Full Name	Class	Class Index No.

Anglo-Chinese School (Barker Road)

END-OF-YEAR EXAMINATION 2024

SECONDARY TWO EXPRESS

SCIENCE

Total Duration for All Sections: 2 hours

SECTIONS B & C

INSTRUCTIONS TO CANDIDATES:

Write your name, class and index numbers in the space provided at the top of this page.
Write in dark blue or black pen.
You may use a pencil for any graphs.
The use of an approved scientific calculator is expected, where appropriate.
Do not use glue or correction fluid.

Sections B and **C**
Answer all questions in the spaces provided.

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

For Examiner's Use		
Section A		**/30**
Section B		**/40**
Section C		**/30**
Total		**/100**

*This question paper consists of **17** printed pages.*

SECTION B (40 marks)

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

B1 Table 1.1 shows some information about two different substances, **P** and **Q**.

Table 1.1

substance	information
solid **P**	It is made of three different elements combined in a fixed ratio. **P** is soluble in water.
powder **Q**	It is made up of a mixture of grey and yellow powder that are both insoluble in water. Only the grey powder is attracted to magnet.

(a) Put a tick (√) in the table below to indicate if **P** and **Q** is an element, a compound or a mixture.

substance	element	compound	mixture
solid **P**			
powder **Q**			

[2]

(b) A student accidentally mixed solid **P** and powder **Q** in a beaker.

Describe the steps needed to obtain powder **Q** from the mixture.

……

……

……

……

…… [3]

(c) Table 1.2 shows three substances and their chemical formulae.

Table 1.2

substance	chemical formula	number of atoms
nitrogen gas	N_2	
ethene	C_2H_4	
sulfuric acid	H_2SO_4	

Complete Table 1.2 to show the number of atoms for each substance. [3]

[Total: 8]

B2 Fig. 2.1 shows an experiment conducted to investigate how the temperature of water affects the rate at which salt dissolves in water.

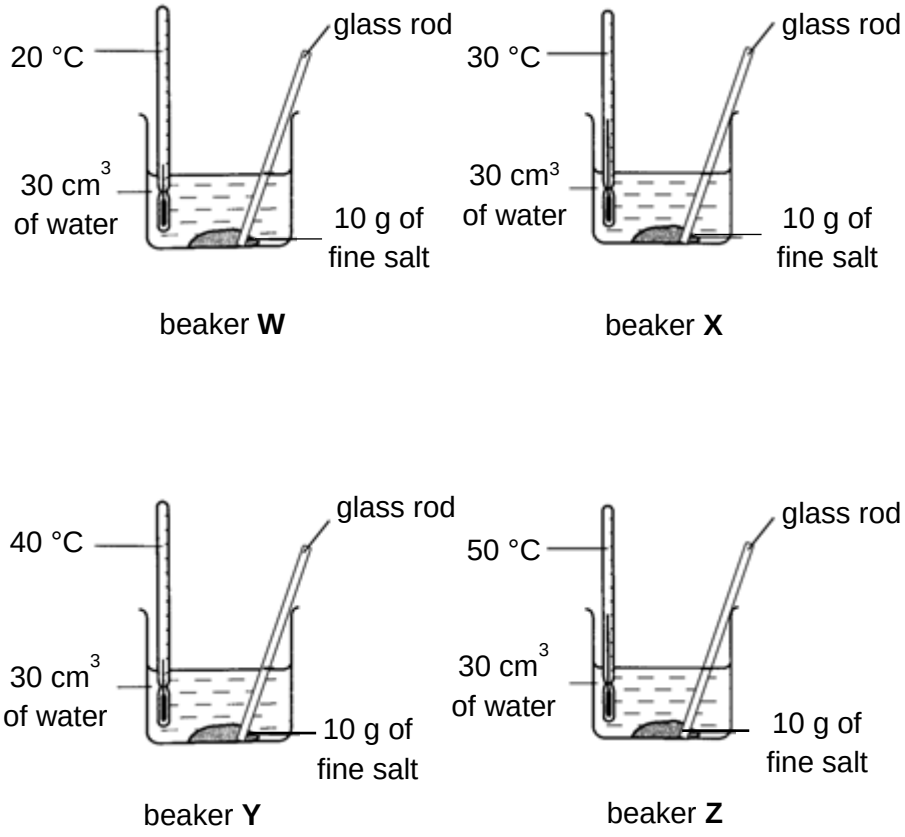

Fig. 2.1

(a) **(i)** Identify the independent variable in the experiment.

