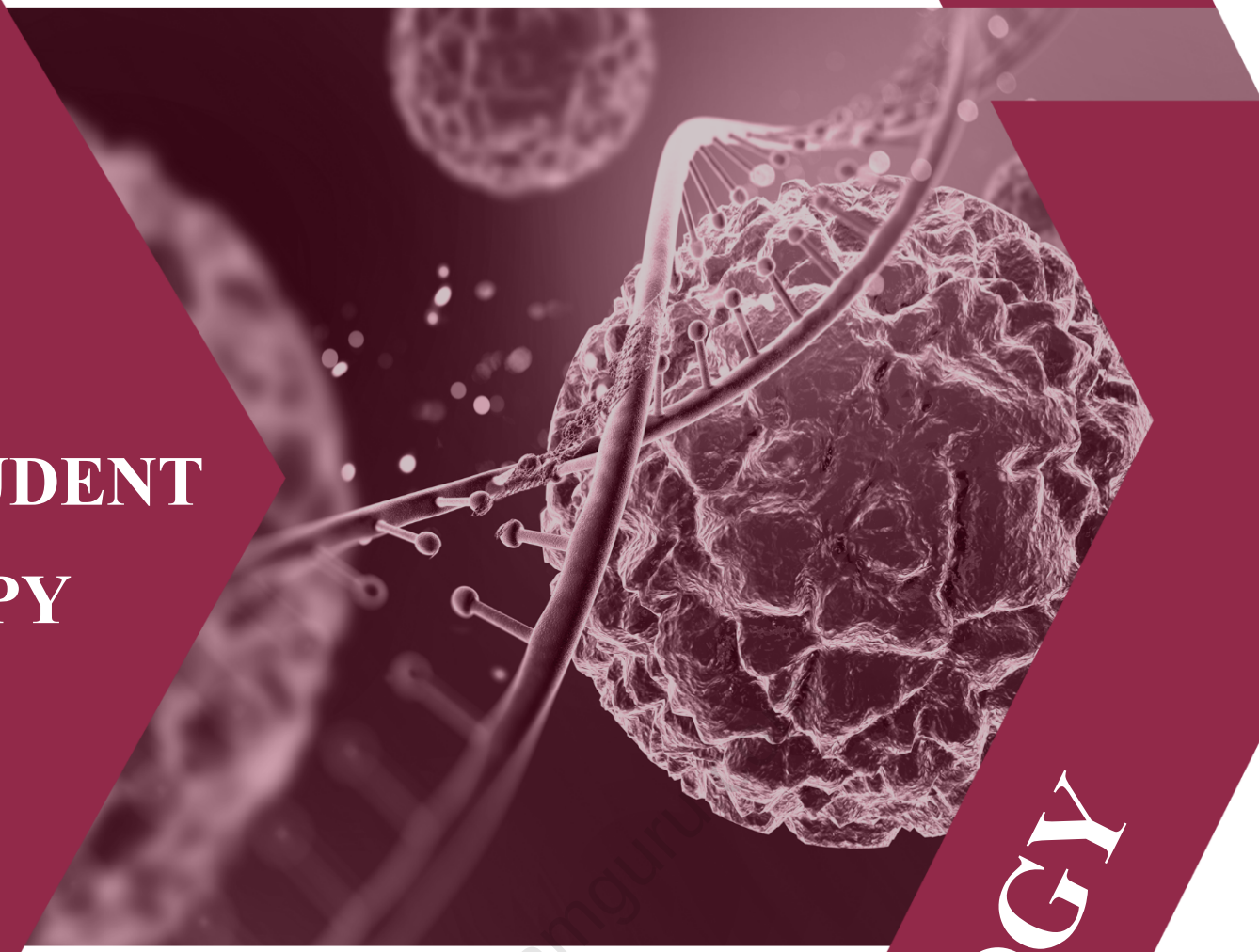
STUDENT COPY



IGCSE BIOLOGY

HEADS-UP
REACH FOR THE STARS

TOPICAL PRACTICE QUESTIONS

PAPER 6

VOL. 1

CHAPTERS 1-4

2020 EDITION

1 Fig. 2.1 shows three worms. One is a nematode.

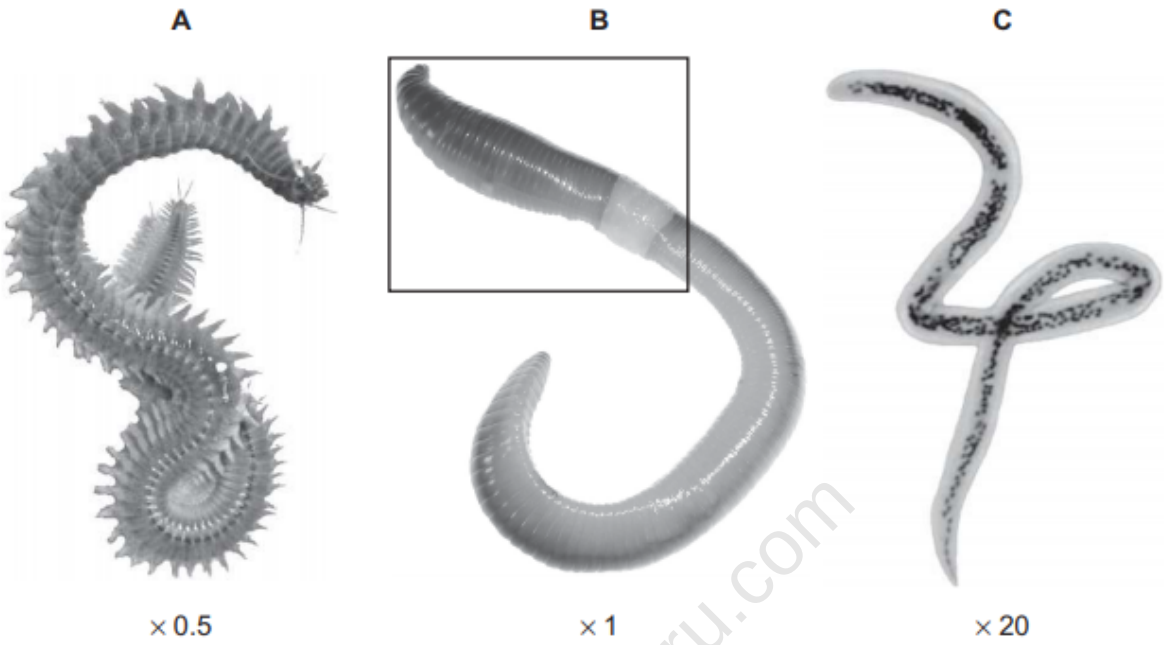


Fig. 2.1

(a) (i) Write the letter that identifies a nematode worm ..... [1]

(ii) Give **two** reasons for your answer.

.....

.....

.....

..... [2]

(iii) The other two worms belong to a different group.

Name this group ..... [1]

(b) Part of the worm labelled **B** is shown in a rectangle.

Make a large labelled drawing of this part of worm **B**.

[4]

(c) Some students studied a population of 40 worms. They measured the lengths of 35 worms. These measurements are shown in Table 2.1.

(i) Complete Table 2.1 by measuring the lengths of the five worms shown in Fig. 2.2. Use a ruler to measure them.

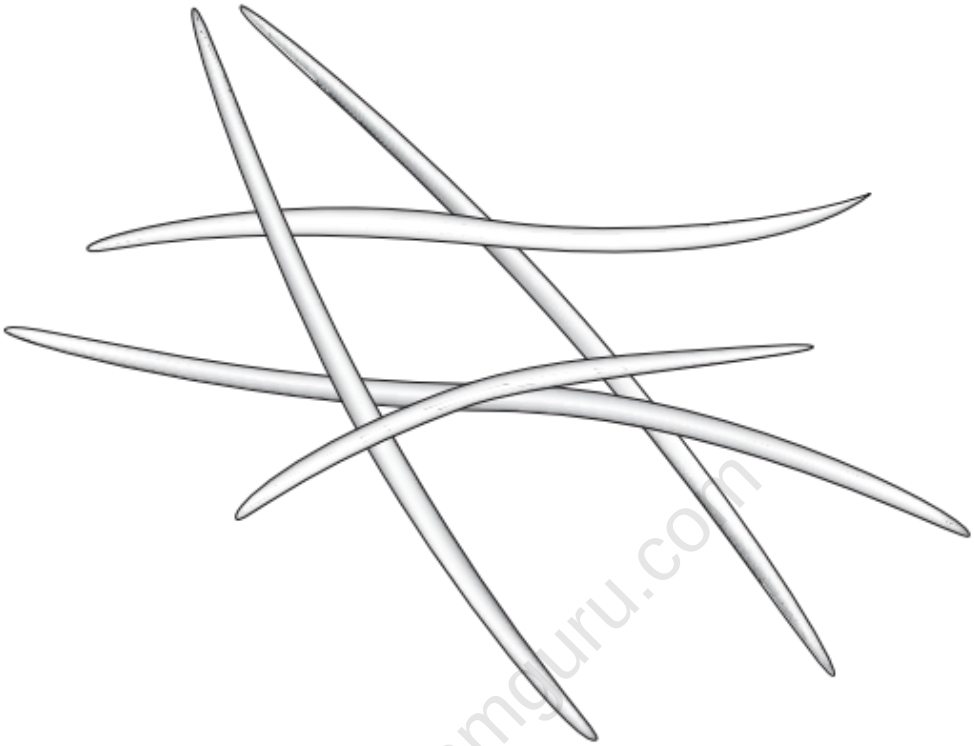


Fig. 2.2

Table 2.1

length/cm	7.0	8.1	10.8	6.2	11.4	9.0	10.3	12.1	13.5	5.6
length/cm	11.3	7.9	12.9	7.4	13.1	13.7	15.5	8.8	14.1	15.2
length/cm	9.6	8.4	14.7	16.0	7.2	10.5	9.2	12.4	6.7	13.3
length/cm	14.0	11.6	12.6	12.2	8.3	.....	.....	.....	.....	.....

Record the length of each worm in Table 2.1 [2]

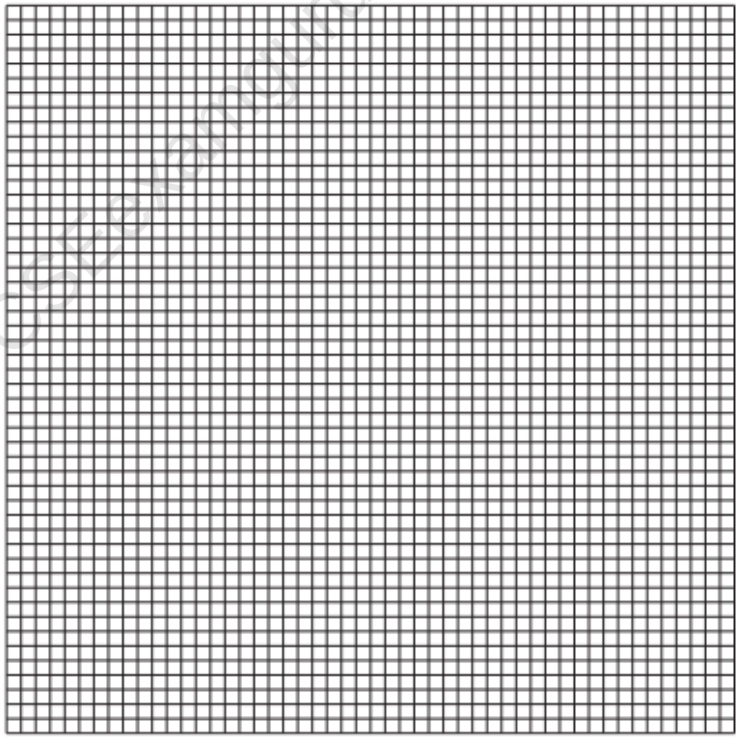
(ii) Complete the tally chart, Table 2.2, to show the number of worms in each range of lengths.

