SPECIMEN MATERIAL

GCSE
BIOLOGY

F

Foundation Tier Paper 1F

Specimen 2018 Time allowed: 1 hour 45 minutes

Materials
For this paper you must have:
- a ruler
- a calculator.

Instructions
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- There are 100 marks available on this paper.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions 02.7, 10.4 and 11.2 you need to make sure that your answer:
  - is clear, logical, sensibly structured
  - fully meets the requirements of the question
  - shows that each separate point or step supports the overall answer.

Advice
In all calculations, show clearly how you work out your answer.

Please write clearly, in block capitals.

Centre number ☐☐☐☐☐ Candidate number ☐☐☐☐

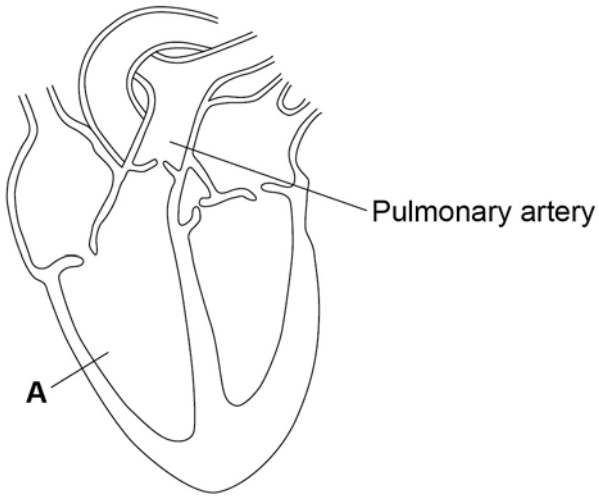
Surname ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Forename(s) ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Candidate signature _____

0 1 **Figure 1** shows a diagram of the human heart.

Figure 1



0 1 . 1 What part of the heart is labelled **A**?

[1 mark]

Tick **one** box.

Aorta ☐

Atrium ☐

Valve ☐

Ventricle ☐

0 1 . 2 Where does the pulmonary artery take blood to?

[1 mark]

Tick **one** box.

- Brain ☐
- Liver ☐
- Lungs ☐
- Stomach ☐

0 1 . 3 Circle a valve on **Figure 1**.

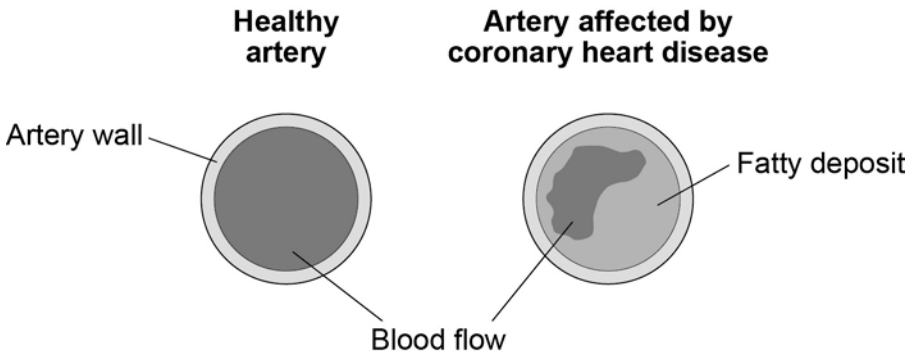
[1 mark]

Question 1 continues on the next page

The coronary arteries supply blood to the heart.

Figure 2 shows two coronary arteries.

Figure 2



0 1 . 4 Describe **two** ways the healthy artery is different from the artery affected by coronary heart disease.

[2 marks]

1 _____

_____

2 _____

_____

0 1 . 5 What can be used to treat people with coronary heart disease?

[2 marks]

Tick **two** boxes.

- Antibiotics ☐
- Hormones ☐
- Statins ☐
- Stent ☐
- Vaccination ☐

0 1 . 6 Suggest **two** risk factors for coronary heart disease.

