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|               |              |                  |
|---------------|--------------|------------------|
| <b>Name :</b> | <b>Class</b> | <b>Index no.</b> |
|---------------|--------------|------------------|

## DEYI SECONDARY SCHOOL



### Mid-Year Examination 2018 Secondary One Express

**SCIENCE**

**8 May 2018  
0800 – 0930 h  
1 hour 30 minutes**

Additional Material: OTAS

#### READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on the cover page of the question booklet.

This paper consists of three sections.

**Section A** (20 marks)

There are 20 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 OTAS provided.

**Section B** (30 marks)

Answer **all** the questions in the spaces provided on the question booklet.

**Section C** (30 marks)

Answer **all** the questions in the spaces provided on the question booklet.

At the end of the examination, hand in separately

- (i) OTAS
- (ii) Question Booklet

A copy of the Periodic Table is printed on page **15**.

**CALCULATORS MAY BE USED.**

| For Examiner's Use |              |
|--------------------|--------------|
| <u>Section</u>     | <u>Marks</u> |
| <b>A</b>           | <b>/ 20</b>  |
| <b>B</b>           | <b>/ 30</b>  |
| <b>C</b>           | <b>/ 30</b>  |
| <b>Total</b>       | <b>/ 80</b>  |

This question paper consists of **15** printed pages, including the cover page.

**[Turn over**

**Section A (20 marks)**

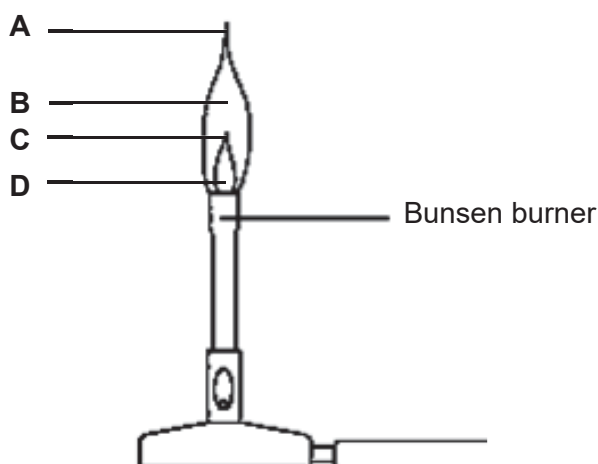
Answer **all** the questions on the OTAS provided.

- 1 Aston needs to fill a bottle with exactly  $55.0 \text{ cm}^3$  of a solution. Which apparatus is most appropriate for this task?
- A** Beaker  
**B** Conical flask  
**C** Displacement can  
**D** Measuring cylinder
- 2 Benjamin came across a bottle of chemical powder with the following symbol.

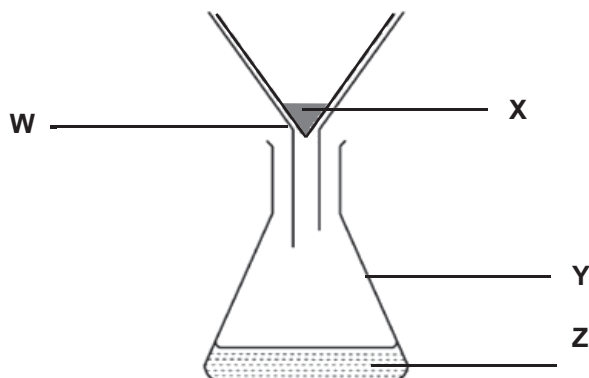


Which of the following describes the correct way that he should follow when handling this chemical powder?

- A** He must keep the chemical powder away from the flame as it is explosive.  
**B** He must not wash the chemical powder down the sink as it can harm the aquatic environment.  
**C** He must store the chemical powder in a lead-lined container as it emits radiation.  
**D** He must use a spatula when handling the chemical powder as it can irritate the skin.
- 3 Which of the following sequences of steps is correct for lighting up a Bunsen burner?
- A** close the air-hole → light up the burner → turn on the gas tap → open the air-hole  
**B** close the air hole → turn on the gas tap → light up the burner → open the air-hole  
**C** open the air-hole → light up the burner → turn on the gas tap → close the air-hole  
**D** open the air hole → turn on the gas tap → light up the burner → close the air-hole
- 4 The diagram below shows a Bunsen flame. Which part of the flame is the hottest?