Table 2.2

range of lengths / cm	tally	frequency
5.0 - 6.9	.....	.....
7.0 - 8.9	.....	.....
9.0 - 10.9	.....	.....
11.0 - 12.9	.....	.....
13.0 - 14.9	.....	.....
15.0 - 16.9	.....	.....

[3]

(iii) Use the data from Table 2.2 to plot a histogram showing the frequency of each range of lengths.



[4]

(iv) Suggest a reason for the shape of the histogram.

.....

..... [1]

[Total: 18]

2 The animals labelled **A** and **B** in Fig. 2.1 are both arthropods.

Fig. 2.1

(a) Make a large labelled drawing of the **head** of arthropod **B**

[5]

(b) **A** and **B** belong to the same group of arthropods.

(i) Name this group

..... [1]

(ii) State two visible features of **A** and **B** which show that they belong to this group

1 .....

2 ..... [2]

(c) Fig 2.2 shows a trap which can be used to catch other insects such as fruit flies.

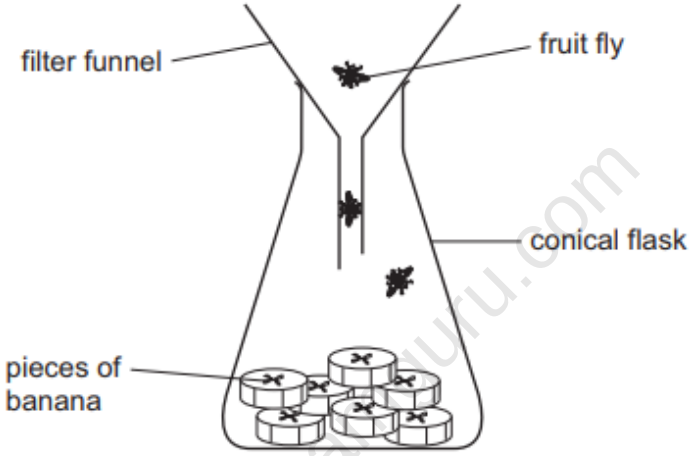


Fig. 2.2

(i) Fruit flies feed on fruits such as bananas. Bananas contain carbohydrates.

Describe how you could safely test a piece of banana for **two** different carbohydrates.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

(ii) Describe the observations expected if **these** two carbohydrates are present.

.....

.....

.....

..... [2]

(d) Fig. 2.3 shows a banana and a similar fruit called a plantain.

Fig. 2.3

Suggest an investigation to find out if fruit flies are more likely to feed on banana or plantain.

.....

.....

.....

.....

.....

..... [3]

[Total: 19]

3 Fig. 1.1 shows a woodlouse.

Fig. 1.1

(a) (i) Name the invertebrate group to which this animal belongs.

..... [1]

(ii) Describe **two** features that are characteristic of this invertebrate group.

1 .....

2 ..... [2]

Small invertebrates such as woodlice respond to different environmental conditions.

24 woodlice were placed in a choice chamber linked by a connecting passage, as shown in Fig. 1.2.

12 of the woodlice were placed in the damp area on one side of the choice chamber; the other 12 were placed in the dry area on the other side of the choice chamber.

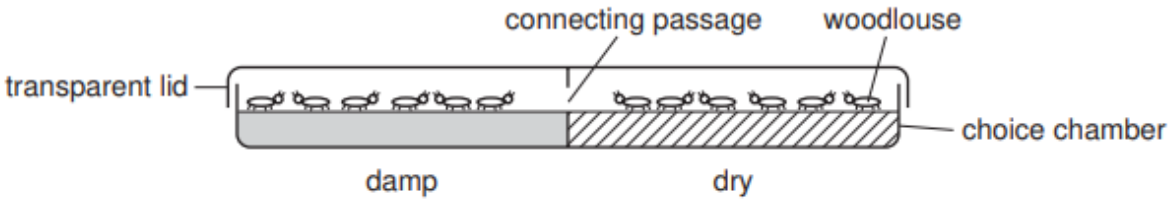


Fig. 1.2

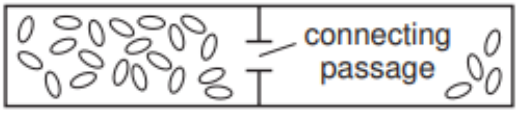
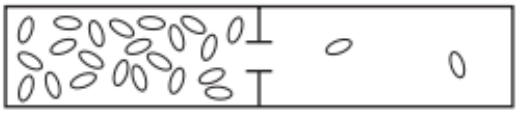
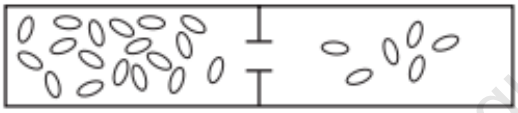
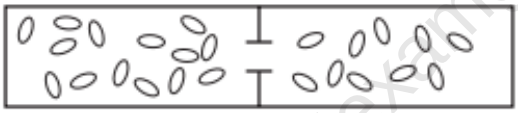
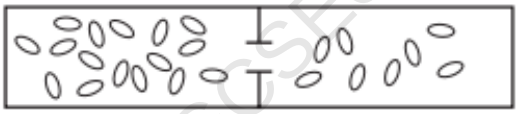
After 5 minutes the number of woodlice in each area of the chamber was recorded.

The woodlice were released into their natural environment.

This procedure was repeated **four** more times using different woodlice.

The results are shown in Table 1.1.

Table 1.1

trial	positions of woodlice		number of woodlice in the damp area	number of woodlice in the dry area
	damp area	dry area		
1			.....	.....
2			.....	.....
3			.....	.....
4			.....	.....
5			.....	.....
	total		.....	.....
	mean		.....	.....

(b) Complete Table 1.1 by:

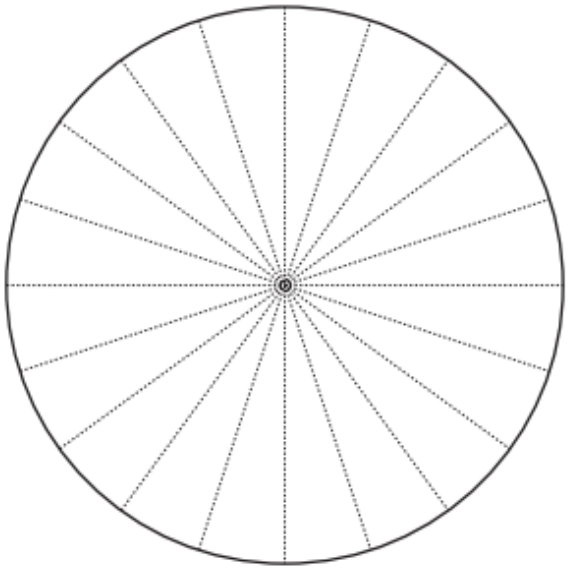
(i) counting and recording the number of woodlice in each area of the choice chamber for each trial;

[2]

(ii) calculating the total number of woodlice and the mean for each area.

[2]

(c) Draw a pie-chart on the diagram below to show the mean number of woodlice in each area of the chamber. Give a key to identify the areas.



Key

[2]

(d) Explain how the behaviour of the woodlice would help them to survive in their natural habitat.

.....

.....

.....

.....

.....

..... [3]

(e) Suggest how you might improve this investigation.

.....

.....

.....

.....

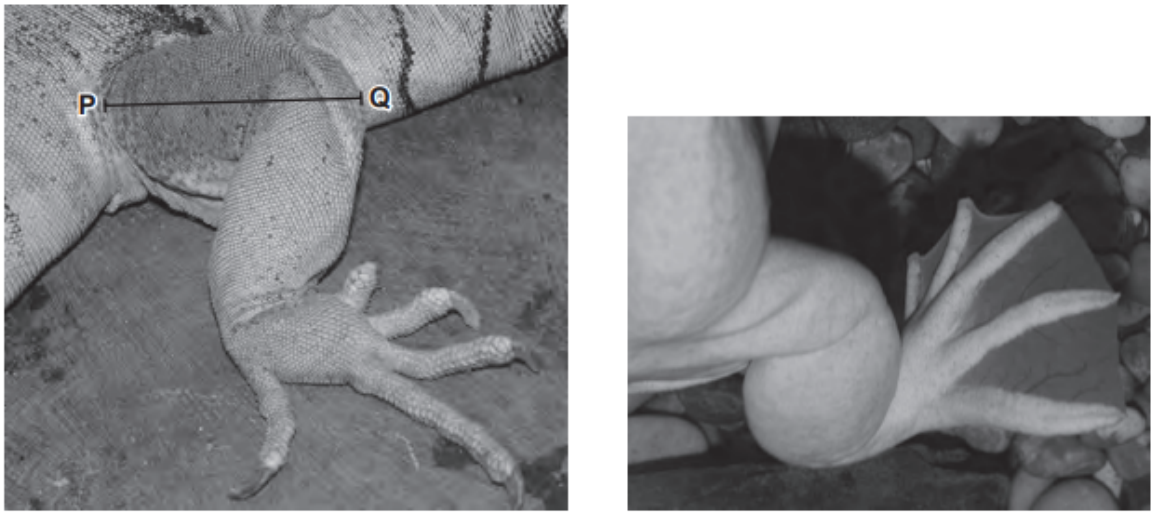
.....

..... [3]

[Total: 15]

4 Fig. 2.1 shows the back leg of two animals.

The animals belong to two different vertebrate groups.



animal **A** animal **B**

Fig. 2.1

(a) (i) Describe **one similarity**, **visible** in Fig. 2.1, between the leg of animal **A** and the leg of animal **B**.

.....

.....

..... [1]

(ii) Complete Table 2.1 to state **two differences**, **visible** in Fig. 2.1 between the leg of animal **A** and the leg of animal **B**.

Table 2.1

feature	animal **A**	animal **B**

[3]

(b) Make a large, labelled drawing of the leg of animal **A**.

[5]

(c) You are going to calculate the magnification of your drawing of the photograph of the leg of animal **A**.

Length of line **PQ** in Fig. 2.1 is 36 mm.
Draw line **PQ** on your drawing in the same position as in Fig. 2.1.

Length of line **PQ** in drawing ..... mm

Calculate the magnification of your drawing.
Show your working.

magnification × ..... [3]

(d) A population of animals was studied over nine years. The changes in the population of **males** are shown in Fig. 2.2

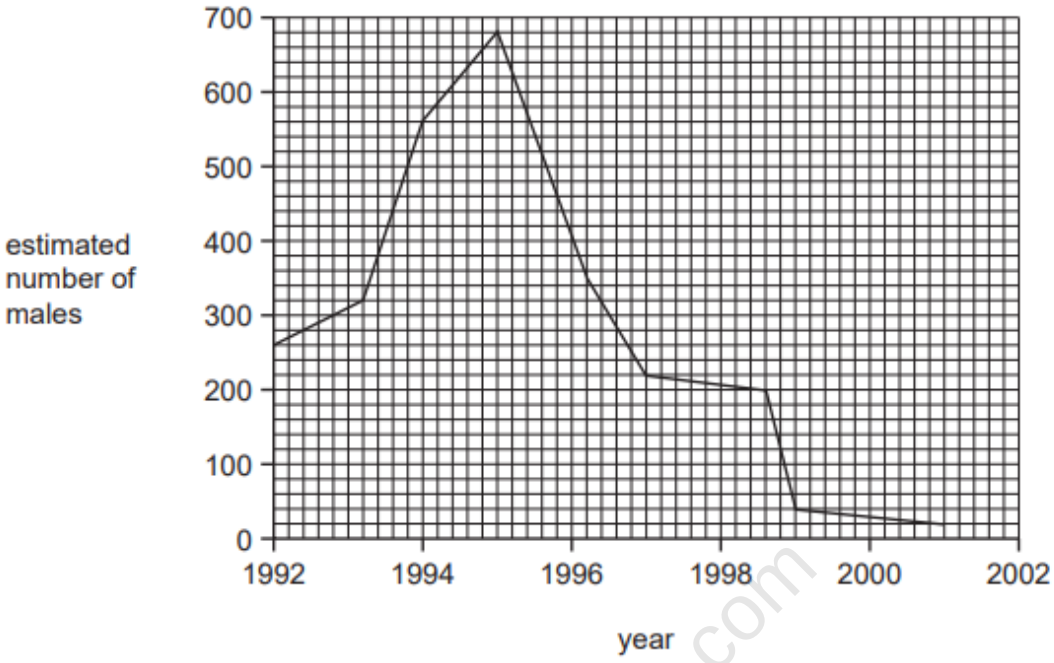


Fig. 2.2

(i) Use the graph to estimate the **total** population of males **and** females in 1992. Assume that the number of males and females is equal.
Show your working.

total population of males and females ..... [1]

(ii) Describe the changes in the population from 1992 to 2001.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 16]

5 You are going to observe and draw one of your fingers.

(a) Place the palm of your hand on the paper.
Examine one finger.

