Name :	Class	Index no.

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	
Section	**Marks**
A	**/ 20**
B	**/ 30**
C	**/ 30**
Total	**/ 80**

Section A (20 marks)

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

1 Aston needs to fill a bottle with exactly 55.0 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.

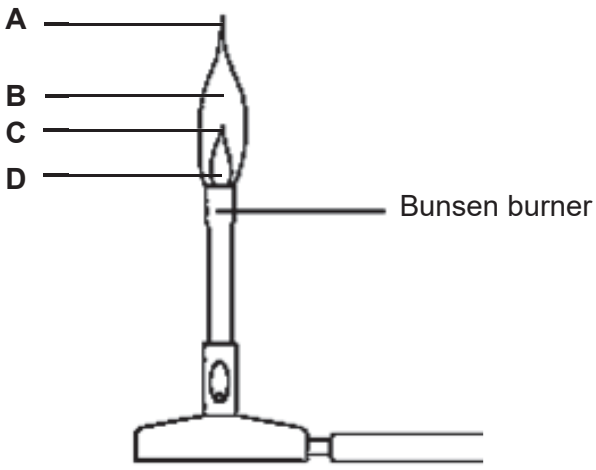
Which of the following describes the correct way that he should follow when handling this chemical powder?

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

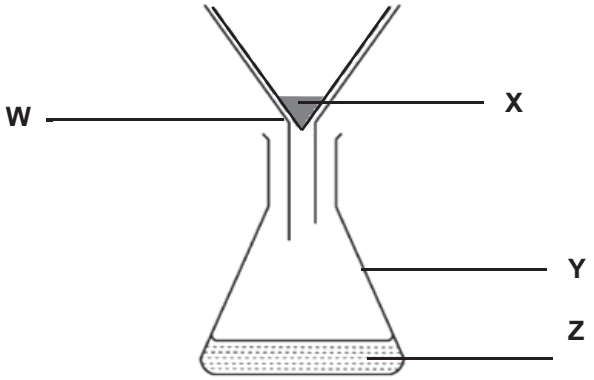
4 The diagram below shows a Bunsen flame. Which part of the flame is the hottest?



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.

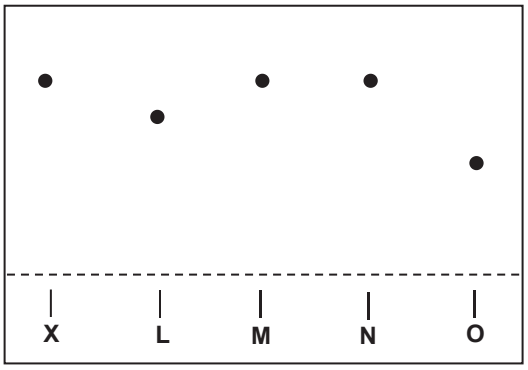
6 The diagram below shows a set-up to separate a mixture of salt, sesame seed and water.



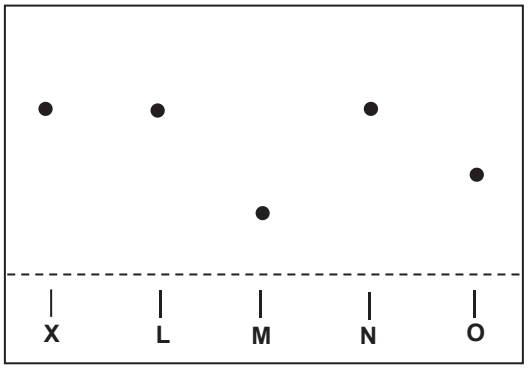
Which of the following correctly identifies the labels **W**, **X**, **Y** and **Z** after the separation?

	W	X	Y	Z
A	filter funnel	salt solution	beaker	sesame seed suspension
B	filter funnel	sesame seeds	conical flask	salt solution
C	filter paper	salt solution	beaker	sesame seed suspension
D	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

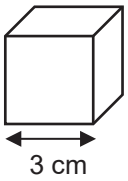


Using alcohol as solvent

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**.