[2 marks]

1 _____

_____

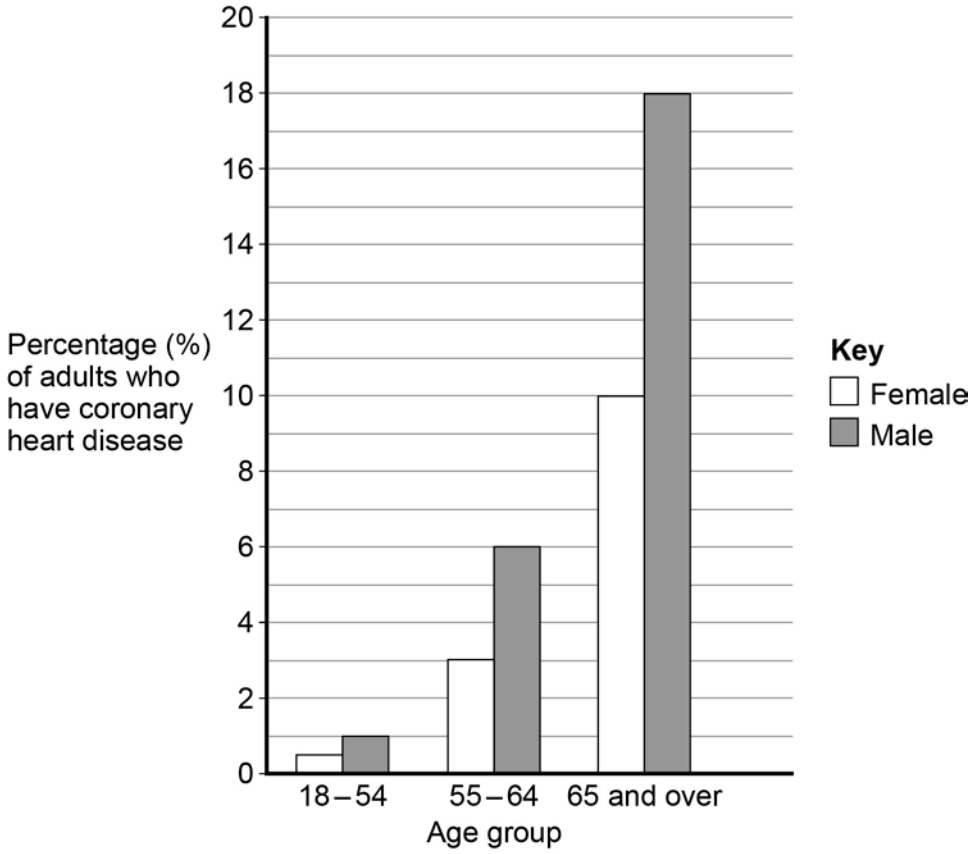
2 _____

_____

Question 1 continues on the next page

Figure 3 shows the percentages of adults in the UK who have coronary heart disease.

Figure 3



0 1 . 7 Calculate the difference in the percentage of male and female adults aged 65 and over who have coronary heart disease.

[1 mark]

_____ %

0 1 . 8 Which is the correct conclusion for the data in **Figure 3**?

[1 mark]

Tick **one** box.

Children do **not** suffer from coronary heart disease ☐

More males suffer from coronary heart disease than females ☐

More younger people suffer from coronary heart disease than older people ☐

Turn over for the next question

0 2 Catalase is an enzyme.

Catalase controls the following reaction:

hydrogen peroxide ⟶ water + oxygen

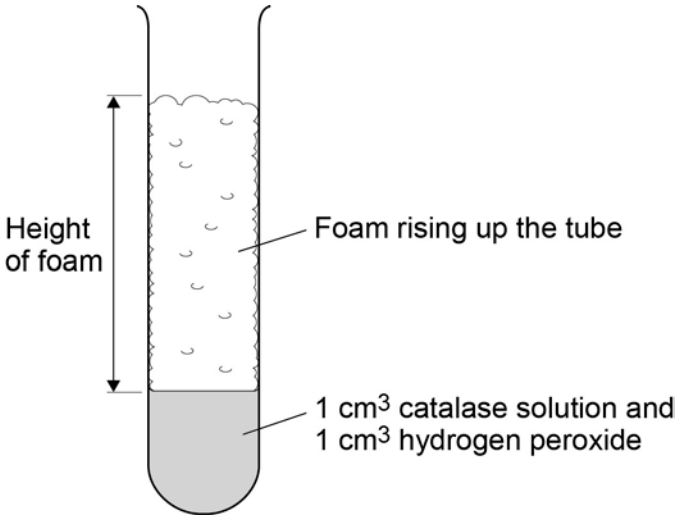
A student did an investigation on catalase activity.

