raw materials & products; 1 m: correct conditions
6b			3
c		<p>leaf X: A leaf Y: C</p>	1 1
7	a	<p>A: plasma B: white blood cells</p>	1 1
b		The red blood cells have <u>higher density</u> than the other blood components.	1
c		carbon dioxide	1
d		<ul style="list-style-type: none"> • <u>biconcave</u>[1]; to <u>increase surface area to volume ratio</u> [1] or • <u>absence of nucleus</u>; more space to pack more haemoglobin or • <u>contains haemoglobin</u>; to bind to oxygen molecules <p style="text-align: right;">Any 2</p>	2

1	a i	Release (rej: discharge) of a mature egg; <u>from ovary into oviduct</u>	1 1
	a ii	20 July	1
	a iii	Contraceptive/ birth control pills	1
	b	No; The thickness of the uterine lining starts to decrease again/ menstruation happens after period X.	1 1
	c i	<u>produces eggs</u>	1
	c ii		1
	ciii	blockage in oviducts/ fallopian tube; <u>sperm is unable to meet the egg to fertilise it.</u>	1 1

2	a	<p style="text-align: center;">Flowering trees in Singapore</p> <div><div>umbrella shaped</div><div>conical crown</div></div> <div><div><div>seed dispersed by splitting</div><div>seed dispersed by animals</div></div><div><div>seed dispersed by splitting</div><div>seed dispersed by animals</div></div></div> <div><div>saga</div><div>rain</div><div>trumpet tree</div><div>tembusu tree</div></div> <p>each correct cluster answered =1</p>	4
---	---	--	---

	b	A dichotomous key shows how organisms are classified according to their similarities and differences	BP-69 1
	d	<ul style="list-style-type: none"> - Lay eggs usually in jelly-like mass in water - breathe with Lungs, gills, and/or their skin - have four legs without claws or nails on toes - are cold-blooded <p>Any 2 List features special for amphibians</p>	2
	e	<p>They both lay eggs, breathe with lungs and are cold- blooded.</p> <p>Any 2 Don't list features that include other mammals</p>	2
3	a	<p>An ecosystem consists of</p> <ul style="list-style-type: none"> • different <u>communities</u> of organisms interacting with one another • and their physical / surrounding environment. 	1 1
	b	<ul style="list-style-type: none"> • phytoplankton → herbivorous copepods → arctic cod → ringed seal → polar bear <p>OR</p> <ul style="list-style-type: none"> • phytoplankton → herbivorous copepods → shrimp → arctic cod → ringed seal → polar bear 	1
	c	<p>In the <u>absence of light</u>, phytoplanktons cannot photosynthesize / make food</p> <p>Other consumers down the food chains decrease in population.</p> <p>The bears hibernate to <u>conserve energy</u> until sunlight returns to the Arctic.</p> <p>Reject: cannot find food because the polar bear cannot see</p>	1 1
	d	<p>Any 2:</p> <ul style="list-style-type: none"> - Deplete and decrease the population of producers - Compete for source of food with other primary consumers, decreasing their population - Carry diseases that may kill other wildlife <p>State effect on other populations</p>	2
	ei	Non-native / invasive species being introduced to the island.	1
	eii	Predator-prey relationship	1
	eiii	<p>Any of the following:</p> <ul style="list-style-type: none"> - Long legs of Anolis lizards can run away from the Curly-tailed lizards. - Short legs of Anolis lizard failed to escape and is consumed by the Curly-tailed lizard. 	1



BEDOK SOUTH SECONDARY SCHOOL END-OF-YEAR EXAMINATION 2017

1EXP

CANDIDATE
NAME

CLASS

REGISTER
NUMBER

SCIENCE

3 October 2017

2 hours

Candidates answer on the OMS and Question Booklet.

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name on the work you hand in.
Write in dark blue or black ink on both sides of the paper.
Do not use staples, paper clips, highlighters, glue or correction fluid.

This paper consists of three sections. You are required to answer **ALL** questions in Section A and B and **FOUR** questions in Section C.

Section A (30 marks)

There are **30** 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 pencil** on the OMS provided.

Section B (30 marks)

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

Section C (40 marks)

Answer only **four** questions in this section.
Write your answers in the spaces provided on the question paper.

Show all necessary working. Round off all non-exact answers to 3 significant figures.

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

A copy of the Periodic Table is provided on page 30.

Setter: Ms. Denise Wong

This paper consists of **30** printed pages i

SECTION A: Multiple Choice Questions (30 marks)

Each question below is provided with four answers. Select the correct answer and shade either **A**, **B**, **C** or **D** in the OMS provided.

Refer to the experiment below to answer questions 1 and 2.

A series of experiments were designed to test the solubility of substance **P** in water. The following table shows the different variables used in each experiment.

experiment	maximum mass of P dissolved / g	size of particles	volume of water used / cm ³	temperature of water / °C
1	10	Large lumps	50	30
2	10	Fine powder	50	30
3	15	Fine powder	50	45
4	18	Fine powder	75	30

- Which set of apparatus was used to measure the maximum mass of **P** dissolved and the volume of water used?
 - electronic balance and beaker
 - burette and measuring cylinder
 - spring balance and measuring cylinder
 - electronic balance and measuring cylinder
- Which set of experiments can be used to show that solubility of **P** does **not** depend on the size of particles?

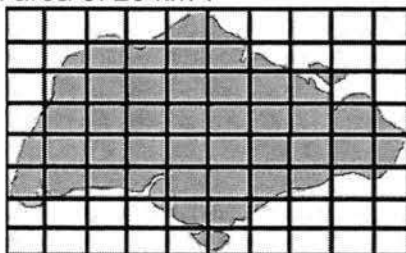
A 1 and 2	B 1 and 3
C 1 and 4	D 2 and 3
- A chemical powder has the following symbol on its bottle.



What precaution should a person take when using the powder?

- Use a spatula when taking out the powder from its bottle.
- Keep the powder away from the flame, spark or any heat source.
- Wash down unused powder into the sink with a lot of running water.
- Wear a face shield and lead-lined clothing before handling the powder.

- 4 The figure below shows an outline of the area occupied by Singapore. Each grid square unit measures an area of 20 km^2 .



What is the approximate area of Singapore?

- A** 80 km²
- B** 1 600 km²
- C** 800 km²
- D** 16 000 km²

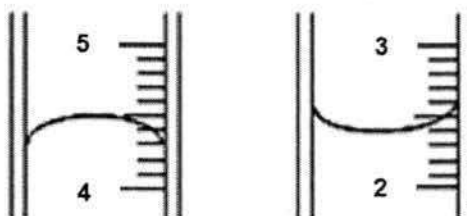
- 5 The diagram below shows four substances **P**, **Q**, **R** and **S**, placed in a measuring cylinder.



Which substance has the greatest mass if the volume of each substance is the same?

- A P B Q
C R D S

- 6 A student measured the volume of mercury and the volume of alcohol in two separate measuring cylinders, as shown in the diagrams below.



What are the **correct** volumes for each liquid?

	volume of mercury / cm ³	volume of alcohol / cm ³
A	2.4	4.5
B	2.6	4.3
C	4.5	2.4
D	5.5	3.6

4

- 7 Which of these groups of elements has an element that has different properties from the rest in the group?
- A iron, lead, tin, copper
 - B helium, gallium, chlorine, neon
 - C carbon, sulfur, nitrogen, oxygen
 - D sodium, caesium, calcium, magnesium

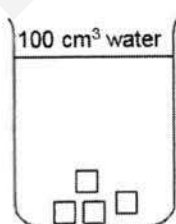
- 8 Element X is found to have similar chemical properties as nitrogen in the Periodic Table.

Which of the following is true about element X?

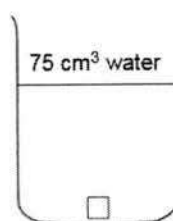
- A It is a magnetic material.
 - B It is an electrical insulator.
 - C It has a very high melting point.
 - D It belongs to Group III in the Periodic Table.
- 9 The formula of talcum powder was given in old textbooks as $\text{MgO} \cdot \text{SiO}_2 \cdot \text{H}_2\text{O}$.
What is the number of oxygen atoms in one molecule of talcum powder?
- A 2
 - B 3
 - C 4
 - D 5

- 10 Which of the sugar solutions will be the most saturated after the sugar has dissolved?

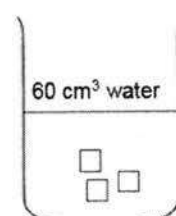
A



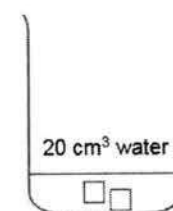
B



C



D



- 11 The table below shows the colours of four solids **W**, **X**, **Y** and **Z**, and their solubilities in water.

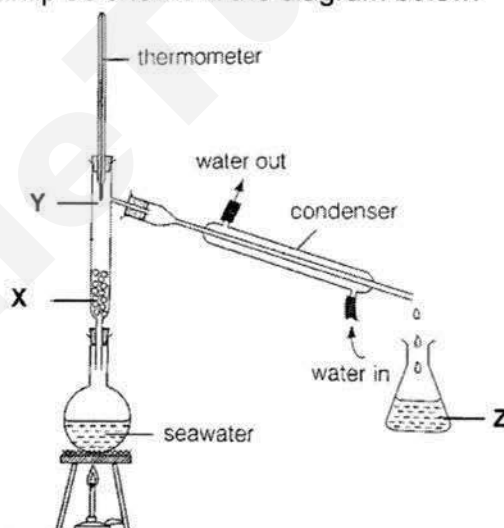
solid	colour	solubility in water
W	blue	insoluble
X	blue	soluble
Y	white	insoluble
Z	white	soluble

A mixture containing two of the solids was added to excess water, stirred and filtered. A blue filtrate and a white residue was obtained.

Which two solids were present in the mixture?

- A** W and X **B** W and Y
C X and Y **D** X and Z

- 12** An experiment was set up as shown in the diagram below.



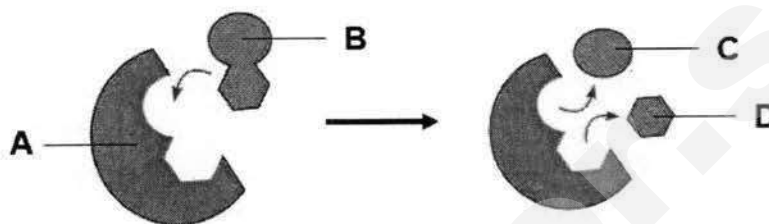
Which correctly identifies the substances found at positions **X**, **Y** and **Z**?

	X	Y	Z
A	seawater	seawater	water vapour
B	seawater	water vapour	pure water
C	water vapour	seawater	pure water
D	water vapour	water vapour	pure water

6

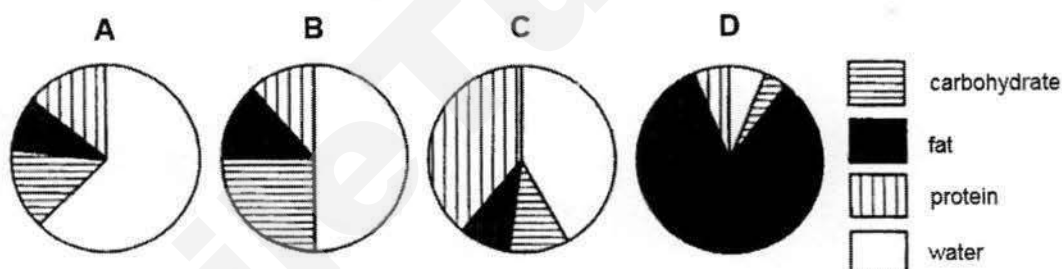
- 13 The diagram below shows the process of breaking down of a substrate molecule into its products.

What represents the substrate?



- 14 The pie charts below show the composition of four different foods, A, B, C and D.

Which food provides the most energy per serving for people living in cold countries?



- 15 The list below shows various secretions produced by the organs in the digestive system.

- I bile
- II gastric juice
- III intestinal juice
- IV pancreatic juice
- V saliva

Which secretion contains proteases?

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

7

- 16 In an experiment, 1 cm³ of lipase solution was added to a bottle of milk containing bile salts. A few drops of indicator was added. The table below show the colours of the indicator under different conditions.

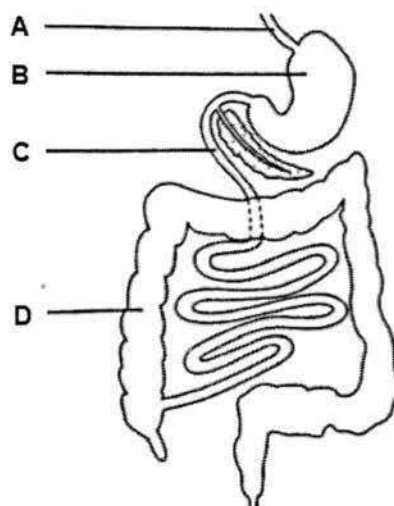
condition	colour
acidic	red
neutral	green
alkaline	purple

Which of the following will most likely be the colour observed at the beginning of the experiment and after 1 hour?

	colour before experiment	colour after experiment
A	red	red
B	green	purple
C	purple	red
D	purple	purple

- 17 The diagram below shows a section of the human digestive system. A man ate a drug encased in a film that can be broken down under acidic conditions. This drug can paralyse muscles and cause their loss of function.

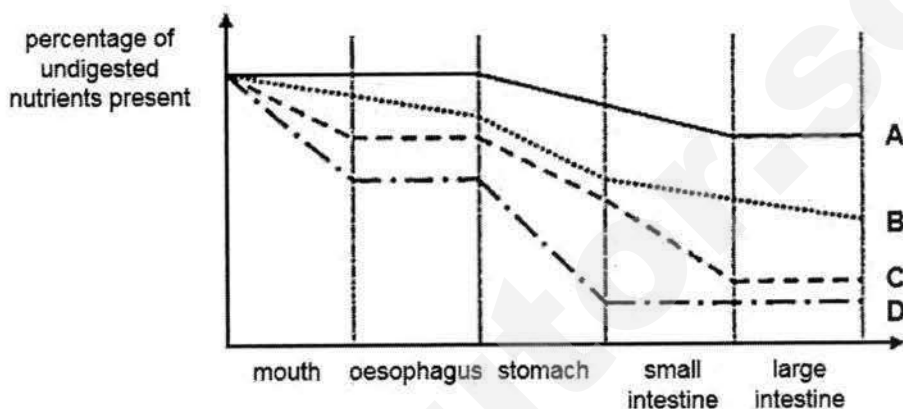
Which part of the digestive system will first experience loss of function?



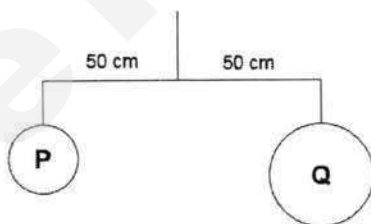
8

- 18 The graph below shows the changes in the percentage of undigested nutrients as food moves along the alimentary canal.

Which graph represents the digestion of protein through the alimentary canal?

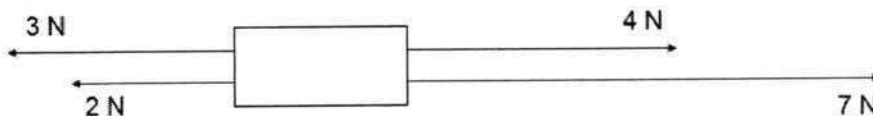


- 19 Two metal balls **P** and **Q** are suspended as shown in the experimental set-up below.



Which statement about **P** and **Q** is true?

- A **P** and **Q** have equal density.
 - B **P** and **Q** have equal volume.
 - C **P** and **Q** have equal mass and weight.
 - D **P** and **Q** have equal mass, volume and density.
- 20 The diagram below shows four forces acting on a block.



What is the resultant force?

- A 0 N
- B 5 N to the left
- C 6 N to the right
- D 11 N to the right

- 21 When an aeroplane flies in the sky, which of the following forces is **not** experienced by it?
- A air resistance
 - B gravitational force from the Earth
 - C normal reaction from the ground
 - D propelling force from the jet engine

- 22 Which diagram shows an application of the turning effect of a force?

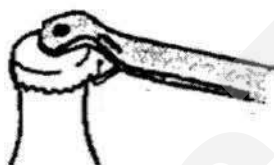
A



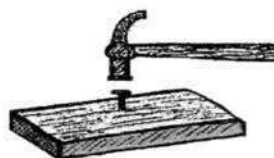
B



C



D



- 23 Two instruments are used on Earth to measure the weight and mass of an object. A spring balance reads 6 N and a beam balance requires 6 pieces of 100 g discs to balance. The measurements are then repeated on the Moon, where the gravitational field strength is 6 times less than on Earth.

Which correctly shows the results expected?

	reading on spring balance / N	number of 100 g discs required to balance
A	1	1
B	1	6
C	6	1
D	6	6

- 24 An elephant weighs 60 000 N. It stands on one foot with an area of 0.1 m².

What is the pressure exerted on the ground when it stands on four feet?

- A 1 500 Pa
- B 60 000 Pa
- C 150 000 Pa
- D 600 000 Pa

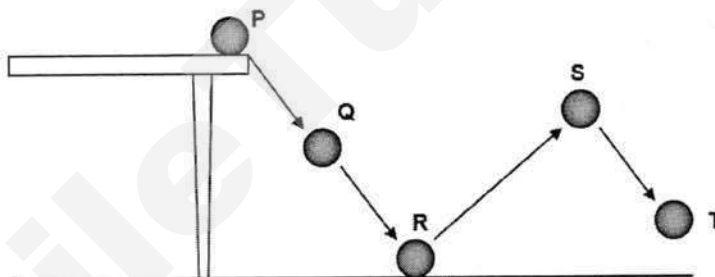
25 Which statements about friction is true?

- A It causes energy conversion to heat.
- B A stationary object is free from friction.
- C It only happens when an object moves.
- D It always acts in the same direction as the motion of an object.

26 Which person has done the most work?

- A A boy weighing 500 N climbing 1 m up a tree.
- B A girl lifting a 10 N book up onto a table 1 m high.
- C A weight-lifter holds a 600 N weight in the same position for 1 minute.
- D A man releasing a 100 N rock which then falls a distance of 10 m into a pit.

27 A ball is pushed from a table onto the floor and follows the path as shown.



Which statements are correct?

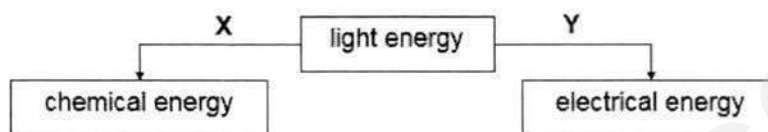
- I At P, the ball has maximum potential energy and minimum kinetic energy.
- II The ball has more kinetic energy at R than at Q.
- III The ball has zero kinetic energy at S.

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

28 Which object does not possess any form of potential energy?

- A a battery
- B a compressed spring
- C a piece of chocolate
- D a magnet placed on the ground

- 29 The diagram shows how light energy is converted to other forms of energy.



Which examples correctly represents **X** and **Y**?

	X	Y
A	cooking	solar water heater
B	steam engine	fossil fuels in car
C	electric light bulb	battery
D	photosynthesis in plants	solar toy car

- 30 Wendy is standing against a huge tree trunk and pushing against it in an attempt to make the tree fall to the ground. The tree did not move.

Which of the following is true?

	work done	energy used
A	yes	no
B	yes	yes
C	no	no
D	no	yes

- End of Section A -

**BEDOK SOUTH SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2017
SECONDARY 1 EXPRESS SCIENCE**

FOR EXAMINER'S USE	
SECTION A	
SECTION B	
SECTION C	
TOTAL	100

Class	Register Number	Name

SECTION B: Structured Questions (30 marks)

Answer all questions in the spaces provided.

- B1** A student carried out an experiment to find out the density of a Styrofoam ball. She used a Vernier caliper to measure the diameter, d cm, of a Styrofoam ball. Fig. B1.1 shows part of the Vernier caliper when its jaws are closed while Fig. B1.2 shows the reading taken when the jaws of the Vernier caliper are used to measure the diameter of the Styrofoam ball.

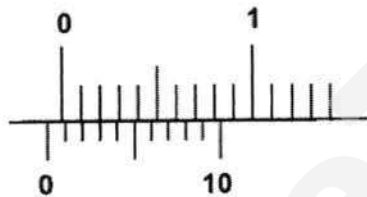


Fig. B1.1

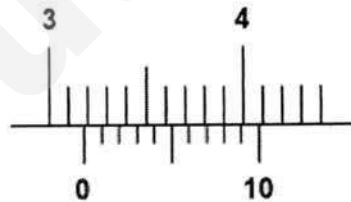


Fig. B1.2

- (a) (i) State the zero error on the Vernier caliper.

..... [1]

- (ii) Calculate the actual diameter d of the Styrofoam ball.

actual diameter, d [1]

For
Examiner's
Use

- (b) The volume of the Styrofoam ball can be calculated using the formula shown below where d is the diameter found in (a)(ii).

$$V = \frac{4}{3}\pi\left(\frac{d}{2}\right)^3$$

Given that $\pi = 3.14$, calculate the volume of the Styrofoam ball to one decimal place.

volume of Styrofoam ball [1]

- (c) (i) The mass of the Styrofoam ball was measured to be 17.3 g. Calculate the density of the Styrofoam ball in g/cm^3 .

density of Styrofoam ball [1]

- (ii) State the density of the Styrofoam ball in kg/m^3 .

..... [1]

- (d) Her friend suggested that a displacement can could be used to measure the volume of the Styrofoam ball. Explain why her suggestion would not work.

.....
 [1]

[Total : 6m]

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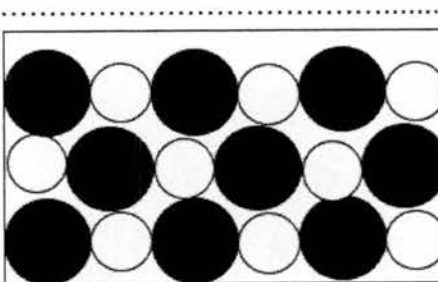
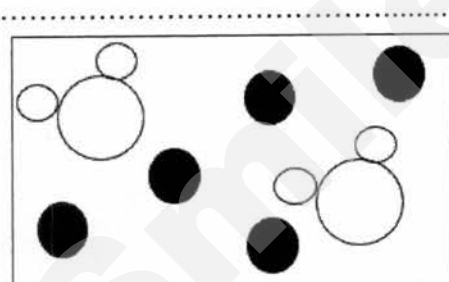
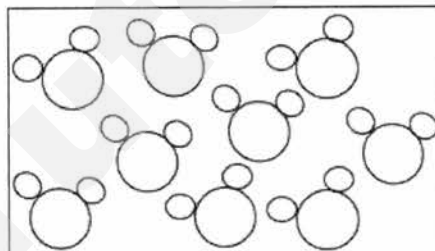
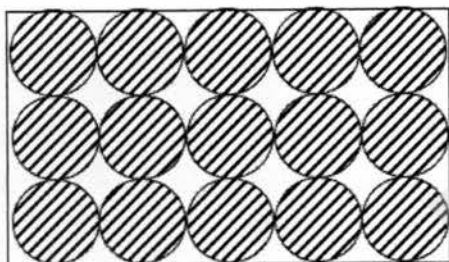
B2 Table B2 shows some information about four substances, **P**, **Q**, **R** and **S**.

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substance	information
P	It is a colourless liquid. When it is distilled, only a colourless liquid is collected.
Q	It is a white solid formed by burning magnesium in oxygen.
R	It is a grey solid which cannot be decomposed into anything simpler.
S	It is a blue liquid. When it is distilled, a colourless liquid is collected.

Table B2

- (a) The diagrams below show four different representations of the four substances. Identify the substance **P**, **Q**, **R** or **S** that matches the diagrams below.



[2]

- (b) State two differences in properties between substance **S** and **Q**.

1

.....

2

.....

[2]

[Total : 4m]

- B3** Fig. B3 shows a flowchart outlining the methods used to separate a mixture of copper(II) sulfate crystals and sand.

For
Examiner's
Use

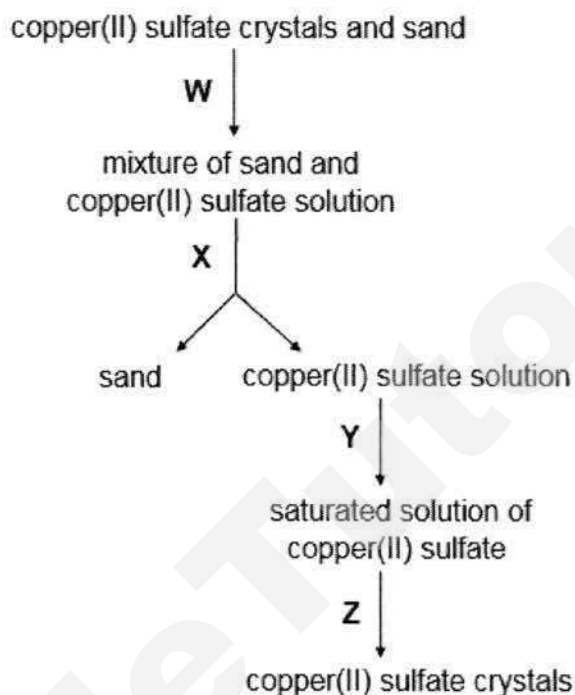


Fig. B3

- (a) Identify the processes **W**, **X**, **Y** and **Z**.

W **X**

Y **Z** [2]

- (b) One of the ways to obtain a saturated solution is to heat the copper(II) sulfate solution under a Bunsen flame. Draw a **labelled** diagram to show the type of flame that is suitable for heating to obtain a saturated solution.

[1]

[Total : 3m]

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B4 A person consumed a meal of grilled chicken chop that came with a side of mashed potatoes. Fig. B4.1 shows some of the food just before it entered the person's stomach at **A** and the same food as it left the stomach four hours later at **B**.

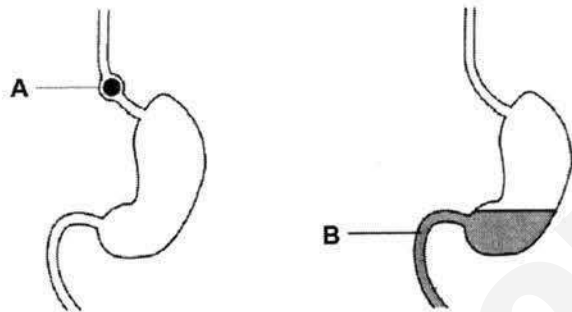


Fig. B4.1

(a) By placing ticks (✓) in the appropriate boxes in the table below, show how the major components of the food compare at positions **A** and **B**.

components of food	more at A	almost the same at A and B
starch		
protein		

[2]

(b) Fig. B4.2 shows the same food at position **C** and 24 hours later at position **D**.

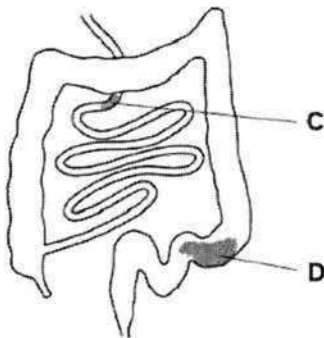


Fig. B4.2

Explain what happened to the major components of the food between **C** and **D**.

.....

.....

.....

.....

[2]

- (c) Sometimes a sore can develop on the wall of the stomach. This condition is known as a stomach ulcer, which can cause a person pain. The pain may be relieved by taking a drug that reduces the amount of acid produced in the stomach.

Suggest how taking this drug may affect the processes taking place in the stomach.

.....

.....

.....

..... [2]

[Total: 6m]

- B5** Fig. B5 shows the outline of a Toyota Prius, a hybrid energy car that runs on both petrol and electricity. The mass of a Toyota Prius is 1325 kg. It has four tyres, each with a contact area of 0.4 m^2 with the ground.

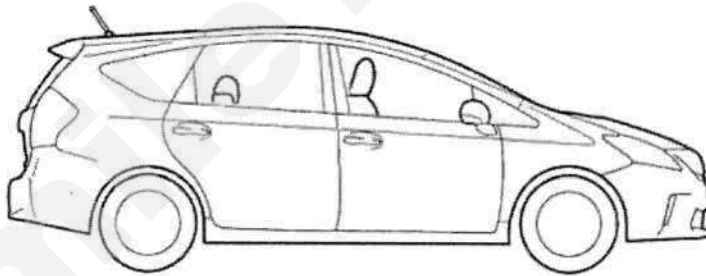


Fig. B5

- (a) (i) The car is reversing backwards when the driver applies the brakes to stop the car. On Fig. B5, draw and label an arrow to indicate the direction and position of the force that acts to stop the car. [1]
- (ii) Assuming that the gravitational field strength on Earth is 10 N/kg , calculate the pressure that the car exerts on the ground.

pressure [2]

- (iii) When driving on soft sand, it is recommended that larger tyres are used. Explain why.

.....
 [1]

- (b) (i) Scientists have been researching on ways to reduce our dependence on fossil fuels to lessen the negative impact on the environment. Suggest a form of renewable energy that can be used to power our vehicles.

..... [1]

- (ii) Suggest why people still prefer to drive a car that runs on petrol fully, rather than a hybrid car.

..... [1]

[Total: 6m]

- B6** Fig. B6.1 shows part of a roller coaster track. Points **A**, **B**, **C** and **D** mark various positions along the track. A cart is positioned right before point **A**.