…….. [1]

(ii) Identify **one** variable that is kept constant in the experiment.

…….. [1]

(b) State which beaker's salt dissolves the fastest. Explain your answer.

……..……

……..……

……..……

……..…… [2]

[Total: 4]

B3 Fig. 3.1 shows an individual looking at an object in the mirror.

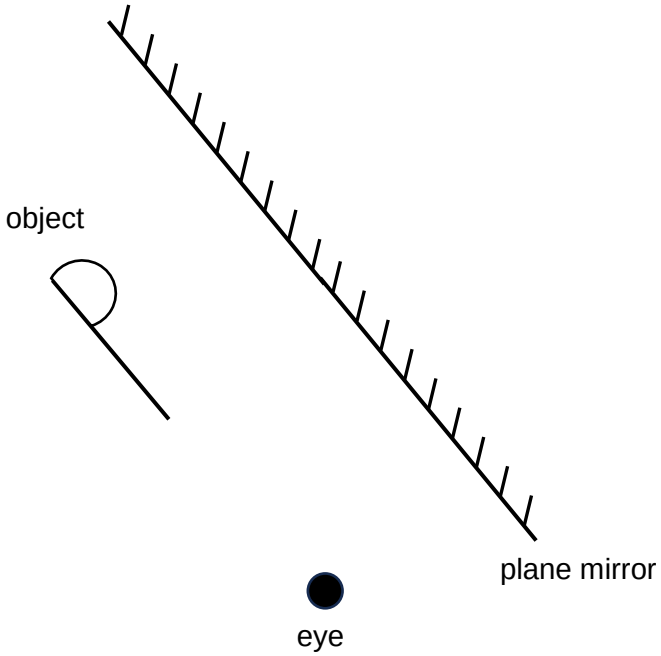

Fig. 3.1

(a) In Fig. 3.1, draw the ray diagram and locate the position of the image. [3]

(b) State **two** properties of an image formed on a mirror.

1 ……..…

2 ……..…. [2]

[Total: 5]

B4 Fig. 4.1 shows a flowchart for five different reactions with dilute nitric acid.

Five unknown substances **A**, **B**, **C**, **D** and **E** are added to the dilute nitric acid as shown below.

