



Pasir Ris Secondary School

Name:	Class:	Register Number:
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SECONDARY 2 EXPRESS END OF YEAR EXAMINATION 2024

LOWER SECONDARY SCIENCE

Paper 2 Theory
Thursday 0800 – 1000

03 October 2024
Papers 1 and 2: 2 hours

Additional Materials: Nil

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number in the spaces provided at the top of this page.
Do not use staples, paper clips, highlighters, glue, correction fluid or tape.
The use of an approved scientific calculator is expected, where appropriate.

Section A [30 marks]

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

Section B [40 marks]

There are five questions in this section. Answer any **four** questions. Write your answers in the spaces provided.

You may proceed to answer Paper 2 as soon as you have completed Paper 1.

A copy of the Periodic Table is printed on Page 12 of Paper 1.

At the end of the examination, hand in your answers to Paper 1 and Paper 2 separately.
The number of marks is given in brackets [] at the end of each question or part question.

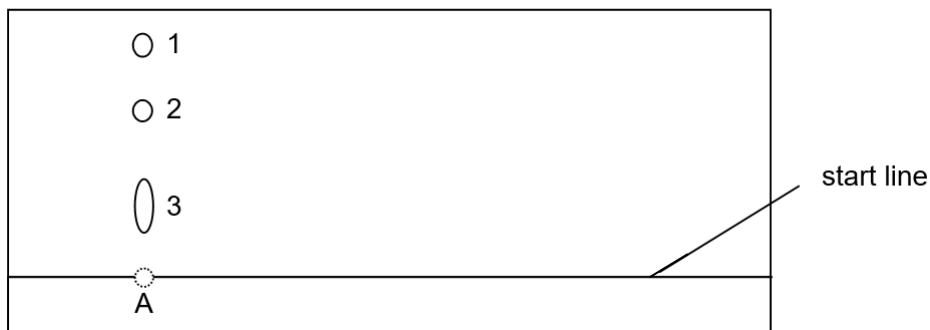
For Candidate's Use	For Examiner's Use	
Circle the numbers of the four questions you have attempted in Section B .	Section A	30
	Section B	40
7 8 9 10 11	Total	70

This document consists of **18** printed pages, including the cover page.

Section A (30 marks)Answer **all** the questions.

Write your answers in the spaces provided.

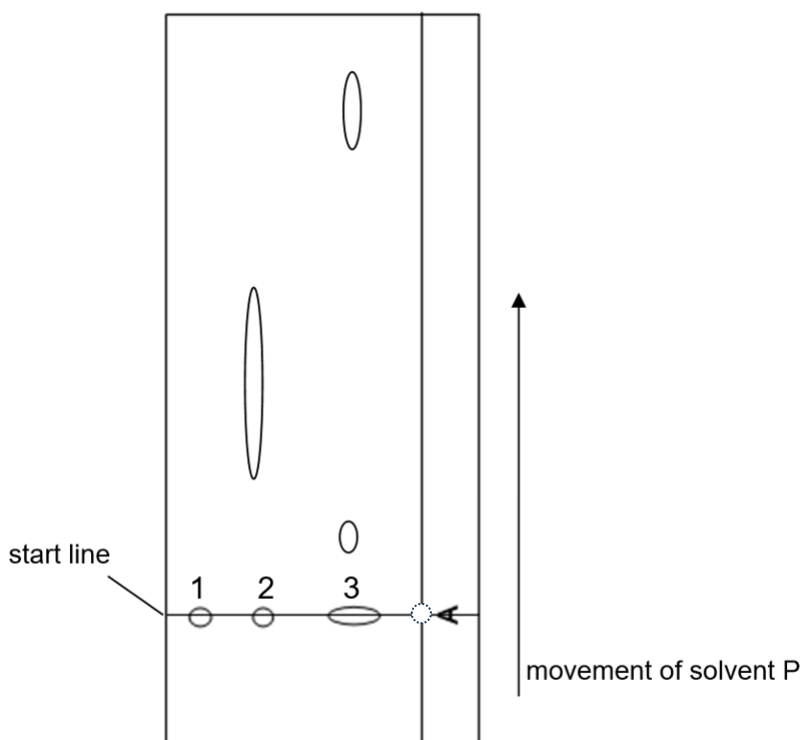
- 1** Paper chromatography is a fast and easy way to determine if samples are pure. Fig. 1.1 shows a chromatogram with sample A using water as the solvent.