Make a large, labelled drawing of this finger.

[4]

(b) Fig. 2.1 shows the European mole, *Talpa europa*.

Fig. 2.1

(i) State **one similarity**, **visible** in Fig. 2.1, between the structure of the mole's hand and your hand.

.....

..... [1]

(ii) Complete Table 2.1 to state **two differences**, **visible** in Fig. 2.1 between the shape and size of the mole's hand and your hand.

feature	mole's hand	your hand
shape		
size		

[2]

(c) (i) Name the group of vertebrates to which the mole belongs.

.....

[1]

(ii) State **one** feature, **visible** in Fig. 2.1, that supports your answer to **(c)(i)**.

.....

.....

[1]

[Total: 9]

6 Fig. 2.1 shows an arthropod.

×2.5

Fig. 2.1

(a) You are going to calculate the actual length of the part of the leg that is marked **ST** in Fig. 2.1.

Measure the length of line **ST**.

length of line **ST** ..... mm

Calculate the actual length of the part of the leg that is marked **ST**.

Show your working.

actual length of leg ..... mm [3]

(b) Use features, **visible** in Fig. 2.1, to identify the group of arthropods to which this animal belongs.

Give **two** reasons for your answer.

Group .....

reason 1 .....

.....

reason 2 .....

..... [3]

[Total: 6]

7 Slugs and snails are molluscs that can live in water or on land.

Fig. 3.1 shows a slug and a snail.

slug snail

Fig. 3.1

(a) (i) Describe **two** features, **visible** in Fig. 3.1, that suggest the slug and the snail belong to the same group of molluscs.

1 .....

2 ..... [2]

(ii) Describe **one** difference, other than size, **visible** in Fig. 3.1, between the slug and the snail.

..... [1]

Fig. 3.2 shows a shell of a mollusc.

Fig. 3.2

(b) Suggest the importance of the shell to molluscs that belong to this group.

.....

..... [1]

[Total: 4]

8 A parasite is an organism that obtains its nutrients from another living organism (the host).

Fig. 2.1 shows the parasitic plant dodder, *Cuscuta epithymum*, growing on the host plant, gorse, *Ulex* sp. The flowers and stems belong to the dodder. This plant does not have leaves or roots, and obtains its nutrients and water from the gorse.

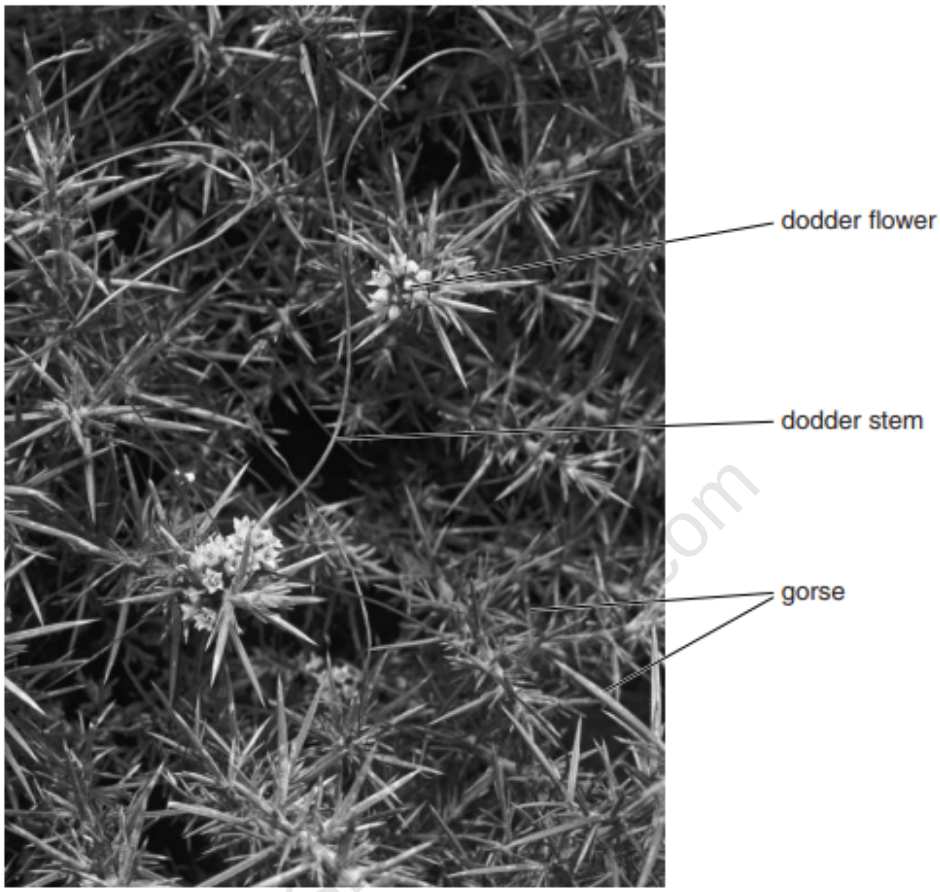


Fig. 2.1

Fig. 2.2 shows a section through the stem of gorse to show the attachment of the dodder as seen using a microscope.

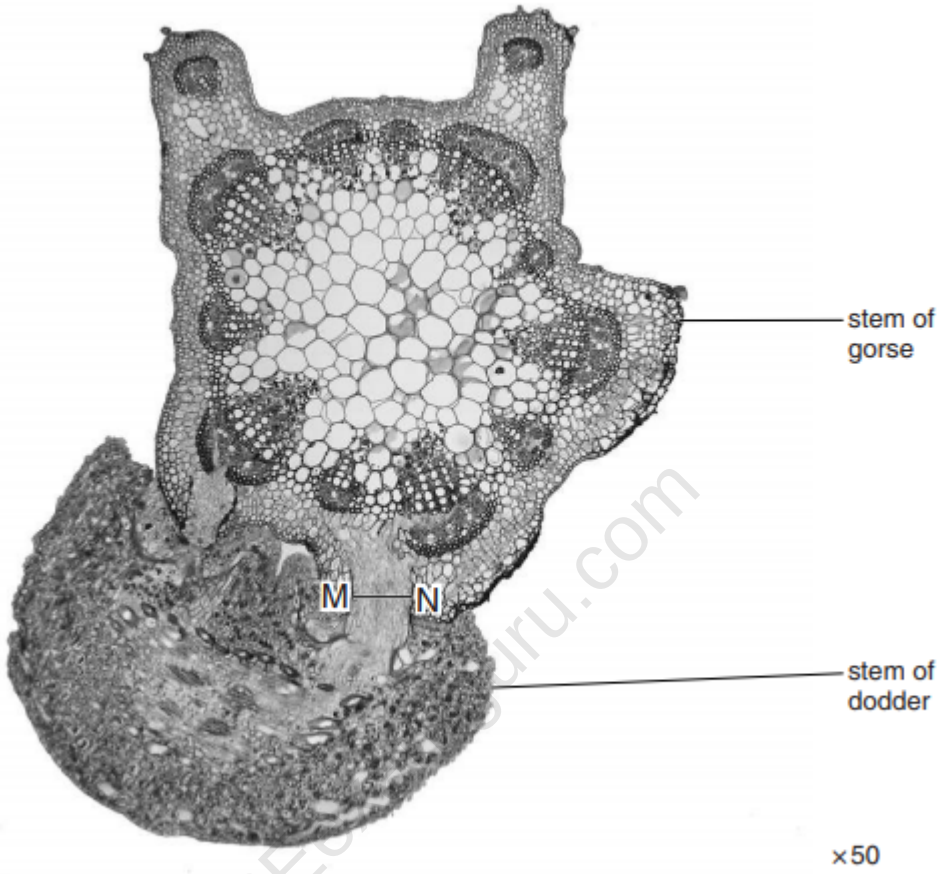


Fig. 2.2

(a) On Fig. 2.2, draw labelled lines to identify the position of:

(i) xylem of gorse;

(ii) phloem of gorse.

[2]

(b) Suggest how dodder obtains minerals from the gorse.

.....

.....[1]

(c) The structure that dodder uses to make contact with the gorse is called a haustorium. The width of the haustorium is marked by the line **MN**, on Fig. 2.2.

Measure the length of **MN**.

..... mm

Calculate the actual width of the haustorium (**MN**).

Show your working.

actual width ..... mm [3]

Fig. 2.3 shows an arthropod that is a parasite that can live on humans.

Fig. 2.3

(d) **(i)** Make a large labelled drawing of the part of the parasite in the rectangle.

[4]

(ii) Name the group of arthropods to which this animal belongs.

Give a reason for your answer.

.....

.....[2]

[Total: 12]

9 Fig. 2.1 shows two leaves, **R** and **S**, from different plants.

R **S**

actual size

Fig. 2.1

(a) **(i)** Make a large drawing of **R** to show:

- the shape of the leaf
- the arrangement of the veins in the leaf.

Label the main vein (midrib).

[4]

(ii) Draw a line across the widest part of **R** in Fig. 2.1. Measure, in millimetres, the distance and record your result. Include your units.

distance across the widest part of **R** .....

Draw a line across the widest part of your drawing, measure the distance (in millimetres) and record your result. Include your units.

distance across widest part of drawing of **R**.....[3]

(iii) Calculate the magnification of your drawing.

Show your working.

Give your answer to the nearest whole number.

magnification × .....[2]

(b) **(i)** Complete Table 2.1 by recording two **visible** differences, other than colour, between leaves **R** and **S**.

Table 2.1

R	S
1.....	....
2.....	....

[2]

(ii) State, with a reason, which of the leaves, **R** or **S**, is from a monocotyledon.

.....

.....[1]

(c) Some students were provided with two leaves, **V** and **W**, from different plants. In an investigation into water loss, the students recorded the mass of each of these leaves every 5 minutes for 60 minutes.

(i) The humidity did not change during the investigation.

State **two** other variables that should be kept constant during the investigation.

Describe how each variable could be kept constant.

1. variable .....

method of keeping constant .....

.....

2. variable .....

method of keeping constant .....

.....[4]

The results are shown in Table 2.2.

Table 2.2

time / min	mass of **V** / g	mass of **W** / g
0	5.2	7.5
5	4.8	7.2
10	4.0	6.5
15	5.5	6.0
20	3.2	5.5
25	2.9	5.1
30	2.8	4.3
35	2.7	4.0
40	2.4	3.6
45	2.2	3.2
50	1.8	3.0
55	1.8	2.9
60	1.8	2.7

(ii) The students assumed that the change in mass was due to water loss.