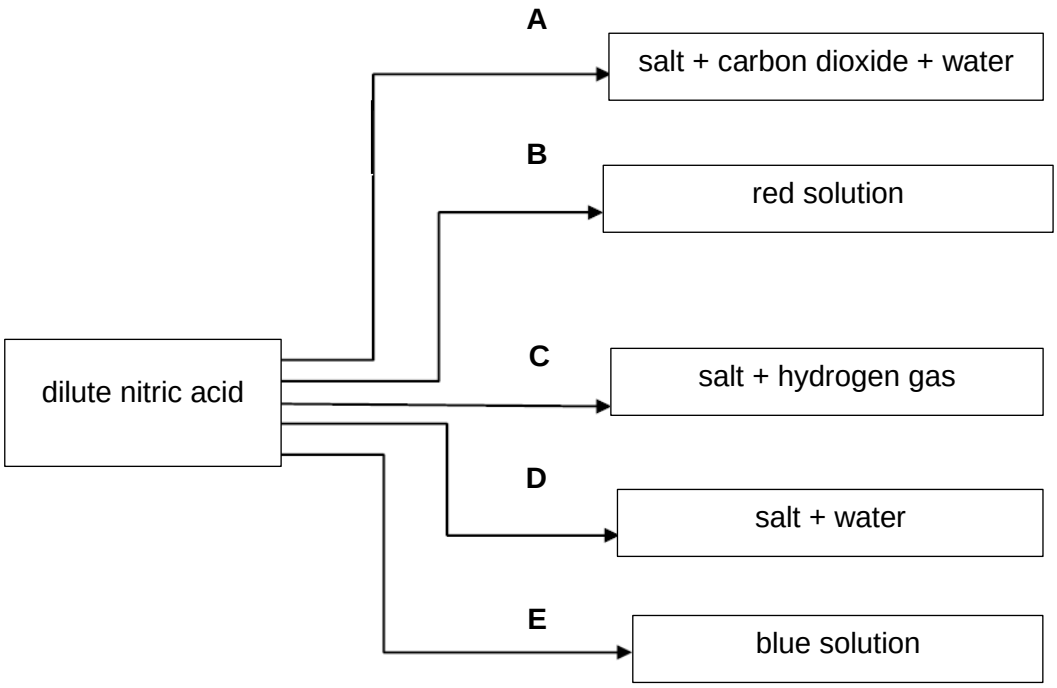

Fig. 4.1

(a) Use the letters **A**, **B**, **C**, **D** and **E only**, match the substance to the following based on the chemical reactions shown in Fig. 4.1.

(i) calcium carbonate …….

(ii) iron …….

(iii) Universal indication solution ……. [3]

(b) State a difference between chemical and physical reaction.

……...…….

……...……. [1]

[Total: 4]

B5 Fig 5.1 shows a sequence of steps in the experiment to investigate the fat content of several milk samples. The pH indicator used is colourless when the pH is 7 or less, and purple when the pH is over 7.

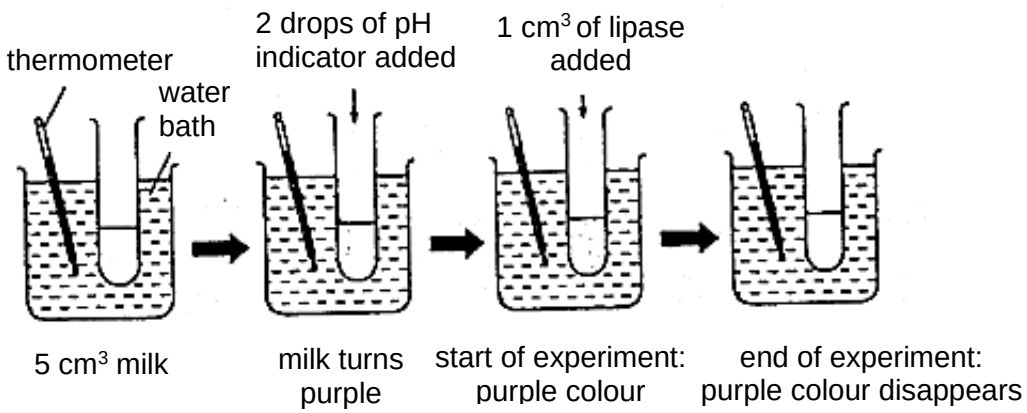

Fig. 5.1

(a) **(i)** State one product of digestion of fat by lipase.

……..... [1]

(ii) Explain how the action of lipase led to the indicator losing its colour.

……

……..... [1]

(b) A student was tasked to conduct the experiment as shown in Fig. 5.1 using three different samples of goat's milk. The time taken for the purple colour to disappear was recorded. The experiment for each sample was repeated once.

Table 5.2 shows the time taken for the purple colour to disappear.

Table 5.2

experiment	time taken for indicator to lose its colour / min		
	sample **A**	sample **B**	sample **C**
1	5	3	4
2	6	4	5

(i) Briefly explain why the experiment was conducted twice.