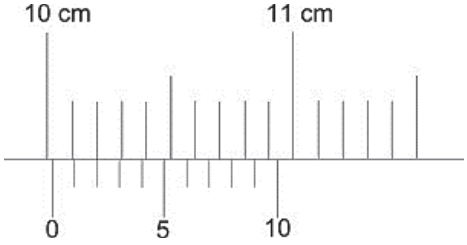
8 The diagram below shows the length of the side of a cube.



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

A 0.000027 m^3
B 0.0009 m^3
C 9 cm^3
D 27 cm^3

9 A student used a pair of vernier calipers to measure the external diameter of a beaker. The diagram below shows the measurement obtained.

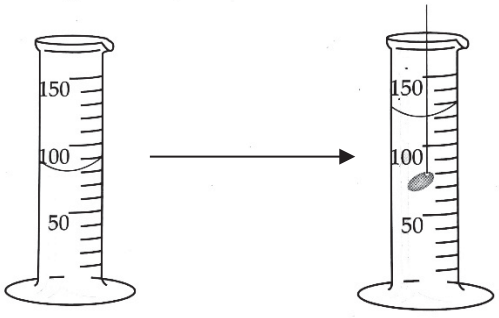


Given that the vernier calipers have a negative zero error of value –0.07 cm, what is the actual diameter of the beaker?

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^3	102 cm^3
B	54 cm^3	103 cm^3
C	80 cm^3	120 cm^3
D	90 cm^3	130 cm^3

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

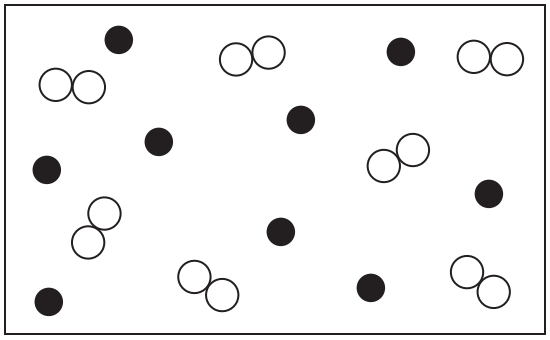
A When the liquid is changed from water to oil.
B When the liquid is not colourless.
C When the object has a lower density than the liquid.
D When the object is insoluble in the liquid.

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

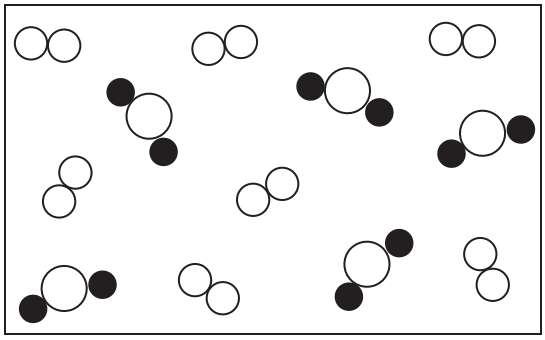
A air, carbon and salt
B air, tap water and tea
C carbon dioxide, salt and sugar
D carbon, iron and oxygen