Describe how the students could show that **water** is lost from the leaves.

.....

.....

.....

.....

.....

.....[3]

(iii) Describe **two** similarities and **two** differences in the pattern of water loss of leaf **V** and leaf **W**.

similarities

1 .....

.....

2 .....

.....

differences

1 .....

.....

2 .....

.....[4]

[Total: 23]

10 Fig. 3.1 shows a male and a female fly of the same species.

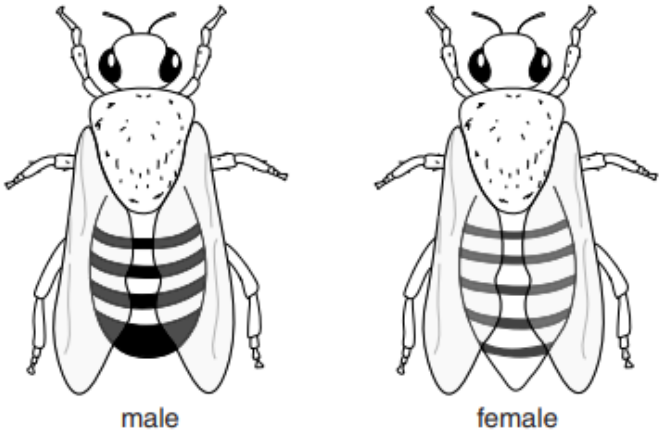


Fig. 3.1

(a) Describe **two** differences, **visible** in Fig. 3.1, between the male and female fly.

Complete Table 3.1 to record these differences.

Table 3.1

feature	male	female

[3]

(b) Fig. 3.2 shows a different type of insect, a bee.

not drawn to scale

Fig. 3.2

Insects can be recognised by having three parts to the body and three pairs of legs, amongst other features.

Describe **two other** features, visible in Fig. 3.1 **and** Fig. 3.2 that show that the fly and the bee are both identified as insects.

1 .....

2 .....[2]

(c) Both flies and bees are attracted to coloured flowers.

Suggest how you could find out which colours attract more bees than flies.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[5]

[Total: 10]

11 Fig. 3.1 shows four different animals that pollinate flowers.

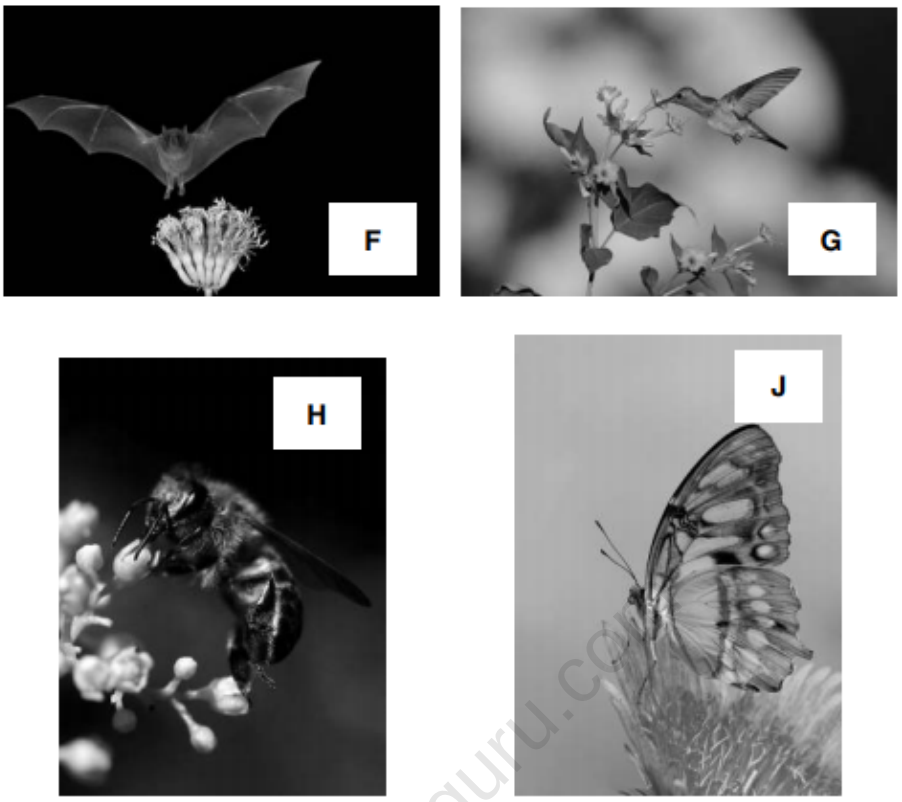


Fig. 3.1 **not to scale**

(a) (i) State **one** way, visible in Fig. 3.1, that animal **G** is different from animal **H**.

..... [1]

(ii) State **two** characteristics, **visible** in Fig. 3.1, that are common to all four animals, **F**, **G**, **H** and **J**.

1 .....

2 .....

[2]

(b) (i) State the letters of the **two** animals, **F**, **G**, **H** or **J**, which belong to the same animal group.

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

(ii) Identify the animal group to which they belong. Suggest a reason why you have chosen this group.

animal group .....

reason for choice .....

.....

[2]

[Total: 6]

12 Fig 3.1 shows one complete leaf from two different species of plant, **P** and **Q**.

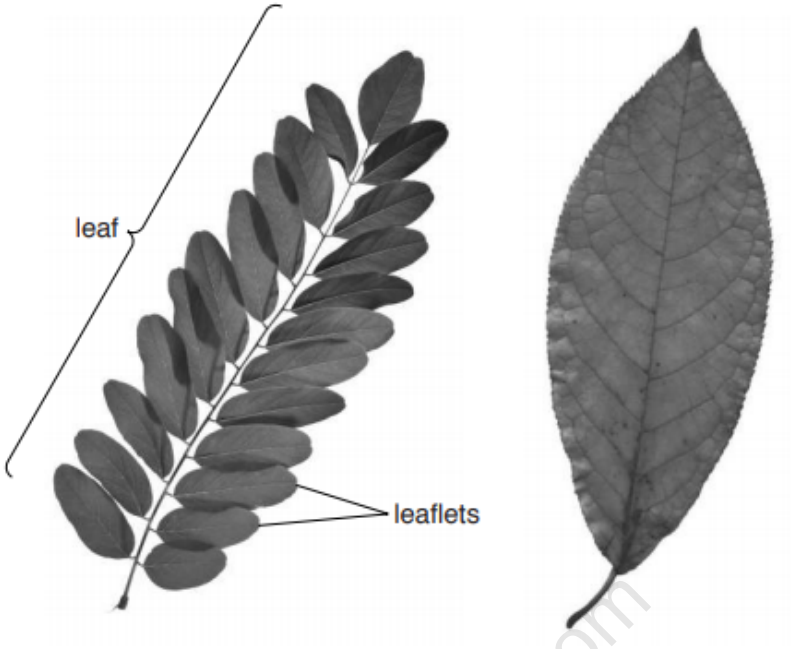


Fig. 3.1

(a) (i) State **two** features which are visible in **both** leaf **P** and leaf **Q**.

1 .....

2 .....

[2]

(ii) State **two** ways, other than size, in which leaf **P** differs from leaf **Q**.

1 .....

2 .....

[2]

(b) Fig. 3.2 shows part of a climbing plant.

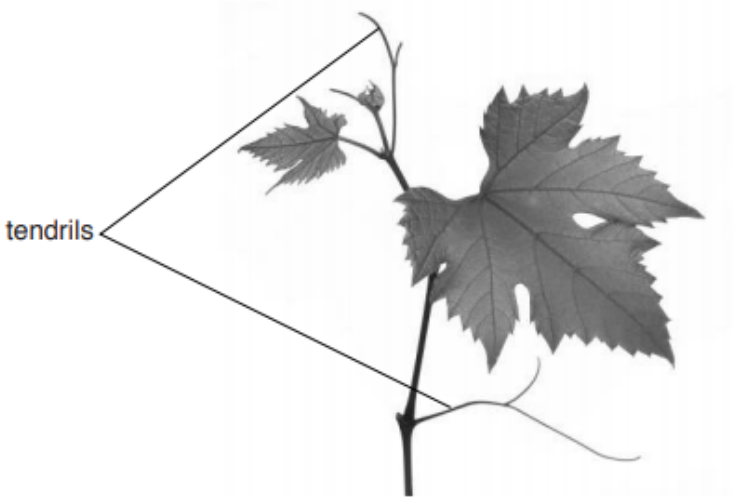


Fig. 3.2

(i) In the space below make a large drawing of the part of the climbing plant shown in Fig. 3.2.

[4]

(ii) Suggest **one** advantage and **one** disadvantage to the plant of having tendrils, as shown in Fig. 3.2.

advantage .....

.....

disadvantage .....

.....

[2]

(c) Fig. 3.3 shows a leaf of a monocotyledonous plant.

Fig. 3.3

The leaves shown in Fig 3.1 and Fig. 3.2 are all from eudicotyledonous (dicotyledonous) plants.

Complete Table 3.1 by stating **two** ways in which the leaves shown in Fig. 3.1 and Fig. 3.2 differ from the leaf of a monocotyledonous plant, shown in Fig. 3.3.

Table 3.1.

feature	eudicotyledonous	monocotyledonous

[3]

[Total: 13]

Chapter 2: Organisation of the Organism

62/ON 2017

1 Fig. 2.1 is a photomicrograph of the epidermis of a leaf. It shows epidermal cells, guard cells and stomata.

Each stoma is surrounded by two guard cells containing chloroplasts.

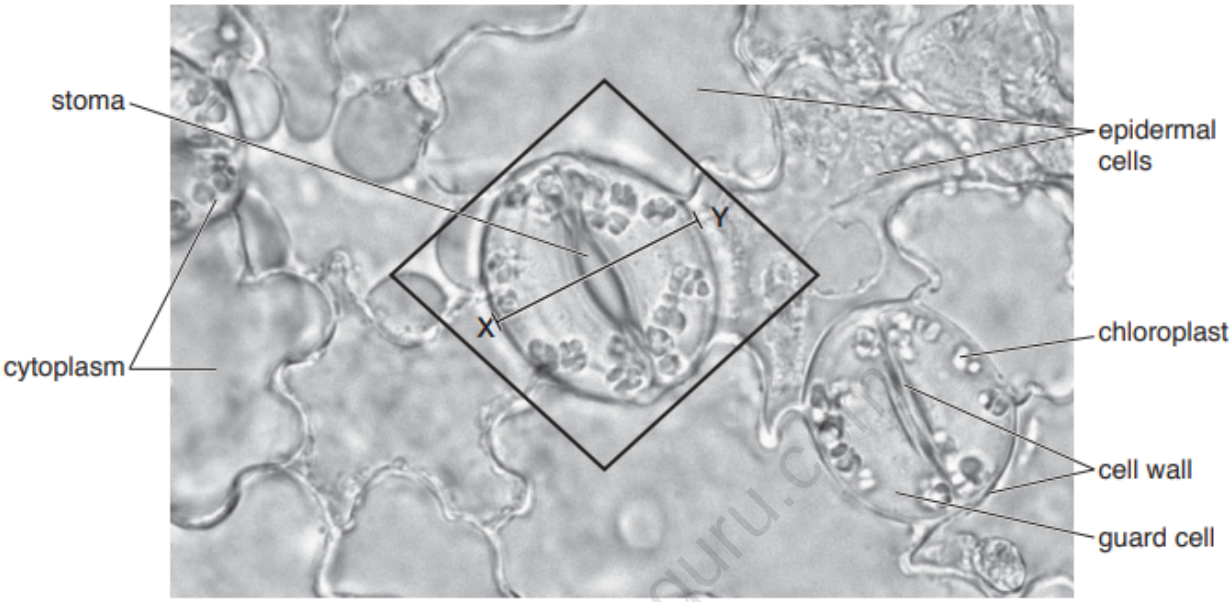


Fig. 2.1

(a) (i) Complete table 2.1 to show **two** visible differences between epidermal cells and guard cells.

feature	epidermal cell	guard cell

[2]

(ii) Make a large drawing of the two guard cells and the stoma shown inside the box on Fig. 2.1.