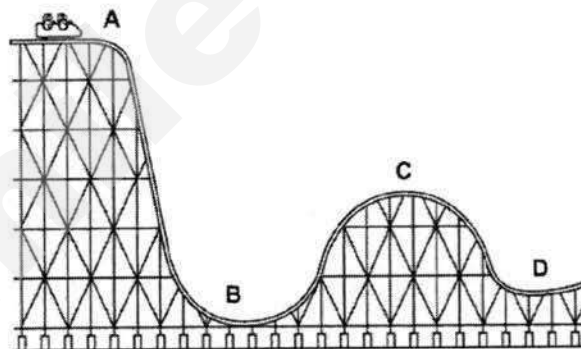


Fig. B6.1

- (a) Describe the energy changes of the cart from point **A** to **B**.

.....

 [3]

- (b) Fig. B6.2 shows a simplified diagram of the roller coaster track from point **B** to **C**.

For
Examiner's
Use

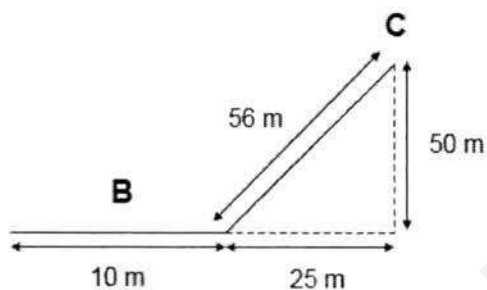


Fig. B6.2

- (i) The speed of the roller coaster was measured to be 25 m/s as it moved horizontally along part **B**. Calculate the time taken for the roller coaster cart to move along part **B**.

speed [1]

- (ii) If the roller coaster cart does 158 000 J of work going up from the bottom of the slope to reach point **C**, calculate the force exerted by the roller coaster cart.

force [1]

[Total: 5m]

- End of Section B -

SECTION C: Free Response Questions (40 marks)For
Examiner's
UseAnswer any **four** questions in this section.

- C1** Mars 2020 is Mars rover mission by the National Aeronautics and Space Administration that aims to collect samples of rocks on Mars in 2020 to examine and study the possibility of past life on Mars. Currently, scientists rely on a small number of Martian meteorites that land on Earth to carry out tests. Table C1.1 shows some information about Mars and Earth.

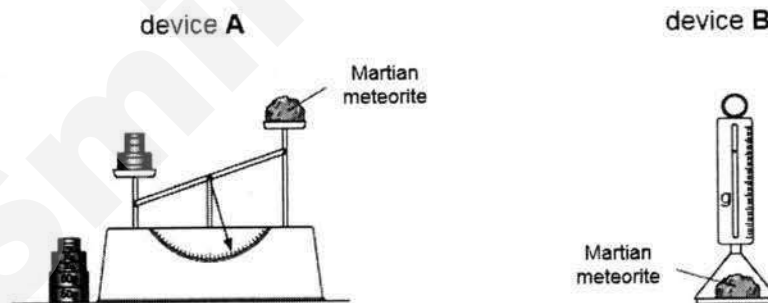
planet	gravitational field strength / N/kg
Earth	9.8
Mars	3.7

Table C1.1

- (a) State one attitude of scientists that are essential for working on projects such as Mars 2020.

[1]

- (b) The density of the Martian meteorites are determined by scientists. Fig. C1.2 shows two measuring devices that can be used to measure two physical quantities of the meteorite.

**Fig. C1.2**

- (i) Explain why the two devices will give different readings.

[2]

- (ii) The volume of a Martian meteorite was found to be 813 cm^3 . Explain why the volume of the rock cannot be measured using a measuring cylinder.

..... [1]

- (iii) Without any calculation, state and explain the difference, if any, in the values of density of the rock on Earth and on Mars.

..... [2]

- (c) If the Mars 2020 mission is successful, liquid samples could also be collected back to Earth to analyse for the presence of water on Mars.

- (i) To determine the purity of the liquid samples, scientists may heat small samples of liquid samples to remove excess solvent to obtain any solute. Draw the experimental set-up in the space below and label all the apparatus required.

- (ii) State one safety precaution that must be taken in the lab when carrying out the experiment in (ci). [2]

..... [1]

- (iii) Describe another method and the results observed that scientists can carry out to conclusively determine if the liquid samples are pure water.

..... [1]

[Total : 10m]

- C2 (a)** Table C2.1 shows the maximum mass of three solids **A**, **B** and **C** that can dissolve in 100 cm³ of 3 different solvents **X**, **Y** and **Z** at room temperature.

For
Examiner's
Use

liquid	mass of A dissolved / g	mass of B dissolved / g	mass of C dissolved / g
X	25	40	0
Y	0	5	55
Z	35	8	3

Table C2.1

- (i) A student dissolved 10 g of solid **B** in 50 cm³ of liquid **Y** in a beaker at room temperature. Describe and explain what she would observe.

.....

.....

.....

.....

[2]

- (ii) Explain what can be done to increase the rate of dissolving solid **A** in liquid **X**.

.....

.....

[1]

- (iii) A student accidentally mixed solids **A** and **C** in a container. Describe what can be done to allow him to separate both substances. Your answer should clearly indicate the apparatus and materials required.

.....

.....

.....

.....

.....

.....

.....

.....

.....

[3]

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

For
Examiner's
Use

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 in Fig. C2.2.

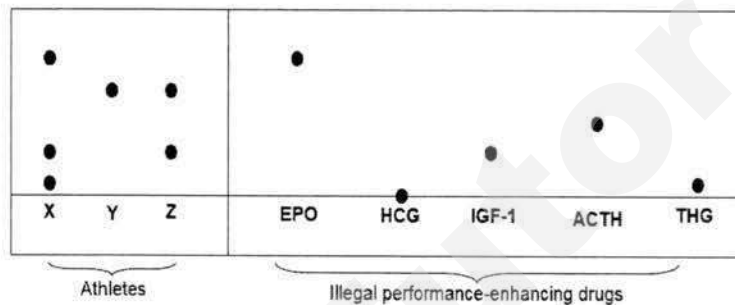


Fig. C2.2

- (i) Explain why the final positions of the samples of EPO and ACTH differ on the chromatogram.

.....
 [1]

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

.....
 [1]

- (iii) Besides athlete **X**, which other athlete should be disqualified from the race? Explain your answer.

.....

 [2]

[Total: 10m]

C3 Fig. C3.1 shows the steps of an experimental set-up inside a log book that a student was supposed to follow.

For
Examiner's
Use

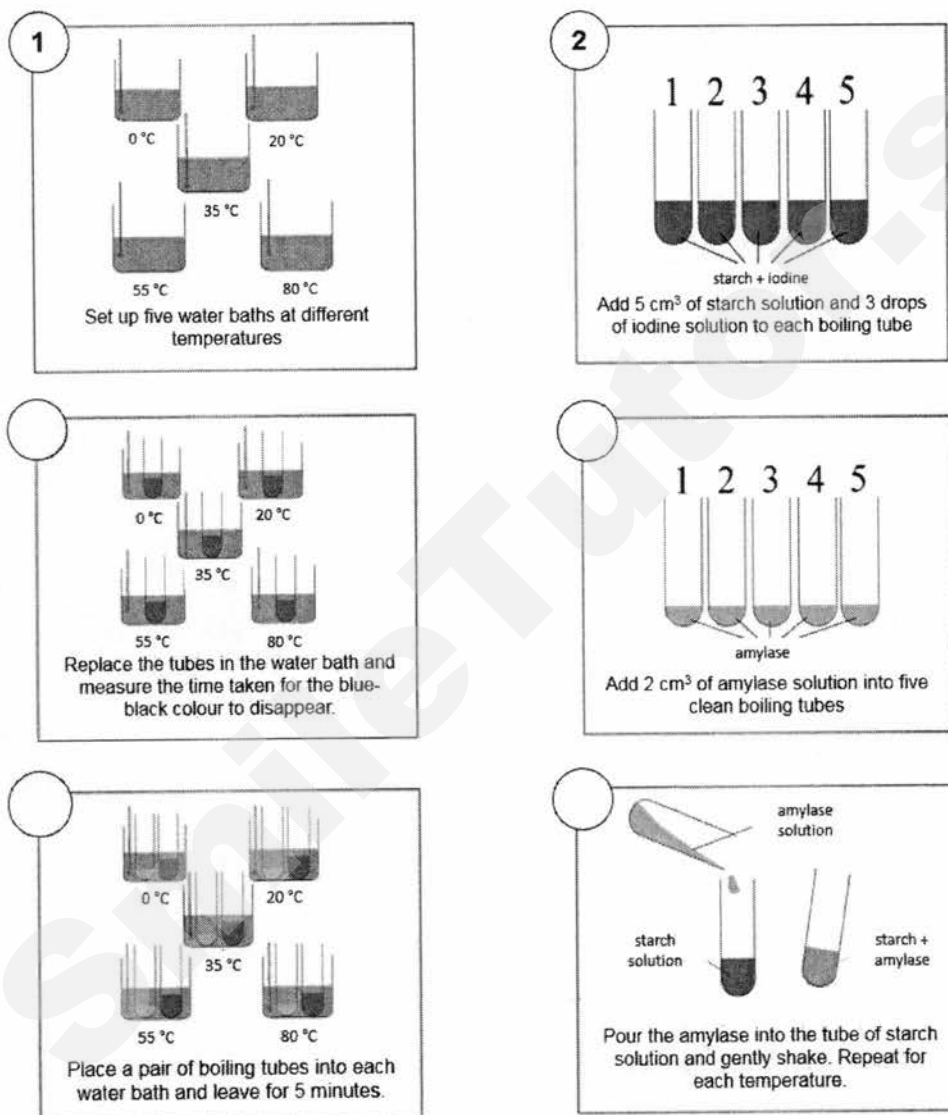


Fig. C3.1

- (a) (i) The order of the steps was missing in the log book. On Fig. C3.1, label the diagrams with the correct order of steps to carry out the experiment. The first two steps have been done for you. [2]

- (ii) State the hypothesis of this experiment.

.....

..... [1]

25

- (iii) State the independent variable in this experiment.

..... [1]

- (iv) State the dependent variable in this experiment.

..... [1]

- (v) State a controlled variable in this experiment.

..... [1]

- (b) After the experiment, the student recorded her results as shown in Table C3.2.

temperature / °C	0	20	35	55	80
time taken for starch to be digested / min	30	15	5	40	more than 40

Table C3.2

- (i) Explain the result observed at 80 °C.

.....

 [2]

- (ii) Her friend suggests that replacing amylase with lipase would produce the same result. Using your knowledge of the lock and key hypothesis, explain why her suggestion is wrong.

.....

 [2]

[Total: 10m]

For
Examiner's
Use

C4 (a) A student carried out an experiment involving weights and an extension spring as shown in Fig. C4.1.

For
Examiner's
Use

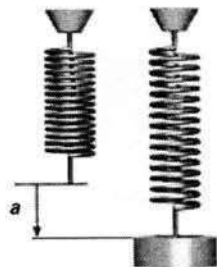


Fig. C4.1

She measured the length of the extension of the spring, a cm, each time she added weights to the spring. The results were recorded in Table C4.2.

mass of added weights /g	length of the extension, a /cm
0	0
10	5
20	10
30	
40	20
50	22
60	22

Table C4.2

- (i) State the relationship between the mass of added weights and the length of the spring for the mass of added weights between 0 and 40 g.
-
- [1]
- (ii) Name the force that is causing the length of the spring to extend.
- [1]
- (iii) State the length of spring when the mass of added weight is 30 g.
- [1]
- (iv) The length of the extension of the spring remains at 22 cm when the mass of the added weight is 50 g or more. Suggest a reason why there is a limit to the number of weights added to the spring.
- [1]

27

- (b) The student conducted another experiment on pressure with wooden blocks. She tested the different positions that the wooden block can be placed on eggs without the eggs cracking as shown in Figure C4.3. The block has a weight of 800 N.

For
Examiner's
Use

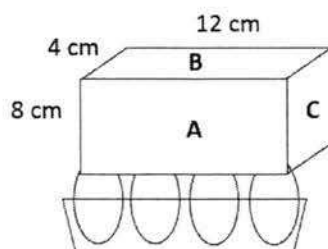


Fig. C4.3

- (i) Calculate the pressure exerted by the block when it is resting on side **B** on the floor.

- (ii) She then placed the block on top of a carton of 12 eggs and recorded the following results. The surface area of the top of each egg is 1.5 cm^2 .

[2]

side	number of eggs the block is in contact with	condition of the eggs after the experiment
A	12	not cracked
B	8	cracked
C	6	cracked

Using appropriate calculations, explain why the eggs cracked when lying on sides **B** and **C** but not **A**.

[4]

[Total: 10m]

- C5 (a)** The Singapore Assault Rifle 21 (SAR 21) is a weapon used by military personnel in Singapore. Fig. C5.1 shows the ammunition that is used with the rifle.

For
Examiner's
Use

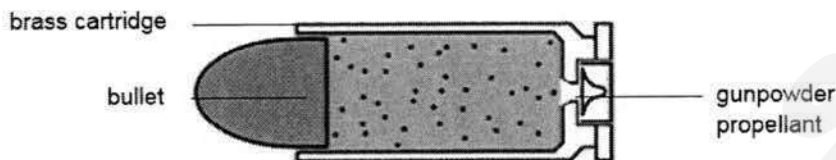


Fig. C5.1

The ammunition consists of a gunpowder propellant and a bullet encased in a brass cartridge. When the rifle's trigger is pressed, the propellant burns and pushes the bullet forward, emitting a loud sound.

- (i) State the form of energy that the gunpowder propellant contains.
- [1]
- (ii) The energy stated in (ai) is converted to other forms of energy when the bullet is fired. State two forms of energy it will be converted to by supporting your answer with evidence.
-
-
- [2]
- (iii) Hence, explain why the bullet may not be able to hit a target at extremely long distances.
-
- [1]

29

- (b) Fig. C5.2 shows a boy flying a drone. The mass of the drone is 800 g.

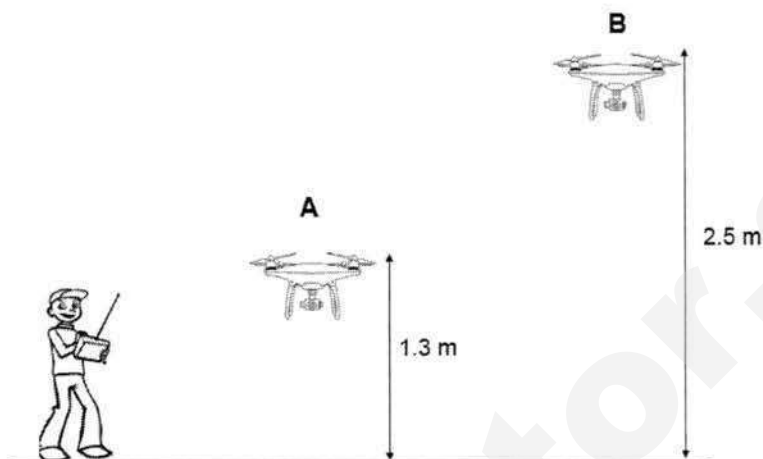


Fig. C5.2

For
Examiner's
Use

- (i) On Fig. C5.2, draw and label all the forces acting on the drone while it is in the air at position **A**. [2]
- (ii) Assuming that the gravitational field strength on Earth is 10 N/kg , calculate the work done against gravity by the drone in moving from position **A** to position **B**.

- (iii) The boy controls the drone to hover at position **B**. Explain how the drone is able to hover at position **B**. [2]

.....

.....

.....

.....

[2]

[Total: 10m]

- END OF PAPER -

The Periodic Table of Elements

Group																	
I	II	1 H hydrogen 1										III	IV	V	VI	VII	0
Key proton (atomic) number atomic symbol name relative atomic mass																	
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 -				

lanthanoids

actinoids

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
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 -

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

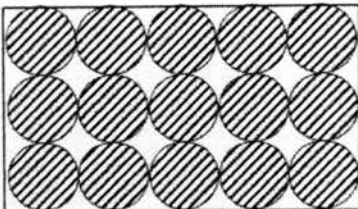
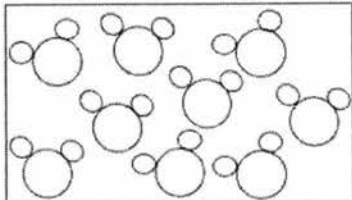
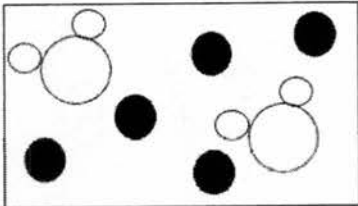
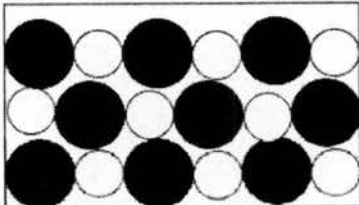
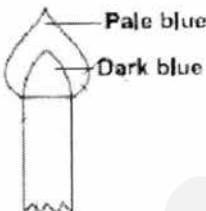
BEDOK SOUTH SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2017
Secondary 1 Express
Science
Marking Scheme

SECTION A: Multiple Choice Questions (30 marks)

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
D	A	A	C	D	C	B	B	C	D
Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
C	D	B	D	C	C	B	A	C	C
Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
C	C	B	C	A	D	A	D	D	D

SECTION B: Structured Questions (30 marks)

Qn no.	Suggested answer	Comments to markers	Marks
B1	a (i)	<ul style="list-style-type: none"> - 0.07 cm [1] 	[½] without units 1
	a (ii)	<ul style="list-style-type: none"> Reading with error = 3.18 cm [½] $d = 3.18 - (-0.07) = 3.25 \text{ cm}$ [½] 	[½] without units Award ECF 1
	b	<ul style="list-style-type: none"> $V = \frac{4}{3} \pi \left(\frac{d}{2} \right)^3$ $= \frac{4}{3} \times 3.14 \left(\frac{3.25}{2} \right)^3 = 18.0 \text{ cm}^3$ [1] 	[½] without units Award ECF 1
	c (i)	<ul style="list-style-type: none"> $\text{Density} = \frac{\text{Mass}}{\text{Volume}} = \frac{17.3}{18} = 0.96 \text{ g / cm}^3$ [1] 	Award ECF No penalty for units 1
	c (ii)	<ul style="list-style-type: none"> 960 kg / m³ [1] 	1
	d	<ul style="list-style-type: none"> The Styrofoam ball has a lower density than water and would float such that it cannot displace water. [1] 	A: lower density / float R: light so will float 1

B2	a	<div></div> <div></div> <div></div> <div></div>	[½] each	BP2102									
	b	<ul style="list-style-type: none">• S melts and boils over a range of temperature but Q has fixed melting and boiling points. [1]• S has variable composition by mass but Q has fixed composition by mass. [1]	Accept any other correct property	2									
B3	a	<ul style="list-style-type: none">• W: dissolving / adding water or solvent [½]• X: filtration [½]• Y: evaporation to dryness / heating [½]• Z: crystallisation [½]		2									
	b		[0] if luminous flame drawn or labelled / no labels / orange colour was indicated [½] if indicated as non-luminous	1									
B4	a	<table><tr><td>components of food</td><td>more at A</td><td>almost the same at A and B</td></tr><tr><td>starch</td><td></td><td>✓</td></tr><tr><td>protein</td><td>✓</td><td></td></tr></table>	components of food	more at A	almost the same at A and B	starch		✓	protein	✓		[0] if more than 1 tick per row	2
	components of food	more at A	almost the same at A and B										
starch		✓											
protein	✓												
b	<p>Any 2:</p> <ul style="list-style-type: none">• The proteins are digested to amino acids by proteases in the small intestine. [1]			2									

- Starch is digested to maltose by amylase. [1]
- Maltose is digested to glucose by maltase. [1]
- The amino acids and glucose / digested food substances are absorbed in the small intestine / villi into the bloodstream. [1]

•

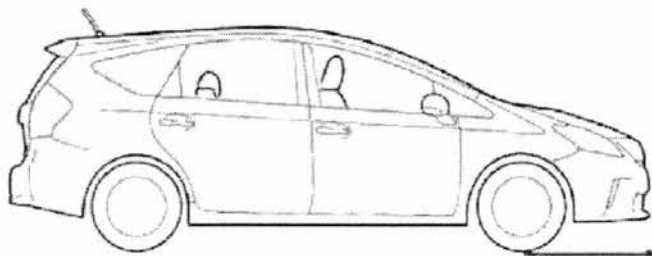
- c**
- Less bacteria / microorganisms are killed. [1]
 - The pH of the environment in the stomach is less acidic so digestion of proteins by proteases is less efficient. [1]

[½] for digestion of food slower / less

2

•

B5 a (i)



Arrow must be drawn between tyres and road [½] if correct direction but not at tyres

1

•

- a (ii)**
- $W = mg = 1325 \times 10 = 13250 \text{ N}$ [1]
 - $P = \frac{F}{A} = \frac{13250}{0.4 \times 4} = 8.28 \times 10^3 \text{ Pa}$ [1]

[½] without units

2

•

- a (iii)**
- With larger tires, the total contact area between the tyres and sand is increased [½] such that the pressure between the tyres and sand is reduced [½].

Must show relationship between area and pressure

1

•

- b (i)**
- Biofuels / solar energy / hydrogen fuel cell [1]

1

•

- b (ii)**
- Hybrid cars have less power. [1]
 - Hybrid cars are more expensive in Singapore. [1]

Accept other reasonable answers

1

•

- B6 a**
- At **A**, the roller coaster has gravitational potential energy only. [1]
 - As it slides down from **A** to **B**, some of the gravitational potential energy is converted to kinetic energy, sound and heat energy. [1]
 - At lowest point **B**, all the gravitational potential energy of the roller coaster is now converted to kinetic energy, sound and heat energy. [1]

3

•

- b (i)**
- $t = \frac{d}{s} = \frac{10}{25} = 0.4 \text{ s}$ [1]

1

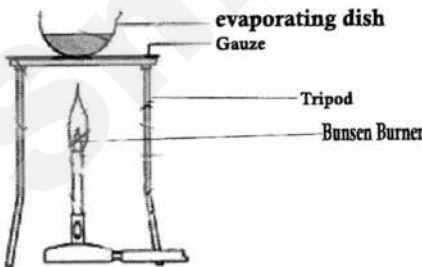
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- $F = \frac{W}{d} = \frac{158\,000}{56} = 2821.4 \text{ N} (2820 \text{ N})$ [1]

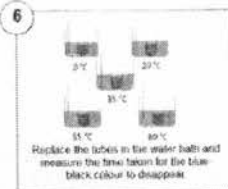
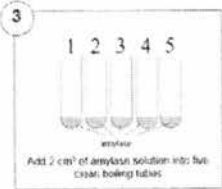
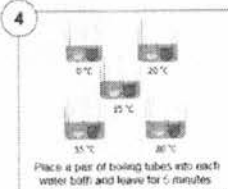
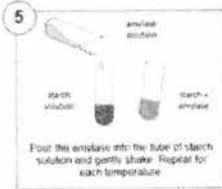
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b (ii)	•	
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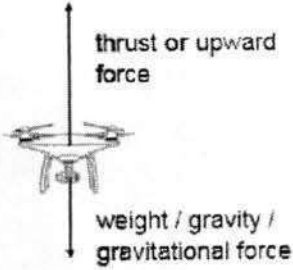
SECTION C: Free Response Questions (40 marks)

Qn no.	Suggested answer	Comments to markers	Marks
C1	a	<ul style="list-style-type: none"> Curiosity / Perseverance / Integrity / Objectivity / Open-mindedness [1] 	Accept other reasonable answers 1
		•	
	b (i)	<ul style="list-style-type: none"> Device A is a beam balance that measures the mass of the rock which depends on the amount of matter in the meteorite. Device B is a spring balance that measures the weight of the meteorite which depends on the gravitational field of the planet. 	Award [$\frac{1}{2}$] each for mention of mass or weight 2
		•	
	b (ii)	<ul style="list-style-type: none"> The meteorite has a large volume and would not be able to fit into the measuring cylinder. [1] 	A: measuring cylinder cannot measure large vol. 1
		•	
	b (ii)	<ul style="list-style-type: none"> Same density [1] The mass [$\frac{1}{2}$] and volume [$\frac{1}{2}$] of the meteorite is the same on both planets as it is not affected by the gravitational field. 	2
c	(i)	 <p>evaporating dish Gauze Tripod Bunsen Burner</p>	evaporation dish tripod correctly drawn [$\frac{1}{2}$] each labelled apparatus [$\frac{1}{2}$] each 2
		•	
	c (ii)	<ul style="list-style-type: none"> Wear safety goggles during heating. [1] 	Accept other reasonable answers e.g. close air hole 1
		•	
c	(iii)	<ul style="list-style-type: none"> Test for its boiling point. [$\frac{1}{2}$] If it is pure water, it should have a fixed boiling point at 100 °C. [$\frac{1}{2}$] 	A: density of 1 g/cm ³ 1

		OR		BP~105
		<ul style="list-style-type: none"> Distillation [$\frac{1}{2}$] If liquid distills at 100 °C (or same temperature), it is pure water / collect only 1 distillate. [$\frac{1}{2}$] 		
		•		
C2	a (i)	<ul style="list-style-type: none"> She would observe a solution with excess solid formed / solid B would not be fully dissolved. [1] The maximum solubility of solid B in liquid Y at room temperature is 50 g / 100 cm³. Hence, there would be 7.5 g of solid B undissolved. [1] 	A: cannot dissolve anymore as reached saturation / need more solvent / quoting any reasonable figures to support	2
		•		
	a (ii)	<ul style="list-style-type: none"> Increase the temperature of the solvent / Use finely ground solids / increase rate of stirring [1] 	A: add more solvent	1
		•		
	a (iii)	<ol style="list-style-type: none"> Add liquid X / Y to dissolve the solid A / C in a beaker. [1] Filter the mixture using a filter funnel and filter paper into a conical flask. [1] (If using liquid X) Solid C will be collected as residue on the filter paper while the solid A is the filtrate collected in a conical flask OR (If using liquid Y) Solid A will be collected as residue on the filter paper while the solid C is the filtrate collected in a conical flask. [1] <p>OR</p> <ol style="list-style-type: none"> Heat the filtrate in an evaporating dish to dryness to obtain solid A OR Heat the filtrate in an evaporating dish to dryness to obtain solid C. [1] 	No penalty for not stating apparatus A: last step as crystallization instead of evaporation	3
		•		
	b (i)	<ul style="list-style-type: none"> EPO is more soluble than ACTH in alcohol and moves a further distance along the filter paper / EPO and ACTH have different solubilities in alcohol. [1] 		1
		•		
	b (ii)	<ul style="list-style-type: none"> HCG is insoluble [$\frac{1}{2}$] in alcohol. [$\frac{1}{2}$] 		1
		•		
	b (iii)	<ul style="list-style-type: none"> Athlete Z [1] The urine sample of Z contains IGF-1. [1] 		2
		•		

C3	a (i)	   	[½] for each	
	a (ii)	<ul style="list-style-type: none"> The higher the temperature, the longer/shorter the time taken for the blue-black colour to disappear / the longer/shorter the time taken for starch to be digested. [1] 	A: closer to body temperature, faster digestion	1
	a (iii)	<ul style="list-style-type: none"> Temperature of the water bath [1] 		1
	a (iv)	<ul style="list-style-type: none"> Time taken for the blue-black colour to disappear / Time taken for starch to be digested [1] 		1
	a (v)	<ul style="list-style-type: none"> Volume/concentration of starch solution used/ volume of iodine solution used/ volume/concentration of amylase solution added [1] 		1
	b (i)	<ul style="list-style-type: none"> At 80 °C, the enzyme amylase has been <u>denatured</u>. [1] When the active site shape of amylase is changed by denaturation, it is no longer complementary to / does not fit the shape of the starch substrate, hence <u>starch cannot be digested / take longer time to digest</u>. [1] 		2
	b (ii)	<ul style="list-style-type: none"> The enzyme lipase (enzyme) has an active site shape that is <u>not complementary to</u> / does not fit the substrate starch (key). Hence, lipase would not be able to bind to the starch and there <u>will not be any digestion of starch</u> / Lipase can only digest fat / enzymes digest specific substrates. [1] 		2
	a (i)	<ul style="list-style-type: none"> As the mass of added weight increases, the length of spring increases (proportionally). [1] 		1
	a (ii)	<ul style="list-style-type: none"> Gravitational force / weight [1] 	[½] gravity	1
	a (iii)	<ul style="list-style-type: none"> 15 cm [1] 		1

	a (iv)	<ul style="list-style-type: none">Beyond a certain mass, the spring will be permanently stretched and will not revert back to its original form. [1]	Accept other reasonable answers e.g. stretched to max / prevent spring from breaking	BP1107								
		<ul style="list-style-type: none">										
	b (i)	<ul style="list-style-type: none">$area = l \times b = 0.12 \times 0.04 = 0.0048 \text{ m}^2$ [1]$pressure = \frac{force}{area} = \frac{800}{0.0048} = 1.67 \times 10^5 \text{ Pa}$ [1]	A: 16.6 N/cm^2 [½] for showing calculating each area correctly (regardless of units)	2								
	b (ii)	<ul style="list-style-type: none">$pressure \text{ (side A)} = \frac{force}{area} = \frac{800}{12 \times 0.015} = 4.44 \times 10^3 \text{ Pa}$ [1]$pressure \text{ (side B)} = \frac{force}{area} = \frac{800}{8 \times 0.015} = 6.67 \times 10^3 \text{ Pa}$ [1]$pressure \text{ (side C)} = \frac{force}{area} = \frac{800}{6 \times 0.015} = 8.89 \times 10^3 \text{ Pa}$ [1]Side A exerts the least pressure and thus does not cause the egg to crack. Sides B and C exert more pressure on the eggs than side A, thus causing the eggs to crack. [1]	[½] for showing calculating each area correctly (regardless of units) A: 18 cm^2 B: 12 cm^2 C: 9 cm^2	4								
		<ul style="list-style-type: none">										
	C5	a (i)	<ul style="list-style-type: none">Chemical potential energy [1]		1							
	a (ii)	<table><thead><tr><th>energy [½]</th><th>evidence [½]</th></tr></thead><tbody><tr><td>kinetic energy</td><td>bullet moves at great speeds</td></tr><tr><td>sound energy</td><td>a loud sound is emitted</td></tr><tr><td>heat energy</td><td>heat is released when the gunpowder burns causing the barrel of the gun to be hot</td></tr></tbody></table>	energy [½]	evidence [½]	kinetic energy	bullet moves at great speeds	sound energy	a loud sound is emitted	heat energy	heat is released when the gunpowder burns causing the barrel of the gun to be hot		2
	energy [½]	evidence [½]										
	kinetic energy	bullet moves at great speeds										
	sound energy	a loud sound is emitted										
	heat energy	heat is released when the gunpowder burns causing the barrel of the gun to be hot										
	<ul style="list-style-type: none">											
	a (iii)	<ul style="list-style-type: none">The CPE (from the bullet) / kinetic energy (of the moving bullet) / is converted to other forms of energy such as heat energy so there is <u>not enough kinetic energy to propel the bullet over long distances / which slows the bullet down.</u> [1]	A: not all CPE is converted to KE	1								
	<ul style="list-style-type: none">											

	b (i)		[1] each force ON the drone [½] if indicate direction of force	2
		•		
	b (ii)	<ul style="list-style-type: none"> • $W = mg = 0.8 \times 10 = 8\text{ N}$ [1] • $W = f \times d = 8 \times (2.5 - 1.3) = 9.6\text{ J}$ [1] 		2
		•		
	b (iii)	<ul style="list-style-type: none"> • The drone is able to hover when the resultant force acting on the drone is 0 N. [1] • This happens when the upward force (thrust) is equal to the downward gravitational force. [1] 		2
		•		

- END OF PAPER -



END OF YEAR EXAMINATION 2017

Secondary 1 Express

SCIENCE

2 OCT 2017

TIME: 10:00 a.m. – 11:45 a.m.