……

……..... [1]

(ii) With reference to Table 5.2, write down the three milk samples in **decreasing order** of fat content, from highest to lowest.

……..... [1]

[Total: 4]

B6 Fig. 6.1 shows an image of red blood cells.

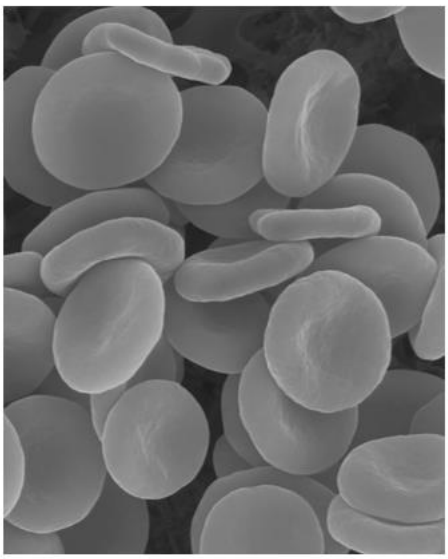

Fig. 6.1

(a) **(i)** State the function of a red blood cell.

…….. [1]

(ii) Describe one way in which a red blood cell is adapted for its function.

……..

……..

……..

…….. [2]

(b) State the component of blood responsible for clotting.

…… [1]

(c) Fig. 6.2 shows a diagram of the circulatory system. The blood vessels are labelled with letters.

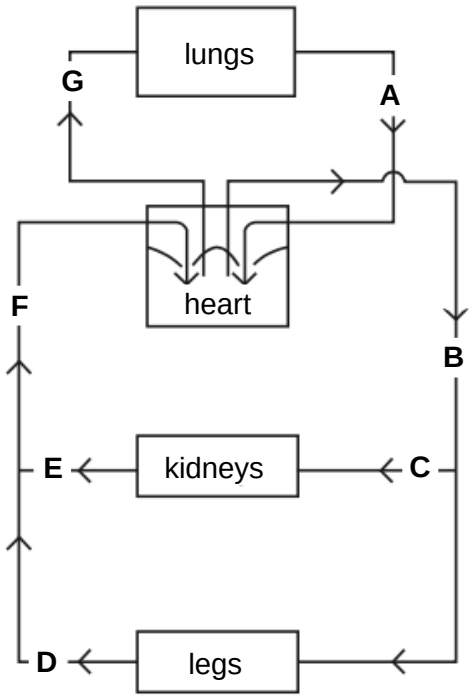

Fig. 6.2

With reference to Fig. 6.2, state all letters that represent the following:

(i) arteries

…….. [1]

(ii) veins

…….. [2]

[Total: 7]

B7 Fig. 7.1 shows the human male reproductive system and part of the excretory system.

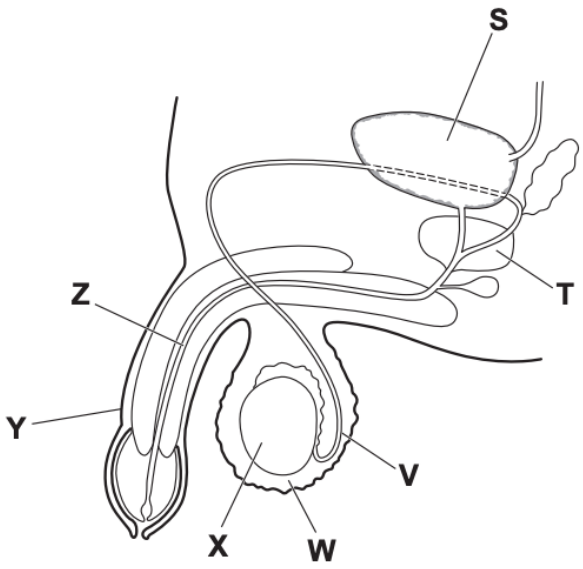

Fig. 7.1

(a) Table 7.2 shows the letters, names and functions of various parts in Fig. 7.1.