**Fig. 1.1**

- (a)** Identify the most soluble spot in water.

.....[1]

- (b)** The chromatogram is turned 90° and another solvent (solvent P) is used to dissolve spots 1, 2 and 3. The results are shown in Fig. 1.2.

**Fig. 1.2**

- (i)** Explain why **no** spot was found above spot 1 in Fig. 1.2.

.....[1]

(ii) State the number of components present in sample A.

..... [1]

(iii) State one other conclusion that can be made about spots 2 and 3.

.....
 [1]

[Total: 4]

2 Mirrors can be used to produce different effects with light.

(a) State the **two** characteristics of reflection in the ray model of light.

.....

 [2]

(b) Fig. 2.1 shows a ray diagram of a type of mirror.

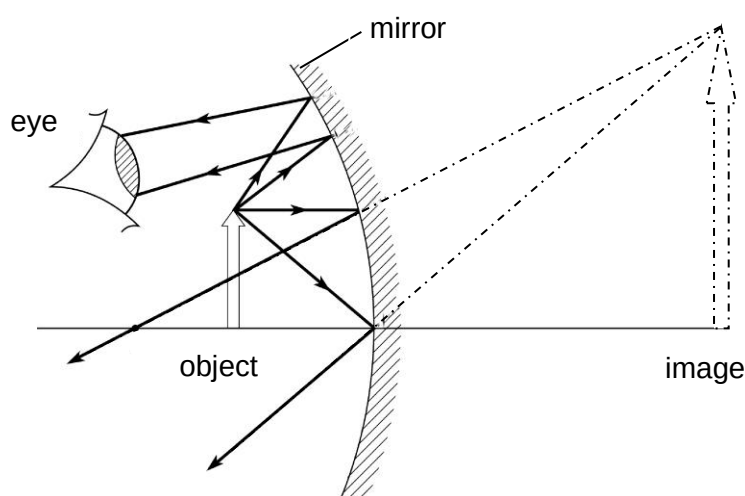


Fig. 2.1

(i) State the type of mirror used in Fig. 2.1.

..... [1]

(ii) State **two** characteristics of the image formed by the mirror in Fig. 2.1.

.....
 [2]

[Total: 5]

3 Fig. 3.1 shows the diagram of a bacterial cell.

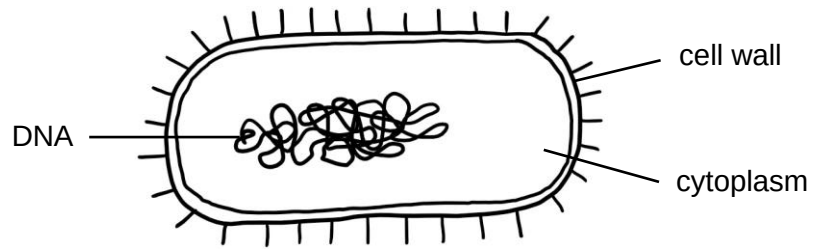


Fig. 3.1

- (a) State one way in which the bacterial cell is similar to a typical plant cell but **not** a typical animal cell.

.....
[1]

- (b) State one way in which the bacterial cell is different from both typical animal and plant cells.

.....
[1]

- (c) Using information from Fig. 3.1, state and explain if the bacterial cell is able to make its own food.

.....

[2]

[Total: 4]

- 4 The melting and boiling points of some substances are given in Table 4.1.

Table 4.1

substance	melting point/ °C	boiling point/ °C
A	-81	400
B	-79	-79
C	46	280
D	87	450
E	1,255	2,150

- (a) Draw the arrangement of the particles of substance A at room temperature in a box shown in Fig. 4.2.



Fig. 4.2

- (b) State the substance which sublimes on heating.