This is the method used.

1. Put 1 cm^3 hydrogen peroxide solution in a test tube.
2. Add 1 cm^3 of catalase solution.
   - Bubbles of oxygen are produced.
   - Bubbles cause foam to rise up the tube.
3. Measure the maximum height of the foam.

Figure 4 shows the experiment.

Figure 4



The experiment is carried out at 20 °C.

Table 1 shows some results from the investigation.

Table 1

Temperature in °C	Maximum height of foam in cm			
	Test 1	Test 2	Test 3	Mean
10	1.3	1.1	0.9	1.1
20	0.0	3.3	3.1	3.2
30	5.2	5.0	5.3	5.2
40	4.2	3.5	4.4	4.0
50	2.1	1.9	2.3	2.1
60	0.0	0.0	0.0	0.0

0 2 . 1 Why did the student carry out the experiment three times at each temperature?

[1 mark]

Tick **one** box.

To make the experiment more accurate ☐

To prove the experiment was correct ☐

To show the experiment was more repeatable ☐

0 2 . 2 The student thought one result was an anomaly.

Circle the anomaly in **Table 1**.

[1 mark]

0 2 . 3 What did the student do with the anomalous result?

[1 mark]

Question 2 continues on the next page

0 2 . 4 Look at **Table 1** on **page 9**.

What conclusion can be made as the temperature increases?

[1 mark]

Tick **one** box.

- Decreases the rate of reaction up to 30 °C ☐
- Decreases the rate of reaction up to 40 °C ☐
- Increases the rate of reaction up to 30 °C ☐
- Increases the rate of reaction up to 40 °C ☐

0 2 . 5 At which temperature was catalase denatured?

[1 mark]

Tick **one** box.

- 10 °C ☐
- 30 °C ☐
- 40 °C ☐
- 60 °C ☐

0 2 . 6 The student thought the optimum temperature for catalase activity was between 30 °C and 40 °C.

How could the investigation be improved to find a more precise value for the optimum temperature?

Tick **one** box.

[1 mark]

- Do the experiment at 70 °C and 80 °C ☐
- Do the experiment at 30 °C, 35 °C and 40 °C ☐
- Use less hydrogen peroxide solution ☐
- Use more catalase solution ☐

0 2 . 7 Amylase is the enzyme that controls the breakdown of starch to glucose.

Describe how the student could investigate the effect of pH on the breakdown of starch by amylase.

[4 marks]

Turn over for the next question

0 3 **Figure 5** shows a human cheek cell viewed under a light microscope.

Figure 5

Image of a human cheek cell viewed under a light microscope not reproduced here due to third party copyright restrictions.

0 3 . 1 Label the nucleus **and** cell membrane on **Figure 5**.

[2 marks]

0 3 . 2 Cheek cells are a type of body cell.

Body cells grow through cell division.

What is the name of this type of cell division?

[1 mark]

Tick **one** box.

- Differentiation ☐
- Mitosis ☐
- Specialisation ☐

0 3 . 3 Ribosomes and mitochondria are **not** shown in **Figure 5**.

What type of microscope is needed to see ribosomes and mitochondria?

[1 mark]

0 3 . 4 What is the advantage of using the type of microscope you named in part **03.3**?

[1 mark]

Tick **one** box.

Cheaper ☐

Higher magnification ☐

Lower resolution ☐

0 3 . 5 The cheek cell in **Figure 6** is magnified 250 times.

The width of the cell is shown by the line **D** to **E**.

Figure 6

Image of a cheek cell not reproduced here due to third party copyright restrictions.

Calculate the width of the cheek cell in micrometres (µm).

Complete the following steps.

[3 marks]

Measure the width of the cell using a ruler _____ mm

Use the equation to work out the real width of the cell in mm:

$$\text{real size} = \frac{\text{image size}}{\text{magnification}}$$

_____ mm

Convert mm to µm _____ µm

Question 3 continues on the next page

0 3 . 6 A red blood cell is 8 µm in diameter.

A bacterial cell is 40 times smaller.

Calculate the diameter of the bacterial cell.