[4]

(b) Measure the total width of the guard cells and stoma along the line **XY** on Fig. 2.1. Include the units.

Total width of the guard cells and stoma on Fig. 2.1 .....

Draw a line **on your drawing** in the same position as the line XY.

Measure the width of the guard cells and stoma on your drawing. Include the units.

Total width of the guard cells and stoma on your drawing .....

Calculate the magnification of your drawing using the formula:

$$\text{magnification} = \frac{\text{width on your drawing}}{\text{width on Fig. 2.1}}$$

Show your working and give your answer to the nearest whole number.

.....

[3]

(c) Fig. 2.2 shows the rate of water gain by absorption and the rate of water loss by transpiration in a plant during a 24-hour period on a hot sunny day.

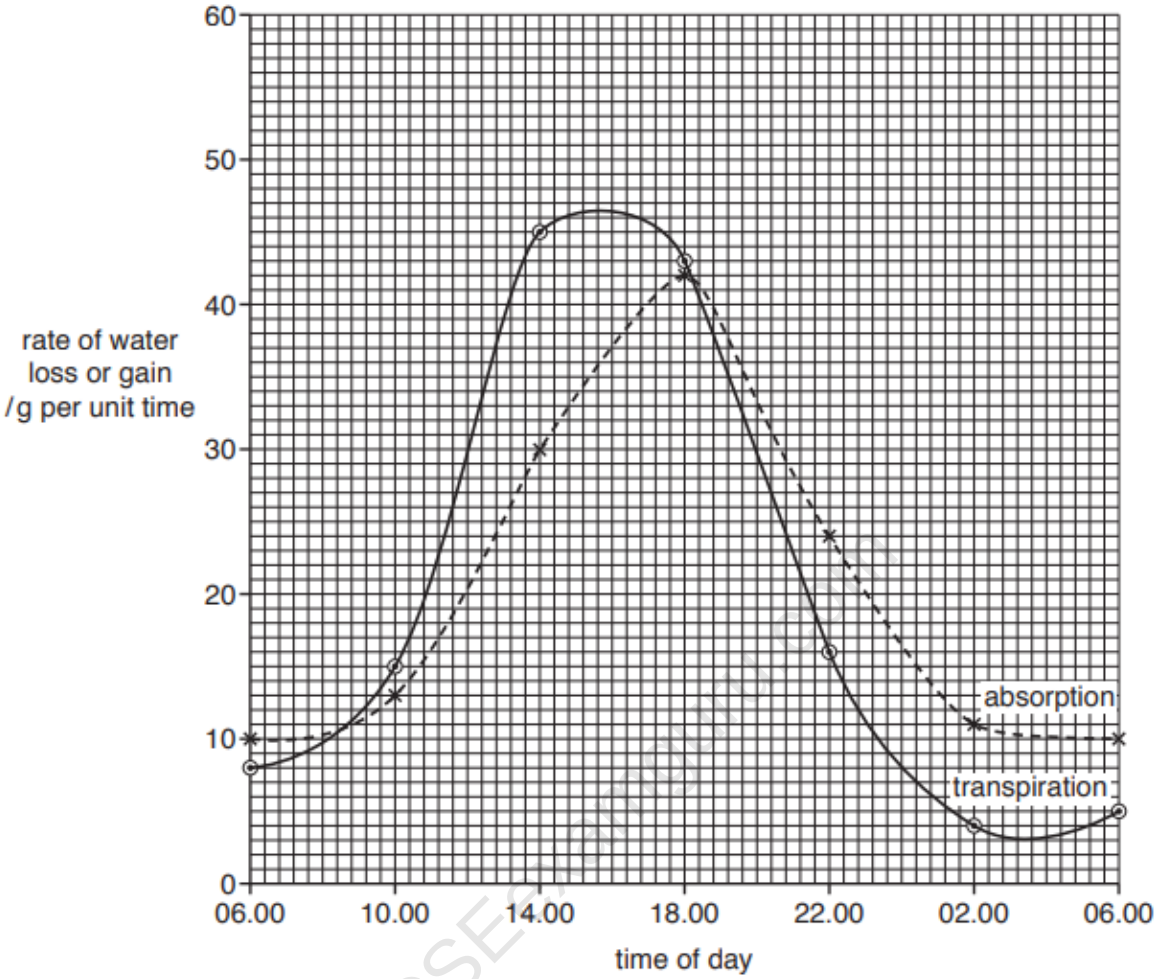


Fig. 2.2

Compare the trends shown in Fig. 2.2 for the absorption and transpiration of water during the 24-hour period.

.....

.....

.....

.....[2]

(d) Fig. 2.3 shows the apparatus used to measure water uptake by a leafy shoot. The leafy shoot is sealed tightly into a glass tube which is connected to a capillary tube containing water.

As the leafy shoot loses water through its leaves it absorbs water from the apparatus. Air is pulled into the open end of the capillary tube as the water moves towards the leafy shoot.

The distance moved by the air in the capillary tube can be measured on the scale and used to calculate the volume of water absorbed by the leafy shoot.

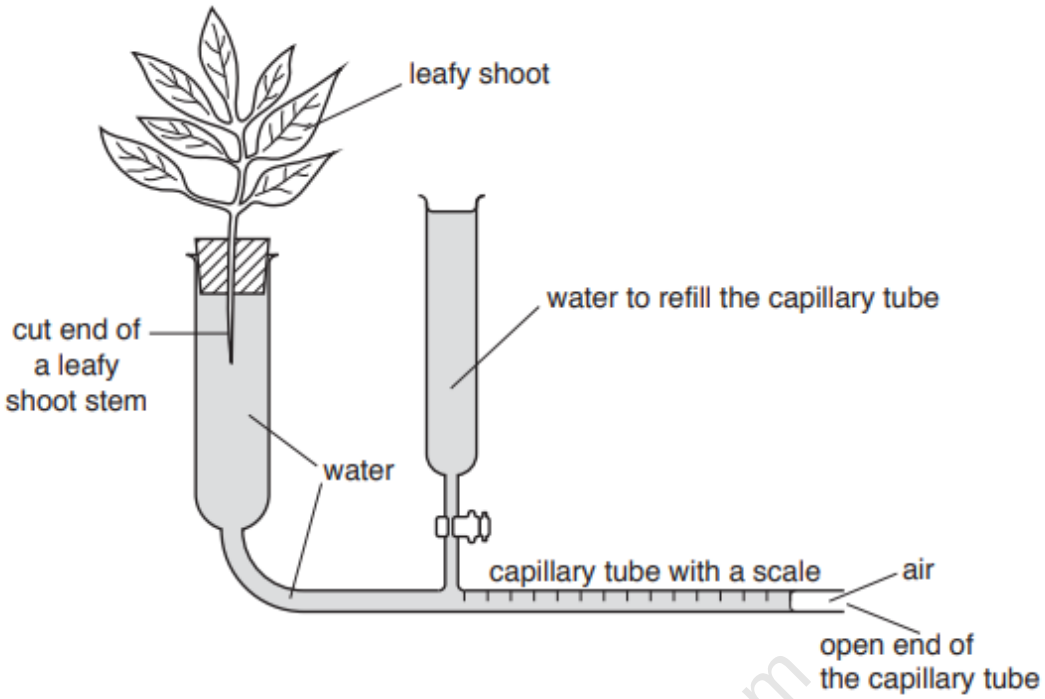


Fig. 2.3

Describe how you would use the apparatus in Fig. 2.3 to investigate the effect of temperature **OR** humidity on the rate of water absorption by a leafy shoot.

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.....

.....

.....[6]

[Total: 17]

2 A student investigated the effect of different concentrations of salt solution on a hollow plant stem.

They were provided with a 2% salt solution and distilled water. The student used these to make up different concentrations of salt solution.

Step 1 Four test-tubes were labelled **1**, **2**, **3** and **4**.

Step 2 The information in Table 1.1 was used to make up the four different salt solutions in the test-tubes.

Table 1.1

test-tube	volume of 2% salt solution / cm^3	volume of distilled water / cm^3	final percentage concentration of salt solution
1	0	20	0.0
2	5	15	
3	10	10	1.0
4	20	0	2.0

(a) (i) Complete Table 1.1 by calculating the final percentage concentration of the salt solution in test-tube **2**.

Space for working.

[1]

Step 3 The contents of each test-tube were poured into four Petri dishes labelled **1**, **2**, **3** and **4**.

Step 4 A hollow stem was cut into 12 rings using a sharp scalpel. Each stem ring was approximately 2 mm long, as shown in Fig. 1.1.

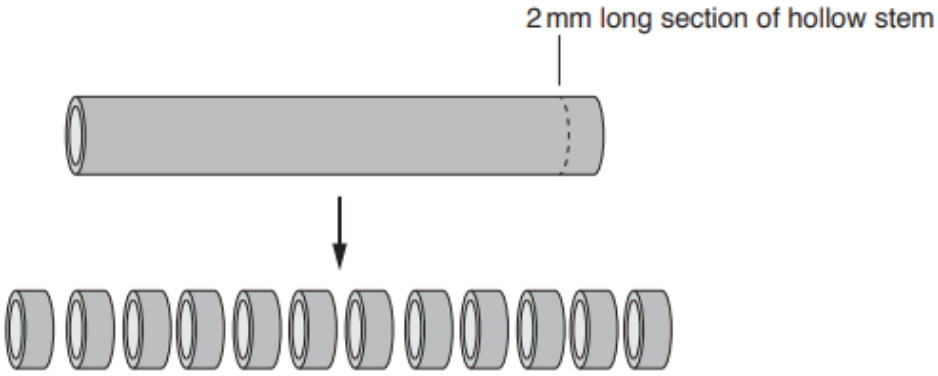


Fig. 1.1

Step 5 Each stem ring was then cut open as shown in Fig. 1.2.

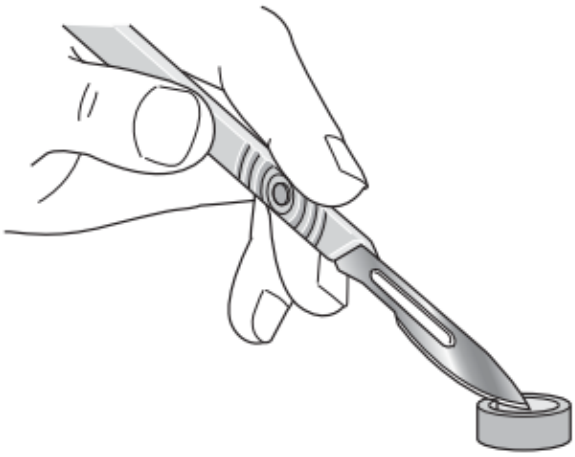


Fig. 1.2

Step 6 Three cut stem rings were put into each of the different salt solutions in the labelled Petri dishes and left for 10 minutes.

Fig. 1.3 shows the appearance of the cut stem rings **after** 10 minutes.