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

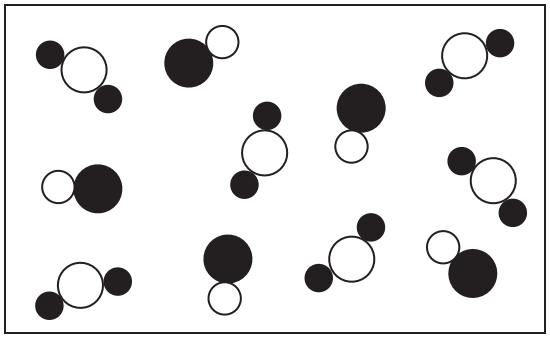
A



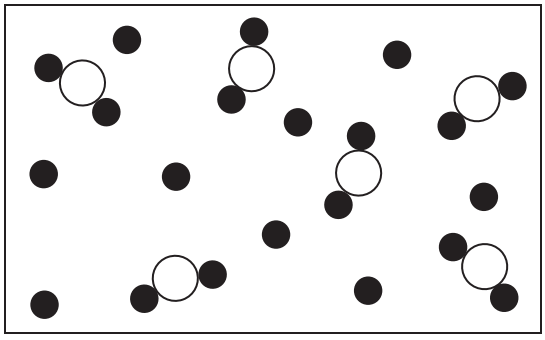
B



C



D



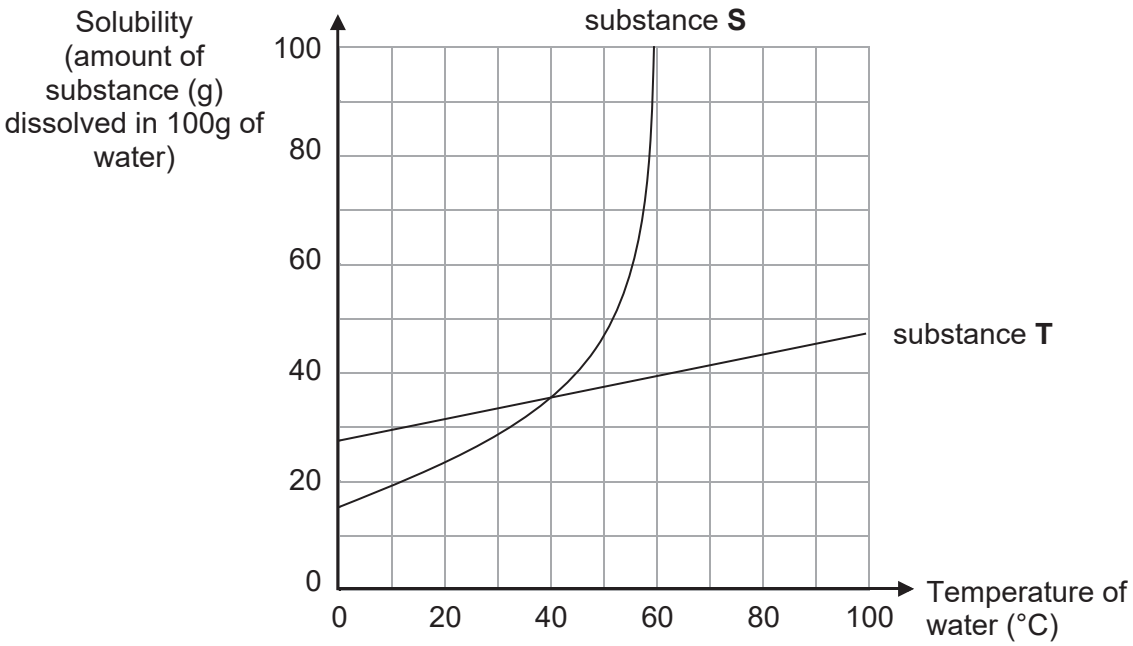
14 How many atoms can be found in a molecule of potassium dichromate, $K_2Cr_2O_7$?

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

Refer to the diagram below for Questions **16** and **17**.
The diagram shows the solubility of substances **S** and **T** at different temperatures.



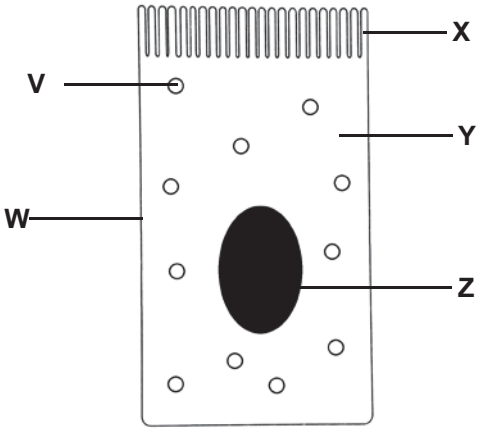
16 At which temperature does substances **S** and **T** have the same solubility in water?