DURATION: 1 hour 45 minutes

Additional material: OAS

INSTRUCTIONS TO STUDENTS:

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

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

You may use a soft pencil for any diagrams, graphs or rough working.

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

SECTION A

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 (2B) on the separate OAS.

SECTION B

Answer **all** questions.

Write your answers in the spaces provided on the Question Paper.

SECTION C

Answer **three** questions.

Question 12 is in the form of an **EITHER / OR** question. Only one should be answered.

Write your answers in the spaces provided on the Question Paper.

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

The total number of marks for this paper is 100.

Name of Student: _____ ()

Class: _____

Parent's Signature: _____

Setter: Mr Sia Jiale

For Examiner's Use	
Section A	30
Section B	40
Section C	30
Total	100

This question paper consists of 25 printed pages including this page.

Section A**Multiple Choice Questions [30 marks]**

Answer **all** questions. Shade your answers with 2B pencil in the OAS provided.

1. A student wants to find out why cactus is able to survive very long without water in its environment.
Which attitude has he displayed?
 - A curiosity
 - B integrity
 - C perseverance
 - D responsibility

2. Which is a scientific investigation?
 - A counting how many prime numbers there are between 100 to 300
 - B conducting a survey to find out how many people listen to pop music
 - C excavating to find out things which were used in ancient China
 - D using cooking oil in cars to see whether it can be a substitute for liquid petroleum

3. Annabelle noticed that paint on walls faded after some time.
Which is a hypothesis for this observation?
 - A Is the paint quality good?
 - B Paint is a mixture.
 - C Rain washed off the paint.
 - D Samples of paint need to be analysed.

4. Which statement is inferred and not a direct observation?
 - A A swan can fly.
 - B Matter is made up of particles.
 - C Pure ice freezes at 0 °C.
 - D The moon orbits around the Earth.

5. Which statement is correct about laboratory safety?
 - A Drinking distilled water in the laboratory is allowed.
 - B Entering the lab is not allowed without teacher's supervision.
 - C Reporting accidents to the teacher only if someone is injured.
 - D Tasting of chemicals is allowed when one is identifying them.

6. Silicon carbide is a hard substance. This means that it _____.

- A can withstand weights without breaking
- B cannot be easily hammered into shapes
- C cannot be easily scratched
- D cannot go back to its original shape after being bent

7. What is the laboratory apparatus shown below?



- A beaker
- B conical flask
- C flat-bottomed flask
- D triangular beaker

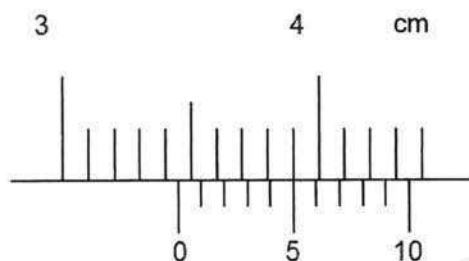
8. John wanted to see if sublimation will affect the density of a substance. He started with 100g of solid iodine. After undergoing sublimation, only 80g of solid iodine is left. What can you say about the density of solid iodine?

- A The density decreased by 20%.
- B The density decreased by 25%.
- C The density increased by 20%.
- D The density remained the same.

9. The table below shows properties of substances **A**, **B**, **C** and **D**. Which substance is most likely a metal?

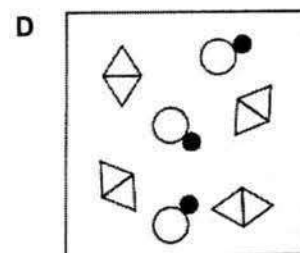
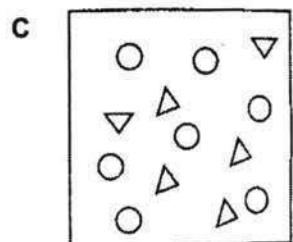
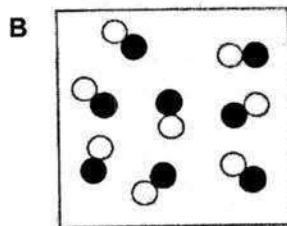
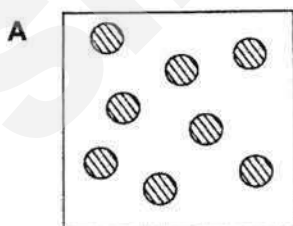
	melting point / °C	boiling point / °C	electrical conductivity	
			solid state	liquid state
A	1020	3561	nil	good
B	34	700	good	nil
C	660	2470	good	good
D	-77	-33	nil	nil

10. The diagram shows the reading on a pair of Vernier calipers when measuring the thickness of a book. The Vernier calipers has a zero error of $+0.03\text{cm}$.



What is the actual thickness of the book?

- A 3.42 cm
 B 3.45 cm
 C 3.48 cm
 D 3.50 cm
11. Ethanol is found in alcoholic drinks. Its chemical formula is $\text{C}_2\text{H}_6\text{O}$. This means that ethanol contains the elements _____.
- A carbon and hydrogen only
 B carbon and water only
 C copper, hydrogen and oxygen only
 D carbon, hydrogen and oxygen only
12. Which diagram shows the model of a mixture of compound and element?



13. Which is the correct term to describe the mixture of sand and water?
- A emulsion
 - B residue
 - C solution
 - D suspension
14. Which is a mixture?
- A alloy
 - B mercury
 - C salt
 - D water
15. After separating salt solution into its components, salt and water, they _____.
- A chemically changed as the substances are chemically combined
 - B chemically changed as the substances are physically mixed
 - C remain chemically unchanged as the substances are chemically combined
 - D remain chemically unchanged as the substances are physically mixed
16. Fractional distillation is best used to separate _____.
- A substances of boiling points that are far apart
 - B substances of different but close boiling points
 - C substances which are immiscible
 - D substances with different solubilities
17. When distilling a liquid, it is sometimes advisable to place porcelain chips in the distillation flask. This is because porcelain chips _____.
- A can absorb excess heat
 - B can remove any impurities present
 - C do not allow the liquid to boil till dryness
 - D ensure smooth boiling

18. The diagram shows a cross-section of a red blood cell. The red blood cell is biconcave as shown.



Which statement best explains the function of this adaptation?


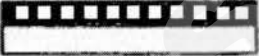


- A It does not have a nucleus.
 - B It has a larger surface area to absorb oxygen.
 - C It has more space to contain oxygen.
 - D It is easier to travel in the bloodstream.
19. A scientist removed the cell wall of a unicellular organism. The cell continued to move and feed for several days. However, the cell died a few days later from an infection caused by a bacteria present in air. The experiment was repeated several times and similar results were obtained.
What can be inferred from this experiment?
- A The cell wall gives the cell its regular shape.
 - B The cell wall helps the cell feed better.
 - C The cell wall helps to protect the cell.
 - D The nucleus helps the cell to reproduce.
20. The small intestine is an organ because it is made up of _____.
- A different types of tissues working together
 - B many different types of specialised cells
 - C many tissues carrying out different tasks
 - D same types of cells working together
21. Which statement describes the behaviour of gaseous particles?
- A They are moving randomly at high speeds.
 - B They are widely and equally spaced apart.
 - C They settle to the bottom after some time.
 - D They slide over one another.




The table below shows the melting and boiling points of four substances **A**, **B**, **C**, **D**. Study the table and answer questions 22 and 23.

	A	B	C	D
melting point / °C	-73	-131	5	9
boiling point / °C	60	-1	5	103

22. Which substance has the weakest attractive force between its particles at 4°C?
23. Which substance undergoes sublimation?
24. Which statement about particles is correct when liquid freezes to become a solid?
- A** The particles decrease in size.
 - B** The particles stop moving.
 - C** The particles move further apart.
 - D** The speed of the particles decreases.
25. Dust particles in the air appear to move on their own in random directions. Which statement correctly explain this observation?
- A** The dust particles change speed randomly.
 - B** The dust particles collide with gas particles in the air.
 - C** The dust particles collide with one another.
 - D** The dust particles collide with water particles.
26. Wei Meng found an element which contains 5 neutrons, 3 protons and 3 electrons. Which statement correctly describes the identity of the element?
- A** Beryllium, because it has 5 neutrons.
 - B** Lithium, because it has 3 protons.
 - C** Lithium, because it has 3 electrons.
 - D** Insufficient information was given to identify the element.

27. The table below shows two bimetallic strips, X and Y which are made up of different metals, P, Q and R.

	bimetallic strip X	bimetallic strip Y
before heating		
after heating		

Legend:  Metal P  Metal Q  Metal R

Which correctly arranges the worst thermal conductor to the best thermal conductor?

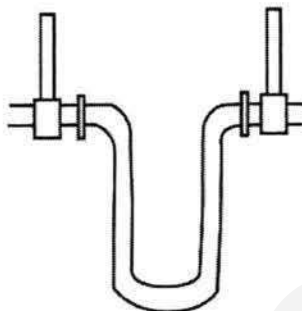
- A P, Q, R
 B Q, P, R
 C R, P, Q
 D R, Q, P
28. The tyres of cars and bicycles deflate after some time.
 Which statement best explains this observation?
- A The air particles contract during cold weather and escape the tyres.
 B The tyres are made of rubber which loses elasticity and hence deflate.
 C The tyres contract during cold weather, making it look deflated.
 D There are tiny holes in the tyres which allow air particles to escape.
29. The diagram shows a saucepan.



Which material is suitable to make the handles of a saucepan?

- A aluminium
 B brass
 C glass
 D plastic

30. The diagram shows a loop in a pipe that carries steam to a machine.



The loop is necessary to _____.

- A** allow for expansion of the pipe when hot
- B** allow for contraction of the pipe when hot
- C** increase the flow of steam in the pipe
- D** reduce the flow of steam in the pipe

Section B**Short Structured Questions [40 marks]**

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

1. **Table 1.1** shows the density of various materials.

Table 1.1

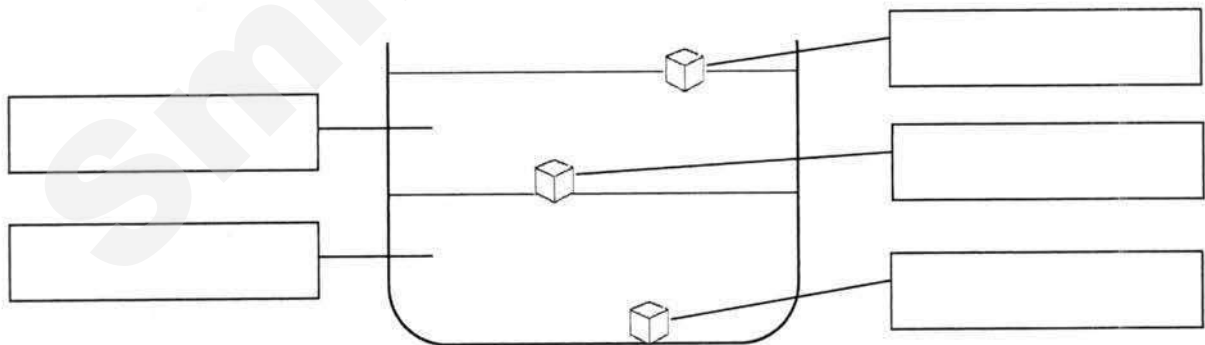
material	density (g/cm ³)
mercury	13.6
sea water	1.3
gold	19.3
ice	0.92
aluminium	2.7

- (a) With reference to **Table 1.1**, explain one advantage of using aluminium to build aircrafts.

[1]

- (b) **Figure 1.1** shows the mixture obtained when all of the above materials were put into a container. Write down the identity of the materials in the boxes.

[3]

**Figure 1.1**

[Total: 4 marks]

2. Mary placed some fish balls in boiling water to cook them. After some time, she found that the fish balls which originally sank in water, began to float. Explain this observation. [2]

[Total: 2 marks]

3. **Figure 3.1** shows a drawing of a Bunsen burner.

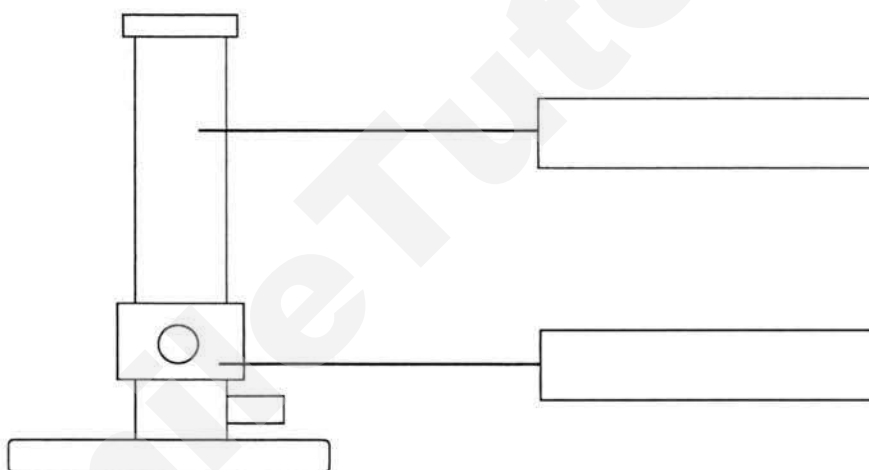


Figure 3.1

- (a) Complete **Figure 3.1** by naming the parts of the Bunsen burner in the boxes. [2]
- (b) Explain why it is important to close the air-hole before lighting a Bunsen burner. [1]

- (c) Explain why leaving a Bunsen burner unattended with an open air-hole is more dangerous than with a closed air-hole. [2]

[Total: 5 marks]

4. Sugar has the chemical formula $C_6H_{12}O_6$. When heated, steam and a black coloured substance is formed.

(a) State if the change is chemical or physical. Give a reason to support your answer. [1]

(b) A student proposed that the black coloured substance is the element iodine. Based only on the information given above, explain why the substance is not iodine. [2]

(c) Given that the black substance is an element in the solid state, suggest the identity of the black substance. [1]

(d) Explain why sugar is a compound. [1]

[Total: 5 marks]

5. **Figure 5.1** shows the process of reverse osmosis.

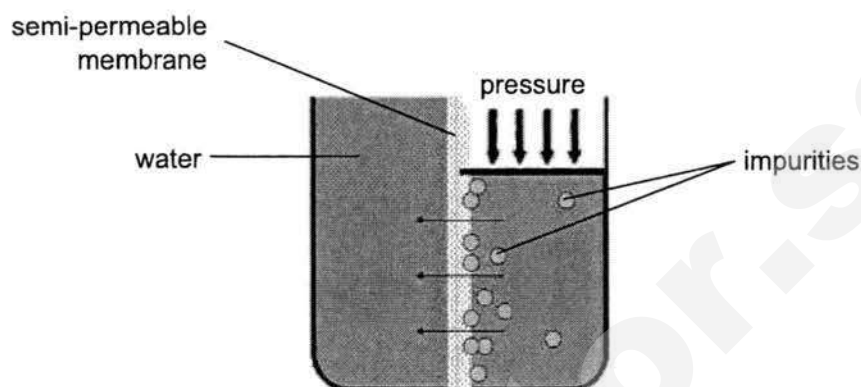


Figure 5.1

- (a) Define "*semi-permeable membrane*". [1]

- (b) Describe how this process is different from filtration. [1]

- (c) Explain why the water that is produced from reverse osmosis may not be pure. [1]

- (d) Suggest a reason why reverse osmosis is an expensive process. [1]

[Total: 4 marks]

6. **Figure 6.1** shows the concentration of oxygen in blood samples at three different places in the circulatory system.

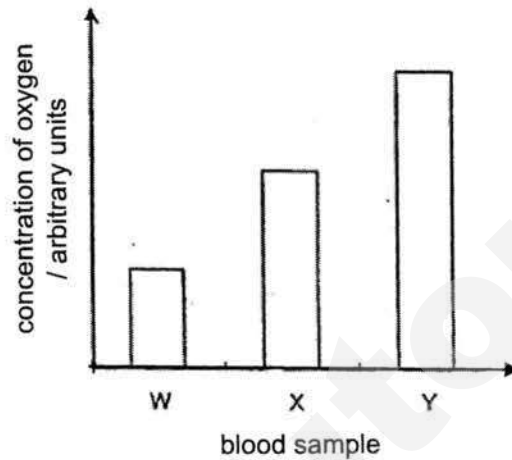


Figure 6.1

- (a) Which sample was taken from a blood vessel which has been transported through the liver? Explain your answer. [1]

- (b) Which blood sample has the lowest amount of carbon dioxide? [1]

- (c) With reference to the movement of dissolved substances between the blood stream and organs, explain the advantage of capillary walls being only one cell thick. [2]

[Total: 4 marks]

7. **Figure 7.1** shows a model of a plant cell.

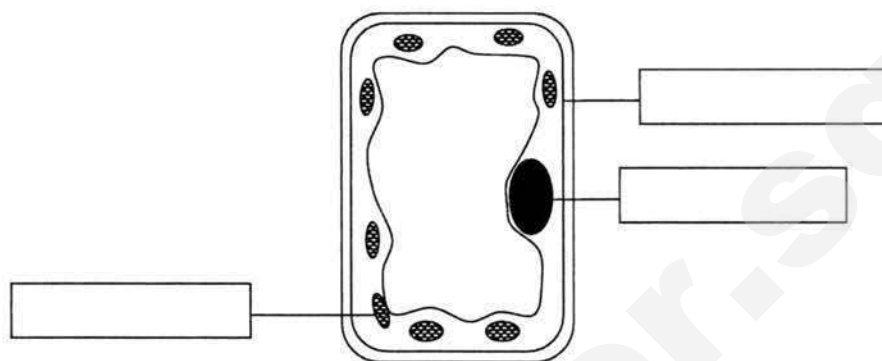


Figure 7.1

- (a) Label the parts of the plant cell in **Figure 7.1**. [3]
(b) Describe two differences between a typical plant cell and a typical animal cell. [2]

1. _____

2. _____

[Total: 5 marks]

8. **Figure 8.1** shows a flask of air with a drop of dye in the capillary tube.

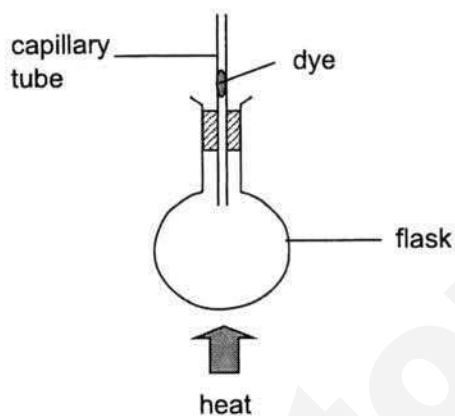


Figure 8.1

- (a) When the flask was heated strongly, the dye moved down for a moment before moving upwards. Explain this observation. [2]

- (b) Explain why a small flame would not cause an obvious downward movement of the dye. [1]

- (c) One flask was filled with air and the other flask was filled with water. Both flasks were warmed gently to ensure that no boiling takes place. State how the upward distance moved by the dye would be different. Explain your answer. [2]

[Total: 5 marks]

- 9 **Figure 9.1** shows two sealed containers filled with boiling water at 100°C . The thermometers measure the temperature of the water in the containers. The containers are wrapped with different colours of paper as shown. They are left in the same place to cool.

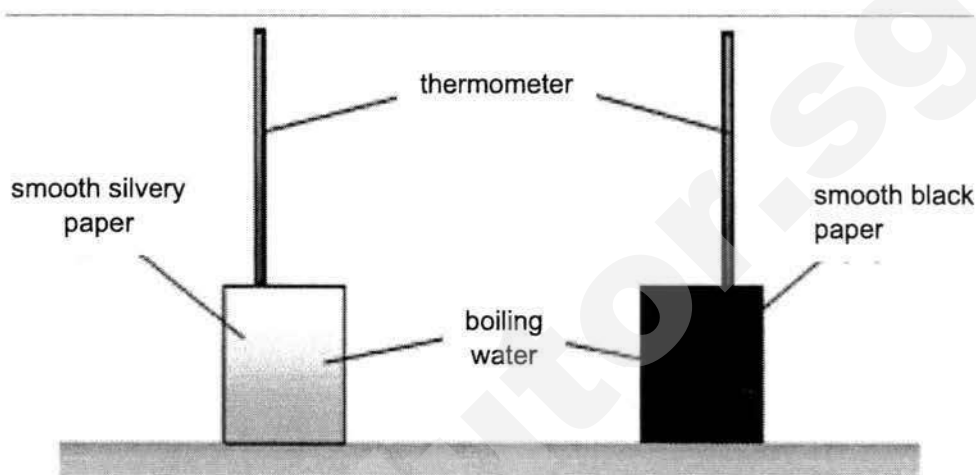


Figure 9.1

- (a) State the SI unit of temperature. [1]
- _____
- (b) State and explain which container will reach room temperature first. [2]
- _____
- _____
- _____
- (c) Suggest a change which you can make to the texture for both papers to increase the rate of heat loss. [1]
- _____
- _____
- (d) Radiation is the only mode of heat transfer from the Sun to the Earth. Explain why heat cannot be transferred to Earth via conduction or convection. [2]
- _____
- _____
- _____

[Total: 6 marks]

Section C**Long Structured Questions [30 marks]**

Answer three questions. Question 12 is in the form of an **EITHER / OR** question. Only one should be answered. Write your answers in the spaces provided.

10. (a) Hydrochloric acid is commonly used in the production of batteries. It has the chemical formula HCl . Figure 10.1 shows the representation of hydrogen and chlorine as found in the periodic table.

1 H hydrogen 1	17 Cl chlorine 35.5
-------------------------	------------------------------

Figure 10.1

- (i) State the proton number and nucleon number for chlorine. [2]

proton number: _____ nucleon number: _____

- (ii) Calculate the number of neutrons in a hydrogen atom. [1]

- (iii) In the space below, draw circles to represent the HCl molecule. [2]

- (b) Figure 10.2 shows the model of an atom. Label the parts of an atom in the boxes below. [2]

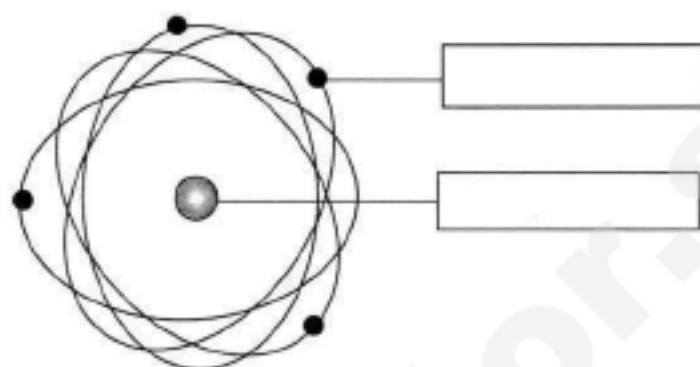


Figure 10.2

- (c) Explain why an atom is electrically neutral even though it has negatively charged electrons. [3]

[Total: 10 marks]

11. (a) **Figure 11.1** shows a setup of heating a beaker filled with water.

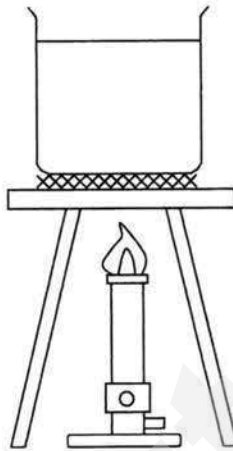


Figure 11.1

- (i) On **Figure 11.1**, draw the convection current formed in the water. [1]
- (ii) With reference to the particulate nature of matter, explain why heated water has lower density. [4]

- (b) **Figure 11.2** shows rods of three different materials being mildly heated at one end. All three rods have the same length and they have equal masses of wax attached at the other end of the rod.

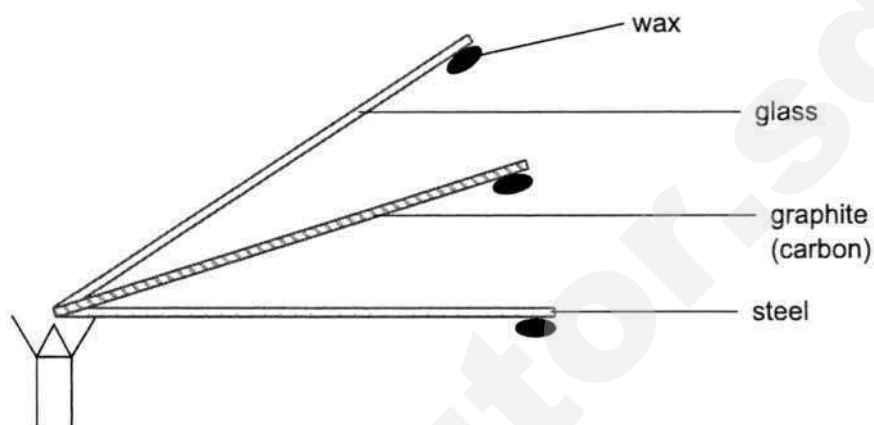


Figure 11.2

- (i) Explain which wax will melt first. [2]

- (ii) State the mode of heat transfer from the flame to the wax. [1]

- (iii) With reference to the particulate nature of matter, explain how heat energy is transferred from the flame to the wax. [2]

[Total: 10 marks]

EITHER

12. **Table 12.1** shows the maximum mass of four substances **A**, **B**, **C** and **D** that can dissolve in various solvents **W**, **X**, **Y** and **Z**. 20g of each substance is dissolved in the same amount of solvent.

Table 12.1

solvent	maximum mass of substance dissolved /g			
	A	B	C	D
W	4	10	0	0
X	14	13	20	11
Y	3	6	13	12
Z	11	2	12	10

- (a) If a shirt was stained with substance **A**, state the best solvent to remove the stain. [1]

- (b) If substance **B** and **D** are mixed together, state the best solvent to separate them. [1]

- (c) Given that both substances **B** and **D** are solids at room temperature, describe how you would carry out your separation using the solvent stated in 12(b). State clearly where the substances can be obtained after separation. [3]

- (d) State the combination of solvent and substance that will produce a solution without sediments. [1]

- (e) Describe three ways to increase the rate of dissolving a solid in a solvent. [3]

- (f) A student wants to dissolve more of substance **A** in solvent **W**. Without changing the amount of **A** and volume of **W**, describe one way to dissolve more of substance **A** in solvent **W**. [1]

[Total: 10 marks]

OR

12. **Figure 12.1** shows a potometer that measures the rate of water movement through a leafy shoot (no roots are present). The experiment was conducted in various weather conditions and the distance moved by the air bubble was recorded.