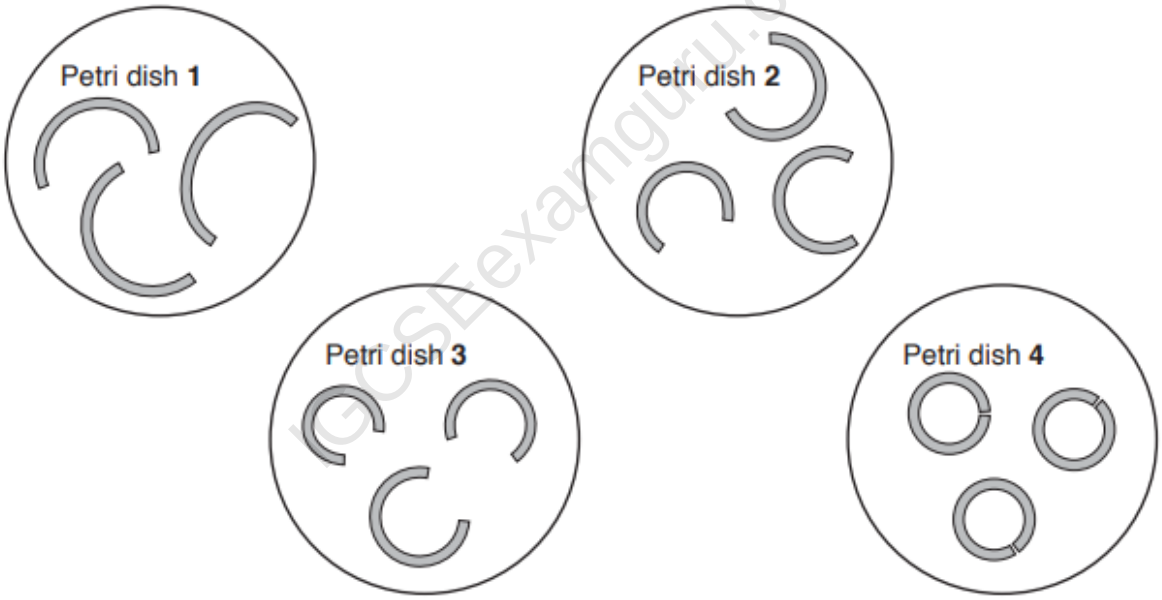


Fig. 1.3

Step 7 The distance between the two cut ends of each stem ring can be measured, as shown in Fig. 1.4.

In the example shown in Fig. 1.4 the distance is 12 mm.

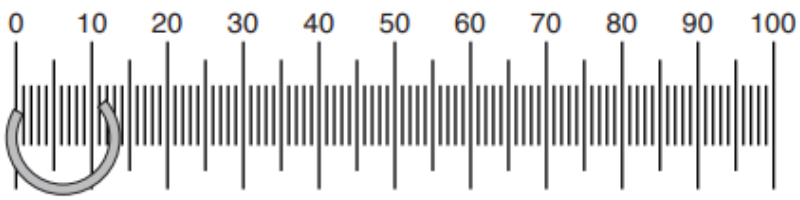


Fig. 1.4

(ii) Measure the gap between the cut ends of all of the stem rings shown in Fig. 1.3.

Prepare a table in the space provided and record your measurements in your table.

Your table should show:

- all of your results
- a calculated average for each solution.

[4]

(iii) Use Table 1.1 and your measurements to describe the results shown in Fig. 1.3.

.....

.....

.....[1]

(b) Identify one hazard in step 4 and describe a suitable safety precaution.

hazard .....

.....

precaution .....

.....

[2]

(c) Explain why more than one ring of the hollow stem was placed into each Petri dish.

.....

.....

.....

.....[2]

(d) **(i)** State the variable that was changed (independent variable) in this investigation.

.....[1]

(ii) Identify **two** variables that were kept constant in this investigation.

1 .....

2 .....

[2]

(e) There are potential errors in steps 4 and 7.

Identify **two** of these errors and suggest an improvement for each.

error 1 .....

.....

improvement 1 .....

.....

.....

error 2 .....

.....

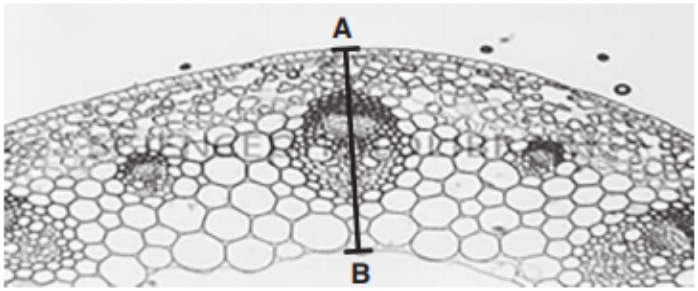
improvement 2 .....

.....

.....

[4]

(f) Fig 1.5 shows a section through a hollow plant stem observed through a light microscope.



magnification ×50

Fig. 1.5

Measure the length of **AB** on Fig. 1.5. Include the unit.

measured length of **AB** on Fig. 1.5 .....

Calculate the actual length of **AB** using the following equation:

$$\text{magnification} = \frac{\text{measured length of } \mathbf{AB}}{\text{actual length of } \mathbf{AB}}$$

Show your working.

.....

[3]

[Total: 20]

Chapter 3: Movement In and Out of Cells

1 A student investigated the effect of solution **E** on cucumber.

A thin slice, approximately 2 mm thick, was cut from a cucumber as shown in Fig. 2.1.

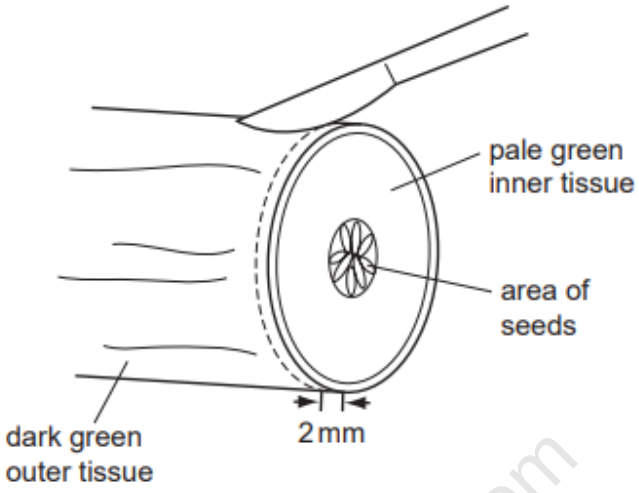


Fig. 2.1

The centre of the slice was removed as shown in Fig. 2.2**A**.
The slice was cut in half as shown in Fig. 2.2**B**.

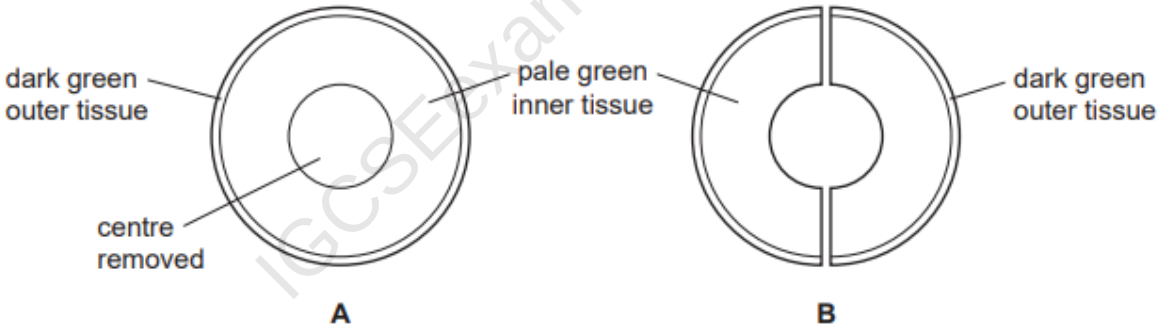
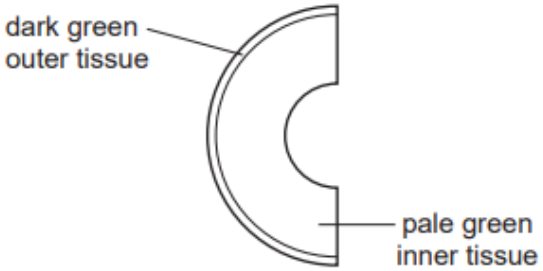
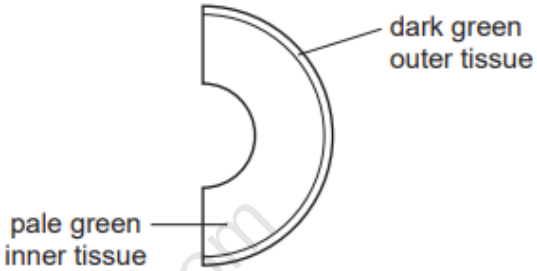
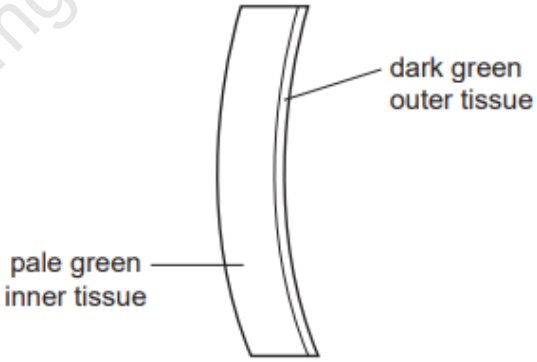


Fig. 2.2

One piece (half slice) of cucumber was placed in solution **E**.
A second piece was placed in water.
After 5 minutes the shape of the pieces in solution **E** and water had changed.
Table 2.1 shows the pieces of cucumber before and after being placed in solution **E** and water.

Table 2.1

the shape of the piece of cucumber **before** being placed in solution **E**	the shape of the piece of cucumber **before** being placed in water
	
the shape of the piece of cucumber after being placed in solution E	**the shape of the piece of cucumber after being placed in water**
	

(a) Describe the effect of solution **E** and water on:

(i) the dark green outer tissue of the pieces of cucumber;

in solution **E** .....

.....

in water .....

..... [2]

(ii) the pale green inner tissue of the pieces of cucumber.

in solution **E** .....

.....

in water .....

..... [2]

(b) Explain the effect of solution **E** on the tissues of the cucumber.

.....

.....

.....

.....

.....

..... [3]

(c) State **one** possible source of error in the method used in this investigation.

Suggest a suitable improvement.

source of error .....

.....

improvement .....

..... [2]

[Total: 9]

2 You are going to investigate the variation in size of bean seeds. The bean seeds have been soaked in water for 48 hours.

Fig. 2.1 shows five soaked bean seeds.

A ..... mm

B ..... mm

C ..... mm

D ..... mm

E ..... mm

Fig. 2.1

(a) (i) Measure, to the nearest mm, the **maximum** lengths of the five seeds labelled **A**, **B**, **C**, **D** and **E** shown in Fig. 2.1.

Write your measurements on Fig. 2.1. [2]

Forty other bean seeds have been measured for you.

This data has been recorded as a tally in Table 2.1.