[1 mark]

Tick **one** box.

0.02 µm ☐

0.2 µm ☐

2.0 µm ☐

20.0 µm ☐

0 4 Microorganisms can cause disease.

0 4 . 1 Draw **one** line from each disease to the correct description.

[3 marks]

Disease	Description
	Can be spread by not washing hands thoroughly.
HIV	Can increase the chance of infections such as pneumonia.
	Part of the life cycle includes an insect.
Malaria	
	Spread by coughs and sneezes.
Salmonella	Treated with stem cells.
	Treated with fungicides.

Question 4 continues on the next page

0 4 . 2 Gonorrhoea is a sexually transmitted disease.

A bacterium causes gonorrhoea.

What are the symptoms of gonorrhoea?

[2 marks]

Tick **two** boxes.

- Headache ☐
- Pain when urinating ☐
- Rash ☐
- Vomiting ☐
- Yellow discharge ☐

Table 2 shows the number of people in the UK diagnosed with gonorrhoea in different years.

Table 2

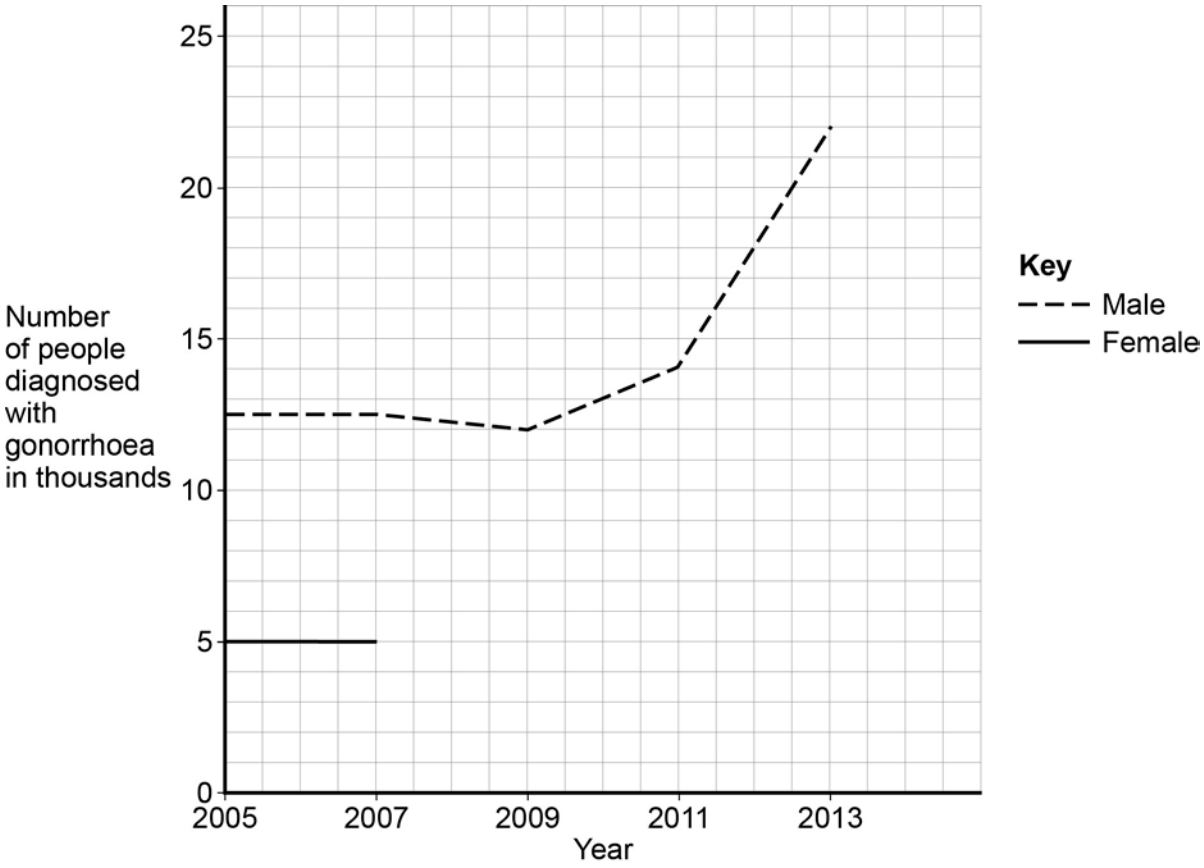
	Number of people diagnosed with gonorrhoea in thousands	
Year	**Female**	**Male**
2005	5.0	12.5
2007	5.0	12.5
2009	5.5	12.0
2011	6.0	14.0
2013	7.5	22.0

0 4 . 3 Use the data in **Table 2** to complete **Figure 7**.