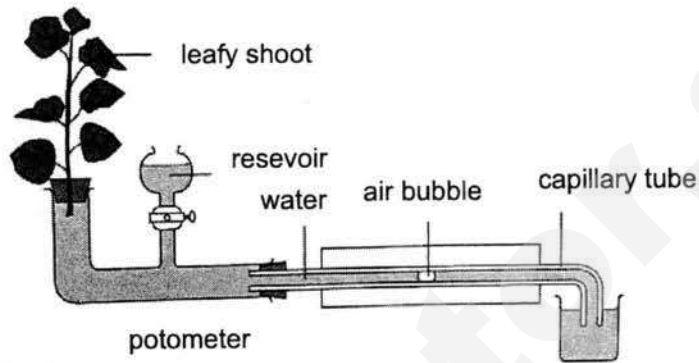


Figure 12.1

- (a) State the direction which the air bubble will move after it has been left in the open for one day. Explain your answer. [1]

- (b) State two factors affecting the rate of intake of water by the plant **and** describe how they affect the intake of water. [2]

factor 1: _____

factor 2: _____

- (c) Name the part of the shoot which transports water. [1]

- (d) Name the part of the shoot which transports dissolved sugar, and describe the direction of movement of the dissolved sugar. [2]

- (e) Give two reasons to explain why the plant needs water. [2]

- (f) When pure water was used for the setup, the plant died after a few days. Given that the plant is an aquatic plant, and that it received sufficient sunlight, suggest a reason for this observation. [1]

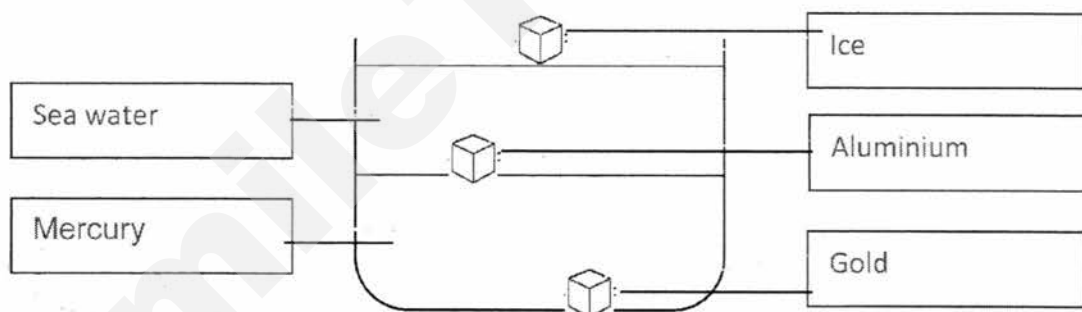
- (g) Describe one variable which must be kept constant throughout all experiments. [1]

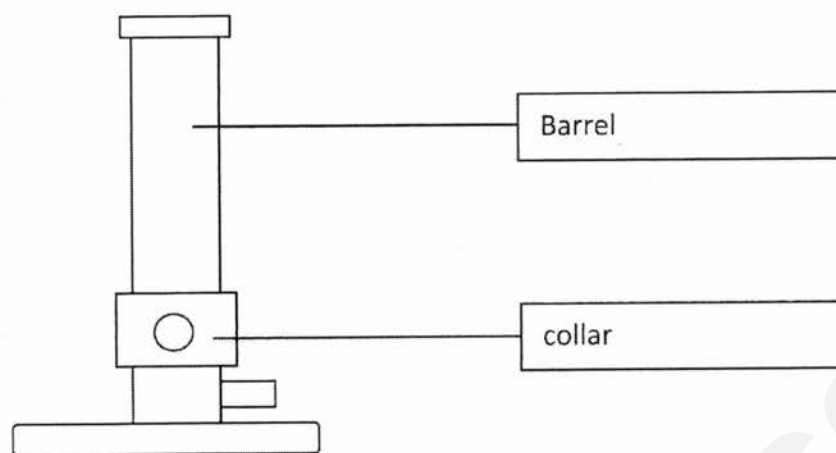
[Total: 10 marks]

SECTION A – MULTIPLE CHOICE QUESTIONS (30 MARKS)

1	2	3	4	5	6	7	8	9	10
A	D	C	B	B	C	B	D	C	A
11	12	13	14	15	16	17	18	19	20
D	D	D	A	D	B	D	B	C	A
21	22	23	24	25	26	27	28	29	30
A	B	C	D	B	B	C	D	D	A

SECTION B – SHORT STRUCTURED QUESTIONS (40 MARKS)

Qs	Suggested answer	Remarks	Marks
1 (a)	Aluminium is <u>not dense</u> , and <u>aircraft needs a light body to fly</u> .	OWTTE	1
1 (b)	 <p>1 mark for correct placement of seawater and mercury</p> <p>2 marks for ice aluminium and gold. -1 mark for every wrong placement of the solids.</p>		3
Total: 4 marks			
2	<p>The fish balls <u>expanded / increased in volume</u> when heated. [1]</p> <p>Hence <u>density decreased to become lesser than density of water</u>. [1] causing the fishball to float.</p>		2



3(a)

2

3(b)

This is to prevent a strikeback from occurring.

1

3(c)

The flame is difficult to see [1]
and it is also much hotter [1], potentially causing serious burns.

2

Total: 5 marks

4(a)

Chemical. A new substance is formed

No marks for just stating chemical reaction.

1

4(b)

Sugar is not made up of Iodine. [1] OR Sugar only contains C, H, and O.

No new elements can be created [1] from the chemical reaction.

2

4(c)

carbon

CAO

1

4(d)

It is made up of 3 different elements chemically combined.

1

Total: 5 marks

5(a)

A semi-permeable membrane only allows certain substances to pass through.

OR only allows small substances to pass through.

1

5(b)

Pressure is involved.

ACCEPT: Filtration uses gravitational pull

1

5(c)

Some impurities are small enough to pass through the membrane. [1] making the water not pure.

1

5(d)

Membranes need to be changed frequently

1

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OR

The energy used to exert the force/pressure is expensive.

Total: 4 marks

6(a)

W or X

Oxygen from the blood has diffused to the liver. [1]
Hence it has less oxygen content.

1

6(b)

Y

CAO

1

6(c)

This is because the distance between the substances and the organs is short. [1]

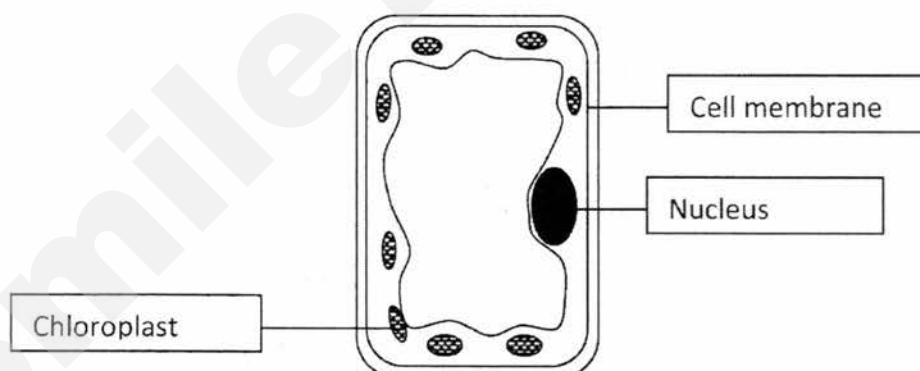
ACCEPT: thin walls will hinder the movement of the substances to a lesser extent. (OWTTE)

Hence, there is faster rate of diffusion of substances across the walls [1]

2

Total: 4 marks

7(a)



REJECT: spelling error

3

7(b)

The plant cell has cell wall but an animal cell doesn't. [1]

The plant cell has chloroplasts but an animal cell doesn't. [1]

The plant cell has a central large vacuole but an animal cell has many small vacuoles. [1]

Any 2 points.

Max 2 marks.

Must show comparison

2

Total: 5 marks

8(a)

The flask expanded first, hence the dye moved down to fill the space. [1]

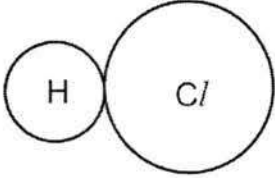
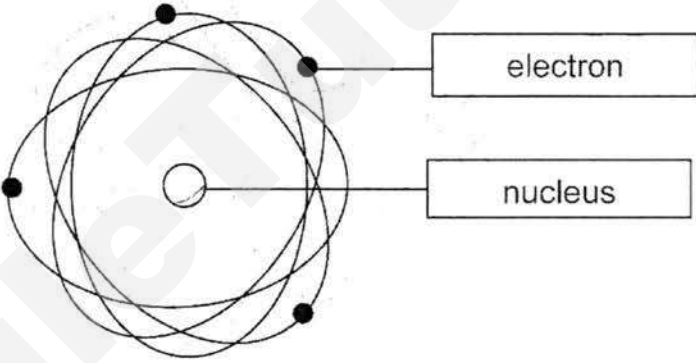
ACCEPT: air pressure in flask decrease

OWTTE

2

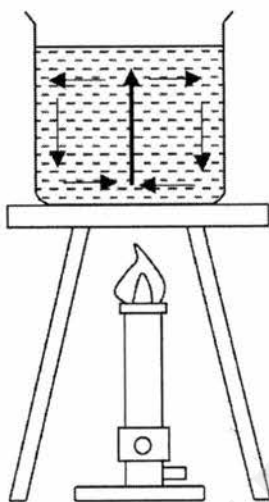
	The air inside the flask then expanded, pushing the dye up. [1]		BP~224
8(b)	The flask would not expand fast enough before the heat reaches the air. [1]		1
8(c)	The distance moved will be lesser. [1] Since gases expands more than liquids. [1] (OR Liquids expands less than gases)		2
Total: 5 marks			
9(a)	K OR Kelvin		1
9(b)	The container with black paper. [1] The black container is a better radiator of heat. [1] OR The black container lose heat to the surrounding faster. [1]	2 nd point either statement	2
9(c)	Use rough paper.		1
9(d)	There is only vacuum in space [1] Conduction and convection requires matter to transfer heat [1]	OWTTE	2
Total: 6 marks			

SECTION C – LONG STRUCTURED QUESTIONS (30 MARKS)

Qs	Suggested answer	Remarks	Marks
10(ai)	Chlorine: Proton number: 17 Nucleon number: 35.5		2
10a(ii)	$1 - 1 = 0$ [B1]		1
10(aiii)	 <p>** Labelling of chemical symbol need not be shown.</p>	<p>Show different sizes of circles. [1]</p> <p>Circles must stick together. [1] ACCEPT overlap</p>	2
10(b)			2
10(c)	<ul style="list-style-type: none"> • An atom has <u>protons which are positively charged</u> [1] • <u>The number of protons and electrons in an atom are equal.</u> [1] • <u>The positive charges cancel out the negative charges</u> [1] and hence the atom is electrically neutral. 		3

Total: 10 marks

11(a) (i)



1

11(aii)

Water particles gain energy and slide around faster [1]. The spaces between particles increase [1] and thus volume increase [1].

Since mass stays the same, density decreases. [1]

4

11(bi)

The wax on the steel bar. [1]

Steel bar is the best conductor of heat and it conducts heat to the wax fastest. [1]

2

11(bii)

Conduction.

1

11(biii)

The particles gain energy and vibrate faster. [1]

The particles pass on the kinetic energy from one end of the rod to the other via vibration. [1]

2

Total: 10 marks

12 (a)

Solvent X

1

12 (b)

Solvent W

1

12 (c)

Dissolve the mixture in solvent W. [1]

Filter the resulting mixture. [1]

3

	The residue will be D and the filtrate will be B. [1]		
12 (d)	Substance C and solvent X		1
12 (e)	Heat up the mixture / use a warm solvent [1] Stir faster [1] when dissolving the solute Cut the solid into smaller pieces before dissolving [1]		3
12(f)	Heat up the mixture / solvent.		1
Total: 10 marks			
12 (a)	The bubble will move toward the plant. OR The bubble will move left This is because water is taken in by the leaf shoot. [1]		1
12 (b)	The higher the temperature, the faster the intake of water. [1] OR The higher the humidity, the slower the intake of water. [1] OR The more windy it is, the faster the intake of water. [1] OR The higher the light intensity, the faster the intake of water. [1]	Choose any 2 Max 2 points OWTTE	2
12 (c)	Xylem		1
12 (d)	Phloem [1] transports dissolved sugar from the leaves to the cells in the stem. [1]	REJECT roots	2
12 (e)	Plant needs water for photosynthesis OR Plant needs water for chemical reactions happening in the plant.	Choose any 2	2

	<p>OR</p> <p>Plant needs water so that substances can be dissolved and transported around the plant.</p> <p>OR</p> <p>Plants need water to maintain turgor pressure to keep the shoot upright.</p>		
12 (f)	Pure water does not have minerals which is essential for the plant.		1
12 (g)	<p>Volume of water</p> <p>OR</p> <p>Type of plant</p> <p>OR</p> <p>Number of leaves</p>	Choose 1	1
Total: 10 marks			



PASIR RIS CREST SECONDARY SCHOOL
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Science (Physics/ Biology)

Paper 1

9 October 2017

Papers 1, 2 and 3: 2 hours

Additional material: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

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

Write your name, class and register number on the answer sheet in the spaces provided.

There are **thirty** questions on this paper. 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.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

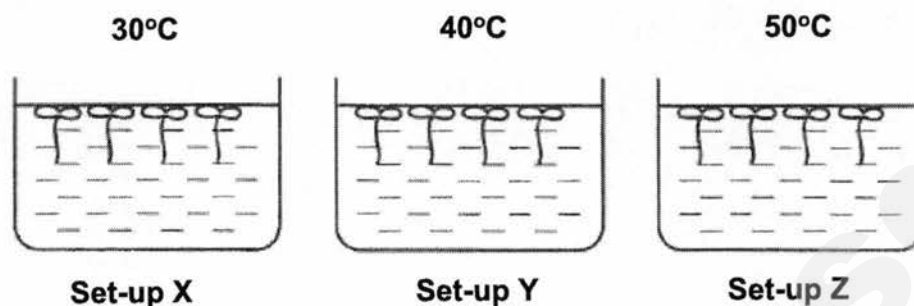
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30

Parent's Signature

This document consists of 8 printed pages.

- 16 A student wanted to investigate if temperature of the surroundings will affect the increase in length of a certain type of water plant. He set up the experiment as shown below.

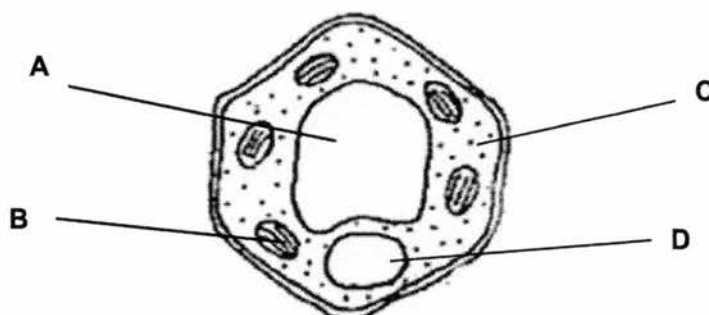


Identify the variable that was changed in the experiment.

- A Type of water plant used.
 - B Number of water plants used
 - C Average temperature of the surroundings
 - D Average increase in the length of the water plants
- 17 The table below shows some characteristics of four types of cells.
- Which cells could be a root hair cell?

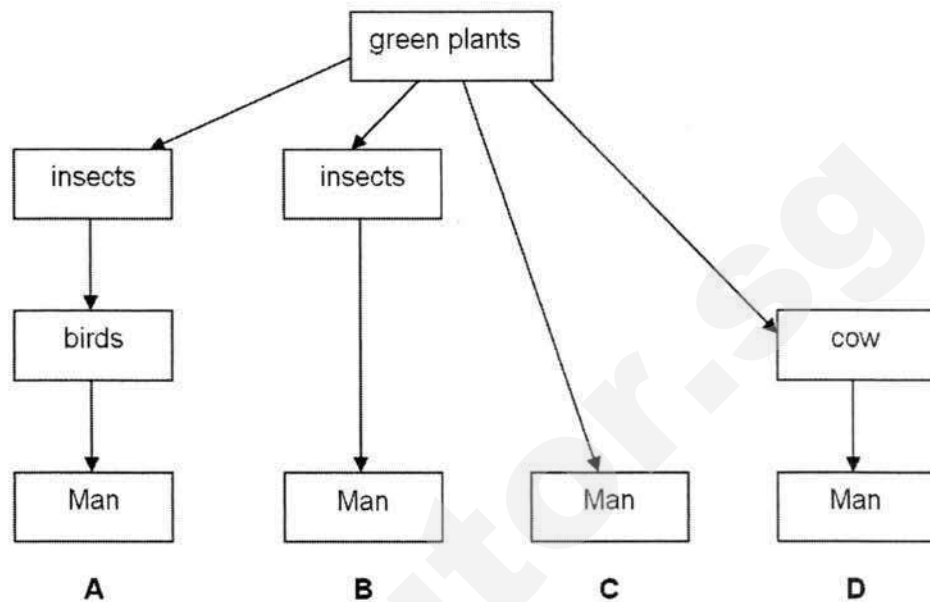
	Nucleus	Chloroplast
A	Present	Absent
B	Absent	Absent
C	Present	Present
D	Absent	Present

- 18 The diagram shows a plant cell. In which part of the cell is glucose made?

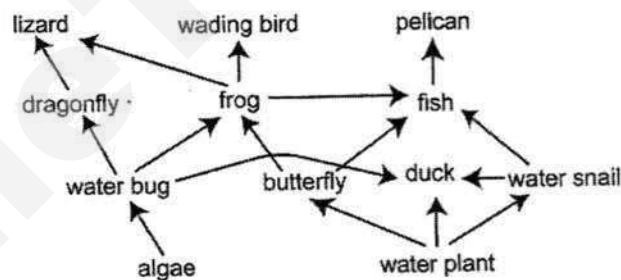


- 19 The diagram shows four possible pathways for the transfer of energy from green plants to Man.

Which pathway shows green plants transferring the **least** energy to Man?



- 20 The diagram below shows a food web in a wetlands ecosystem



Which of the following organisms is both a primary and a secondary consumer?

- A** frog **B** duck
C lizard **D** butterfly

- 21 Which of the following is an example of something we can do to protect and conserve biodiversity?

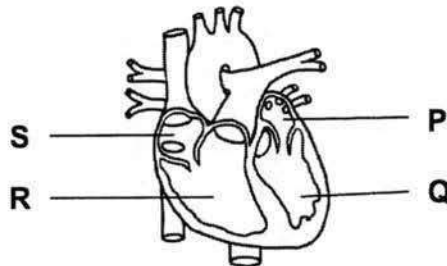
- A** clear land for development of a shopping centre
- B** leave the fans in the room on as we are returning later
- C** buy products made from recycled materials
- D** treat your family with a meal including shark's fin soup

- 22 A leafy shoot is placed in a blue dye solution.



Which part of the plant becomes stained by the blue dye **first**?

- A Xylem vessels in the leaves.
 - B Xylem vessels in the stem.
 - C Phloem cells in the leaves.
 - D Phloem cells in the stem.
- 23 Which of the features helps plants to make the most food by photosynthesis?
- A broad and flat green leaves
 - B broad and flat variegated leaves
 - C red coloured leaves
 - D spiky green leaves
- 24 Which of the following statements is not true about the human vena cava?
- A It carries blood to the heart muscle.
 - B It carries deoxygenated blood.
 - C It has a thin muscular wall.
 - D It has valves.
- 25 The diagram below shows a section of the human heart.



Which chambers contain deoxygenated blood?

- | | |
|-----------|-----------|
| A P and Q | B Q and R |
| C P and S | D R and S |

- 26 When the right atrium contracts, blood flows from the right atrium into the _____.

A aorta
B left atrium
C pulmonary artery
D right ventricle

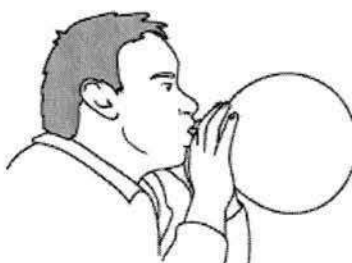
- 27 Which of the following occurs as a result of respiration?

	carbon dioxide produced	oxygen used	water produced
A	yes	no	no
B	yes	yes	yes
C	no	no	yes
D	no	yes	no

- 28 In which conditions will a plant photosynthesise fastest?

	carbon dioxide concentration / %	temperature / °C
A	0.04	15
B	0.04	25
C	0.01	15
D	0.01	25

- 29 The diagram shows someone blowing up a balloon.

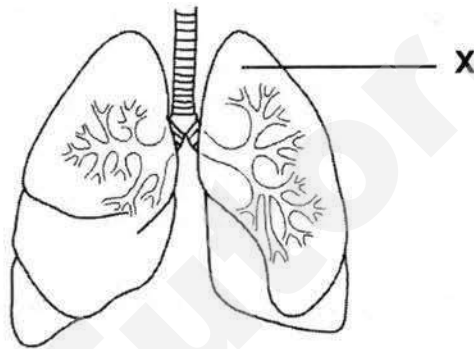


How do the proportions of gases in the air inside the balloon compare with the air outside the balloon?

	carbon dioxide	oxygen	water vapour
A	less	more	more
B	less	more	less
C	more	less	more
D	more	less	less

30

A patient in a hospital is suffering from a disease which causes organ **X** to malfunction. Which of the following is a possible problem the patient would face?



- A** Food will not be digested efficiently
- B** Oxygenated and deoxygenated blood will be mixed
- C** Exchange of gases between the organ and air will become reduced
- D** Unable to pump blood around the body

End of Paper



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Science (Biology)

Paper 3

9 October 2017

Paper 1, 2 and 3: 2 hours

READ THESE INSTRUCTIONS FIRST

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

Write in dark blue or black pen.

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

Do not use staples, paper clips, glue or correction fluid.

Section A (15 marks) and Section B (20 marks)

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

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

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Parent's Signature

This document consists of 9 printed pages.

Section A: Structured Questions (15 marks)

1. Fig 1.1 shows some human muscle tissue.

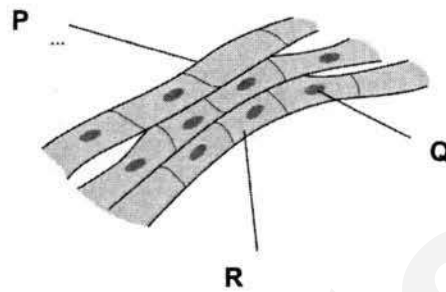


Fig 1.1

- (a) Name the parts P, Q and R of the muscle cells.

[2]

P _____
 Q _____
 R _____

Fig. 1.2 below shows a photomicrograph of onion epidermal cells.

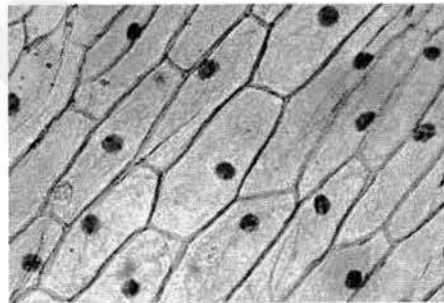


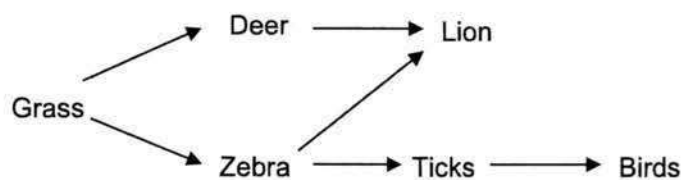
Fig. 1.2

- (b) With reference to **Fig. 1.1** and **Fig. 1.2**, describe one way in which the muscle cells are different from the onion epidermal cells. [1]

- (c) Both figures 1.1 and 1.2 shows tissues. Define the term "tissue". [1]

[Total : 4 marks]

2. The diagram below shows a food web.



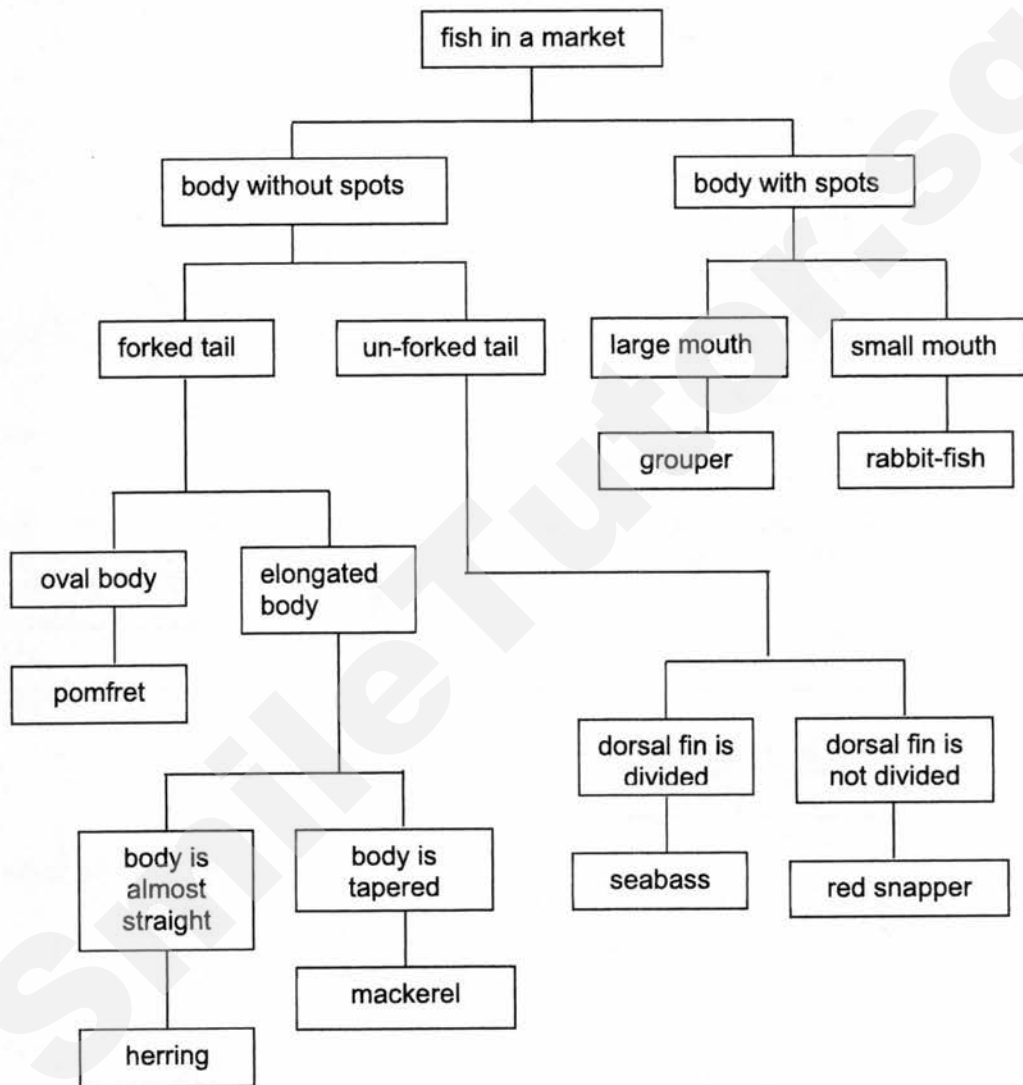
- (a) Name the primary consumers in this food web. [1]

- (b) What is the source of energy for this food web? [1]

- (c) Suggest, with reasons, what will happen to the zebra population if there is a sudden drought in the habitat. [2]

[Total : 4 marks]

3. The diagram below shows a classification chart.



- (a) Using the information from the classification chart only, identify two characteristics of a pomfret.

[1]

- (b) Identify a feature that can differentiate between a grouper and a mackerel.

[1]

- (c) Is the classification chart shown above considered as a dichotomous key? [1]
Explain your answer.
-

[Total : 3 marks]

4. Fig.4 below shows a section through a part of the stem of a flowering plant.

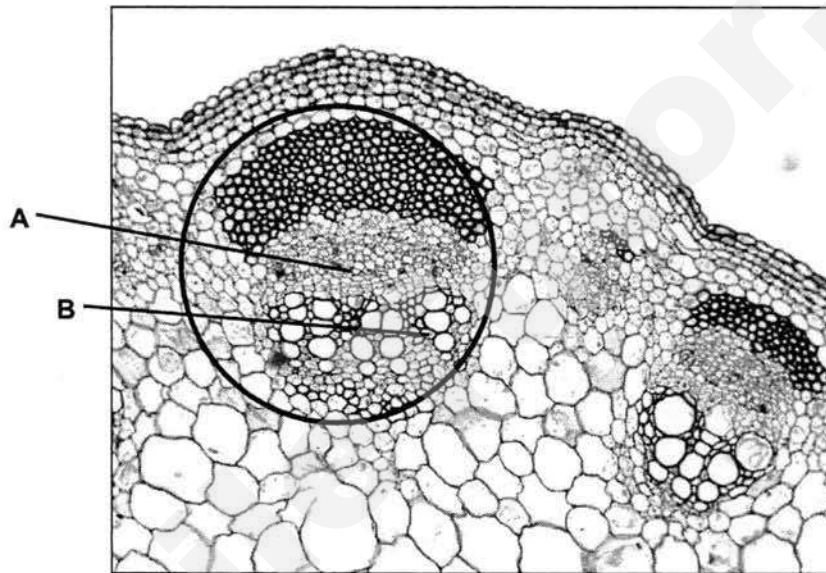


Fig. 4

- (a) Name the structures labeled A and B. [2]

A _____

B _____

- (b) State the function of each type of cell. [2]

A _____

B _____

Section B: Structured Questions (20 marks)

5. **Fig. 5** shows some red blood cells, as seen through a microscope.

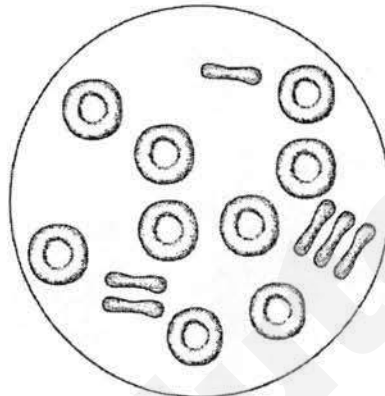


Fig. 5

- (a) Name one structure, normally present in cells, that is not present in red blood cells. [1]
- _____
- (b) State the main function of the red blood cells. [1]
- _____
- _____
- (c) Name **one** substance that is carried in the blood by the plasma. [1]
- _____
- (d) Complete the table below to identify the components of blood that performs the function stated. [2]

components of blood	function
	helps the blood to clot
	protects the body against infection

[Total : 5 marks]

6. **Fig. 6** shows the cross-sections of three different types of blood vessels **P**, **Q** and **R**.