(ii) Insert the tally mark for each bean seed **A**, **B**, **C**, **D** and **E** in the correct row in Table 2.1. [2]

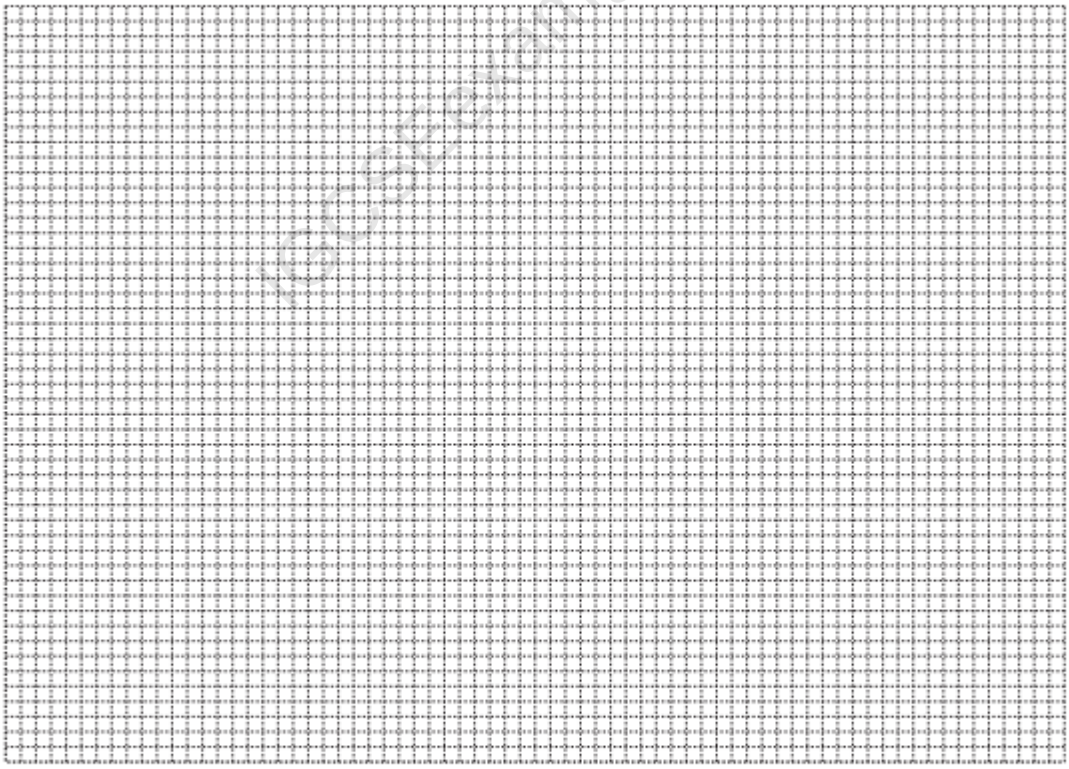
(iii) Count the tally marks in each group of bean seed length.

Write the total number in each group in Table 2.1. [2]

Table 2.1

bean seed length / mm	tally	number in group
24.0 – 25.9	I	
26.0 – 27.9	IIII	
28.0 – 29.9	𝍸 II	
30.0 – 31.9	𝍸 𝍸 𝍸 II	
32.0 – 33.9	𝍸 I	
34.0 – 35.9	𝍸	

(iv) Construct a histogram on Fig. 2.2 of the number in each group of bean seed length.



[4]

Fig. 2.2

(v) Name the type of variation shown by the bean seeds.

..... [1]

(b) Fig. 2.2 shows one bean seed with the testa (seed coat) removed.

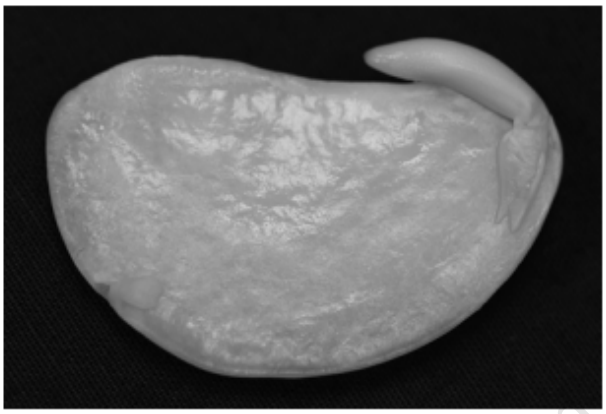


Fig. 2.2

(i) Make a large, labelled drawing of the bean seed.
Include detail of the embryo in your drawing.

[4]

(ii) You are going to calculate the magnification of your drawing.

Measure the maximum length of the bean seed in Fig. 2.2.

maximum length of the bean seed in Fig. 2.2 ..... mm

Measure the maximum length of the bean seed in your drawing.

Draw a line on your drawing, to show where you have measured this length.

maximum length of the bean seed in your drawing ..... mm

Calculate the magnification of your drawing.

Show your working.

magnification × ..... [4]

Bean seeds are included in the human diet. Most types of bean seeds have a high protein content.

(c) Describe a food test you could do to show that bean seeds contain protein.

.....

.....

.....

..... [2]

[Total: 21]

Chapter 4: Biological Molecules

1 Fig. 1.1 shows a bird's egg. Part of the shell has been removed.

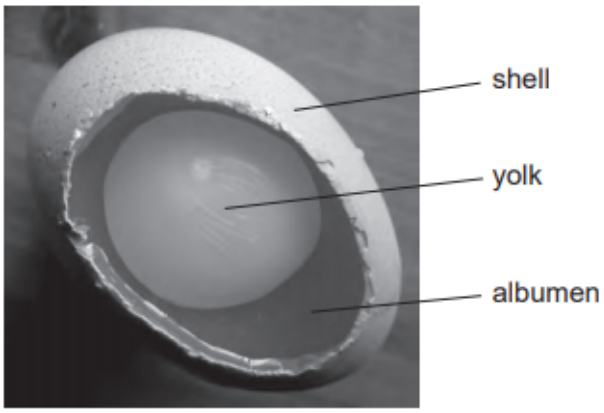


Fig. 1.1

Approximately 90 % of albumen is water. The remaining 10 % is made up of other substances such as reducing sugar.

(a) Describe how you could safely test a sample of albumen for reducing sugar.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) A student tested some albumen for the presence of protein using Biuret reagent. The solution changed colour. It was a positive result.

Describe this colour change.

.....

.....

..... [1]

(c) Fig. 1.2 shows an experiment to investigate the effect of acid on albumen.

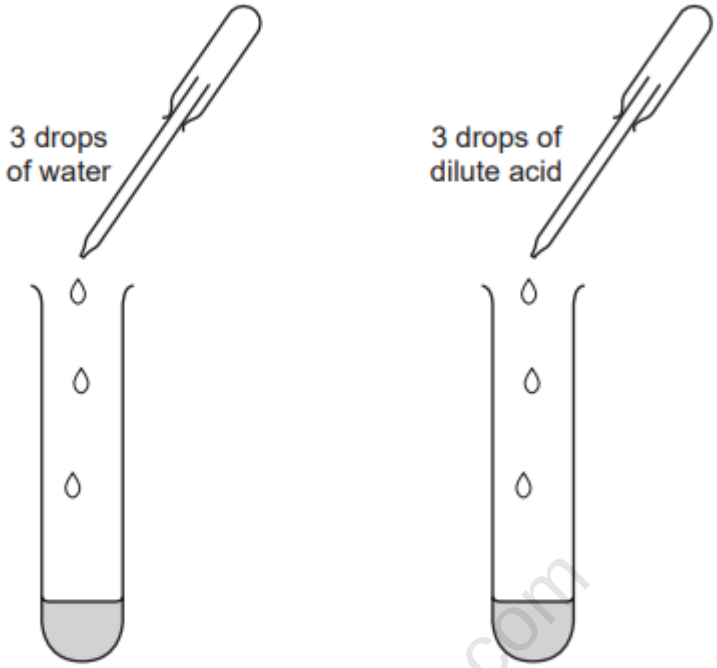


Fig. 1.2

The test-tubes were observed after five minutes.
The results are shown in Table 1.1.

Table 1.1

test-tube	observation
1	stayed as a clear liquid
2	changed from a clear liquid to a white solid

(i) State a conclusion that can be made from these results.

.....

.....

..... [1]

(ii) State why water was added to test-tube **1**.

.....

..... [1]

(d) Fat is present in the yolk.
A student carried out the emulsion test on a sample of yolk and it gave a positive result.
State what the student would observe.

.....

..... [1]

(e) Two students wanted to investigate the effect of concentration of acid on albumen.

For this investigation, suggest a suitable:

variable to change; .....

variable to measure or observe; .....

variable to control. ..... [3]

[Total: 11]

2 **(a)** Fig. 3.1 shows a section of a dicotyledonous root as seen with a microscope.

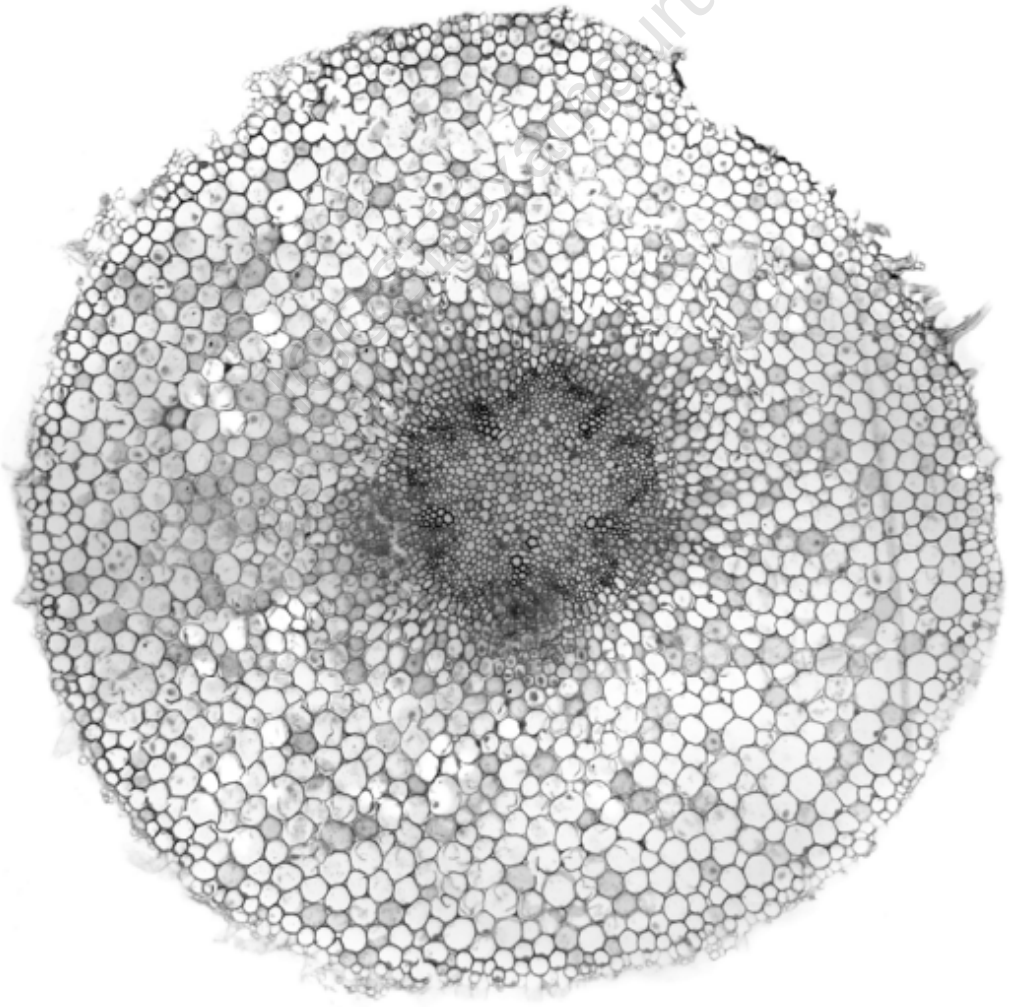


Fig. 3.1

On Fig. 3.1:
draw a line to a root hair cell and label it;
draw a line to a cortex cell and label it. [2]

(b) When stems have just been cut, drops of liquid often appear on the cut surface of the stem.

A dicotyledonous stem was cut and the liquid was collected and tested for:

- water;
- reducing sugar;
- protein;
- fat.

The results are shown in Table 3.1.

Complete Table 3.1 to show the reagents and final colours.

Table 3.1

substance	reagent	results		
		initial colour	final colour	positive or negative (✓or ×)
water	cobalt chloride	blue		✓
reducing sugar		blue		✓
protein		blue		×
fat	ethanol + water	colourless		×

[6]

[Total: 8]

3 Starch is broken down into reducing sugars in the alimentary canal. The digested products are absorbed into the blood.

Some students investigated the action of enzymes on the digestion of starch.