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

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.

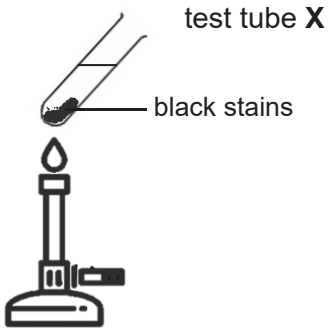


Diagram 2.1

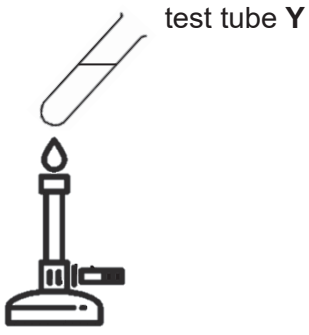


Diagram 2.2

(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 <u>other</u> difference between the two types of Bunsen flames. [1]

_____

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

Safety measure 1 : _____

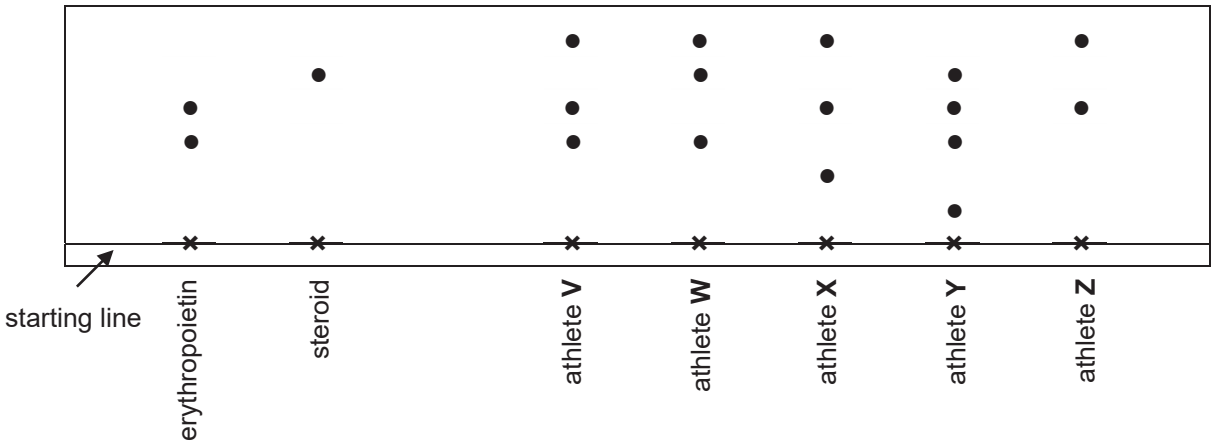
_____

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]

_____

_____

_____

_____

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 **P**	Substance **Q**	Substance **R**
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 _____.

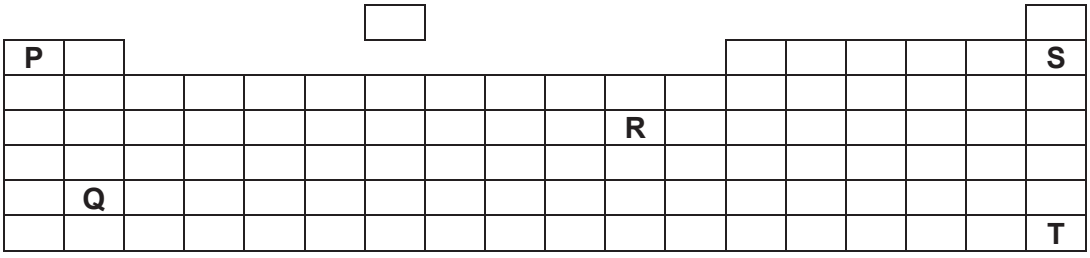
Step 4 : _____ the alcohol / water (*circle one*) to obtain dried substance **R**.