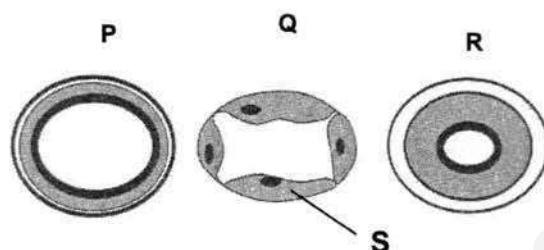


Fig. 6

- (a)(i) In which blood vessel **P**, **Q** or **R**, is the blood flow the fastest and at a high pressure? [1]

- (ii) Explain how the structure of this blood vessel helps it to withstand the high pressure. [1]

- (b)(i) Which blood vessel **P**, **Q** or **R**, has valves along it? [1]

- (ii) State the important function of the valves mentioned in part (b)(i) above. [1]

- (c) Explain how the structure of **S** helps the blood vessel **Q** to perform its function. [2]

[Total :6 marks]

7. **Fig. 7** shows a potted plant that was kept in the dark for 48 hours. One of its leaves was then placed in a bottle containing some sodium hydroxide as shown.

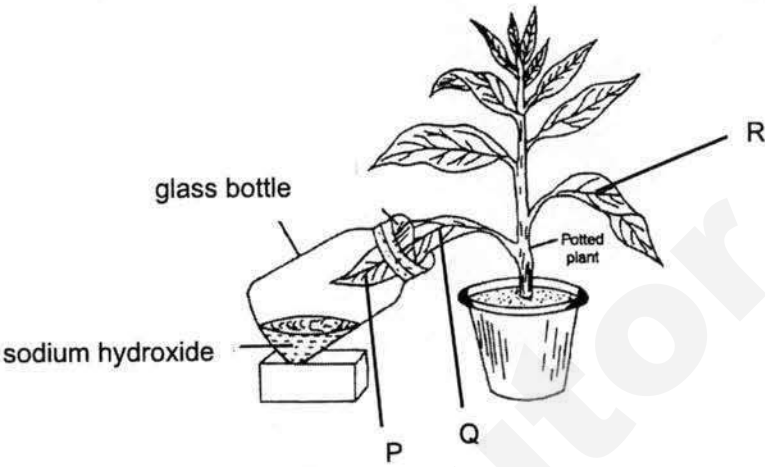


Fig. 7

- (a) Write the word equation for photosynthesis. [1]

- (b) The plant was then left in bright sunlight for 10 hours. The leaves were then removed and tested for the presence of starch

Complete the table below to predict the results of the starch test for each of the indicated areas and for each part state whether starch is present or absent. [3]

Part of leaf	Results of starch test	Starch present / absent
P		
Q		
R		

- (c) What conclusion can be made from this experiment? [1]

[Total :5 marks]

8. An experiment was set-up as shown in Fig 8 to investigate what gas is released by green plants in darkness. The set-up was left in a dark room for 8 hours. Limewater turns milky in the presence of carbon dioxide gas.

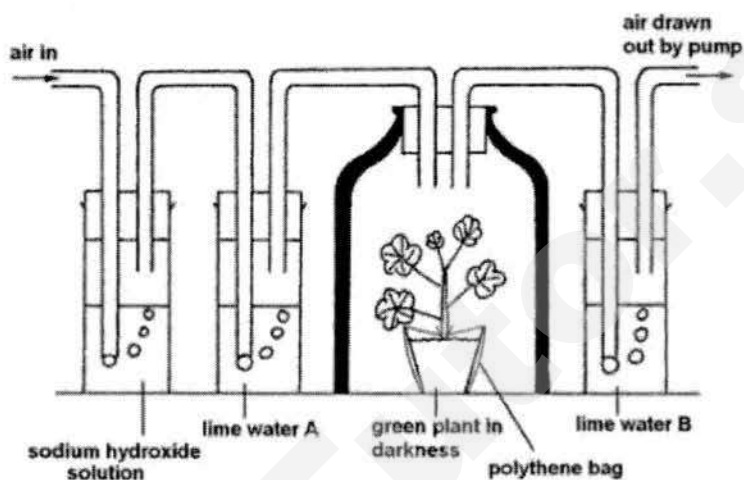


Fig. 8

- (a) At the end of the experiment limewater A remains clear but limewater B turns milky. Suggest a reason why this was observed for each solution. [2]

Limewater A _____

Limewater B _____

- (b) Name the process that has occurred in the plant that has brought about the results observed in limewater B. [1]

- (c) Name the sugar that is required for this process to take place. [1]

End of Paper 3

Paper 1 (15 mcq)

16	C	21	C	26	D
17	A	22	B	27	B
18	B	23	A	28	B
19	A	24	A	29	C
20	B	25	D	30	C

Paper 3

Section A (15 marks)

1(a)	P – cell membrane Q – nucleus R – cytoplasm 3 correct 2m 2 correct 1m 0 / 1 correct – no mark	2m
(b)	Onion epidermal cells have a cell wall but the muscle cells do not have cell walls.	1 m
(c)	A tissue is made up of many cells of the same type performing the same function.	1m
2(a)	Deer zebra	1m Both correct
(b)	sunlight	1m
(c)	-zebra population will decrease -grass will dry up and may not grow well. Thus, the zebra will not have enough food. Some will die due to lack of food	1m 1m
3(a)	Oval body Forked tail Body without spots	1m Any 2 correct
(b)	Body of grouper has spots but body of mackerel has no spots	1m
(c)	Yes It branches into 2 at each point and ends with the identification	1m
4(a)	A – phloem B - xylem	1m 1m
(b)	A – transports manufactured food / sucrose from the leaves to the other parts of the plant B – transports water from the roots to the leaves and other parts of the plant	1m 1m

5(a)	nucleus	1m												
(b)	It transports oxygen from the lungs to the other parts of the body	1m												
(c)	Glucose / amino acids / fats / fatty acids / urea / any relevant	1m												
(d)	- platelets - white blood cells	1m 1m												
6(a)(i)	R	1m												
(ii)	The blood vessel has thick muscular wall to withstand the high pressure of blood flowing through	1m												
(b)(i)	P	1m												
(ii)	Prevents backflow of blood / ensures that blood flows in one direction	1m												
(c)	The wall of the capillary is made up of only a <u>single layer of cells</u> allowing exchange of substances to occur through it / <u>allows substances to pass between the blood and the cells easily</u>	1m												
7	<p style="text-align: center;"> sunlight $\xrightarrow{\text{chlorophyll}}$ carbon dioxide + water \rightarrow glucose + oxygen </p>													
(b)	<table border="1"> <thead> <tr> <th>Part of leaf</th><th>Results of starch test</th><th>Starch present / absent</th></tr> </thead> <tbody> <tr> <td>P</td><td>Iodine remains brown</td><td>Starch is absent</td></tr> <tr> <td>Q</td><td>Iodine turns blue black</td><td>Starch is present</td></tr> <tr> <td>R</td><td>Iodine turns blue black</td><td>Starch is present</td></tr> </tbody> </table>	Part of leaf	Results of starch test	Starch present / absent	P	Iodine remains brown	Starch is absent	Q	Iodine turns blue black	Starch is present	R	Iodine turns blue black	Starch is present	3 m - 2 correct 1m
Part of leaf	Results of starch test	Starch present / absent												
P	Iodine remains brown	Starch is absent												
Q	Iodine turns blue black	Starch is present												
R	Iodine turns blue black	Starch is present												
(c)	Carbon dioxide is required for photosynthesis to take place.	1m												
8(a)	A - Sodium hydroxide solution absorbs carbon dioxide from the air in the set up B – carbon dioxide is produced by the plant during the experiment	1m 1m												
(b)	Respiration	1m												
(c)	glucose	1m												



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SCIENCE (PHY/BIO)

Paper 1 Multiple Choice

9 Oct 2017

Paper 1, Paper 2 and Paper 3 : 2 hours

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

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

Write your name, class and register number on the answer sheet in the spaces provided.

There are **thirty** questions on this paper. 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.

Read the instructions on the answer sheet very carefully.

Answers to Paper 1, Paper 2 and Paper 3 must be handed in separately.

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

Any rough working should be done in this booklet.

For Examiner's Use

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Parent's Signature

This document consists of ?? printed pages.

1. Which of the following is **not** a S.I. unit?

- A Kilometre
- B Kilogram
- C Ampere
- D Kelvin

2. Which of the following has the greatest mass?

- A 1 kg B 1000 ng C 10 000 mg D 10 000 g

3. Which of the following lists basic physical quantities only?

- A electric current, time, speed
- B temperature, density, time
- C temperature, mass, amount of substance
- D length, volume, mass

4. A student has a can of oil.

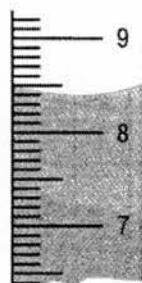
Which quantity can be measured using only a measuring cylinder?

- A density of oil
- B mass of the oil
- C volume of the oil
- D weight of the oil

5. The fuel consumption of a lorry is 12 km/l. How much fuel is needed for the lorry to travel 600 km?

- A 0.02 l B 12 l C 50 l D 7 200 l

6. The diagram below shows the volume of a liquid in a measuring cylinder.





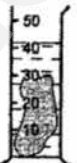

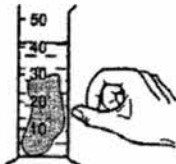
What is the volume of water shown?

- A 8.4 cm³ B 8.5 cm³ C 8.8 cm³ D 8.9 cm³

7. Which of the following best explains the parallax error when measuring an object?

- A It is an error due to the gap between the measuring instrument and the object.
- B It is an error due to the position of the observer's eyes when reading the measurement off a measuring instrument.
- C It is an error due to the mishandling of the instrument by the users when measuring an object.
- D It is an error due to damage to the end of the measuring instrument.

8. A measuring cylinder collects 160 cm^3 of water in two minutes from a tap. What is the rate of flow of water from the tap?
- A $0.0125 \text{ cm}^3/\text{s}$ B $1.3 \text{ cm}^3/\text{s}$ C $80 \text{ cm}^3/\text{s}$ D $19\,200 \text{ cm}^3/\text{s}$
9. Jane receives a manuscript which contains 5040 characters. If her rate of typing is 28 characters/s, what is the time taken for her to finish typing the whole manuscript?
- A 180 min B 80 s C 0.50 hour D 3.0 minutes
10. A cook wants to have some food to be cooked by 1.15 p.m. He uses an oven with an automatic timer that can be set to switch on and off at certain times. The oven needs to be switched on for 2 hours 10 minutes.
- At which time does the oven need to switch on?
- A 11.05 a.m. B 11.25 a.m. C 3.05 p.m. D 3.25 p.m.
11. A student is trying to find the density of a stone, but he has mixed up the instruction cards.

 Find the mass of the stone using a mass balance	 Read the new level of the liquid in the measuring cylinder	 Put the stone into the liquid	Divide the mass of the stone by its volume to find the density
Card 1	Card 2	Card 3	Card 4
 Put some liquid into a measuring cylinder and read the level of the liquid	 Flick the cylinder to get rid of any air bubbles	Subtract the original volume of liquid from the volume of liquid plus the stone	
Card 5	Card 6	Card 7	

What order should the cards be in?

- A $5 \rightarrow 3 \rightarrow 6 \rightarrow 2 \rightarrow 1 \rightarrow 4 \rightarrow 7$
 B $1 \rightarrow 5 \rightarrow 3 \rightarrow 6 \rightarrow 2 \rightarrow 7 \rightarrow 4$
 C $5 \rightarrow 6 \rightarrow 3 \rightarrow 2 \rightarrow 1 \rightarrow 7 \rightarrow 4$
 D $1 \rightarrow 4 \rightarrow 5 \rightarrow 3 \rightarrow 6 \rightarrow 2 \rightarrow 7$

12. The density of a disc is 10 g/cm^3 . The disc is cut into two equal parts.

What is the density of one part of the disc?

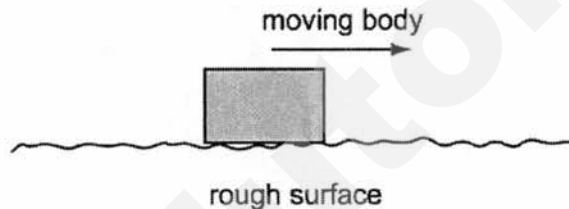
- A 5.0 g/cm^3 B 10 g/cm^3 C 15 g/cm^3 D 20 g/cm^3

13. A force acts on a body.

Which list contains only quantities that can be changed by the force?

- A mass, shape, speed
B mass, shape, volume
C mass, speed, volume
D shape, speed, volume

14. When a body moves across a rough surface, a frictional force is produced.



Which statement about this force is **always** true?

- A It acts in the direction of the motion.
B It is equal in size to the force producing the motion.
C It opposes the motion across the surface.
D It makes the body recoil in the opposite direction after stopping it.

15. Diagram 1 shows a piece of foam rubber that contains many pockets of air. Diagram 2 shows the same piece of foam rubber after it has been compressed so that its volume decreases.



diagram 1
(before compression)

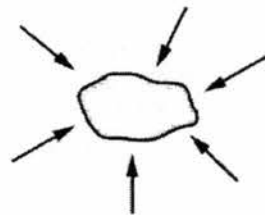


diagram 2
(after compression)

What happens to the mass and to the weight of the foam rubber when it is compressed?

	mass	weight
A	increases	increases
B	increases	no change
C	no change	increases
D	no change	no change



PASIR RIS CREST SECONDARY SCHOOL
End of Year Examination
Secondary One Express

CANDIDATE
NAME

CLASS

 /

INDEX
NUMBER

SCIENCE (PHYSICS)

Paper 2 Theory

9 Oct 2017

Paper 1, Paper 2 and Paper 3: 2 hours

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number in the spaces above.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams or graphs.

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

Section A

Answer all questions.

Section B

Answer all questions.

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

Enter the numbers of the Section B questions you have answered on the dotted lines in the grid below.

At the end of the examination hand in your answers to Paper 1, Paper 2 and Paper 3 separately.

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

For Examiner's Use	
Section A	
Section B	
TOTAL	
Parent's Signature	

This document consists of 8 printed pages.

Section A (15 Marks)

Answer **All** Questions

1. Convert the following quantities. (Give your answer in non-standard form)

[3]

(a) $420\,000\text{ m} = \underline{\hspace{2cm}}\text{ Mm}$

(b) $0.76\text{ }\mu\text{A} = \underline{\hspace{2cm}}\text{ nA}$

2. A ruler is used to measure the length of a piece of cotton, as shown in Fig. 2.1.

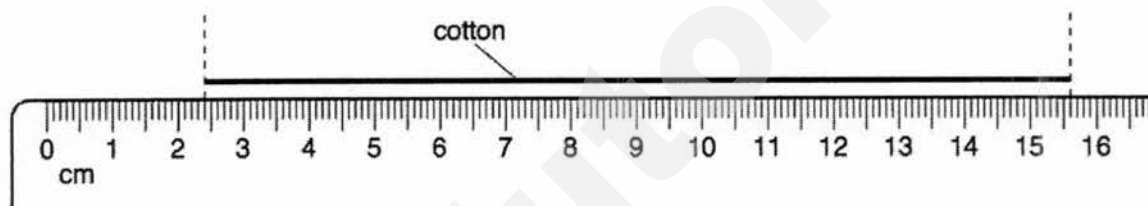


Fig. 2.1 (not actual scale)

- (a) Use the ruler in Fig. 2.1 to find the length of the piece of cotton.

length = [1]

- (b) A rod has a square cross-section with thickness of 1.1 cm as shown in Fig. 2.2. You are given the piece of cotton in Fig. 2.1 (**without** the ruler).

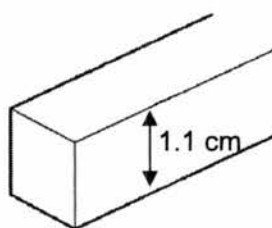


Fig. 2.2

Describe how you will use the length of the piece of cotton in Fig. 2.1 (**without** using any ruler) to show that the thickness of the rod is 1.1 cm.

[3]

3. A vernier calipers is used to measure the external diameter of a test tube.

With the jaws closed and no test tube, the vernier calipers reading is shown in Fig. 3.1.

With the jaws closed around the test tube, the vernier calipers reading is shown in Fig. 3.2.

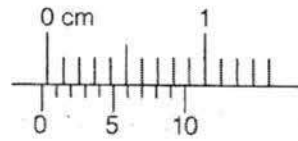


Fig. 3.1

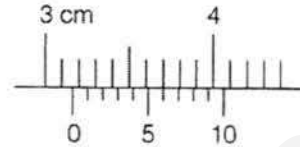


Fig. 3.2

- (a) State the zero error.

zero error = _____ [1]

- (b) Determine the external diameter of the test tube.

diameter = _____ [1]

- (c) Explain why it is necessary to take more than one measurement at different positions to obtain an accurate value of the external diameter of the test tube.

 _____ [1]

4. Fig. 4.1 shows a parachutist.



Fig. 4.1

- (a) Define *gravitational field strength*.

_____ [1]

- (b) Draw and label on Fig. 4.1 all forces acting on the parachutist.

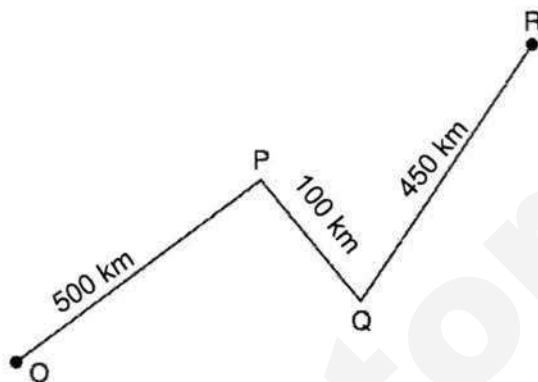
[2]

- (c) The weight of the parachutist is 800 N on Earth.
The gravitational field strength on Earth is 10 N/kg and the gravitational field strength on the Moon is 1.6 N/kg.
Determine the weight of the parachutist on the Moon.

weight = _____ [2]

Section B (20 Marks)Answer **All** Questions.

5. Fig. 5.1 shows the journey of a car travelling from O to R. Peter drives a car and he takes 9 hours to travel from O to P and 7 hours from Q to R. Peter took a break of 30 minutes and 42 minutes at P and Q respectively.

**Fig. 5.1**

- (a) State what is meant by the *average speed*.

[1]

- (b) Determine the average speed of the car from O to P in km/h.

speed = _____ [2]

- (c) The car travel with the same average speed in (b) from P to Q.
Determine the time taken (in hour) for the car to travel from P to Q.

(d) Determine the total time (in hour) that Peter took a break.

time = _____ [1]

(e) Determine the average speed of the car for the whole journey from O to R in km/h.

speed = _____ [3]

(f) Convert the average speed of the car in (e) to m/s.

speed = _____ [1]

6. A student is investigating volume and density.

The student has a box, as shown in Fig. 6.1 and some dry sand.

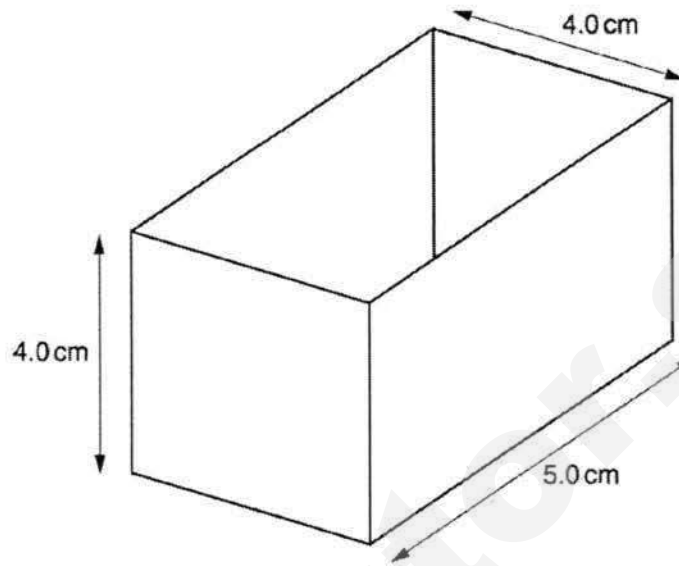


Fig. 6.1

- (a) Fig. 6.1 shows the dimensions of the inside of the box.

Calculate the volume of sand needed to fill the box.

volume of sand = _____ [1]

- (b) The student measures the mass of the box when empty and when filled with sand.

quantity	mass/ g
mass of box filled with sand	180
mass of empty box	20

- (i) Define *mass*.

 _____ [1]

- (ii) State the instrument used to measure the mass.

 _____ [1]

(iii) Calculate the mass of the sand in the box.

mass of sand = _____ [1]

(iv) Define *density*.

_____ [1]

(v) Calculate the density of the sand in g/cm^3 .

density of sand = _____ [2]

(vi) Convert the density of the sand in (v) to kg/m^3 .

density of sand = _____ [1]

(c) A miner has a bag containing a mixture of silver dust and sand. Silver has a density of 10.5 g/cm^3 .

He heats the mixture until the silver melts.

Predict what will happen to the sand. Explain your answer using the concept of density.

_____ [2]

1EX EOY Marking Scheme 2017

		Mark	Additional Guide
	MCQ		
1	A		
2	D		
3	C		
4	C		
5	B		
6	A		
7	B		
8	C		
9	D		
10	A		
11	B		
12	B		
13	D		
14	C		
15	D		
	Structured Questions		
	Section A		
1.a.	$420\,000/10^6 = 0.42\text{ Mm}$	A1	
b.	$0.76\text{ }\mu\text{A} = 0.76 \times 10^{-6}$ $0.76 \times 10^{-6}/10^{-9} = 760\text{ nA}$	C1 A1	
2.a.	Length = $15.6 - 2.4$ Length = 13.2 cm	CA01	No unit – no mark
b.	Wound the piece of cotton around the wooden rod and determine the number of round the cotton goes around the rod (3 round) Determine the thickness by length of cotton divide by the 3 then divide by 4 . OR <ul style="list-style-type: none"> Cut/ Fold the cotton into 12 equal parts Place one part against the rod The length of the cotton should be the same as the thickness 	B1 B1 B1 B1 B1	Answer must be clear on how the cotton is being used to determine the thickness is 1.1 cm .

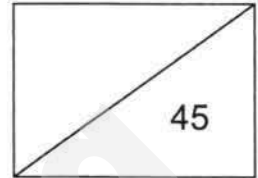
1EX EOY Marking Scheme 2017

3.a.	-0.03 cm	CA01	
b.	External diameter = $3.16 - (-0.03)$ External diameter = 3.19 cm	B1	
c.	The test tube thickness may be uneven.	A1	No mark for stating that the <u>length</u> might be different at different point
4.a.	gravitational force acting per unit mass on an object OR Weight divided by mass	B1	No mark for writing $\frac{\text{weight}}{\text{mass}}$ or weight <u>over</u> mass
b.	Upward force – air resistance Downward force – weight/ gravitational force	B1 B'	Minus one mark for every additional mistake. E.g. Upward force – normal reaction force
c.	$W = mg$ $m = w/g$ $m = 800/10 = 80 \text{ kg}$ Weight on moon = 80 (1.6) Weight on moon = $128 = 130 \text{ N}$	B1 B1	
Section B			
5.a.	Total distance divided by total time (taken)	A1	No mark for Total distance <u>over</u> total time
b.	Average speed = total distance/ total time Average speed = $500/9$ Average speed = $55.5 = 56 \text{ km/h}$	C1 A1	
c.	Average speed = total distance/total time Total time = total distance/average speed Total time = $100/56$ Total time = 1.8 h	C1 A1	Wrong unit for using hrs or hr for hour
d.	Total time = $30/60 + 42/60$ Total time = 1.2 h	A1	Wrong unit for using hrs or hr for hour
e.	Total distance = $500 + 100 + 450 = 1050 \text{ km}$ Total time = $9 + 1.8 + 7 + 1.2 = 19 \text{ h}$ OR $18\frac{69}{70} \text{ h}$ Average speed = $1050/19 = 55.3 = 55 \text{ km/h}$	B1 B1 B1	

1EX EOY Marking Scheme 2017

f.	$55 \text{ km/h} = 55(1000)/3600 = 15.3 = 15 \text{ m/s}$	A1	
6a.	$\text{Volume} = 4(4)(5) = 80 \text{ cm}^3$	A1	
b.i.	Amount of matter in a substance/object/body	A1	No mark for Amount of substance in a body
ii.	Mass balance OR Electronic balance OR Beam balance	A1	No mark for Electronic weighing scale Weighing scale
iii.	$\text{Mass} = 200 - 40 = 160 \text{ g}$	A1	
iv.	Mass per unit volume OR Mass divided by volume	A1	No mark for Mass <u>over</u> volume No mark for writing $\frac{\text{mass}}{\text{volume}}$
V	Density = mass/volume Density = $160/80$ Density = 2.0 g/cm^3	C1 A1	
vi.	$2 \text{ g/cm}^3 = (2/1000)/(1/100 \times 100 \times 100) = 2000 \text{ kg/m}^3$	A1	
c.	The sand will float. sand is less dense than silver	B1 A1	

NAME:	CLASS:	INDEX NO:
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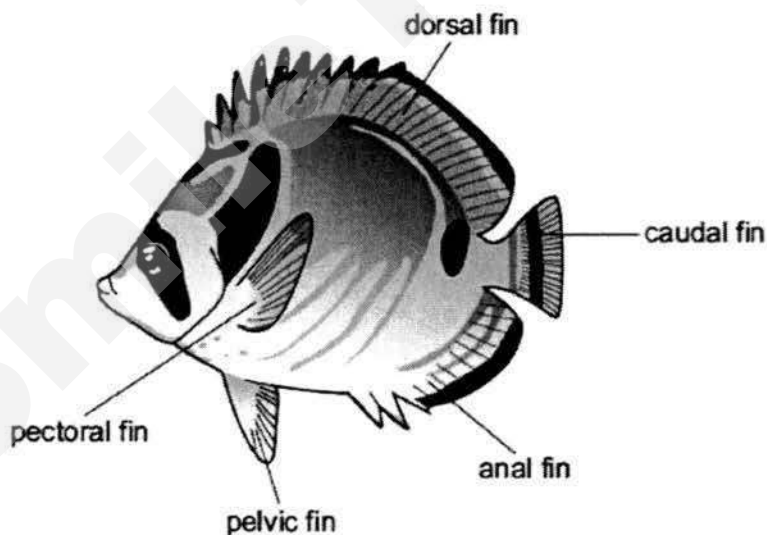
SECTION 2: BIOLOGY SECTION

SECTION 2 (A): Multiple Choice Questions (15 marks)

Answer **all** the questions in this section in the table on page 17.

- 1 What could be a consequence of deforestation?
 - A More habitats are produced for animals and plants.
 - B More transpiration may increase rainfall.
 - C Rainwater runs off the land causing flooding.
 - D Soil erosion is less likely.

- 2 The diagram shows a fish.



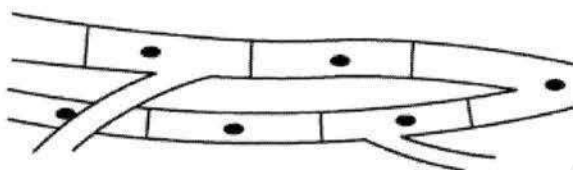
Use the key to identify the fish.

- | | | |
|---|--------------------------------|----------------|
| 1 | black stripe across the eye | go to 2 |
| | no black stripe across the eye | A |
| 2 | black stripe on caudal fin | go to 3 |
| | no black stripe on caudal fin | B |
| 3 | black spot below dorsal fin | C |
| | no black spot below dorsal fin | D |

3 Which parts are found in both plant and animal cells?

- A cell membrane, large vacuole
- B cell membrane, cytoplasm
- C cell wall, large vacuole
- D cell wall, cytoplasm

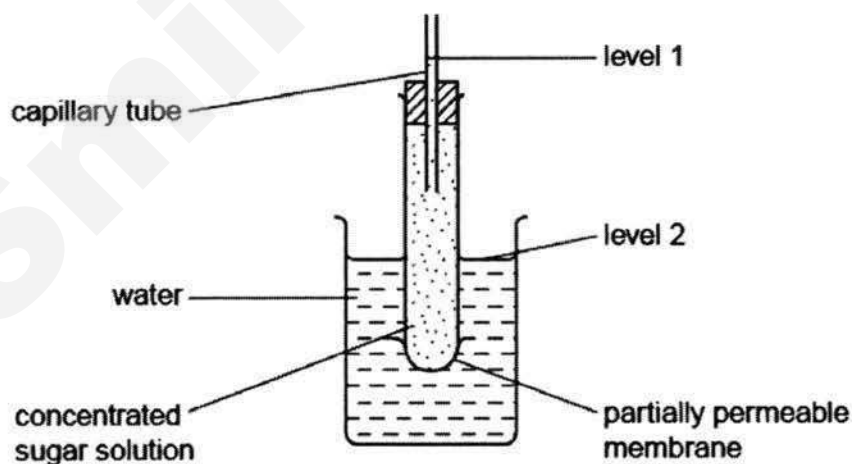
4 The diagram shows some heart muscle cells.



Which describes the level of organisation of these cells and their specific function?

	Level of organisation	Specific function
A	organ	contraction
B	organ	support
C	tissue	support
D	tissue	contraction

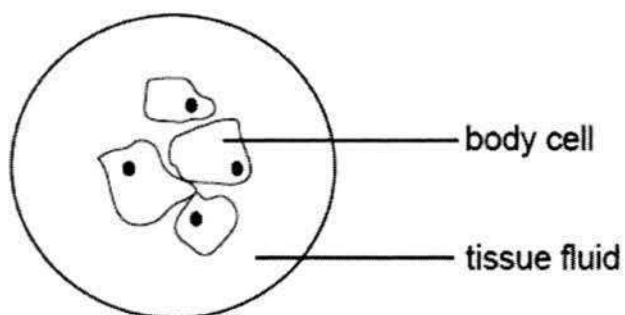
5 The diagram shows an apparatus used to investigate osmosis.