With reference to Fig. 7.1, complete Table 7.2.

Table 7.2

letter from Fig. 7.1	name	function
	male sex glands	makes the fluid for the sperm to swim in
Z		carries urine and sperm out of the body
X		

[4]

(b) Table 7.3 shows some of the events, **G** to **M**, that can occur after the sperm leaves the male reproductive system.

Table 7.3

G	an embryo is formed
H	nuclei of the sperm and egg fuse
J	sperm enters the oviduct
K	sperm passes through the uterus
L	sperm is deposited into the vagina
M	sperm travels through the cervix

Write the letters of the events in the correct sequence, in the spaces provided.

One has been done for you.

L					

[2]

(c) When a person approaches sexual maturity, secondary sexual characteristics start to develop.

In Table 7.4, place ticks (✓) in the correct boxes to identify **three** secondary sexual characteristics that develop in boys.

Table 7.4

breasts develop	
deepening of the voice	
growth of facial and pubic hair	
menstruation begins	
muscular development	
pelvis widens	

[2]

[Total: 8]

SECTION C (30 marks)

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

C1 Fig. 8.1 illustrates a solar power station that is designed for use in desert countries. The solar furnace consists of many concave mirrors and a water container that will channel steam towards the turbine.

Fig. 8.2 shows a flow chart which illustrates the steps involved in the production of electricity.

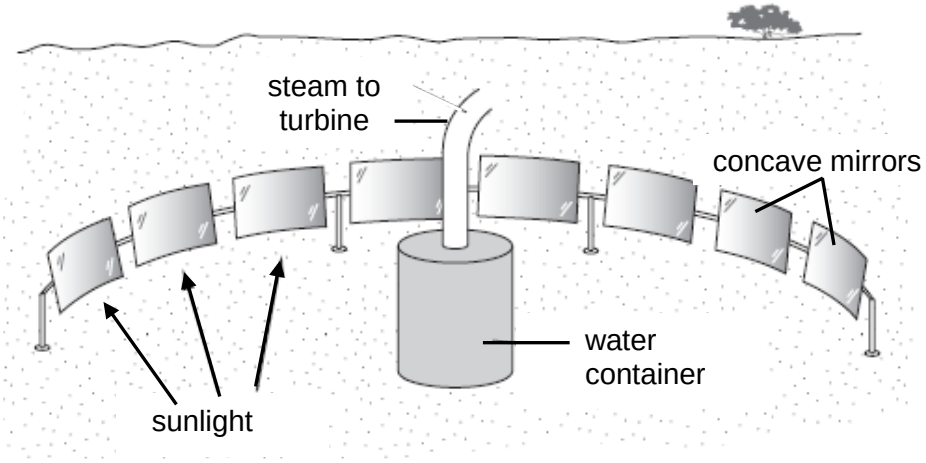

Fig. 8.1

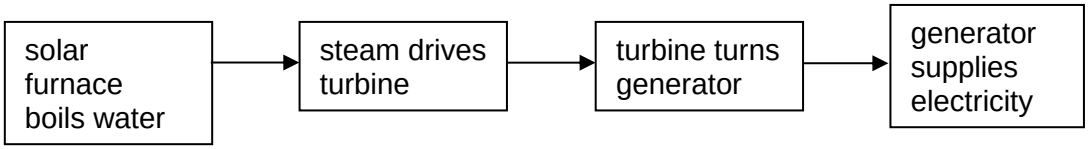

Fig. 8.2

(a) Complete the flowchart below to illustrate the energy conversion in the solar power station.

solar energy → …… →……..……→ ……..…… [2]

(b) State the type of material and colour of surface that are suitable for the water container.

type of material …… [1]

colour of surface …… [1]

(c) Explain your choice for type of material and colour of surface in **(b)**.

……...

……... [1]

(d) State the purpose of the use of concave mirrors and explain their arrangement in the generation of electricity.

……..

……..