[1]

.....[1]

- (c) Describe the arrangement and movement of the particles in substance E at room temperature and pressure.

arrangement

.....

movement

.....[2]

- (d) Explain why pure substance D melts at a fixed temperature of 87°C.

.....

.....[1]

[Total: 5]

- 5 Copper sulfate crystals were made using the following method.

One spatula of copper carbonate was added to 20 cm³ of acid X. Once it had all reacted, more copper carbonate was added until no more gas was given off. The reaction mixture was filtered. The filtrate was evaporated to about half its volume and then allowed to cool. The crystals were filtered out and dried.

- (a) (i) Name the gas given off when copper carbonate reacted with acid X.

.....[1]

(ii) Describe a test to identify the gas stated in (a)(i).

test

.....

observations

.....[2]

(b) Identify acid X. Hence, write a word equation for the chemical reaction between X and copper carbonate.

acid X

word equation

[2]

(c) Describe a simple method to check that the crystals have a neutral pH.

.....

.....[1]

[Total: 6]

6 (a) Fig. 6.1 shows a solar panel used to heat water.

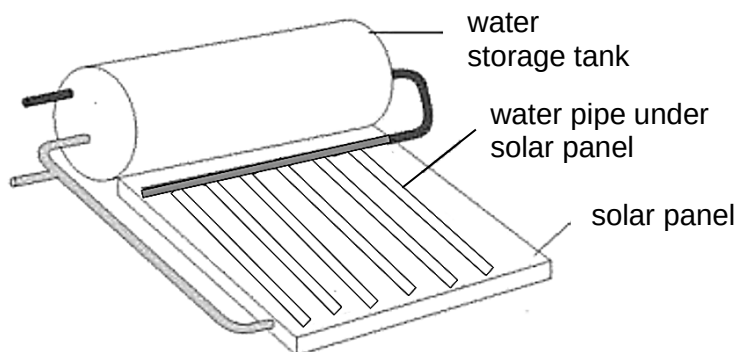


Fig. 6.1

(i) State the process by which thermal energy is transferred from the Sun to the solar panel.

.....[1]

- (ii) State and explain one improvement to the solar panel so that the solar energy can be absorbed more efficiently.

.....

.....

.....

.....[2]

- (iii) State the most suitable material used for the water pipe. Give a reason for your choice.

.....

.....[1]

- (b) A pack which contains a frozen liquid is placed under the lid of a box as shown in Fig. 6.2. The box is then used to keep the apple cold.

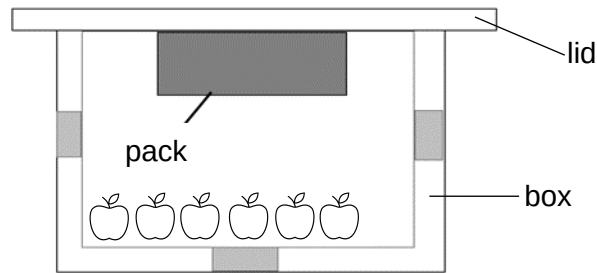


Fig. 6.2

Explain why the pack is placed at the top rather than at the bottom of the box.

.....

.....

.....

.....[2]

[Total: 6]

Section B (40 marks)

There are five questions in this section. Answer any **four** questions.
Write your answers in the spaces provided.

- 7 (a) Fig. 7.1 shows a living space in a house.



Fig. 7.1

- (i) A man lifts the plant pot off the ground and carries it to the right of the room. He places the plant pot on the ground.

Explain if work is done by the man.

.....

.....

.....

.....

.....[3]

- (ii) Describe one way to reduce the amount of energy exerted by the man while moving the plant pot.

.....

.....[1]

(b) Fig. 7.2 shows a circuit in a fire alarm.