(a) Describe how you would carry out a test for starch.

.....

.....[2]

(b) Describe how you would safely carry out a test for reducing sugars.

.....

.....

.....

.....

.....

.....[3]

The students used a length of tubing that had been securely tied at one end.

- $5\,cm^3$ of starch solution and $5\,cm^3$ of enzyme solution were added to the tubing.
- A knot was used to close the open end of the tubing.
- The outside of the tubing was rinsed with water.
- The tubing was supported as shown in Fig. 1.1.

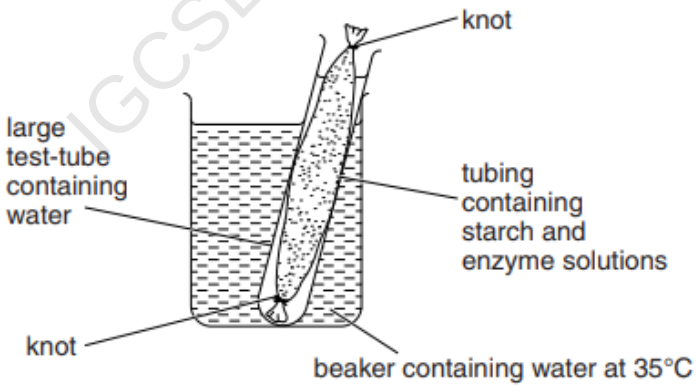


Fig. 1.1

(c) Suggest why the starch and enzyme solutions were kept at 35°C.

.....

.....[1]

- $2\,cm^3$ were removed immediately from the water in the large test-tube. One drop was placed on a white tile to test for starch. The remainder was placed in a test-tube to test for reducing sugar. This was sample 1.
- Four further samples were removed at 10 minute intervals. Each sample was tested for starch and reducing sugar.

(d) **(i)** Complete Table 1.1 by writing in the observations for the five reducing sugar tests.

Table 1.1

sample	time / min	observation	conclusion
1	0		none
2	10		very little
3	20		some present
4	30		more sugars present
5	40		large amount present

[3]

(ii) The observations for the starch tests were all brown.

Explain what can be concluded from these observations.

.....

.....[1]

(e) Suggest **and** explain what happened during the 40 minutes to give the results in **(d)(i)** and **(d)(ii)**.

.....

.....

.....

.....

.....

.....[4]

(f) Explain why each of the following procedures was carried out:

(i) the outside of the tubing was rinsed before it was placed in the large test-tube of water;

.....

.....[1]

(ii) a white tile was used for the starch test.

.....

.....[1]

(g) **(i)** Suggest which region of the alimentary canal is represented by the tubing.
Give a reason for your answer.

.....

.....

.....

.....[2]

(ii) State the name of the enzyme that works in the alimentary canal to break down starch.

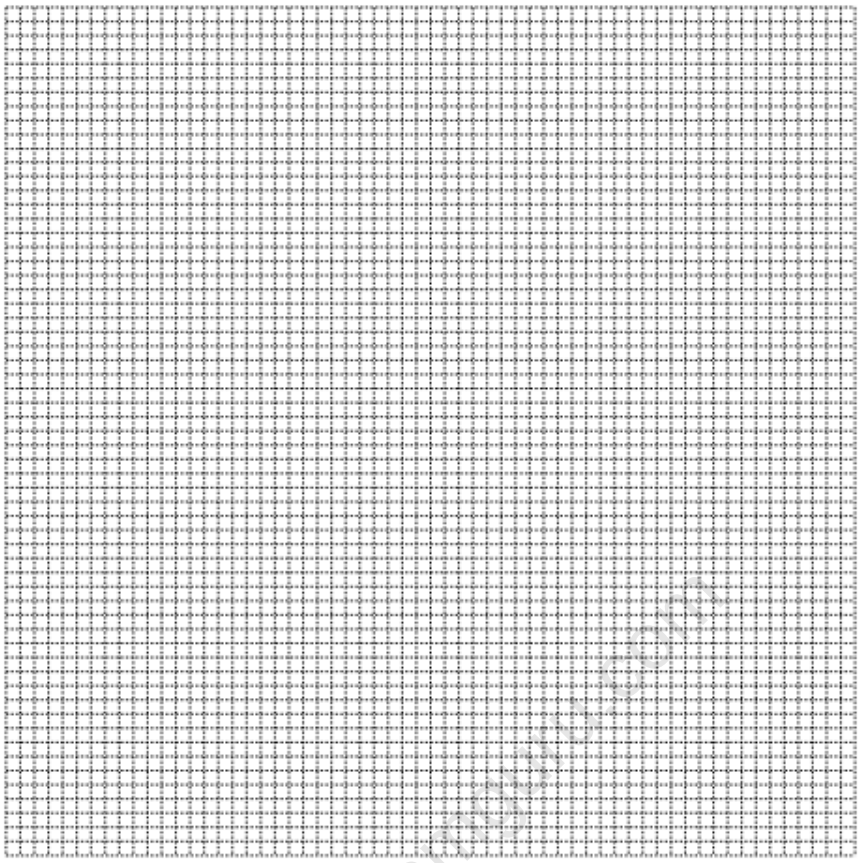
.....[1]

(h) Some students investigated the effect of pH on the activity of this enzyme.
Their results are shown in Table 1.2.

Table 1.2

pH	time for starch to be broken down / min
3.5	9.0
4.0	7.0
5.2	4.0
6.6	1.5
7.0	1.0
8.0	4.5
8.5	10.0

(i) Plot a graph to show the results in Table 1.2.



[4]

(ii) Use the graph to suggest the optimum (best) pH for this enzyme.

.....[1]

(iii) Describe the effect of pH on the activity of this enzyme.

.....

.....

.....

.....

.....

.....[3]

(iv) Suggest a suitable control for this investigation.

.....

.....[1]

[Total: 28]

4 **(a)** The species of plant *Musa acuminata* produces banana fruits.

Fig. 2.1 shows a section cut from a banana.

Fig. 2.1

(i) Make a large drawing of the cut surface of the banana in Fig. 2.1 to show:

- the number of layers;
- the thickness of the layers.

Label the region where seeds may develop.

[4]

(ii) Draw a line across the diameter of the cut slice of banana in Fig. 2.1.

Measure the distance and record your result. Include the unit.

diameter of the banana .....

Draw a line across the diameter of your drawing, measure it and record your result.

diameter of the drawing of the banana.....[3]

(iii) Calculate the magnification of your drawing.

Show your working.

magnification × .....[2]

(b) The student then added iodine solution to the cut surface of the banana.

Fig. 2.2 shows the colour of the iodine in the different regions of the banana.

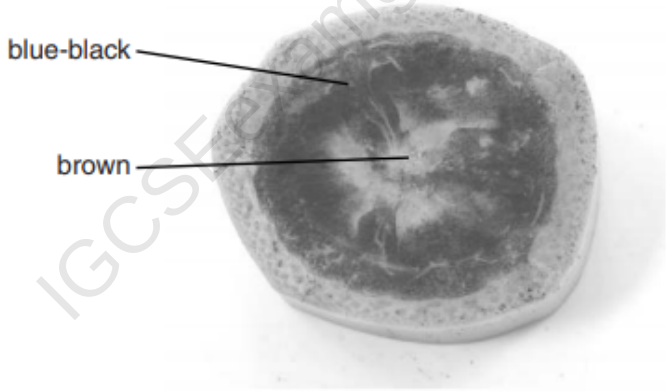


Fig. 2.2

Use the information in Fig. 2.2 to state where starch is stored in the banana.

.....

.....[1]

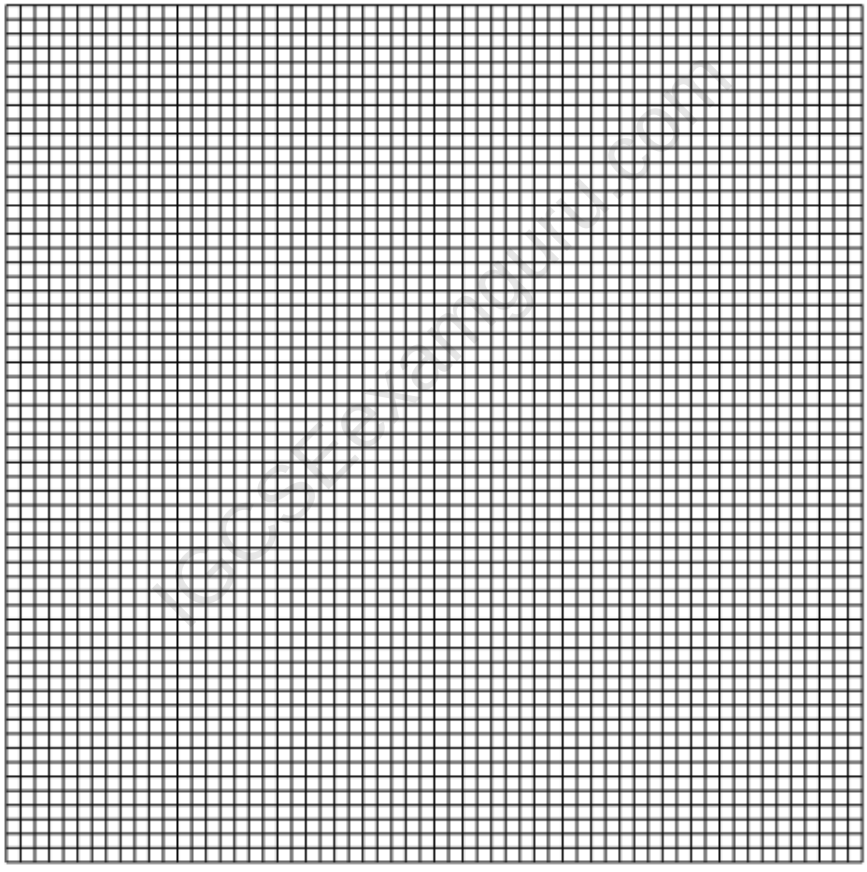
(c) Some students collected food packaging labels to find the nutrients present in bananas.

Table 2.1 is a summary of their findings.

Table 2.1

nutrient	mass/g per 100 g
carbohydrate	22.25
fat	0.25
protein	2.00
fibre	2.50

(i) Plot a bar chart of the data in Table 2.1.



[4]

(ii) The remaining mass of a banana is mostly water, as the mass of vitamins and minerals is very small.

Calculate, to the nearest whole number, the mass of water in 100 g of banana.

Show your working.

.....g [2]

(d) In another investigation, students kept unripe bananas at room temperature for eight days.

They studied some of the changes during ripening.

Each day the students took one banana and:

- observed the colour of the banana skin;
- removed a sample of the flesh tissue and estimated the reducing sugar content.

Table 2.2 shows the students' results.

Table 2.2

time/days	change during ripening	
	skin colour	reducing sugar content/%
1	green	5
2	green and yellow	12
3	mostly yellow	18
4	all yellow	25
5	all yellow	30
6	yellow, some brown	29
7	yellow and brown	30
8	mostly brown	30

(i) Suggest on which day the bananas became ripe. State one reason for your answer.

day .....

reason .....

.....[2]

(ii) The reducing sugar content increased as the bananas ripened.

Calculate how many times greater was the sugar content on day 5 compared with day 1.

Show your working.

.....[2]

(iii) Suggest the source of the reducing sugar.

.....

.....[1]

(iv) Animals eat wild bananas and spread the seeds in their faeces.

Suggest **two** features of ripe bananas that attracts animals.

.....

.....

.....

.....[2]

[Total: 23]