…… [2]

(e) Using the Particulate Nature of Matter, describe the changes in **energy**, **arrangement** and **movement** of water molecles, when water is heated to steam in the process of electricity generation.

energy:

……..

……..

arrangement:

……..

……...

movement

……...

……... [3]

[Total: 10]

C2 Fig. 9.1 shows the bar graph for the monthly electricity consumption of a family living in a 4-room HDB flat, over a six-month period.

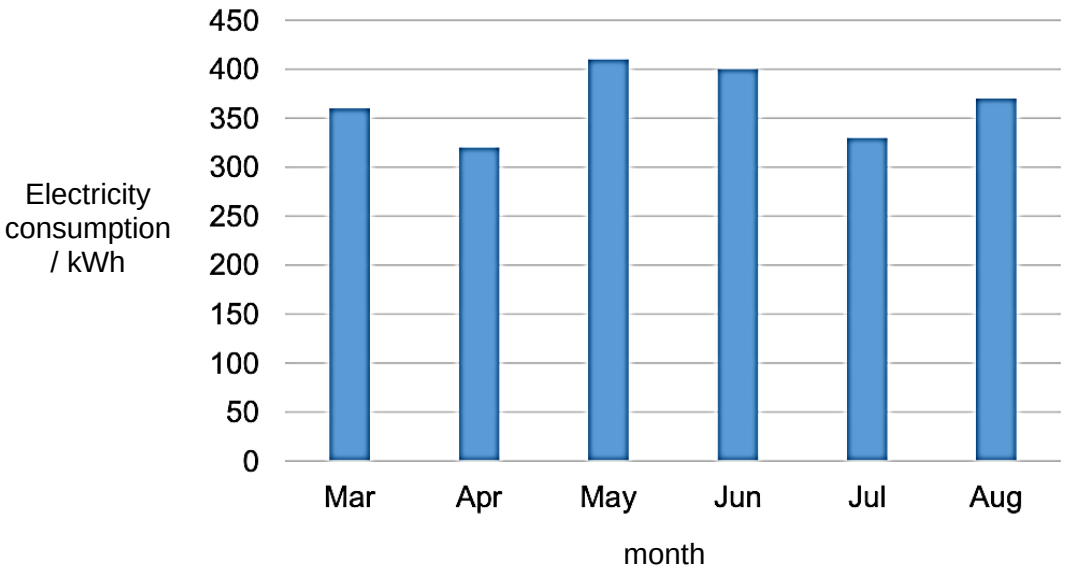

Fig. 9.1

(a) State the month with the highest amount of electricity used.

……. [1]

(b) The average monthly electricity consumption in a 4-room flat is 348 kWh.

State the number of months that the family exceeded the average monthly electricity consumption over the six-month period.

……. [1]

(c) Table 9.2 shows the family's electricity bill which reflects electricity consumption and the rates for June. There are two different rates indicated for the month of June.

Complete Table 9.2 by calculating the

(i) cost of electricity consumption for each rate; and

(ii) total cost the family should pay in June.

Table 9.2

electricity bill for June			
electricity consumption / kWh	rate / $ per kWh	**(i)** cost / $	**(ii)** total cost / $
348	0.2250		
52	0.2575		

[3]

(d) The family decides to reduce their monthly electricity consumption to save cost by reducing electrical wastage.

Suggest **two** ways how the family could reduce electrical energy wastage at home.

……..

……..

……..

…….. [2]

(e) Fig. 9.3 shows a torch containing two cells, a switch and a bulb.