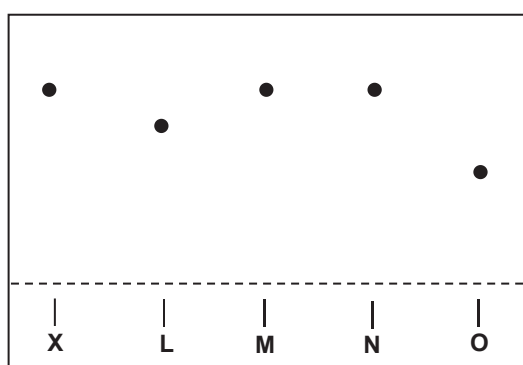
- 5 Which of the following is the correct reason why crystallisation is used to obtain sugar from sugar solution, instead of evaporation by direct heating?
- A** Sugar decomposes into carbon and water upon direct heating.  
**B** Sugar obtained by direct heating is less pure than the sugar obtained by crystallisation.  
**C** The amount of sugar obtained by direct heating is less than the amount of sugar obtained by crystallisation.  
**D** The time taken to obtain sugar through direct heating is longer than crystallisation.
- 6 The diagram below shows a set-up to separate a mixture of salt, sesame seed and water.



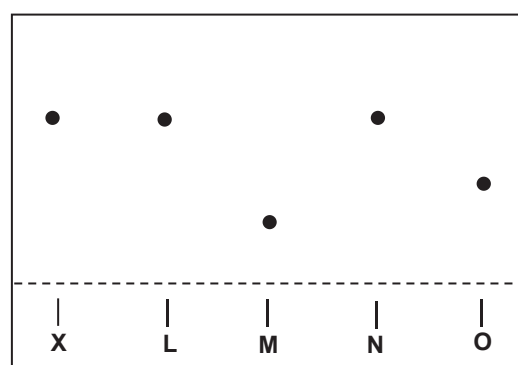
Which of the following correctly identifies the labels **W**, **X**, **Y** and **Z** after the separation?

|          | <b>W</b>      | <b>X</b>      | <b>Y</b>      | <b>Z</b>               |
|----------|---------------|---------------|---------------|------------------------|
| <b>A</b> | filter funnel | salt solution | beaker        | sesame seed suspension |
| <b>B</b> | filter funnel | sesame seeds  | conical flask | salt solution          |
| <b>C</b> | filter paper  | salt solution | beaker        | sesame seed suspension |
| <b>D</b> | filter paper  | sesame seeds  | conical flask | salt solution          |

- 7 An unknown substance (**X**) is suspected to be one of four substances, **L**, **M**, **N** or **O**. Chromatography was carried out using two different solvents, and the chromatograms are shown below.



Using water as solvent



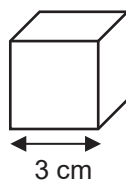
Using alcohol as solvent

From the chromatograms, deduce the identity of **X**.

- A** It must be **L**.  
**B** It must be **M**.  
**C** It must be **N**.  
**D** It must be **O**.

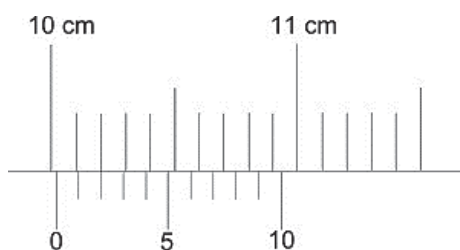
[Turn over

- 8 The diagram below shows the length of the side of a cube.



What is the volume of the cube, expressed in SI unit?

- A 0.000027 m<sup>3</sup>  
 B 0.0009 m<sup>3</sup>  
 C 9 cm<sup>3</sup>  
 D 27 cm<sup>3</sup>
- 9 A student used a pair of vernier calipers to measure the external diameter of a beaker. The diagram below shows the measurement obtained.

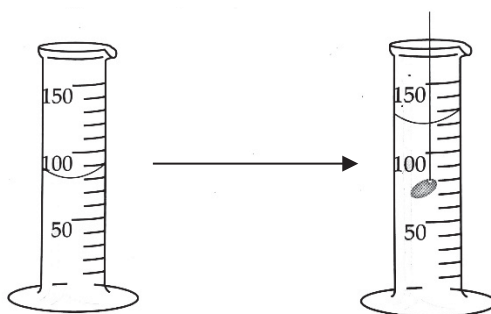


Given that the vernier calipers have a negative zero error of value  $-0.07$  cm, what is the actual diameter of the beaker?

- A 9.95 cm  
 B 10.02 cm  
 C 10.09 cm  
 D 10.27 cm

Refer to the diagram below for Questions 10 and 11.

An experiment was set up to measure the volume of an object by displacement method.