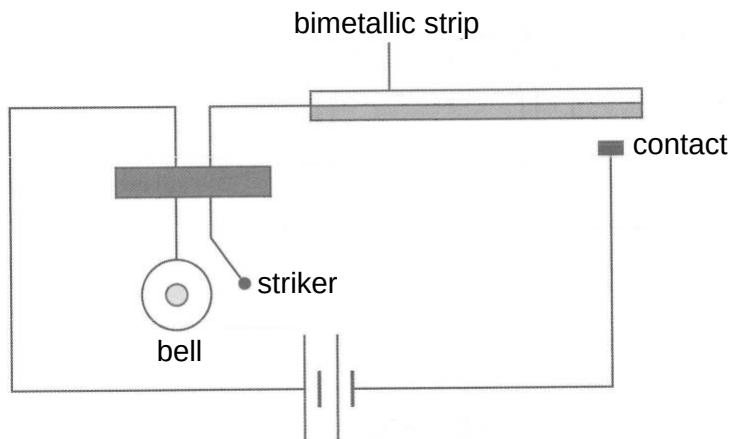


Fig. 7.2

- (i)** In Fig. 7.2, draw arrows to show the direction of current flow. [1]
- (ii)** In Fig. 7.2, draw the electrical components which can be used to determine the potential difference (voltage) of the dry cells and the current that flows through the circuit. [2]
- (iii)** When the bimetallic strip is heated, it bends and touches the contact, creating a closed circuit.

State the conversion of energy from the dry cells to the bell when the circuit is closed.

.....[2]

- (iv)** Bimetallic strips are used in both heaters and fire alarms.

State one other use of a bimetallic strip.

.....[1]

[Total: 10]

- 8 (a) (i) Human activities are increasing the rate of climate change. Conservation of the environment is one significant way of reducing the effects of climate change.

Define *conservation*.

.....[1]

- (ii) Describe one action which supports conservation of energy in the household.

.....

.....[1]

- (b) Algal bloom refers to an excessive growth of algae in water bodies such as oceans.

Fig. 8.1 shows an excerpt from a newspaper regarding *dinoflagellates*, a type of algae found in Singapore.

Blue wonder: Singapore waters light up with algae bloom

SINGAPORE - The waters around Singapore have been "on fire" in recent days, with blue streaks of light resembling the base of a candle's flame spotted in open waters offshore in Pasir Ris and Changi. These sparks were emitted by a group of marine microorganisms called *dinoflagellates*.

Dr Emily Curren, a marine biologist from the National University of Singapore's Tropical Marine Science Institute, said there have been previous sightings of bioluminescent algal blooms along Singapore's coasts - including its southern coastline in 2016.

...Dr Curren said these dinoflagellates are already present in Singapore's waters.

"Due to suitable climatic conditions such as temperature, salinity and rainfall, they will reproduce rapidly and form algal blooms, leading to the bioluminescent sighting when the cells are being disturbed and pushed together by waves for example," she said.

(excerpt from *The Straits Times*, 2022)

Fig. 8.1

Algae are microscopic plants which are a major source of food for many fish.

- (i) Explain the importance of the role of algae in the ecosystem.

.....

.....

.....

.....[2]

- (ii) Based on Fig. 8.1, explain why “suitable climatic conditions” would generally increase the algae population in the Singapore coastal ecosystem.

.....

.....

.....[2]

- (iii) Algal blooms on water surfaces may become harmful to ecosystems when overpopulation causes sunlight to be blocked from marine plants.

Suggest **two** possible effects on underwater marine life when algal blooms are harmful.

.....

.....

.....[2]

- (iv) Explain why algae, while harmful, are **not** considered as parasites in a food web.

.....

.....

.....[2]

[Total: 10]

- 9 An experiment was conducted to investigate the digestion of starch by enzymes present in a digestive juice in humans.

The digestive juice was extracted and added to a Visking tubing containing starch suspension. The Visking tubing was then placed into a boiling tube containing distilled water as shown in Fig. 9.1.

The experimental set-up was left to stand for an hour to allow for the complete digestion of starch.