- The numbers for males have already been plotted.
- Only some of the numbers for females have been plotted.

[3 marks]

Figure 7



0 4 . 4 Describe the patterns in the numbers of males and females with gonorrhoea from 2005 to 2013.

Use the data in **Figure 7**.

[3 marks]

Question 4 continues on the next page

0 4 . 5 Gonorrhoea is treated with an antibiotic.

HIV is another sexually transmitted disease.

Explain why prescribing an antibiotic will **not** cure HIV.

[2 marks]

0 5 Anaerobic respiration happens in muscle cells and yeast cells.

The equation describes anaerobic respiration in muscle cells.

glucose ⟶ lactic acid

0 5 . 1 How can you tell from the equation that this process is anaerobic?

[1 mark]

0 5 . 2 Exercise **cannot** be sustained when anaerobic respiration takes place in muscle cells.

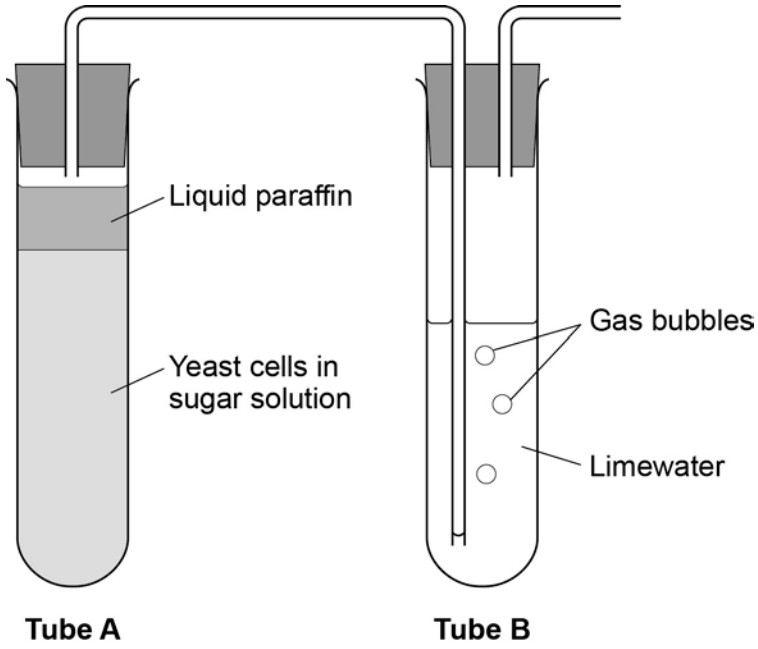
Explain why.

[2 marks]

Question 5 continues on the next page

Figure 8 shows an experiment to investigate **anaerobic** respiration in yeast cells.

Figure 8



0 5 . 3 What gas will bubble into Tube **B**?

[1 mark]

Tick **one** box.

- Carbon dioxide ☐
- Nitrogen ☐
- Oxygen ☐
- Water vapour ☐

0 5 . 4 Describe how you could use tube **B** to measure the rate of the reaction in tube **A**.

[2 marks]

0 5 . 5 Anaerobic respiration in yeast is also called fermentation.

Fermentation produces ethanol.

Give **one** use of fermentation in the food industry.