- 10 What is the volume of the water before and after the object is fully submerged in the water?

|   | Before             | After               |
|---|--------------------|---------------------|
| A | 53 cm <sup>3</sup> | 102 cm <sup>3</sup> |
| B | 54 cm <sup>3</sup> | 103 cm <sup>3</sup> |
| C | 80 cm <sup>3</sup> | 120 cm <sup>3</sup> |
| D | 90 cm <sup>3</sup> | 130 cm <sup>3</sup> |

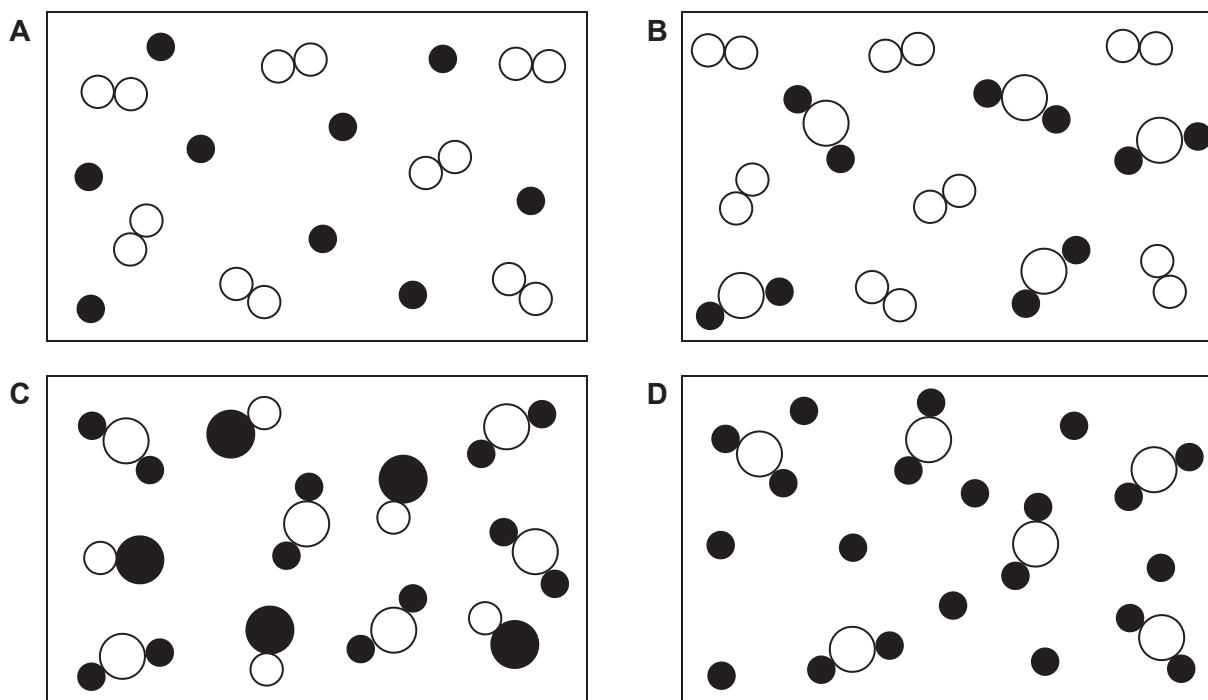
11 Which one of the following situations will make displacement method **unsuitable** for measuring the volume of the object?

- A When the liquid is changed from water to oil.
- B When the liquid is not colourless.
- C When the object has a lower density than the liquid.
- D When the object is insoluble in the liquid.

12 Which of the following contains an element, a compound and a mixture?

- A air, carbon and salt
- B air, tap water and tea
- C carbon dioxide, salt and sugar
- D carbon, iron and oxygen