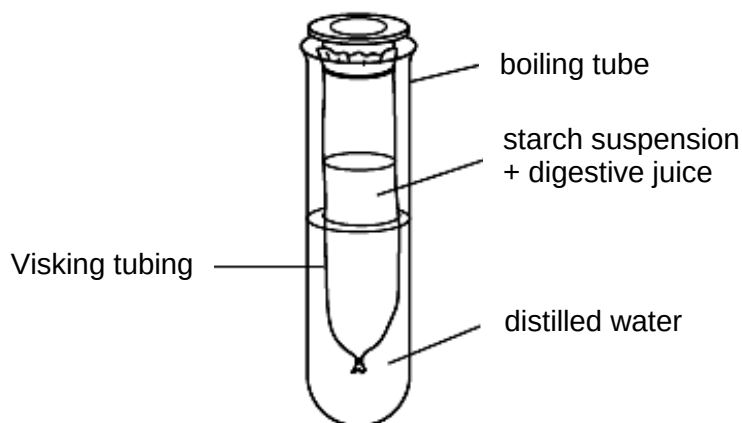


Fig. 9.1

- (a) Name the enzyme present in the digestive juice that digested starch and its expected product.
- enzyme
- product [2]
- (b) After an hour, samples inside and outside the Visking tubing were extracted and tested for the presence of starch and product of digestion. Table 9.2 shows the results obtained.

Table 9.2

sample obtained	test for starch	test for product
inside the Visking tubing	present	present
outside the Visking tubing	absent	present

- (i) Iodine solution was used to test for the presence of starch.

State the observation that confirmed the presence of starch inside the Visking tubing.

.....

.....[1]

- (ii) Explain, in terms of concentration and movement of particles, why the product of digestion was also present outside the Visking tubing.

.....

[2]

- (c) Fig. 9.3 shows the changes in the percentage of undigested starch as food passes along the alimentary canal.