Which molecules will move across the membrane and which changes in levels will occur?

	molecules	level 1	level 2
A	sugar	fall	rise
B	water	fall	rise
C	sugar	rise	fall
D	water	rise	fall

- 6 The diagram shows a group of body cells surrounded by tissue fluid.

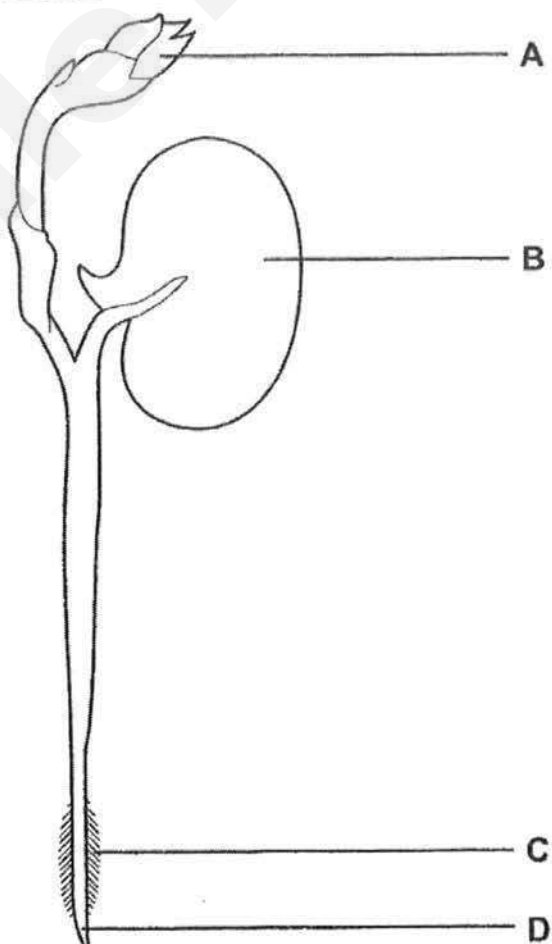


Which conditions cause the body cells to take in water?

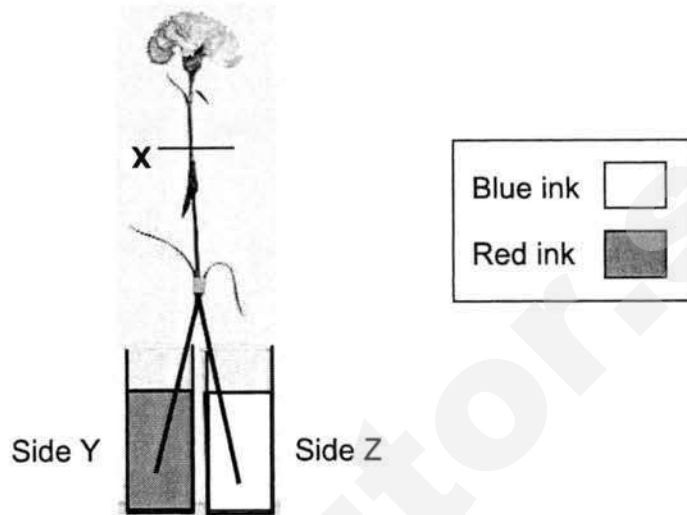
	Water potential in the tissue fluid	Water potential in the cytoplasm of the body cells
A	high	high
B	high	low
C	low	high
D	low	low

- 7 The diagram shows a bean seedling, soon after it has germinated.

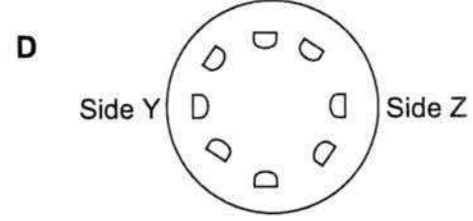
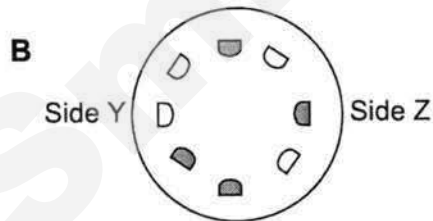
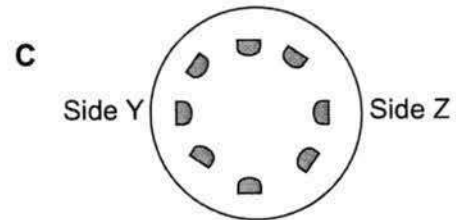
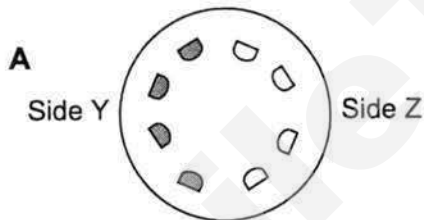
Where is most water absorbed?





- 8 The diagram shows a carnation flower stalk cut vertically into two halves at its base. Each half was then soaked in a different coloured liquid as stated in the box. The stalk was then placed in an airy and bright area for three days. At the end of the third day, the stalk was cut along line **X** and examined under a magnifying glass.

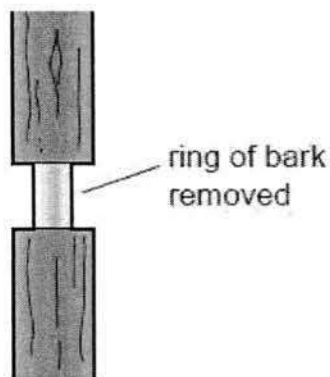


The following diagrams represent the cut stem and the stained areas in the stem. What is the expected appearance of the cut stem on the third day?



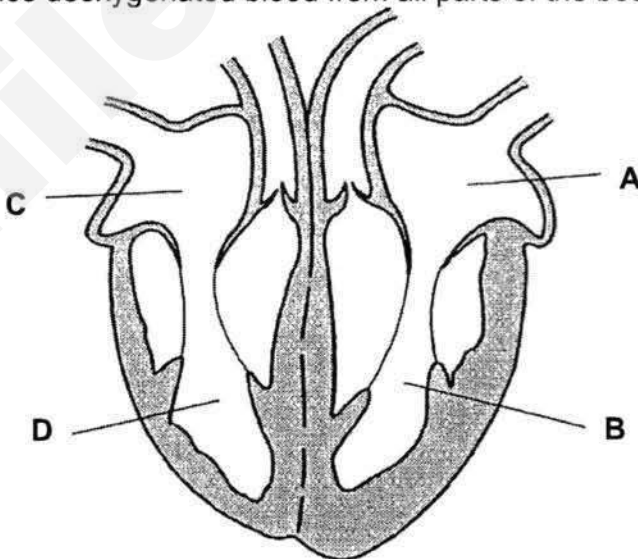
Parts stained by blue ink 
Parts stained by red ink 

- 9 The diagram shows a tree trunk, with a ring of bark, which includes the phloem, removed.

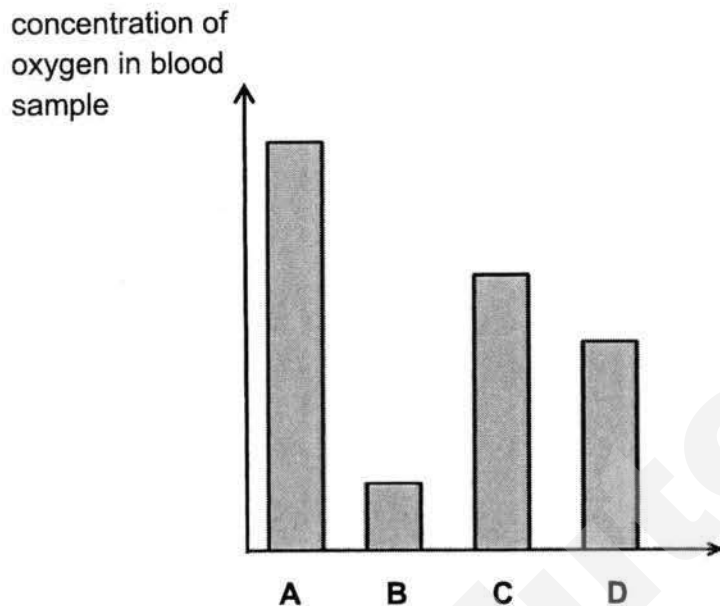


The tree will eventually die because this action cuts off the supply of

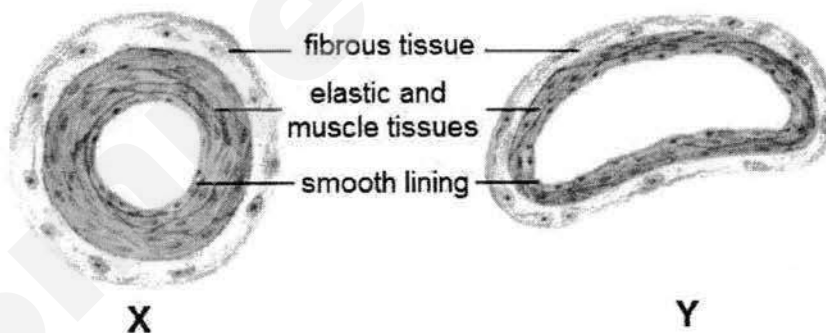
- A mineral salts to the leaves.
 - B manufactured food to the roots.
 - C oxygen to the roots.
 - D water to the leaves.
- 10 The diagram below shows the structure of the heart.
Which structure carries deoxygenated blood from all parts of the body?



- 11 The bar chart shows the concentration of oxygen in blood samples taken from four different blood vessels in the human circulatory system. Which blood sample is taken from the artery entering the lungs?



- 12 The diagrams below show the cross-section of two types of blood vessels.



What do X and Y represent?

	X	Y
A	Artery	Capillary
B	Artery	Vein
C	Capillary	Vein
D	Vein	Artery

- 13 Which of the following is the correct function of the oesophagus?

- A It releases bile.
- B It breaks up the food.
- C It rolls the food into small balls.
- D It pushes the food from the mouth to the stomach.

- 14 Runners sometimes eat bananas before long-distance running races because they contain
- A a large amount of water to keep the runner hydrated.
 - B fats to release a lot of energy at a slow, steady rate.
 - C carbohydrates which can supply energy.
 - D proteins to repair muscle cells damaged while running.
- 15 A scientist extracted a protease from the stomach and subjected it to different pH conditions (acidic or alkaline). In which set-up will digestion take place?

	Acidic condition	Alkaline condition	Food molecule
A	Absent	Present	Carbohydrate
B	Present	Absent	Carbohydrate
C	Present	Absent	Protein
D	Present	Present	Protein

Qns	1	2	3	4	5
Ans					
Qns	6	7	8	9	10
Ans					
Qns	11	12	13	14	15
Ans					

END OF SECTION 2 (A)

SECTION 2 (B): Structured Questions (20 marks)

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

B1 Fig B1.1 shows six arthropods.

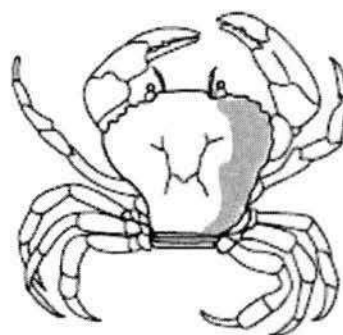
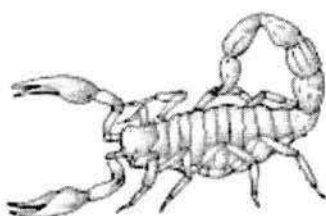
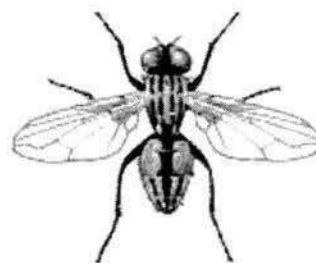
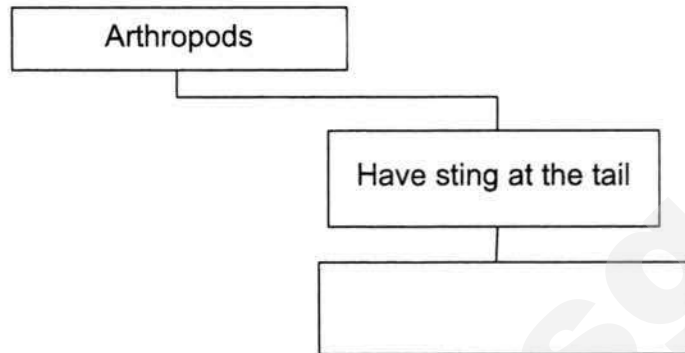
**A****B****C****D****E****F**

Fig. B1.1

19

Construct a dichotomous key to enable the identification of these six animals.

[4]



- B2** A student cuts 9 equal-sized pieces of potato and places them in liquids as shown in Fig. B2.1.

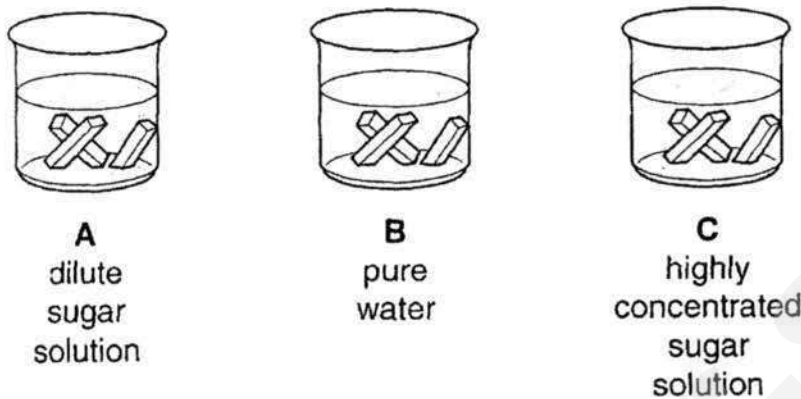


Fig. B2.1

After 30 minutes, the student finds that changes have taken place to the pieces of potato in containers **B** and **C**. The changes are a result of osmosis.

- (a) Fig B2.1A shows a cell from strip **B** that the student draws after observation under a light microscope before the experiment. On Fig B2.1B, draw the sap vacuole, using a pencil, to show how it would look like after the experiment. [1]

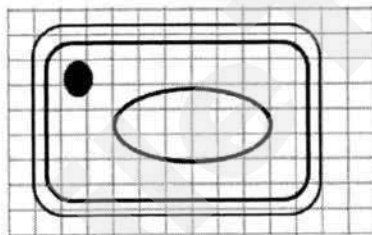


Fig B2.1A
Before experiment

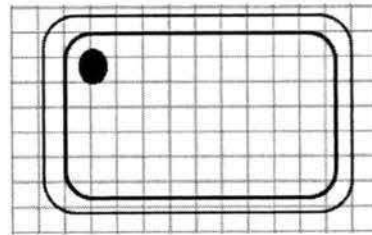


Fig B2.1B
After experiment

- (b) Describe the changes to the length and texture of the potato pieces in containers **B** and **C**.

B:[1]

C:[1]

- (c) Explain why there is no change to the length of potato pieces in container **A** after 30 minutes.

.....

.....

.....[2]

B3 Fig. B3.1 shows a part of a root hair cell.

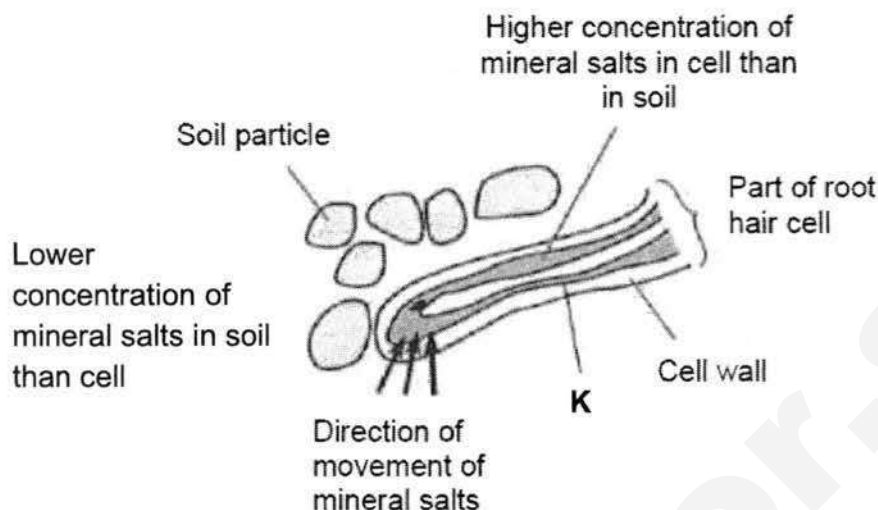


Fig. B3.1

- (a) It is found that the soil is low in mineral salts, in comparison to their respective concentrations found in the root hair cell.

Name the process that transports the mineral salts into the root hair cell.

.....[1]

- (b) (i) Suggest the direction of the net movement of water.

.....[1]

- (ii) Explain why water moves in the direction stated in (b)(i).

.....[1]

- (c) The plant cell contains high concentration of other substances such as starch but they are unable to move out from the cell into the soil. This is because their movement is restricted by structure K.

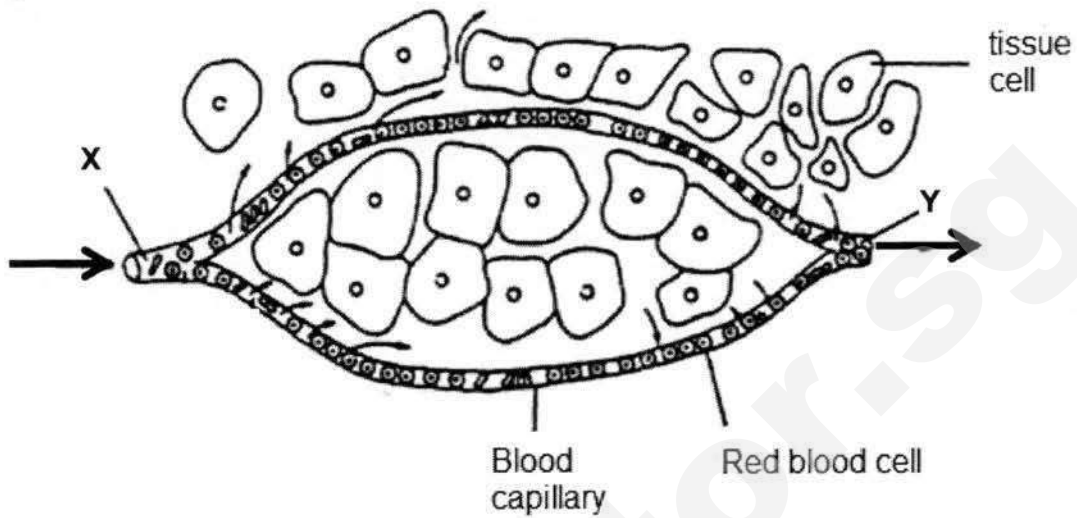
- (i) State the property of K that restricts the movement of starch.

.....[1]

- (ii) Explain why starch cannot pass through K.

.....[1]

- B4** Fig. B4.1 shows the blood flowing through a blood capillary found among the cells of a body tissue



→ Direction of blood flow

Fig. B4.1

- (a) Name each of the following blood vessels:
- Vessel carrying blood to X[1]
 - Vessel carrying blood away from Y[1]
- (b) What is the main function of the red blood cells?
.....[1]
- (c) Explain why the number of white blood cells increases in the blood of a person who suffers from an infection.
.....[1]
- (d) Another component of the blood also increases in number when a person suffers a cut on the blood vessel and is bleeding.
- Name this component
.....[1]
 - Explain why this component increases in number.
.....[1]

END OF SECTION 2 (B)

SECTION 2 (C): Structured Questions (10 marks)

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

- C5 (a)** Fig. C5.1 shows a part of the alimentary canal.



Fig. C5.1

There are two processes that help to digest food in this organ.

Describe and explain how specific parts and substances in each of these processes help to digest the food.

- (i)** Physical digestion

.....
.....[2]

- (ii)** Chemical digestion

.....
.....[2]

- (b) Fig. C5.2 shows a mixture of cooking oil and water as seen under a microscope.

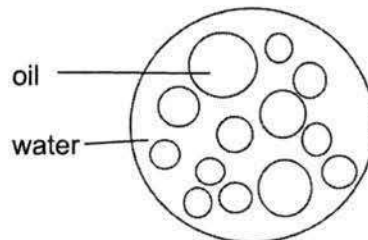


Fig. C5.2

Three different substances (lipase, protease and bile) were added separately to 3 samples of the mixture of oil and water. Each sample was left for twenty minutes. The results are shown in Fig. C5.3.

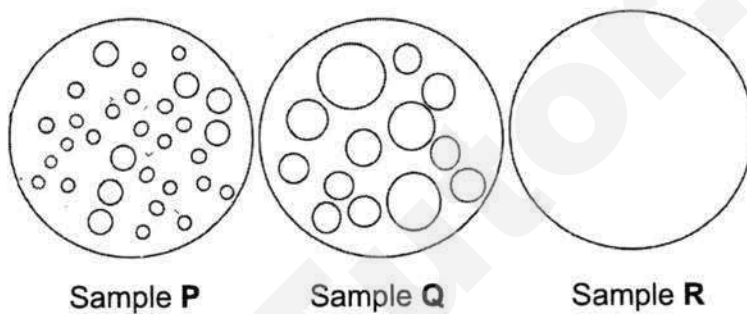


Fig. C5.3

- (i) Write the correct sample (P, Q or R) in each box below.

Treatment	Sample
Lipase	
Protease	
Bile	

[2]

- (ii) Name the process that has caused the change in the appearance of sample P.

.....[1]

- (iii) Explain what happened to sample R.

.....[1]

- (iv) Which part of the alimentary canal would you expect to find sample R?

.....[1]

- (v) What property of the enzyme protease can be deduced from this experiment?

.....[1]

END OF PAPER

MID YEAR EXAMINATION 2017

MARK SCHEME

Level: 1 Express

**Subject: Lower Secondary Science
(Biology)**

Total Marks: 45

Setter: Ma CW & Celine Tan

Section A [15 marks]

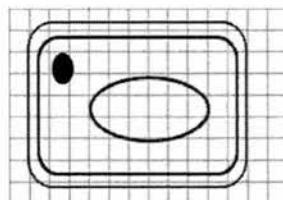
Qn	1	2	3	4	5	6	7	8	9	10
Ans	C	D	B	D	D	B	C	A	B	C
Qn	11	12	13	14	15					
Ans	B	B	D	C	C					

Section B [20 marks]

- B1** deduct 1M if lines are not drawn by ruler
every right branch to get the correct group / id of the organism [1M]
deduct 1 M for every wrong answer/ branch 4

Total = 4

- B2 (a)** Bigger sap vacuole
No mark for drawing done with pen



1

- (b) **B:** longer + rough ; 1
C: shorter + smooth ; 1

- (c) the potato cells and dilute sugar solution has same water potential ; 2
no **net** movement of water into or out of the potato cells/no osmosis has occurred ;

Total = 5

- B3 (b)** Active Transport 1

- (b) (i) From the soil into the root hair cell 1

- (ii) There is a higher water potential in the soil than in the cell / water moves from its high water potential region to its low water potential region 1

- (ii) Starch is made of big particles/molecules that cannot pass through the partially permeable membrane / K. 1

Total = 5

B4 (a) (i) Artery 1

(ii) Vein 1

(b) To transport oxygen (optional - from the lung to all parts of the body). 1

(c) to kill bacteria/fight infection 1

(d) (i) Platelet 1

(ii) for blood clotting 1

Total = 6

Section C [10 marks]

C1 (a) (i) Physical digestion: Teeth grind/cut/chew food into smaller pieces ; 1
to increase surface area for digestion by enzymes ; 1

(ii) Chemical: starch is digested into maltose ; 1
by amylase ; 1

(b) (i)

Treatment	Field of view
Lipase	R
Protease	Q
Bile	P

(1 mark for one correct and 2 marks for all correct) 2

(ii) Emulsification 1

(iii) Fat/oil is digested by lipase into fatty acids and glycerol (A: simpler soluble molecules) 1

(iv) Small intestine / ileum / duodenum 1

(v) Protease cannot digest oil/fats 1

Total = 10

NAME:	CLASS:	INDEX NO:
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QUEENSWAY SECONDARY SCHOOL

MID YEAR EXAMINATION 2017

SECONDARY 1 EXPRESS

Parent's Signature:

LOWER SECONDARY SCIENCE

11 May 2017
1 hour 30 minutes

No additional materials are required.

READ THESE INSTRUCTIONS FIRST

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

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

There are **two** sections. Answer **all** questions.

Section 1: Physics (35 marks)

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

Section 2: Biology (45 marks)

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

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

At the end of the examination, hand in your answers to Section 1 and Section 2 separately.

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

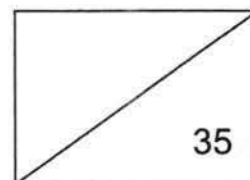
This document consists of **24** printed pages.

Setters: Mrs Sassi, Mr Enrico Tan (Phy)
Ms Celine Tan, Mr Ma Chung Wai (Bio)

[Turn over]

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SECTION 1: PHYSICS SECTION



SECTION 1 (A): Multiple Choice Questions (10 marks)

Answer **all** the questions in this section in the table on **page 5**.

- 1 Tammy wants to be a good scientist.
Which of the following descriptions is appropriate for the values that a scientist should have?

	Value	Description
A	Perserverance	To keep trying until she gets her hypothesis correct
B	Open-mindedness	To be open to ideas and suggestions only from fellow scientists
C	Objectivity	To follow the facts even when what others initially believed was different
D	Integrity	To only report observations that suit the majority belief

- 2 Jill was late for the lesson and missed the laboratory safety briefing. Her friends suggested a few rules from what they remember. Which of the following is **not** one of the laboratory safety rules?
- A There should not be any food brought into the laboratory.
 - B Safety goggles must be worn at all times no matter the experiment.
 - C We should not taste chemicals unless we recognize the chemical name written on the bottle.
 - D The laboratory door should not be locked except when the teacher is inside with the class.

3

- 3 Sammy uses a vernier caliper to measure the thickness of 10 pages of a notebook. Fig. 3.1 shows the vernier caliper reading when it is tightly clamped on the 10 pages.

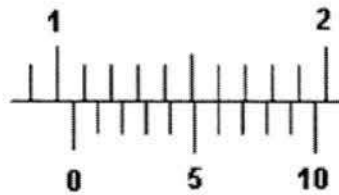
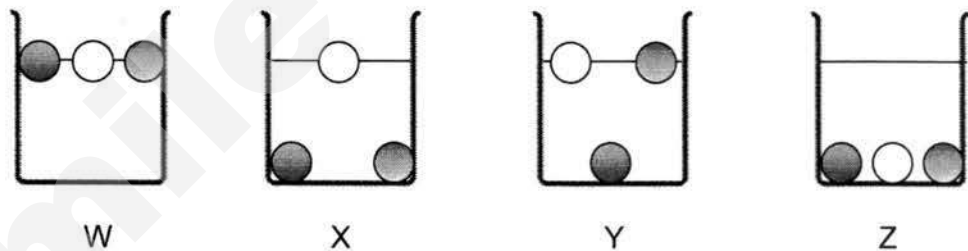


Fig. 3.1

What is the thickness of a single page?

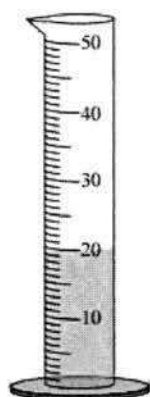
- A 1.06 mm
 B 1.60 mm
 C 1.06 cm
 D 1.60 cm
- 4 Three balls with different densities are placed into four beakers containing different liquids.



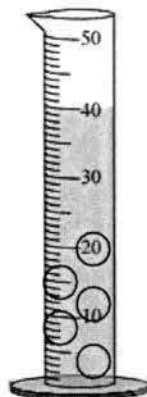
Which of the beakers contains the **second densest** liquid?

- A W
 B X
 C Y
 D Z

- 5 Fred wants to measure the volume of a marble. He places five similar marbles in a measuring cylinder that is partially filled with water.



Without marbles



With marbles

What is the volume of one marble?

- A 4 cm³
 - B 8 cm³
 - C 20 cm³
 - D 40 cm³
- 6 Ted wants to heat up a test tube for an experiment. He is told to use a non-luminous flame.

Which of the following reasons is **false** in explaining why he should use a non-luminous flame for heating?

- A It produces less or no soot at all.
 - B It is steadier than luminous flame.
 - C It is hotter and it burns more efficiently.
 - D It is blue in colour, while luminous flame is yellow.
- 7 Substance A is a solid at a room temperature of 25 °C.

What can you tell about its melting or boiling point?

- A Substance A has a melting point of 25°C.
- B Substance A has a boiling point of 100°C.
- C Substance A has a melting point below 25 °C.
- D Substance A has a boiling point above 25°C.

- 8 Joseph wants to make a water bottle suitable for everyone to use. He is concerned about the material used to make the water bottle. Which of the following physical properties is **not** an important factor that he should consider?
- A The density of the material
 - B The ease at which the material will corrode
 - C The electrical conductivity of the material
 - D Whether the material has a higher melting point than water.
- 9 Which of the following is **not** an effect of forces?
- A A wet towel being dried up under the sun.
 - B A soccer ball being kicked towards a goal.
 - C A basketball being deformed after being crushed.
 - D A volleyball changing direction after hitting the floor.
- 10 Which of the following statements is true about mass and weight?
- A Weight is always the same regardless of location.
 - B Weight can be measured by a spring balance.
 - C Mass differs depending on gravity.
 - D Mass can be measured using a spring balance.