13 Which of the following diagrams represents a mixture of molecules of a compound and molecules of an element?



14 How many atoms can be found in a molecule of potassium dichromate,  $K_2Cr_2O_7$ ?

- A 3
- B 4
- C 11
- D 12

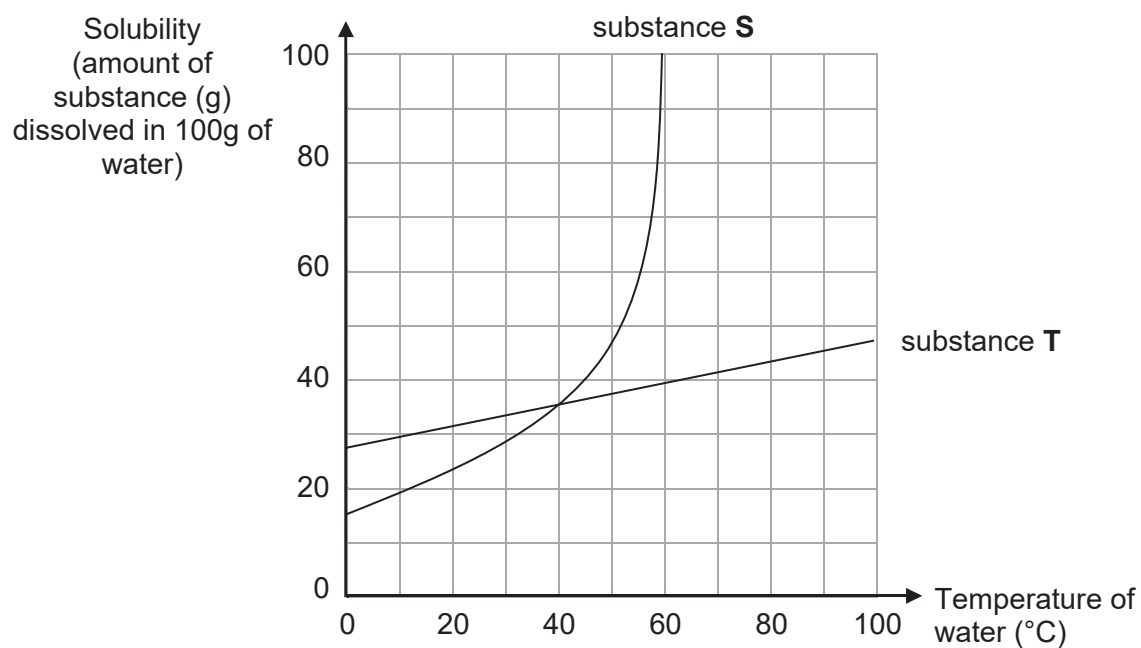
15 Which of the following pairs of substances will form a solution when mixed?

- A carbon dioxide and lime water
- B oil and water
- C pepper and water
- D salt and water

[Turn over

Refer to the diagram below for Questions **16** and **17**.

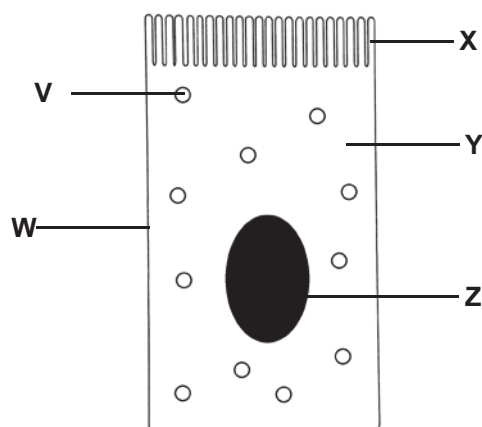
The diagram shows the solubility of substances **S** and **T** at different temperatures.



- 16** At which temperature do substances **S** and **T** have the same solubility in water?
- A** 0 °C  
**B** 40 °C  
**C** 60 °C  
**D** 100 °C
- 17** What is the solubility of substance **T** in 50 g of water when the temperature is 60 °C?
- A** 20 g  
**B** 40 g  
**C** 50 g  
**D** 100 g

Refer to the diagram below for Questions **18** and **19**.

The diagram shows a specialised cell, obtained from the small intestine, which plays a role in the absorption of digested food.



18 Which of the labelled structures is partially permeable?

- A structure V
- B structure W
- C structure Y
- D structure Z

19 Which of the labelled structures stores food and water?

- A structure V
- B structure X
- C structure Y
- D structure Z

20 The diagram below shows four structures in a human being with each representing a level of organization of life.

| structure 1                                                                        | structure 2                                                                        | structure 3                                                                         | structure 4                                                                          |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|  |  |  |  |

*note: the structures are not drawn to scale*

Which of the following correctly identifies the level of organization of life that these structures belong to?

|   | structure 1 | structure 2 | structure 3 | structure 4 |
|---|-------------|-------------|-------------|-------------|
| A | cell        | organ       | tissue      | system      |
| B | cell        | system      | tissue      | organ       |
| C | tissue      | system      | cell        | organ       |
| D | tissue      | organ       | cell        | system      |

[Turn over

### Section B (30 marks)

Answer **all** the questions in the spaces provided on the question booklet.

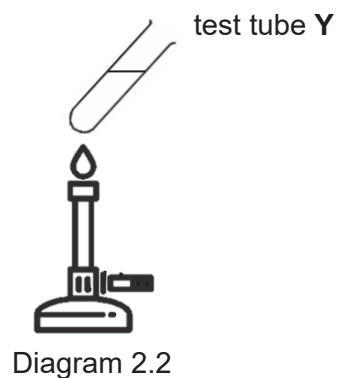
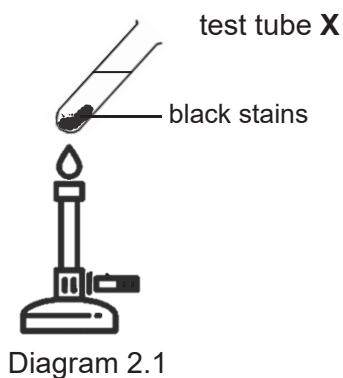
- 1 (a) Complete the table below by naming the Globally Harmonized System (GHS) symbols shown. [2]

|                                                                                   |                                                                                    |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|  |  |
|                                                                                   |                                                                                    |