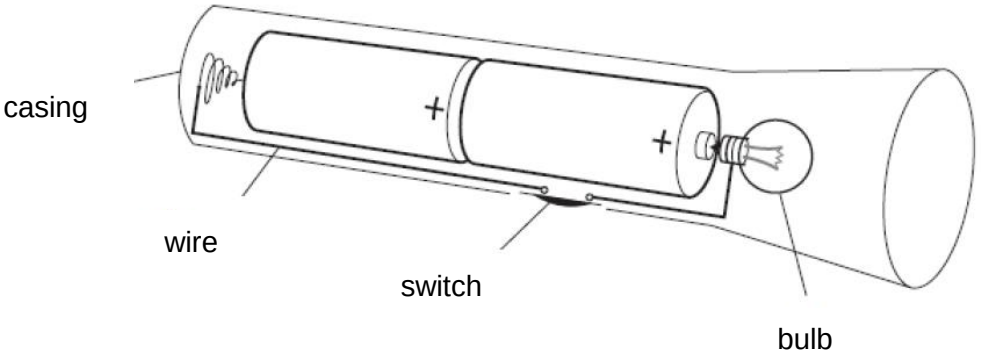

Fig. 9.3

Draw the circuit diagram for the torch in the space provided.

[3]

[Total: 10]

C3 (a) Fig. 10.1 is a diagram of a section through a leaf of a green plant.

Gas **Q** is produced by cell **P** in the leaf when the cell undergoes a process in the presence of sunlight. Gas **Q** moves out of the leaf and into the surroundings.

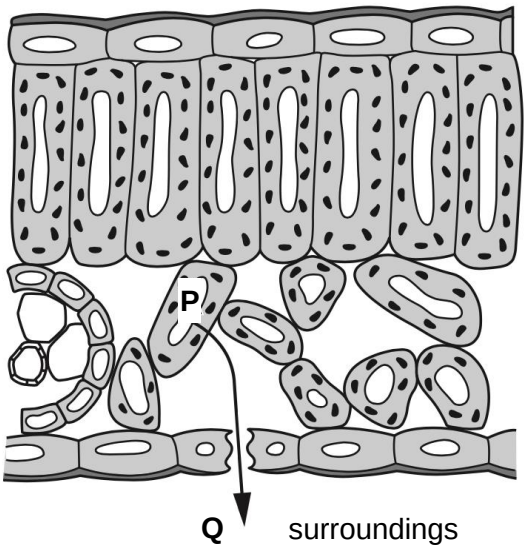

Fig. 10.1

(i) State the gas **Q** produced by the cell in the presence of sunlight.

…….. [1]

(ii) Define the process responsible for the movement of gas **Q**, from cell **P** to the surroundings.

……...

……...

……...

…….. [2]

(iii) Green plants play a key role in the environment as a primary producer.

Describe how green plants support organisms in an ecosystem.

……...

……...

……...

…….. [2]

C3 (b) Fig. 10.2 shows the results of an experiment to investigate the volume of water lost in one hour by two different species of plants, **A** and **B**, at different temperatures.