Qns	1	2	3	4	5
Ans					
Qns	6	7	8	9	10
Ans					

END OF SECTION 1 (A)

SECTION 1 (B): Structured Questions (17 marks)

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

B1 State and explain one safety precaution when operating the Bunsen burner.

(a) Safety precaution:

.....[1]

Explanation:

.....[1]

(b) The following hazard symbols are found on a bottle of chemical **X**. State two safety precautions which you should take when handling chemical **X**.



Safety precaution 1:

.....[1]

Safety precaution 2:

.....[1]

- B2** The hardness of four objects, P, Q, R and S is determined in an experiment. Each object is used to scratch the other three objects and the results are shown below.

Object used to scratch the other objects	Presence of scratches on object			
	P	Q	R	S
P		✓	✓	×
Q	×		×	×
R	×			×
S	✓	✓	✓	

Legend

✓ : scratches present

× : no scratches present

- (a) Fill in the missing blank in the above diagram with a ✓ or a ×, for the test between Q and R. [1]

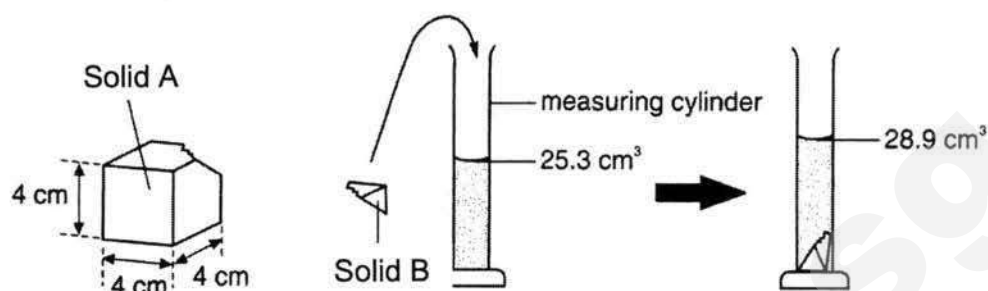
- (b) Which object is the hardest? Explain your answer.

.....
 [2]

- (c) What is one possible use for the material of the object you have chosen in (b)?

..... [1]

- B3** Solid **A** with a dimension of 4 cm by 4 cm by 4 cm has a corner chipped off. The chipped off corner, which is labelled as solid **B**, has a mass of 4.32 g.



Solid **B** is then submerged in a measuring cylinder containing water.

- (a) Find the volume of solid **B**. [1]

- (b) Calculate the density of solid **B**. [2]

- (c) Calculate the mass of the remaining solid **A** after being chipped off. Round off your answer to 1 decimal place. [3]

B4 Lynn is pushing a trolley at a supermarket. When she stops pushing, the trolley stops moving.

(a) What force causes the trolley to slow down and stop?

.....[1]

(b) Give two other effects (other than the ones mentioned in this question) of forces.

.....
[2]

END OF SECTION 1 (B)

SECTION 1 (C): Structured Questions (8 marks)

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

C5 Sharon bought two pots of money plants from a nursery. In one pot, she placed fertilisers while in the other she did not. She had read that fertilisers are additional nutrients for the growth of plants. She watered the plants daily. At the end of experiment, she wanted to find out if the fertilisers truly affected the growth of her money plants.

(a) What could be a hypothesis for the experiment?

.....
[1]

(b) Identify one variable that she needs to keep constant.

.....
[1]

(c) In order to measure the thickness of the stem, Sharon used a ruler. What instrument would be more suitable than a ruler?

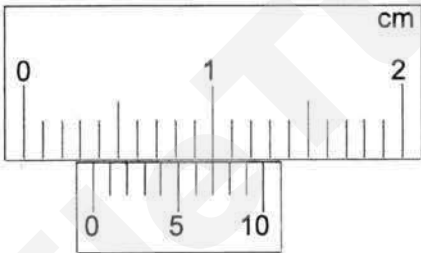
.....[1]

- (d) Sharon plucked three leaves from each plant and measured the width of their stems. She recorded the readings in Table C5.1 below.

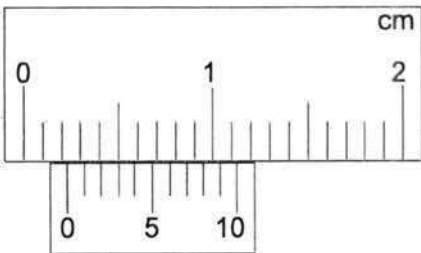
Table C5.1

	Width of leaf's stem / cm			
Plant Condition	Leaf 1	Leaf 2	Leaf 3	Average
With fertiliser	0.34	0.36		
Without fertiliser	0.29	0.25		

- (i) The figures below represent the measurements for the third leaf of both plants. Read the scales below and record your answers in Table C5.1. [2]



Width of 3rd leaf of money plant **with** fertiliser



Width of 3rd leaf of money plant **without** fertiliser

- (ii) Calculate the average width of the stems of the leaves of the two money plants in Table C5.1. Record your answers to 2 decimal places. [2]
- (e) Based on her results, what conclusion can Sharon make?

.....

.....[1]

END OF SECTION 1

MID YEAR EXAMINATION 2017

MARK SCHEME

Level: 1 Express

Subject: Lower Secondary Science
(Physics)

Total Marks: 35

Setter: Sri Idayu & Enrico Tan

PHYSICS SECTION:

SECTION 1(A): MCQ (10 marks)

1. C	2. A	3. A	4. C	5. C
6. D	7. D	8. C	9. A	10. B

SECTION 1(B): Structured Questions (17 marks)

- 1 (a) Safety precaution: When using the bunsen burner place it away from other objects. [1]
Explanation: If Bunsen burner is placed near other objects, they may catch fire.
Accept any possible answer. [1]
- (b) Safety Precaution 1: Place the object far away from flame. [1]
Safety Precaution 2: Do not throw chemical in sink as it may corrode the sink. [1]
- 2 (a) ✓ [1]
- (b) S is the hardest [1]. It scratches all other objects [1].
- (c) Making cutting blades. [1]
(Accept any reasonable answer)

- 3 (a) $28.9 - 25.3 = 3.6 \text{ cm}^3$ [1]
- (b) Density = $4.32/3.6$ [1]
 $= 1.2 \text{ g/cm}^3$ [1]
- (c) Volume of A = $(4 \times 4 \times 4) - 3.6$ [1]
 $= 60.4 \text{ cm}^3$
- Mass = 60.4×1.2 [1]
 $= 72.5 \text{ g}$ [1]
- 4 (a) Frictional force [1]
- (b) A force can change the shape of an object [1]. A force can change the direction of a moving object [1].

Section 1(C): Free Response Questions (8 marks)

- 1 (a) If the amount of fertiliser given to plant increases then the height of plant increases. [1]
- (b) Amount of water given to both plants [1].
- (c) Vernier caliper. [1]
- (d) (i) and (ii)

Plant Condition	Width of Stem of Leaves / cm			
	Leaf 1	Leaf 2	Leaf 3	Average
With fertiliser	0.34	0.36	(i)0.37 [1]	(ii)0.36[1]
Without fertiliser	0.29	0.25	(i)0.23 [1]	(ii)0.26[1]

- (e) The money plant that has fertiliser has thicker stem for the leaves. [1]

THE END

Name: _____ () Class: _____



WOODLANDS SECONDARY SCHOOL END OF YEAR EXAMINATION 2017

Level:	Sec 1 Express	Marks:	50
Subject:	Science (Biology)	Day:	Wednesday
Paper:	-	Date:	11 Oct 2017
Duration:	2 hours (for both Physics and Biology papers)	Time:	0800 - 1000

READ THESE INSTRUCTIONS FIRST

Write in dark blue or black pen only.

You may use a soft pencil for any diagrams or graphs.

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

Answer **all** questions in Sections A, B and C.

At the end of the examination hand in your OTAS and exam paper separately.

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

The use of calculators is allowed in this examination.

For Examiner's Use	
Section A	15
Section B	20
Section C	15
TOTAL:	50

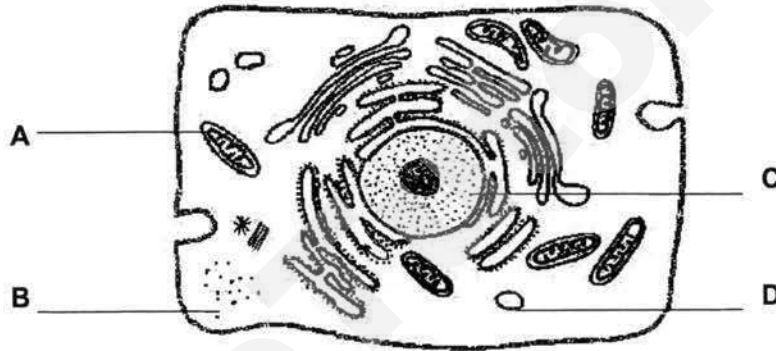
DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.

This document consists of **18** printed pages

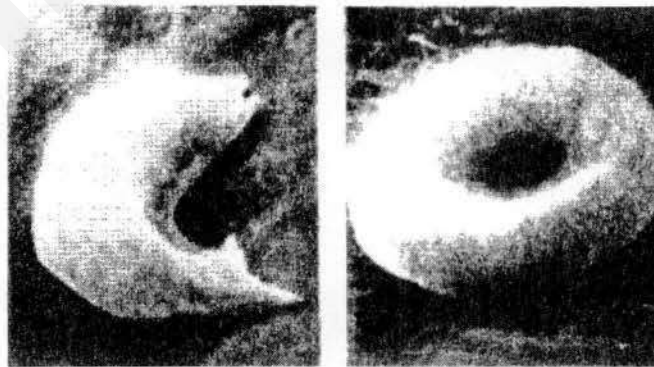
Section A (15 marks)

Answer all questions on the OTAS sheet provided.

- 1 Which structure is found in plant cells but not in animal cells?
- A cell membrane
B cell wall
C nucleus
D small vacuoles
- 2 The following diagram shows an electron micrograph of an animal cell. Which structure is responsible for protein synthesis?



- 3 The photomicrographs below show the appearance of two red blood cells viewed under the same magnification.



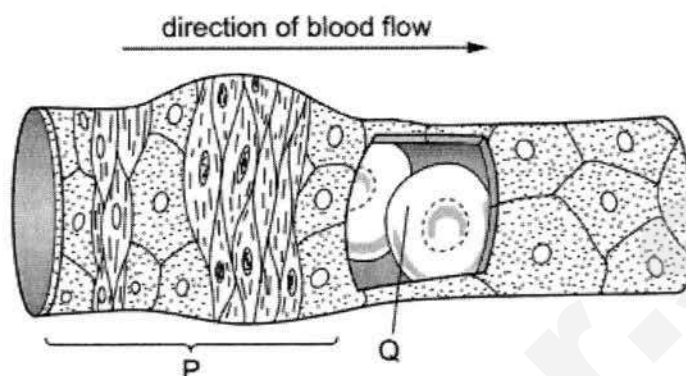
defective red blood cell

normal red blood cell

Which description about the defective red blood cell is correct?

- A It contains a nucleus while the normal red blood cell has lost the nucleus.
B It has the capacity to carry more oxygen than the normal red blood cell.
C It has a lower water potential than the normal red blood cell.
D It has a smaller surface area to volume ratio than the red blood cell.

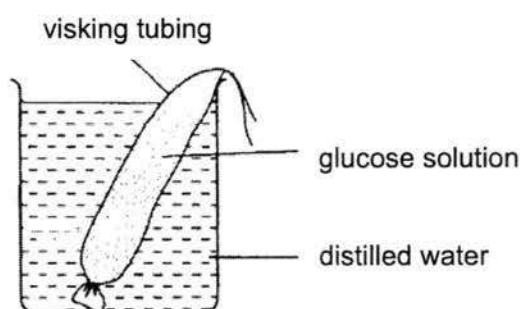
- 4 The diagram below shows a blood vessel. A section of the blood vessel wall has been cut to show the blood flowing inside.



Which option correctly identifies the order of classification for **P** and **Q**?

	P	Q
A	cell	organ
B	organ	cells
C	organ	tissue
D	tissue	organ

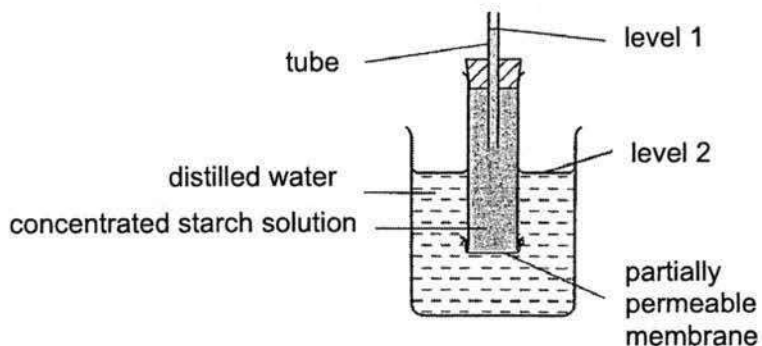
- 5 An experiment was set up as shown below and left for half an hour.



The process responsible for the movement of glucose molecules out of the visking tubing is

- A** osmosis.
- B** diffusion.
- C** absorption.
- D** transport.

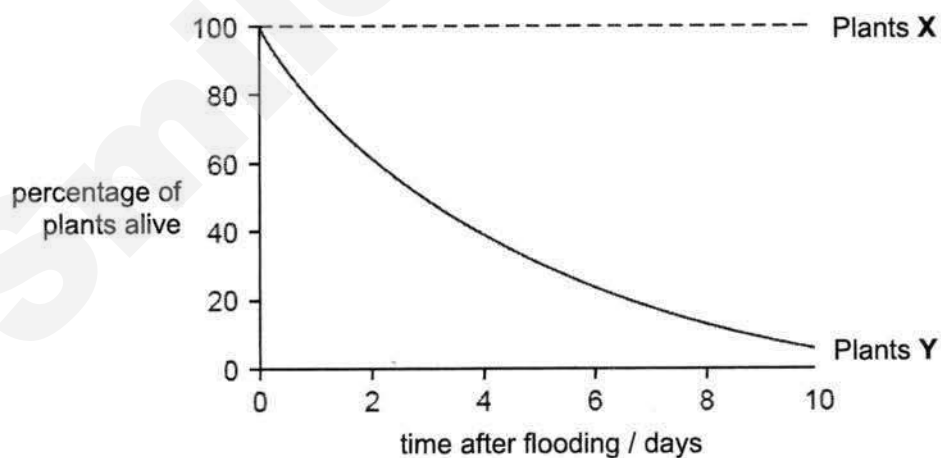
- 6 The diagram shows a set-up used to investigate osmosis.



Which molecules will move across the partially permeable membrane and how will levels 1 and 2 change?

	molecules	level 1	level 2
A	starch	fall	rise
B	starch	rise	fall
C	water	fall	rise
D	water	rise	fall

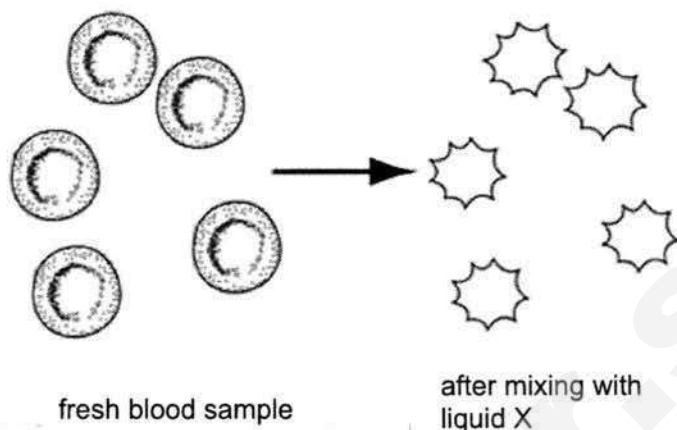
- 7 Concentrated salt solution accidentally flooded a field of young rice plants. The graph shows the effect on two varieties of rice plants, **X** and **Y**, in the field.



What caused the effect shown by the graph?

- A** Water enters the root cells of plants **X**.
- B** Water enters the root cells of plants **Y**.
- C** Water leaves the root cells of plants **X**.
- D** Water leaves the root cells of plants **Y**.

- 8 The diagram below shows cells in fresh blood and the same cells after it has been mixed with liquid X.



Which statement describes the water potential of liquid X?

- A It is lower than that of the cell cytoplasm.
 B It is equal to that of the cell cytoplasm.
 C It is higher than that of the cell cytoplasm.
 D It is equal to that of distilled water.
- 9 The table below shows the percentage nutritional content of four different food substances.

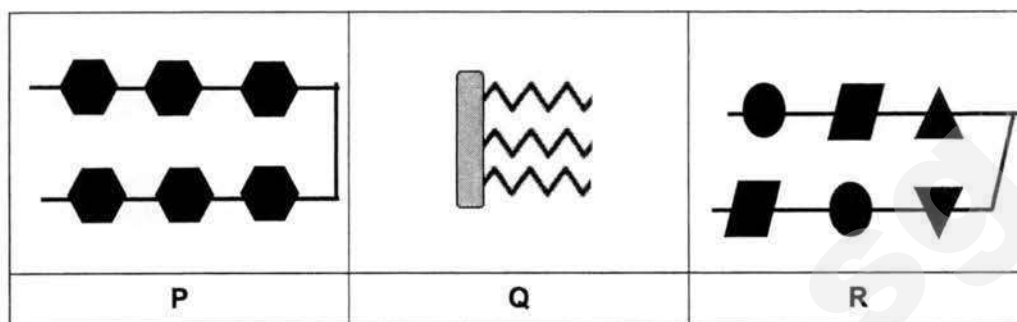
Which of the following food should be avoided by someone who suffers from obesity?

	carbohydrates / %	fats / %	protein / %
A	11.5	15.0	73.5
B	12.0	75.6	12.4
C	15.1	60.4	24.5
D	45.2	16.4	38.4

- 10 Which of the following substances are built from amino acids?

- A bread
 B butter
 C lean meat
 D potato chips

- 11 The diagram below represents three types of nutrients found in food.



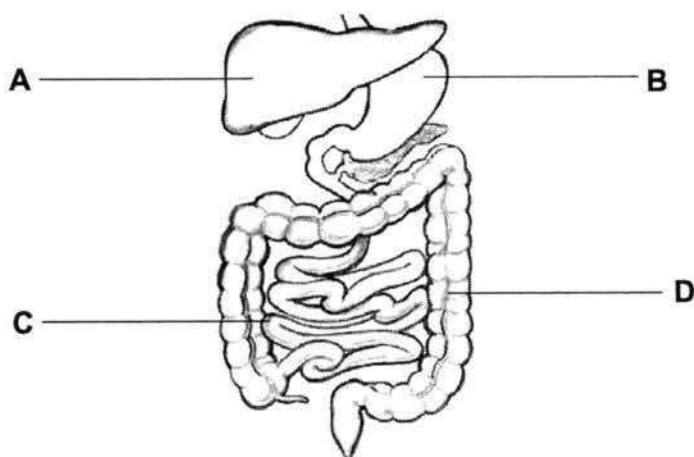
What are P, Q and R?

	P	Q	R
A	fat	carbohydrate	protein
B	carbohydrate	fat	protein
C	protein	carbohydrate	fat
D	protein	fat	carbohydrate

- 12 In which order do these events occur in human nutrition?

- A digestion → ingestion → absorption → assimilation
 B digestion → ingestion → assimilation → absorption
 C ingestion → digestion → absorption → assimilation
 D ingestion → digestion → assimilation → absorption

- 13 Which organ is **not** part of the alimentary canal?

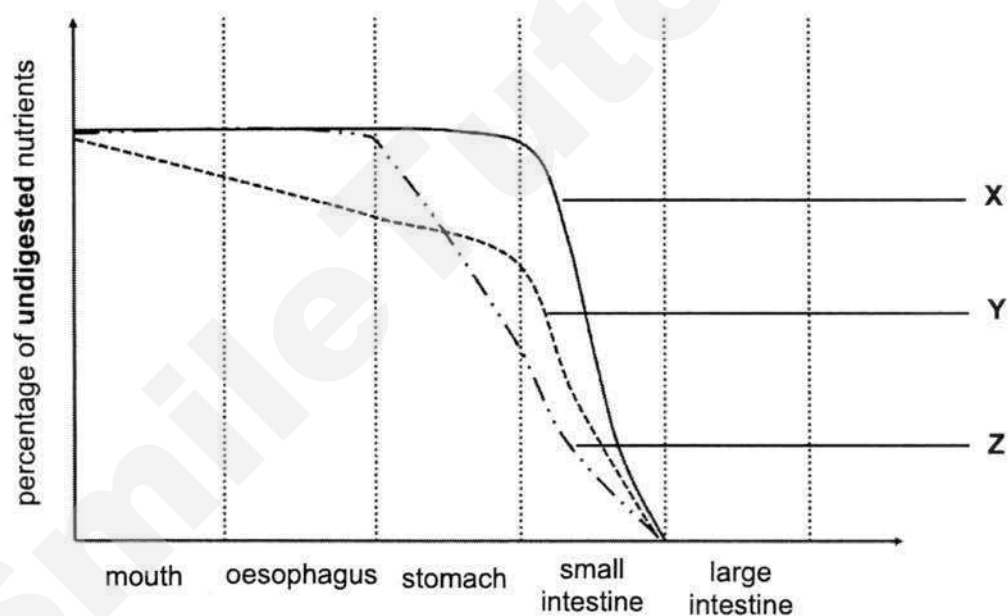


- 14 Litmus paper turns red in acidic solutions and blue in alkaline solutions.

Which part of the alimentary canal has secretions that would change litmus paper red?

- A colon
- B duodenum
- C ileum
- D stomach

- 15 The following figure shows the changes in the amounts of nutrients, **X**, **Y** and **Z**, as they pass through the different parts of the human alimentary canal.

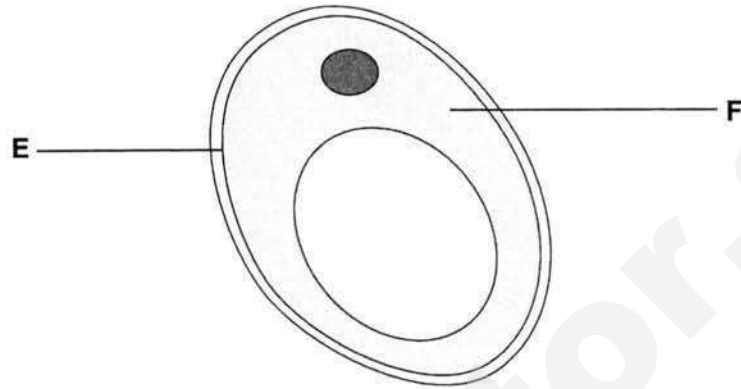


What nutrients are **X**, **Y** and **Z**?

	X	Y	Z
A	carbohydrate	fat	protein
B	carbohydrate	protein	fat
C	fat	carbohydrate	protein
D	protein	carbohydrate	fat

Section B (20 marks)Answer **all** questions in the spaces provided.

- 1 Fig.1.1 shows a unicellular organism, yeast.

**Fig. 1.1**

- (a) Structures labelled **E** and **F** can also be found in human cells. Name these structures.

E:

F: [2]

- (b) Yeast cells do not have complex reproductive systems like humans. To reproduce and produce offspring, they expand and split themselves into two.

Name the structure found in yeast cells that contains genetic material and controls reproduction in yeast.

..... [1]

- (c) Fig. 1.2 shows a root hair cell. It is a specialized plant cell that absorbs water and mineral salts from the surrounding soil.

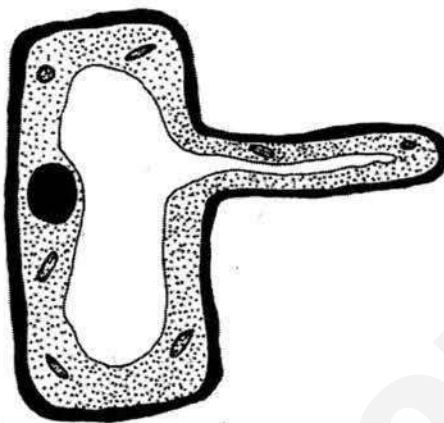


Fig. 1.2

Describe and explain one feature that allows the root hair cell to perform its function efficiently.

.....

.....

..... [2]

[Total: 5]

- 2 Two freshly-peeled potato cylinders, **J** and **K**, each have a mass of 5.0g.

In an experiment, they are balanced on each end of a pivoted ruler, as shown in Fig. 2.1. Then, the cylinders are placed into different solutions, **X** and **Y**, for 30 minutes, before being removed.

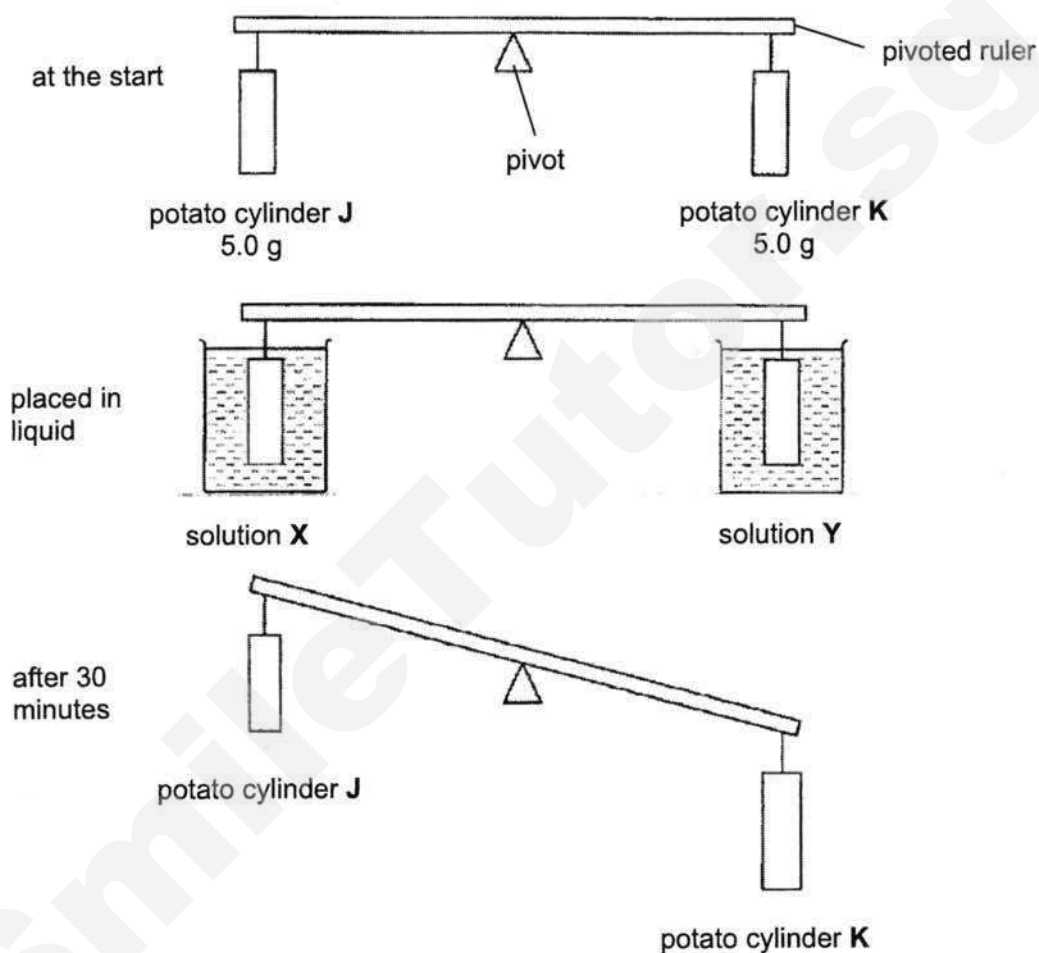


Fig. 2.1

- (a) (i) State how the mass of potato cylinder **J** has changed after the experiment.

..... [1]

- (ii) Explain this change in mass of potato cylinder **J**.

.....
.....
..... [2]

- (b) If both potato cylinders **J** and **K** were placed in the same liquid for 30 minutes, draw a labelled diagram of the expected positions of the ruler and potato cylinders **J** and **K** to show the expected results.

The pivot has been drawn for you.



[1]

[Total: 4]

- 3 A 65-year-old man was shopping for some biscuits in the supermarket. The table below shows the nutritional facts of two brands of biscuits, **X** and **Y**.

Table 3.1

Values per serving	Brand X	Brand Y
Energy	550kJ	380KJ
Carbohydrates	20.1g	18.7g
Lipids (fats)	4.2g	1.2g
Saturated fat	3.7g	0.9g
Dietary Fibre	0.1g	4.4g

- (a) Which brand of biscuits would you recommend for the 65-year-old man? Give a reason to support your answer.

.....
 [2]

- (b) State the nutrient that is **not** found in both Brand **X** and Brand **Y** biscuits.

..... [1]

- (c) State one use of consuming fats.

..... [1]

- (d) He finally chose Brand **X**. He ate 4 servings of biscuits.

Calculate the amount of energy 4 servings of Brand **X** biscuits would provide.
 Show your working and include the appropriate units.

..... [1]

[Total: 5]

- 4 Fig. 4.1 shows the human digestive system.