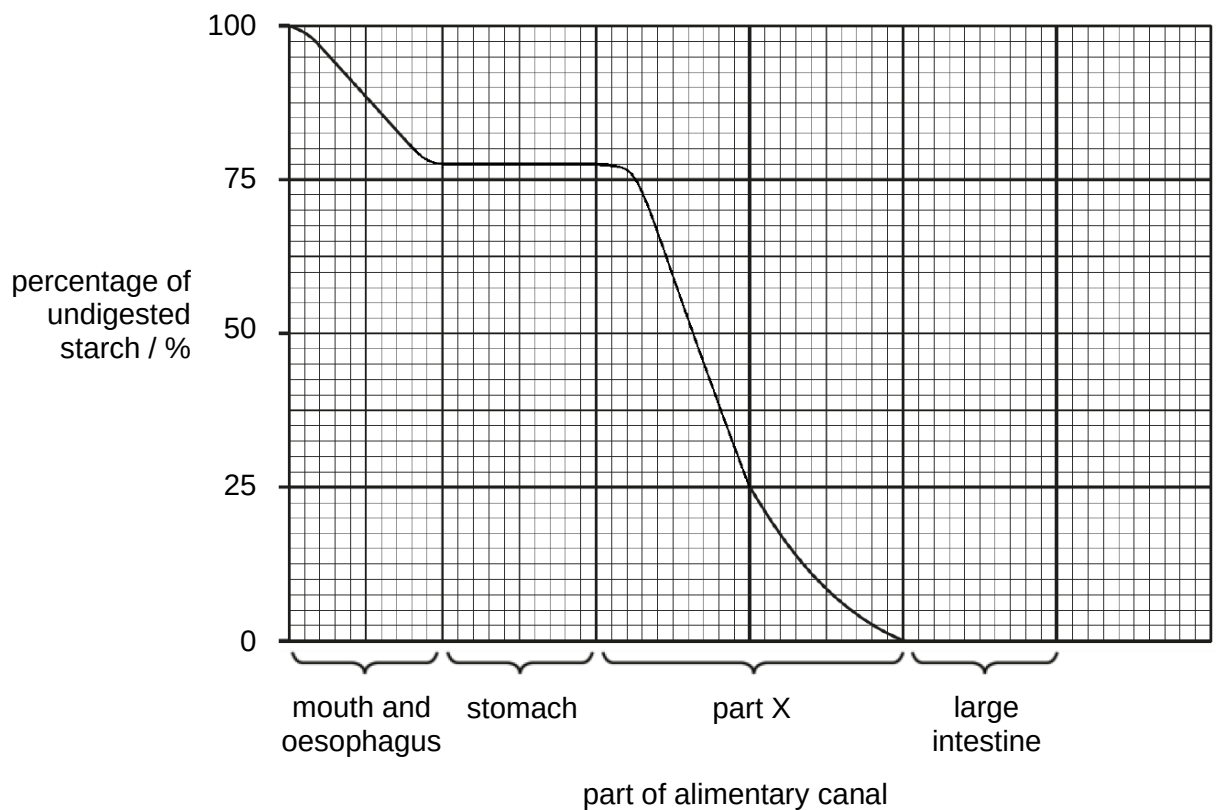


Fig. 9.3

- (i) Using relevant information from Fig. 9.3, describe the changes in the percentage of undigested starch from the mouth to large intestine.

.....

[2]

- (ii) Explain why chewing does **not** result in the change in the percentage of undigested starch in the mouth.

.....
[1]

- (iii) Suggest why **no** starch digestion takes place in the stomach.

.....
[1]

- (iv) Apart from carrying out digestion, state **one** other function of part X.

.....
[1]

[Total: 10]

10 (a) Fig. 10.1 shows the male reproductive system.

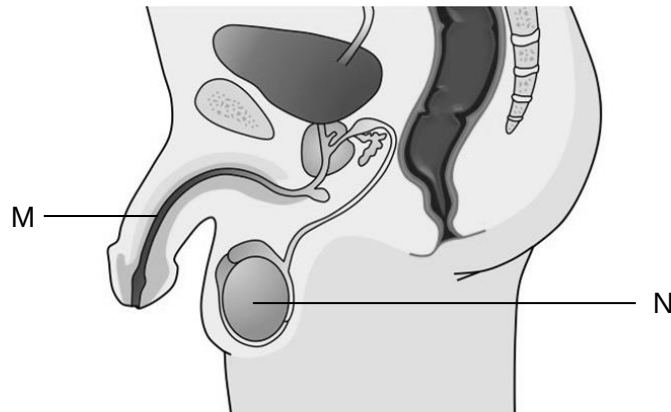


Fig. 10.1

(i) Name structures M and N.

M

N

[1]

(ii) Describe a permanent birth control method for males and explain how it works.

.....

[2]

(iii) The male sex hormone is responsible for the male characteristics in a man.

Explain why the birth control method in (a)(ii) does **not** result in the loss of male characteristics in a man.

.....
[1]

- (b) During a woman's menstrual cycle, the thickness of the uterine lining changes. Fig. 10.2 shows the changes in the thickness of uterine lining of a woman in a particular month.