- (b) In the table below, draw a two-dimensional diagram of each piece of the following apparatus. [2]

|                                                                                    |                                                                                     |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| (i)                                                                                | (ii)                                                                                |
|  |  |
| beaker                                                                             | tripod stand                                                                        |

- 2 The diagrams below show the results of two test tubes after each was moved 20 times in and out of two types of Bunsen flames.



- (a) What are the black stains on the surface of test tube X? [1]

---

- (b) Identify the type of Bunsen flame used in diagrams 2.1 and 2.2. [2]

Diagram 2.1 : \_\_\_\_\_

Diagram 2.2 : \_\_\_\_\_

- (c) State one other difference between the two types of Bunsen flames. [1]

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[Turn over

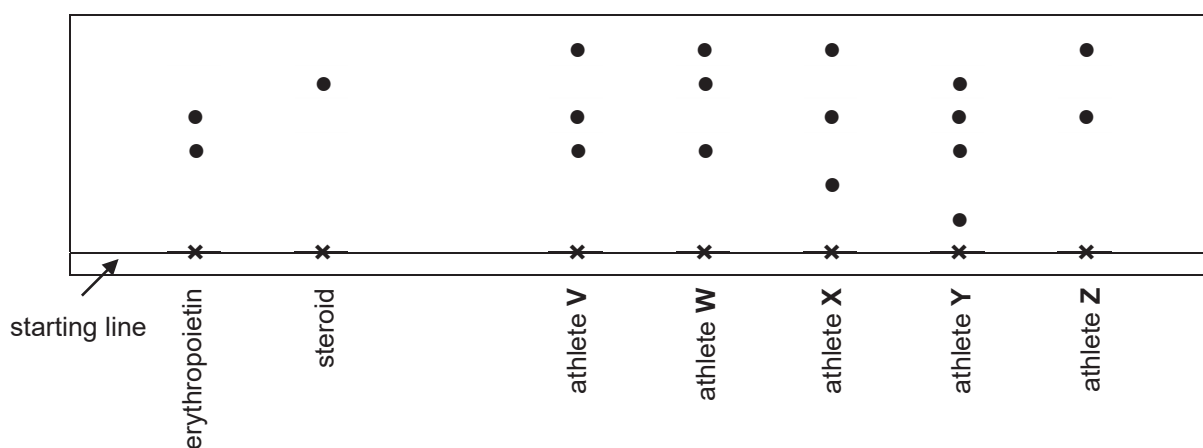
- (d) Give two safety measures that one must follow when heating a solution in a test tube over the Bunsen flame. [2]

Safety measure 1 : \_\_\_\_\_  
 \_\_\_\_\_

Safety measure 2 : \_\_\_\_\_  
 \_\_\_\_\_

- 3 Five athletes have been suspected of taking banned drugs, erythropoietin and steroid, to enhance their performance in the Olympics Games.

During the investigation, chromatography was done on their urine samples to detect whether the drugs were present. The diagram below shows the chromatogram for the two drugs and the five urine samples.



- (a) Which athlete(s) took the drug, erythropoietin? [1]

\_\_\_\_\_

- (b) Which of the drugs is a pure substance? [1]

\_\_\_\_\_

- (c) During the testing process, the urine sample of athlete **X** was contaminated with another athlete's urine sample.

Which urine sample (**V**, **W**, **Y** or **Z**) was the one that contaminated urine sample **X**? [1]

\_\_\_\_\_

- (d) Explain why the starting line **cannot** be drawn with a pen. [2]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[Turn over

- 4 Chris accidentally mixed three substances, **P**, **Q** and **R**, in the laboratory. The properties of the 3 substances are stated in the table below.

|                        | Substance <b>P</b> | Substance <b>Q</b> | Substance <b>R</b> |
|------------------------|--------------------|--------------------|--------------------|
| Attracted to a magnet? | No                 | Yes                | No                 |
| Soluble in alcohol?    | No                 | Yes                | Yes                |
| Soluble in water?      | Yes                | No                 | Yes                |

The statements below describe the steps that Chris could do to get back dried substance R.

Fill in the blanks or circle the correct answers to complete the statements.

[5]

Step 1 : Use a magnet to remove substance from the mixture.