5 **(a)** Define an element. [1]

_____

_____

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



(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]

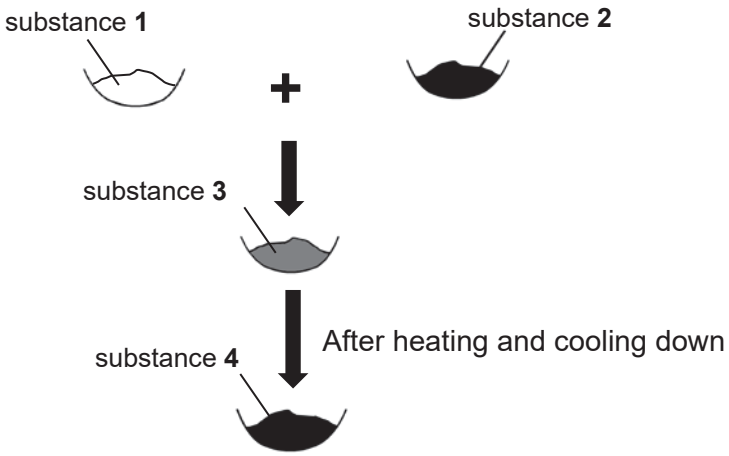
_____

(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
1	no	yellow powder
2	yes	black powder
3	some parts yes, some parts no	yellowish-black powder
4	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]

_____

_____

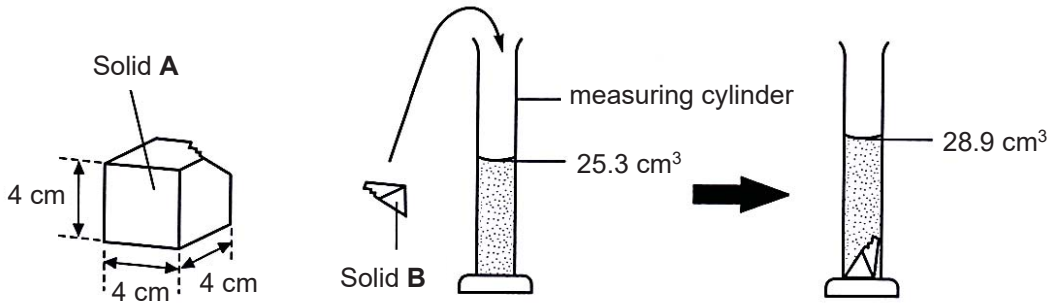
_____

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]

(e) Define density. [1]

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

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]

(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]

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

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

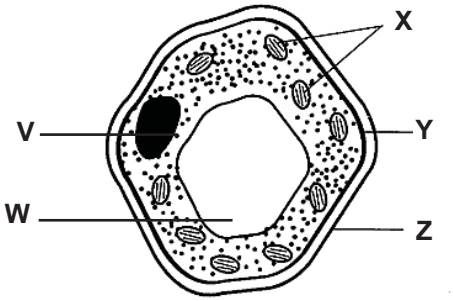


Diagram 3.1

(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]

_____

_____

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

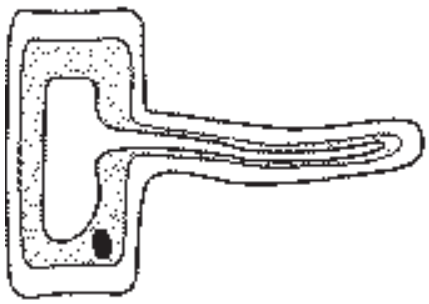


Diagram 3.2

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

_____

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

_____

_____

_____

_____

End of Paper

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9		**Key** proton (atomic) number atomic symbol name relative atomic mass									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	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 dm^3 at room temperature and pressure (r.t.p.).