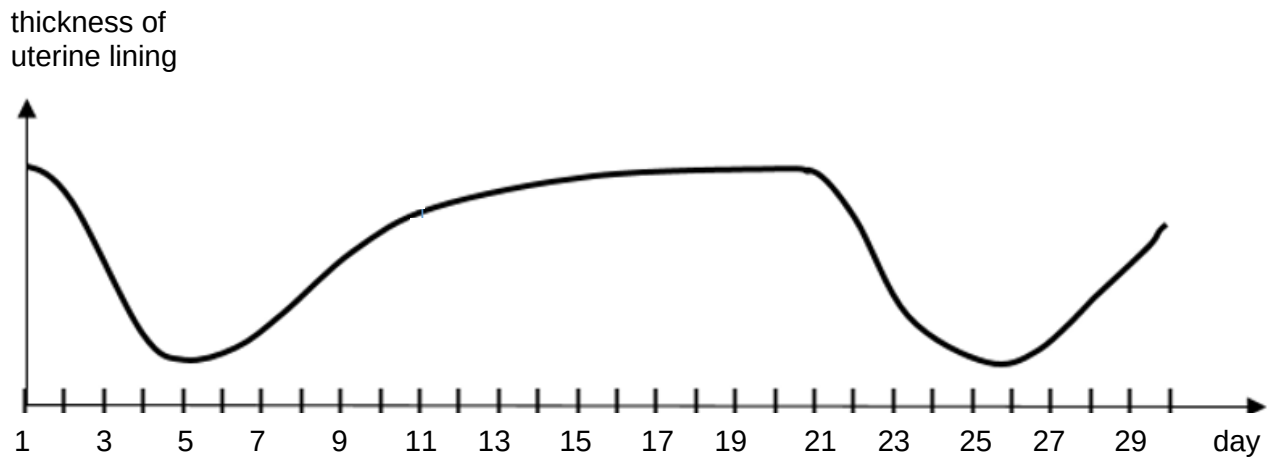


Fig. 10.2

- (i) Using information from Fig. 10.2, estimate the duration of the woman's menstrual cycle.
[1]
- (ii) Suggest why it is unlikely for pregnancy to take place if the woman had sexual intercourse on day 20 of the month.

[2]
- (c) Birth control methods prevent pregnancy by disrupting processes in the human reproductive system.
- (i) State a temporary birth control method which can be used by both males and females.
[1]
- (ii) Explain why the use of condoms may not necessarily reduce the transmission of STIs.

[2]

[Total: 10]

- 11** A 'ringing' experiment was conducted by a farmer to study its effects on the mass of the pears produced. Fig. 11.1 shows three different plants with a ring of transport tissues removed along their stems. All other conditions were kept the same.

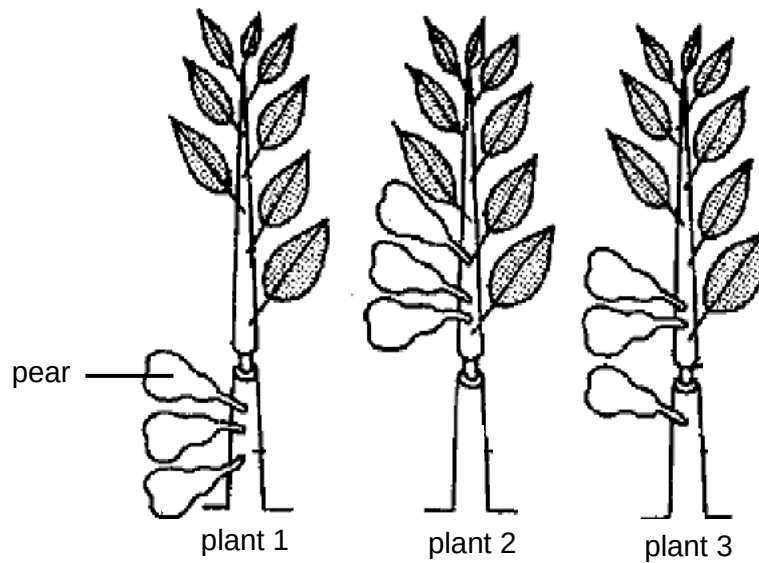


Fig. 11.1

- (a)** Describe the process of water entering a plant from the soil.

.....

.....

.....

.....

.....

.....[3]

- (b)** Fig. 11.2 shows a cross section of the stem of the plant used in the experiment.

On Fig. 11.2, shade the areas that transport water and mineral salts.

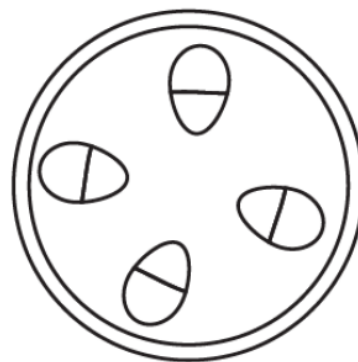


Fig. 11.2

[1]

- (c) Table 11.3 shows the total mass of the pears on each of the three plants several weeks later. Complete Table 11.3 by matching the plant number with the total mass of the pears shown.

Table 11.3

plant number	total mass of pears / g
	75
	525
	750

[2]

- (d) State the function of the phloem in a green plant.

.....

.....

.....

.....[2]

- (e) Explain your choice for the plant with the largest total mass of pears in (b).

.....

.....

.....

.....[2]

[Total: 10]