Step 2 : Add alcohol / water (*circle one*) into the remaining mixture and stir to dissolve substance\_\_\_\_\_.

Step 3 : Separate the mixture through a filtration / chromatography / distillation / evaporation (*circle one*) set-up. Substance \_\_\_\_\_ will be trapped on the filter paper as \_\_\_\_\_ while substance \_\_\_\_\_ will flow through as \_\_\_\_\_.

Step 4 : \_\_\_\_\_ the alcohol / water (*circle one*) to obtain dried substance **R**.

- 5 (a)** Define an element.

[1]

---

- (b)** The diagram below shows the outline of a Periodic Table.

[illegible]

- (i) State the Group and Period of Element Q.

[2]

Group : Period :

- (ii) List all the elements (**P, Q, R, S, T**) that are good conductors of electricity.

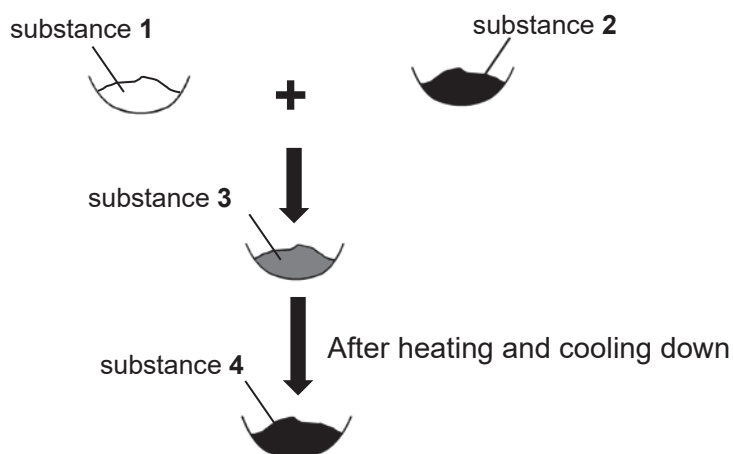
[1]

- (iii) With reference to the Periodic Table on Page 15, state the name of Element **R** and write down its chemical symbol. [2]

Name : \_\_\_\_\_

Chemical symbol : \_\_\_\_\_

- (c) Christina performed an experiment as shown below.



When heating substance **3** with a strong flame, she noticed that it gave off a bright light. After cooling down, substance **4** was formed.

The properties of substances **1**, **2**, **3** and **4** are shown in the table below.

| Substance | Attracted to a magnet?        | Appearance             |
|-----------|-------------------------------|------------------------|
| <b>1</b>  | no                            | yellow powder          |
| <b>2</b>  | yes                           | black powder           |
| <b>3</b>  | some parts yes, some parts no | yellowish-black powder |
| <b>4</b>  | no                            | black solid            |

- (i) Is substance **4** a compound or mixture? [1]

\_\_\_\_\_

- (ii) Is substance **3** a compound or mixture? [1]

\_\_\_\_\_

- (iii) Explain your answer for **c(ii)**. [1]

\_\_\_\_\_

\_\_\_\_\_

- (iv) State **one other** difference between a compound and mixture. [1]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

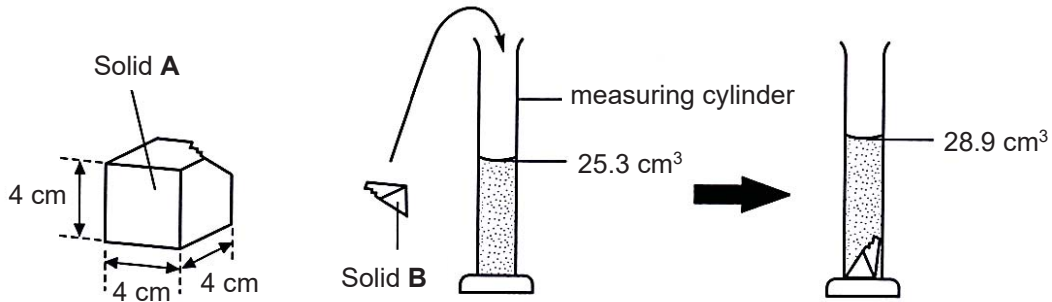
[Turn over

### Section C (30 marks)

Answer **all** the questions in the spaces provided on the question booklet.

- 1 Solid **A** with a dimension of 4 cm by 4 cm by 4 cm has a corner chipped off. The corner which was chipped off (solid **B**) has a mass of 4.32 g.

Solid **B** is then submerged in a measuring cylinder containing water as shown below.



- (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. [3]

- (d) Explain why solid **A** and solid **B** have the same density. [1]

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- (e) Define density. [1]

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- (f) Using the concept of density, explain how a hot air balloon works. [2]

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- 2 John noticed that 5 g of fine sugar dissolved quickly in 200 ml of water at 40 °C when the mixture was stirred continuously.