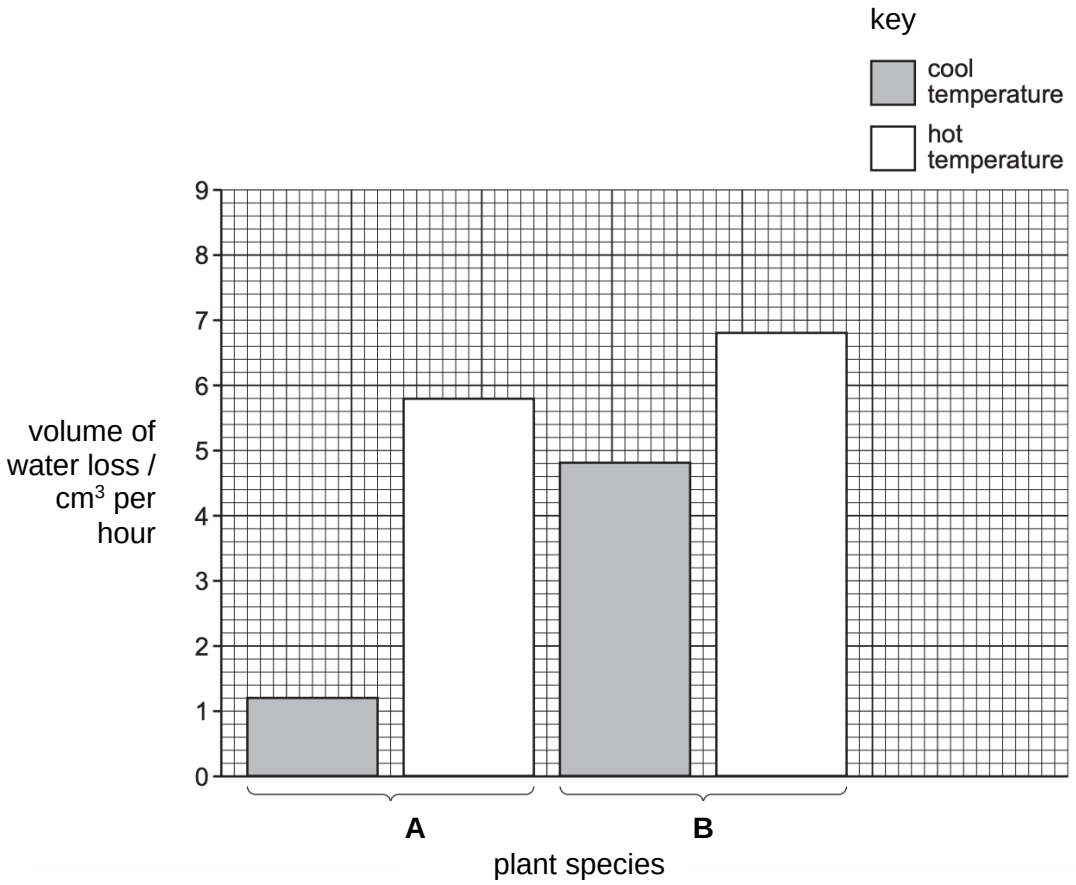

Fig. 10.2

(i) Calculate the difference in volume of water loss in cool and hot temperature for species **A**. Show your working clearly in the space provided.

difference in volume of water loss……. [2]

(ii) State the name of the vessels that transport water through a plant.

..... [1]

(c) A scientist investigated the movement of substances in a plant by cutting a ring of tissues around the stem. This process removed some of the transport vessels found around the edge of the stem. The rest of the plant remained unaffected throughout the experiment.

Fig. 10.3 shows a section of the stem where the tissue was removed. After three days, the scientist noticed swelling above the area where the tissue has been removed.

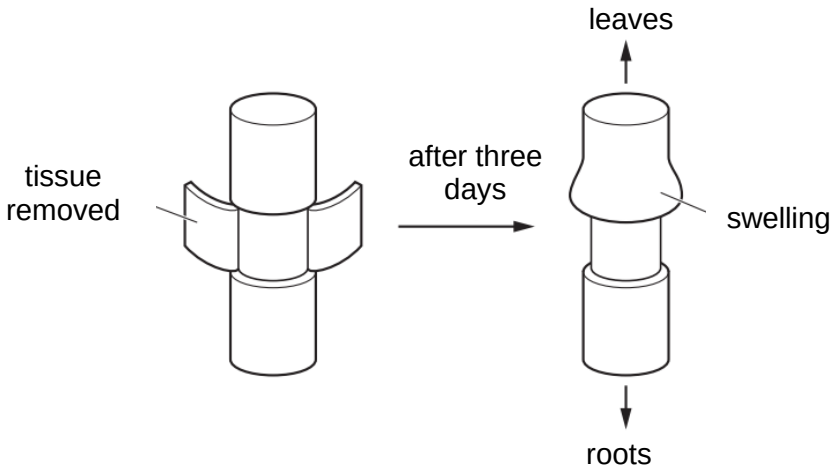

Fig. 10.3

Suggest the reason for swelling above the area where the tissue was removed.

.....

.....

.....

..... [2]

[Total: 10]

END OF PAPER