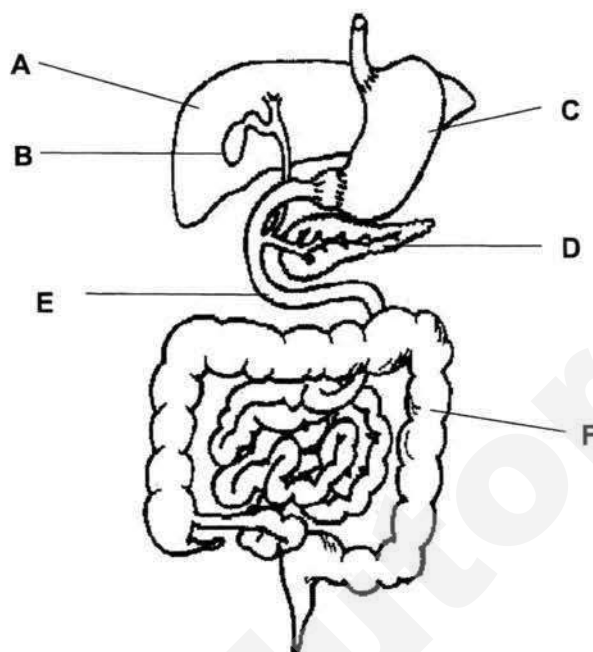


Fig. 4.1

- (a) (i) Name organs A and D.

A: D: [2]

- (ii) State the letter(s) for the part(s) where protein digestion takes place.

..... [1]

- (b) Gallstones are small stones that are formed in the gall bladder from some components of bile. Patients who suffer from this may experience pain and vomiting.

(i) State the function of the gall bladder.

..... [1]

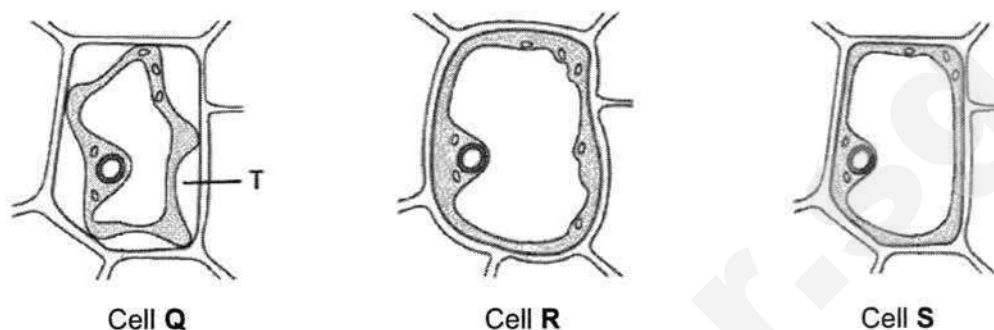
(ii) How would having gallstones affect fat digestion in patients? Explain why.

.....
..... [2]

[Total: 6]

Section C (15 marks)Answer **all** questions in the spaces provided.

- 5 Fig. 5.1 shows three plant cells which had been placed in distilled water, 0.45% sucrose solution and 10% sucrose solution respectively for 30 minutes.

**Fig. 5.1**

- (a) With reference to Fig. 5.1, identify the cell (**Q**, **R** or **S**) placed in each solution.

- (i) Distilled water:
- (ii) 0.45% sucrose solution:
- (iii) 10% sucrose solution: [2]

- (b) Describe the appearance of cells **Q** and **R** after the experiment.

- Cell **Q**: [1]
- Cell **R**: [1]

- (c) Using ideas about osmosis, explain why cell **S** remain unchanged.

-
-
- [2]

- (d) State what can be found in region **T**.

- [1]

[Total:7]

- 6 Kenneth carried out an experiment to compare the amounts of starch that three different liquid food supplement, **X**, **Y** and **Z** contain. He prepared three test tubes containing equal amounts of food supplement, iodine solution and amylase enzyme, as shown in Fig. 6.1.

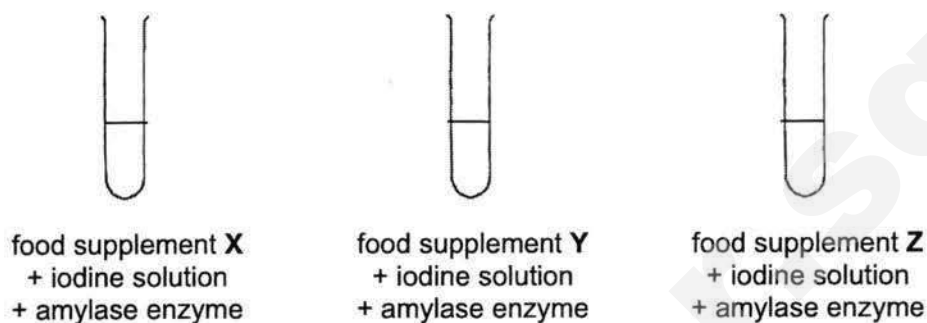


Fig. 6.1

Every 5 minutes, he observed the colour of the mixture and recorded his observations in Table 6.2.

Table 6.2

time in minutes	food supplement		
	X	Y	Z
0 (start of experiment)	blue-black	blue-black	blue-black
5	blue-black	blue-black	blue-black
10	blue-black	blue-black	blue-black
15	blue-black	blue-black	yellow brown
20	blue-black	blue-black	yellow brown
25	blue-black	yellow brown	yellow brown

- (a) What do the colours of the mixture indicate about the presence of starch?

Blue-black:

Yellow brown: [1]

- (b) Name the product that is obtained after starch is fully digested.

..... [1]

- (c) From Table 6.2, state the food supplement (**X**, **Y**, or **Z**) that likely contains the least amount of starch.

..... [1]

- (d) Provide an explanation for your answer in (c).

..... [1]

[Total:4]

- 7 Fig. 7.1 shows an example of a jar of baby food sold in supermarkets. Baby food is usually meant for infants less than 6 months old, and is pureed into a semi-solid mush form.



Fig. 7.1

- (a) Using your knowledge of physical digestion, suggest an explanation why baby food needs to be in a semi-solid form.

.....
 [1]

- (b) Baby food usually contains high amounts of protein. Explain why babies need to consume protein.

..... [1]

- (c) Explain why it is important for nutrients to be completely digested.

.....
..... [2]

[Total: 3]

End of Paper

Section A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
B	B	D	B	B	D	D	A	B	C	B	C	A	D	C

Section B [20 marks]

1	Answer	Marks
a	E: cell membrane F: cytoplasm <i>Spelling must be correct. 1m each.</i>	2
b	Nucleus	1
c	Describe: Long and narrow protrusion Explain: Increases surface area to volume ratio of the cell for faster absorption of water and mineral salts by osmosis and diffusion. Describe: Large central vacuole Explain: allows storage of water Describe: Concentrated cell sap Explain: maintains steep concentration gradient for continuous absorption of water and mineral salts by osmosis and diffusion respectively. <i>Reject: "has no chloroplasts".</i>	<i>1m for stating correct adaptation only.</i> <i>1m for matching explanation.</i>
		Total 5

2	Answer	Marks
ai	The mass of potato cylinder J <u>decreased</u>	1
aii	Solution X has lower water potential than (the cell sap of) potato cylinder J. Water leaves the potato cylinder by osmosis. Or Water molecules move from potato cylinder J (a region of higher water potential) to solution X (a region of lower water potential) by osmosis. <i>1m – identification of direction of movement of water molecules out of potato</i> <i>1m – comparison of higher/lower water potential</i>	1 1
b	Drawing to show: The pivoted ruler remains balanced. Drawing must include: ruler, cylinder J and K.	1
		Total 4

3	Answer	Marks
a	Brand Y. Reason: It provides more dietary fibre / less fat than Brand Y.	1 1
b	protein	1
c	Any of the following: - Fats is an efficient/good store of energy - Insulation / provide warmth	1
d	550 kJ X 4 = <u>2200 kJ</u>	1
		Total 5

4	Answer	Marks
ai	A – liver D – pancreas	1 1
aii	C, E <i>Both must be correct to be awarded 1m.</i>	1
bi	Stores bile	1
bii	Fat digestion will be slower. Less bile is secreted to carry out <u>emulsification</u> .	1 1
		Total 6

Section C [15 marks]

5	Answer	Marks
a	Distilled water: R 0.45% sucrose solution: S 10% sucrose solution: Q <i>1 correct – 0m; 2 correct – 1m; 3 correct – 2m.</i>	2
b	Cell Q : It decreased in size/ became plasmolysed/ became flaccid Cell R: It increased in size/swelled/ became turgid	1 1
c	The water potential of cell sap of S is equal to the water potential of the solution it was placed in. There was no net movement of water molecules into or out of the cell.	1 1
d	10% sucrose solution	1 Allow ECF
		Total 7

6	Answer	Marks
a	Blue black: Starch is present / has not been digested. Yellow brown: Starch is absent / has been digested.	1 for both
b	Glucose	1
c	Z	1
d	It takes the shortest time to turn yellow-brown Which means it takes the <u>shortest time for all the starch to be digested.</u>	1
		Total 4

7	Answer	Marks
a	Babies do not have teeth to chew food into smaller pieces for easier digestion.	1
b	For <u>growth of new tissues</u> as the babies are still developing	1
c	So that they are digested into simpler, soluble molecules Which can be absorbed /diffuse into the blood	1 1
		Total 4

Name: _____ ()

Class: _____



WOODLANDS SECONDARY SCHOOL END OF YEAR EXAMINATION 2017

Level:	Sec 1 Express	Marks:	50
Subject:	Lower Sec Science	Day:	Wednesday
Paper:	Physics	Date:	11 October 2017
Duration:	2 hours (with Biology)	Time:	0800 - 1000

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on the question paper.

Write in dark blue or black pen. You may use a soft pencil for any diagrams, graphs, tables or rough working. Do not use staples, paper clips, highlighters, glue or correction fluid.

For each question in **Section A**, 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 optical answer sheet provided. Hand in **both** multiple choice answer sheet and question paper separately.

Answer all questions from **Section B** and **Section C** in the spaces provided on the question paper.

FOR EXAMINER'S USE	
Section A	/15
Section B	/20
Section C	/15
Total	/50

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.

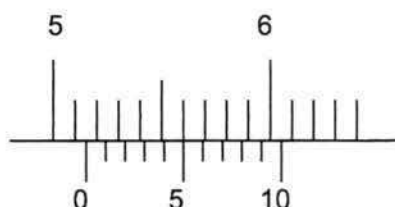
This document consists of **14** printed pages.

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Section A (15 marks)Answer **all** questions.

Shade your answers in the optical answer sheet provided.

- 1 The diagram shows the reading on a vernier calipers when its two jaws clamp a wooden block. What is the reading shown?



- A** 5.10 cm **B** 5.15 cm **C** 5.60 cm **D** 5.65 cm

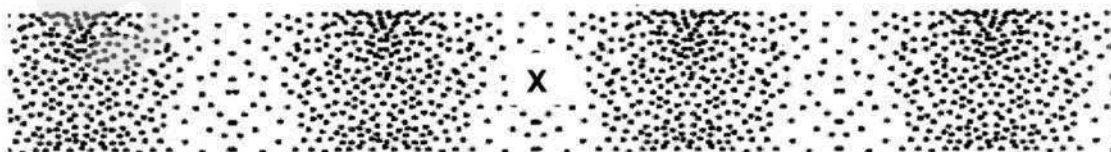
- 2 Which of the following is the SI unit of density?

- A** g/cm³ **B** kg/m³ **C** m/v³ **D** ρ

- 3 The handles of most cooking utensils are made of plastic. Which property of plastic is the main reason for using it as handle?

- A** electrical insulator
B high melting point
C low density
D thermal insulator

- 4 The diagram shows the air particles as sound travels through them.



What is the name of region **X** and the density of air in this region compare to the surrounding?

	region X	density compared to surrounding air
A	compression	higher
B	compression	lower
C	rarefaction	higher
D	rarefaction	lower

- 5 Which of the following is the correct order of the speed of sound from the fastest to the slowest?

	Fastest				Slowest
A	Iron	→	Water	→	Air
B	Water	→	Air	→	Iron
C	Air	→	Water	→	Iron
D	Water	→	Iron	→	Air

- 6 A guitarist wants to play a note of higher pitch with his guitar string. What will be the change in the frequency and vibration of the guitar string?

	frequency	vibration
A	decrease	faster
B	decrease	slower
C	increase	faster
D	increase	slower

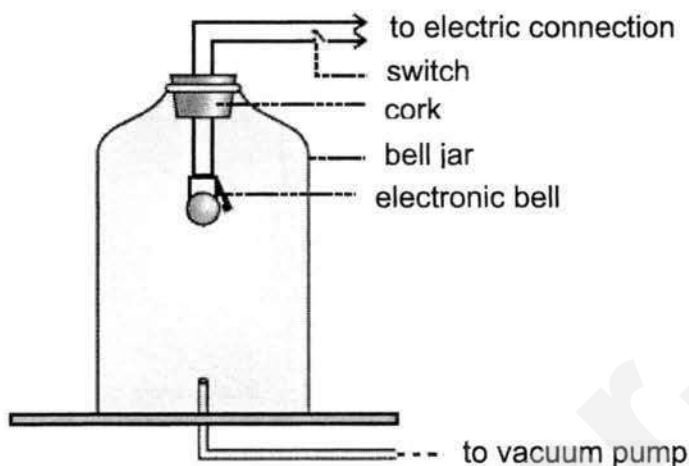
- 7 A student stands in front of a building and shouts. She hears an echo. What happens to the echo when she shouts at a greater distance from the building?

- A It is louder and takes a longer time to reach her.
- B It is louder and takes a shorter time to reach her.
- C It is softer and takes a longer time to reach her.
- D It is softer and takes a shorter time to reach her.

- 8 Which of the following statements about sound is incorrect?

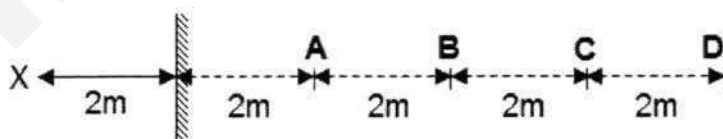
- A A body must vibrate in order to produce sound.
- B Sound cannot pass through vacuum.
- C Sound travels at the same speed as light in air.
- D Sound carries energy from one place to another.

- 9 A student puts a bell into a jar, and switches it on so that it rings continuously. He turns on the vacuum pump to remove air from the jar slowly.



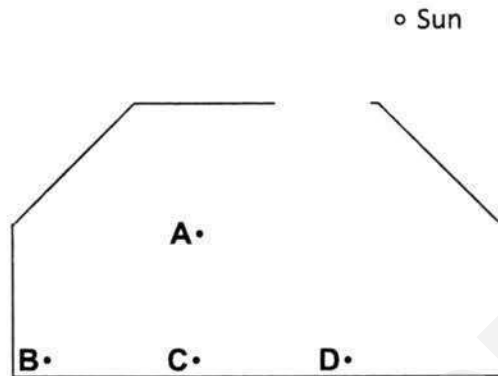
What will the student hear as the air is being pumped out?

- A The bell will sound louder.
 B The bell will sound softer.
 C There will be no change in loudness.
 D There will be no sound instantly.
- 10 An image which **cannot** be caught on a screen is known as a
- A real image B virtual image
 C diminished image D magnified image
- 11 The diagram below shows an object, X, placed 2 metres in front of a plane mirror.

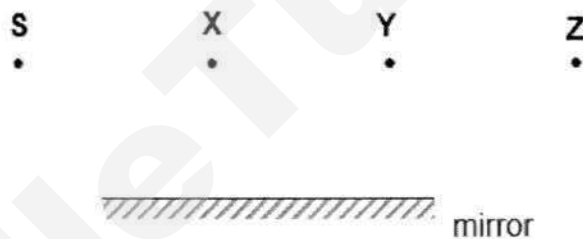


At which position is the object's image located?

- 12 The diagram below shows the position of Sun above a house. Sun light cannot pass through the roof of the house, but there is a hole that allows light to pass through. The walls and roof of the house are not reflective. Which point will be in the shadow?



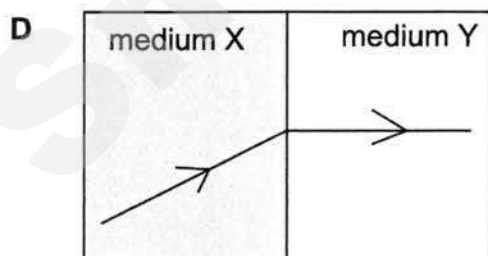
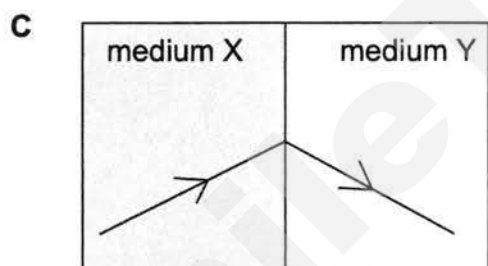
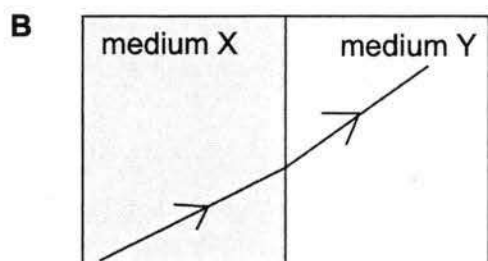
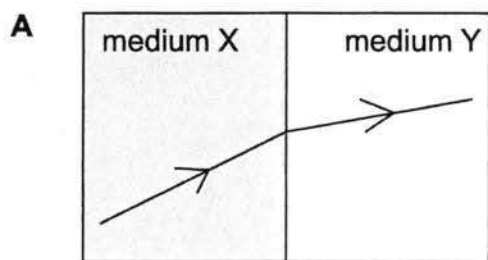
- 13 A student stands in front of a mirror at point S. There are objects placed at points X, Y and Z.



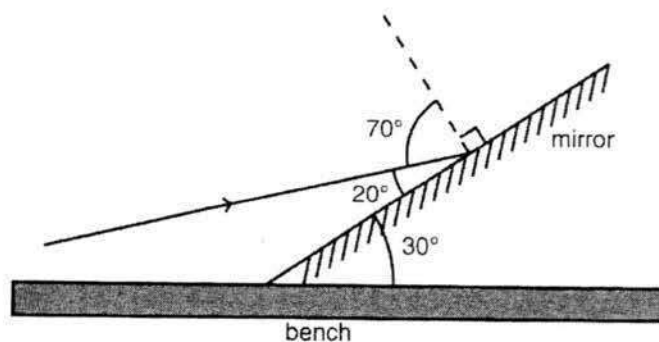
How many images of the objects can the student see in the mirror?

- A 0
- B 1
- C 2
- D 3

- 14 A ray of light travels from medium X to medium Y. If medium X is optically denser than medium Y, which of the following correctly shows the light path?



- 15 A mirror is tilted at an angle of 30° to the bench. A ray of light is directed so that it hits the mirror at an angle of 20° to the surface of the mirror



What is the angle of reflection?

- A 20° B 30° C 50° D 70°

Section B (20 marks)

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

- 16** A student attempts to measure the diameter of a sphere. He uses 5 identical spheres, 2 triangular blocks and a metre rule as shown in Fig. 16.1.

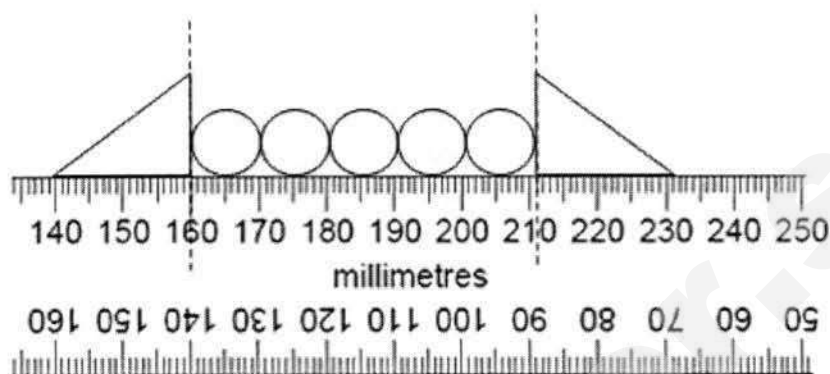


Fig. 16.1

- (a)** Determine, with working, the diameter of **two** spheres.

diameter of two spheres = mm [2]

- (b)** State one precaution the student needs to take to ensure accurate reading.

.....
 [1]

- (c)** Name an instrument that is suitable to be used to measure the diameter of the sphere to a precision of 0.1 mm.

..... [1]

- 17 A time keeper of a race stands a certain distance away from a starter. He starts his stopwatch when he sees the smoke from the starter who fires the gun and stops the stopwatch when he hears the loud bang from the gun. The time recorded is 0.65 s. Take the speed of sound in air = 300 m/s.

(a) Explain why the time keeper sees the smoke from the gun first before hearing the loud bang.

.....
 [1]

(b) Calculate the distance between the time keeper and the starter.

distance = m [2]

- 18 A boy holds a signboard with the word '**STOP**' and stands in front of a plane mirror.

(a) Write down the appearance of the word that the boy sees in the mirror.

..... [1]

(b) State two characteristics of the image formed by a plane mirror.

.....
 [2]

- 19 Fig. 19.1 shows a ray of blue light being refracted at points **A** and **B** on a semi circular glass block.

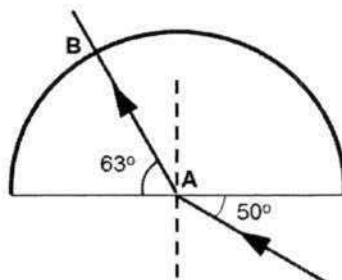


Fig. 19.1

- (a) Why did the ray not change direction at **B**?

..... [1]

- (b) What are the angles of incidence and refraction, in degrees, at **A**?

angle of incidence =

angle of refraction =

[2]

- (c) Calculate the refractive index of the glass.

refractive index =[2]

- (d) Hence or otherwise, calculate the speed of light in the glass block using the answer in part (c). (Given that the speed of light travelling in vacuum is 3.00×10^8 m/s)

speed =m/s[2]

- 20 On Fig 20.1, draw 2 light rays to show how the observer sees the image of the object **O** in the mirror. [3]

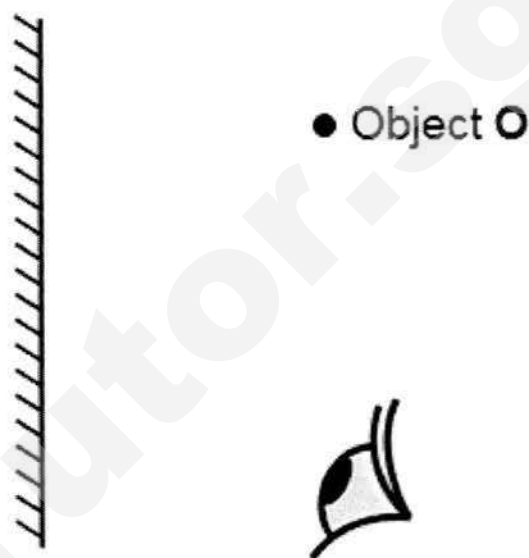


Fig 20.1

Section C (15 marks).

Write your answers in the spaces provided.

- 21 (a) Fig. 21.1 shows four different materials and their physical properties.

material	melting point / °C	boiling point / °C	thermal conductivity	electrical conductivity
P	– 39	357	good	good
Q	660	2743	good	good
R	1495	2927	good	good
S	3527	4440	poor	poor

Fig. 21.1

- (i) State and explain which material is a non-metal.

.....
 [2]

- (ii) Determine the state of matter for the following materials at 1000 °C.

Material **P**:

Material **Q**: [2]

- (iii) State all the material(s) which is/are suitable to be used to make the body of a frying pan.

..... [1]

- 21 (b) Fig. 20.2 shows the masses and volumes of two solids **X** and **Y**.

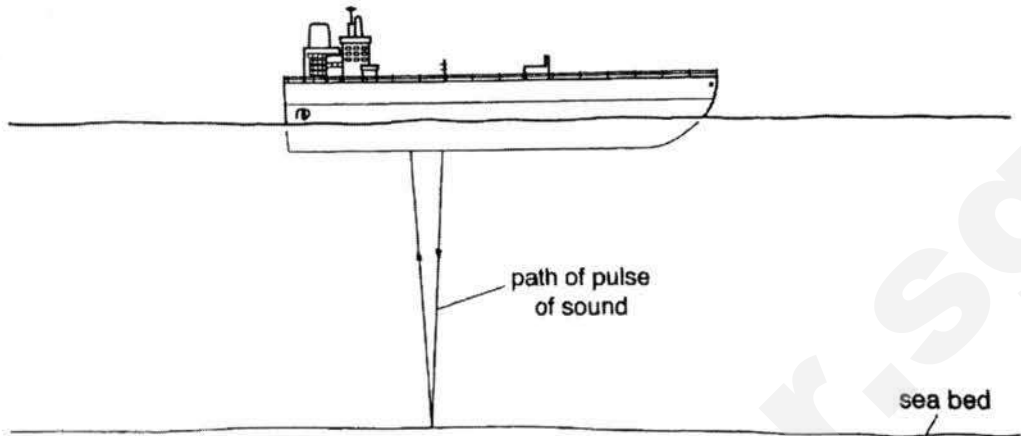
	X	Y
mass / g	28.0	4.5
volume / cm ³	17.5	6.0
density / g/cm ³		

Fig. 20.2

- (i) Complete Fig. 20.2 by filling in the blanks with the densities of solids **X** and **Y** respectively. Show your working. [2]
- (ii) Liquid **Z** has a density of 0.90 g/cm³. Given that both solids **X** and **Y** are insoluble in liquid **Z**, state which solid(s) will sink in liquid **Z**.
 [1]
- (iii) Solid **X** is cut into two equal halves. State and explain what will happen to the half if it is placed in liquid **Z**.

 [2]

- 22 Sound navigation and ranging (Sonar) is a technique that uses sound propagation to navigate, communicate with or detect objects on or under the surface of the water.



- (a) Sonar is an ultrasound. Explain what is meant by ultrasound and state one other use for ultrasound.

.....

 [2]

- (b) Given the speed of sound in water is 1480 m/s, calculate the depth of the sea bed if it took 3 seconds for the echo to be detected by the ship.

depth =m[2]

- (c) Explain why the echo is smaller in amplitude than the original sound from the transmitter of the ship.

.....
 [1]

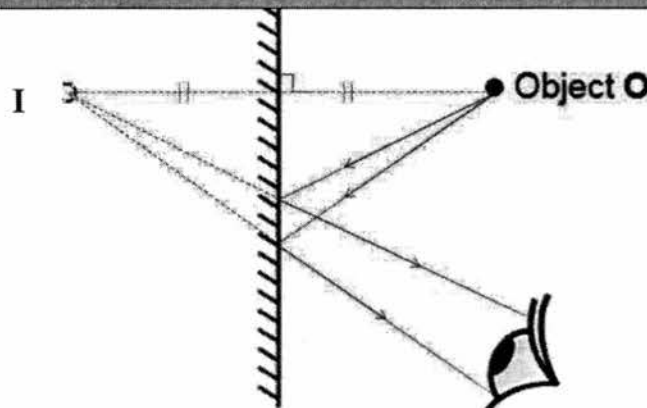
END OF PAPER

Section A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
B	B	D	D	A	C	C	C	B	B	A	D	D	B	D

Section B

16(a)	length of 5 spheres = $211 - 160 = 51$ mm	[1]
	diameter of 1 sphere = $(51/5) \times 2 = 20.4$ mm	[1]
(b)	avoid parallax error / place eyes directly above the metre rule when taking reading	[1]
(c)	vernier calipers	[1]
17(a)(i)	light travels faster than sound	[1]
(ii)	$d = v \times t = 300 \times 0.65$	[1]
	= 195 m	[1]
(b)	No, sound cannot travel in vacuum.	[1]
18(a)	90T2	[1]
(b)	Any two from the following: - laterally inverted - virtual - same size as object - upright - object distance = image distance	[1]
19(a)	The angle of incidence is zero degrees	[1]
(b)	angle of incidence = 40°	[1]
	angle of refraction = 27°	[1]
(c)	$n = \sin i / \sin r$ $= \sin 40 / \sin 27$	[1]
	= 1.42 (3 s.f.)	[1]
(d)	$n = c/v$ $1.415 = (3.00 \times 10^8) / (v)$	[1]
	$v = 2.12 \times 10^8$ m/s	[1]



- (a) Draw two rays from I to Eye. Mark the point as I, the image. [1]
 (b) Draw dotted perpendicular line with perpendicular sign. Mark equidistance. Draw O, the object. [1]
 (c) Draw two converging real rays from the mirror to the object. [1]

Advise students that it is a good practice to draw the normal at the interface to check that the angle of incidence is equal to the angle of reflection.

Section C

21(a)(i)	S	[1]
	It is a poor electrical (& thermal) conductor	[1]
(ii)	P = gas	[1]
	Q = liquid	[1]
(iii)	Q and R	[1]
(b)(i)	Density = m/V $=28/17.5 = 1.6$	[1]
	Students need not state unit as it is in the header of table.	
	Density = m/V $=4.5/6.0 = 0.75$	[1]
(ii)	Solid X	[1]
(iii)	The half will sink in liquid Z,	[1]
	as the density of the half remains unchanged / denser than liquid Z	[1]
22(a)	Sound that has frequency higher than 20000 Hz	[1]
	cleaning delicate jewellery OR scanning pregnant women to examine the foetus OR any suitable scientific used for ultrasound.	[1]
(b)	$d = v \times t$ $= 1480 \times 3$ $= 4440 \text{ m}$	[1]
	depth = $4440 / 2$ $= 2220 \text{ m}$	[1]
(c)	Energy is lost to the surrounding/ Accept the echo is softer (For sec1)	[1]

General notes:

Do not penalize for carry forward errors. Award full marks for subsequent parts if **both** method and units are correct.

Do not penalize for spelling errors but do highlight them to the students.

Remind students to show formulae, working and units for all calculations.

Answers must not be more than 3.s.f. if accuracy is not specified.

If students do not show formulae and intermediate working for more than 2 times for questions involving calculations, deduct **1 mark** overall.

If students give more than 3.s.f. for more than 2 times, deduct **1 mark** overall.