- (a) John concluded that the sugar-water mixture is a solution after doing three tests. Write down what he had observed in the tests. [3]

|        | Test                                                      | Observation |
|--------|-----------------------------------------------------------|-------------|
| Test 1 | Look at the mixture to see whether it is clear or cloudy. |             |
| Test 2 | Filter the mixture                                        |             |
| Test 3 | Let the mixture stand for 30 minutes.                     |             |

- (b) Describe **two** ways to decrease the rate of dissolving of sugar in water. Explain your answer. [4]

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- (c) When John repeated the experiment with 50 g of fine sugar, he observed that there was some sugar remaining at the bottom of the beaker.

- (i) State what could have happened to the mixture. [1]

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- (ii) Suggest **two** ways to make the remaining sugar in **c(i)** dissolve in the water. [2]

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[Turn over

- 3 (a) The diagram below shows a typical plant cell.

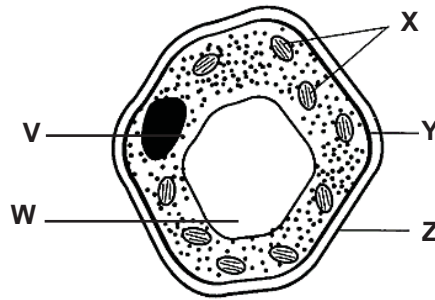


Diagram 3.1

- (i) Identify the labelled structures **V** to **Z**. [5]

**V** : \_\_\_\_\_ **Y** : \_\_\_\_\_

**W** : \_\_\_\_\_ **Z** : \_\_\_\_\_

**X** : \_\_\_\_\_

- (ii) Name **two** structures that **cannot** be found in animal cells. [2]

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- (b) The diagram below shows a root hair cell obtained from the root of a plant.

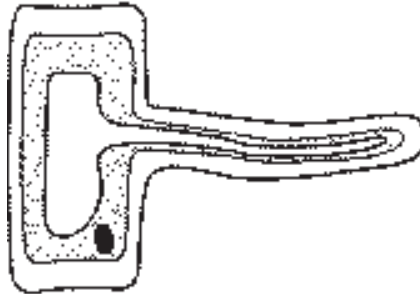


Diagram 3.2

- (i) Compare the cells in diagrams 3.1 and 3.2, and identify the structure that is missing in the root hair cell. [1]

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- (ii) Explain why the root hair cell does not have the structure identified in (b)(i). [2]

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**End of Paper**

## The Periodic Table of Elements

| Group                        |                             |                                                                                                      |                              |                             |                              |                             |                               |                            |                               |                              |                            |                               |                              |                              |                              |                           |                           |
|------------------------------|-----------------------------|------------------------------------------------------------------------------------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|-------------------------------|----------------------------|-------------------------------|------------------------------|----------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|---------------------------|---------------------------|
| I                            | II                          | <div>1<br/>H<br/>hydrogen<br/>1</div>                                                                |                              |                             |                              |                             |                               |                            |                               |                              |                            | III                           | IV                           | V                            | VI                           | VII                       | 0                         |
|                              |                             | <div>Key</div> <div>proton (atomic) number<br/>atomic symbol<br/>name<br/>relative atomic mass</div> |                              |                             |                              |                             |                               |                            |                               |                              |                            |                               |                              |                              |                              |                           |                           |
| 3<br>Li<br>lithium<br>7      | 4<br>Be<br>beryllium<br>9   |                                                                                                      |                              |                             |                              |                             |                               |                            |                               |                              |                            |                               |                              |                              |                              |                           |                           |
| 11<br>Na<br>sodium<br>23     | 12<br>Mg<br>magnesium<br>24 |                                                                                                      |                              |                             |                              |                             |                               |                            |                               |                              |                            |                               |                              |                              |                              |                           |                           |
| 19<br>K<br>potassium<br>39   | 20<br>Ca<br>calcium<br>40   | 21<br>Sc<br>scandium<br>45                                                                           | 22<br>Ti<br>titanium<br>48   | 23<br>V<br>vanadium<br>51   | 24<br>Cr<br>chromium<br>52   | 25<br>Mn<br>manganese<br>55 | 26<br>Fe<br>iron<br>56        | 27<br>Co<br>cobalt<br>59   | 28<br>Ni<br>nickel<br>59      | 29<br>Cu<br>copper<br>64     | 30<br>Zn<br>zinc<br>65     | 31<br>Ga<br>gallium<br>70     | 32<br>Ge<br>germanium<br>73  | 33<br>As<br>arsenic<br>75    | 34<br>Se<br>selenium<br>79   | 35<br>Br<br>bromine<br>80 | 36<br>Kr<br>krypton<br>84 |
| 37<br>Rb<br>rubidium<br>85   | 38<br>Sr<br>strontium<br>88 | 39<br>Y<br>yttrium<br>89                                                                             | 40<br>Zr<br>zirconium<br>91  | 41<br>Nb<br>niobium<br>93   | 42<br>Mo<br>molybdenum<br>96 | 43<br>Tc<br>technetium<br>- | 44<br>Ru<br>ruthenium<br>101  | 45<br>Rh<br>rhodium<br>103 | 46<br>Pd<br>palladium<br>106  | 47<br>Ag<br>silver<br>108    | 48<br>Cd<br>cadmium<br>112 | 49<br>In<br>indium<br>115     | 50<br>Sn<br>tin<br>119       | 51<br>Sb<br>antimony<br>122  | 52<br>Te<br>tellurium<br>128 | 53<br>I<br>iodine<br>127  | 54<br>Xe<br>xenon<br>131  |
| 55<br>Cs<br>caesium<br>133   | 56<br>Ba<br>barium<br>137   | 57 – 71<br>lanthanoids                                                                               |                              | 73<br>Ta<br>tantalum<br>181 | 74<br>W<br>tungsten<br>184   | 75<br>Re<br>rhenium<br>186  | 76<br>Os<br>osmium<br>190     | 77<br>Ir<br>iridium<br>192 | 78<br>Pt<br>platinum<br>195   | 79<br>Au<br>gold<br>197      | 80<br>Hg<br>mercury<br>201 | 81<br>Tl<br>thallium<br>204   | 82<br>Pb<br>lead<br>207      | 83<br>Bi<br>bismuth<br>209   | 84<br>Po<br>polonium<br>-    | 85<br>At<br>astatine<br>- | 86<br>Rn<br>radon<br>-    |
| 87<br>Fr<br>francium<br>-    | 88<br>Ra<br>radium<br>-     | 89 – 103<br>actinoids                                                                                |                              | 105<br>Db<br>dubnium        | 106<br>Sg<br>seaborgium      | 107<br>Bh<br>bohrium        | 108<br>Hs<br>hassium          | 109<br>Mt<br>meitnerium    | 110<br>Ds<br>darmstadtium     | 111<br>Rg<br>roentgenium     | 112<br>Cn<br>copernicium   | 114<br>Fl<br>flerovium        |                              | 116<br>Lv<br>livermorium     |                              |                           |                           |
|                              |                             |                                                                                                      |                              |                             |                              |                             |                               |                            |                               |                              |                            |                               |                              |                              |                              |                           |                           |
| lanthanoids                  |                             |                                                                                                      |                              |                             |                              |                             |                               |                            |                               |                              |                            |                               |                              |                              |                              |                           |                           |
| 57<br>La<br>lanthanum<br>139 | 58<br>Ce<br>cerium<br>140   | 59<br>Pr<br>praseodymium<br>141                                                                      | 60<br>Nd<br>neodymium<br>144 | 61<br>Pm<br>promethium<br>- | 62<br>Sm<br>samarium<br>150  | 63<br>Eu<br>europium<br>152 | 64<br>Gd<br>gadolinium<br>157 | 65<br>Tb<br>terbium<br>159 | 66<br>Dy<br>dysprosium<br>163 | 67<br>Ho<br>holmium<br>165   | 68<br>Er<br>erbium<br>167  | 69<br>Tm<br>thulium<br>169    | 70<br>Yb<br>ytterbium<br>173 | 71<br>Lu<br>lutetium<br>175  |                              |                           |                           |
| actinoids                    |                             |                                                                                                      |                              |                             |                              |                             |                               |                            |                               |                              |                            |                               |                              |                              |                              |                           |                           |
| 89<br>Ac<br>actinium<br>-    | 90<br>Th<br>thorium<br>232  | 91<br>Pa<br>protactinium<br>231                                                                      | 92<br>U<br>uranium<br>238    | 93<br>Np<br>neptunium<br>-  | 94<br>Pu<br>plutonium<br>-   | 95<br>Am<br>americium<br>-  | 96<br>Cm<br>curium<br>-       | 97<br>Bk<br>berkelium<br>- | 98<br>Cf<br>californium<br>-  | 99<br>Es<br>einsteinium<br>- | 100<br>Fm<br>fermium<br>-  | 101<br>Md<br>mendelevium<br>- | 102<br>No<br>nobelium<br>-   | 103<br>Lr<br>lawrencium<br>- |                              |                           |                           |

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