[1 mark]

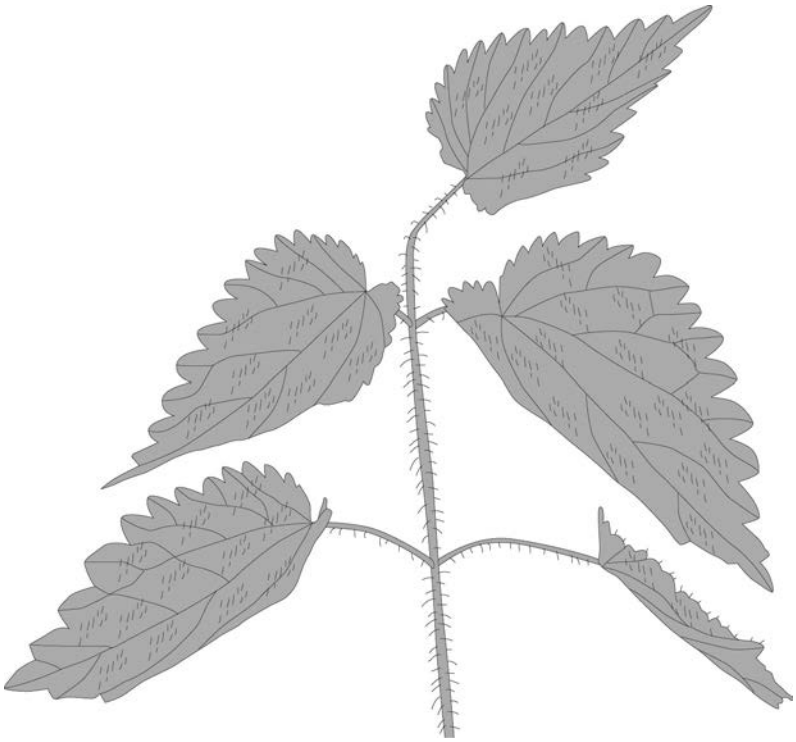
Turn over for the next question

There are no questions printed on this page

0 6 Plants have adaptations to help defend themselves and to help them survive.

Figure 9 shows a nettle plant.

Figure 9



0 6 . 1 Explain how the nettle is adapted for defence and protection.

[3 marks]

Question 6 continues on the next page

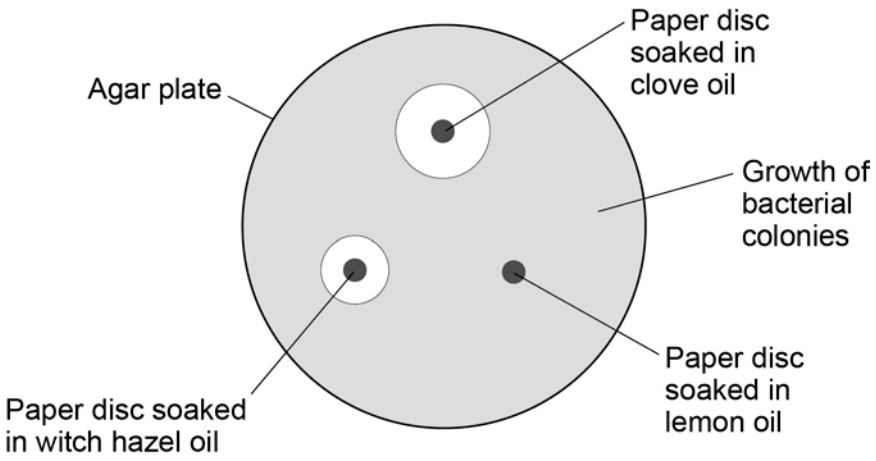
Witch hazel is another plant adapted for defence.

Witch hazel produces oil with antiseptic properties. The oil prevents bacteria from attacking the plant.

A student investigated how effective three different plant oils were at preventing the growth of bacteria.

Figure 10 shows the results.

Figure 10



0 6 . 2 Which plant oil is the most effective at preventing the growth of bacteria?

Give a reason for your answer.

[2 marks]

Oil _____

Reason _____

_____

0 6 . 3 The student tested tea tree oil using the same method.

The results showed tea tree oil was the most effective at preventing bacterial growth.

The student concluded that tea tree oil could be used to treat bacterial infections instead of antibiotics.

Give **one** reason why this is **not** a valid conclusion.

[1 mark]

Turn over for the next question

0 7 After a meal rich in carbohydrates, the concentration of glucose in the small intestine changes.

Table 3 shows the concentration of glucose at different distances along the small intestine.

Table 3

Distance along the small intestine in cm	Concentration of glucose in mol dm^{-3}
100	50
300	500
500	250
700	0

0 7 . 1 At what distance along the small intestine is the glucose concentration highest?

[1 mark]

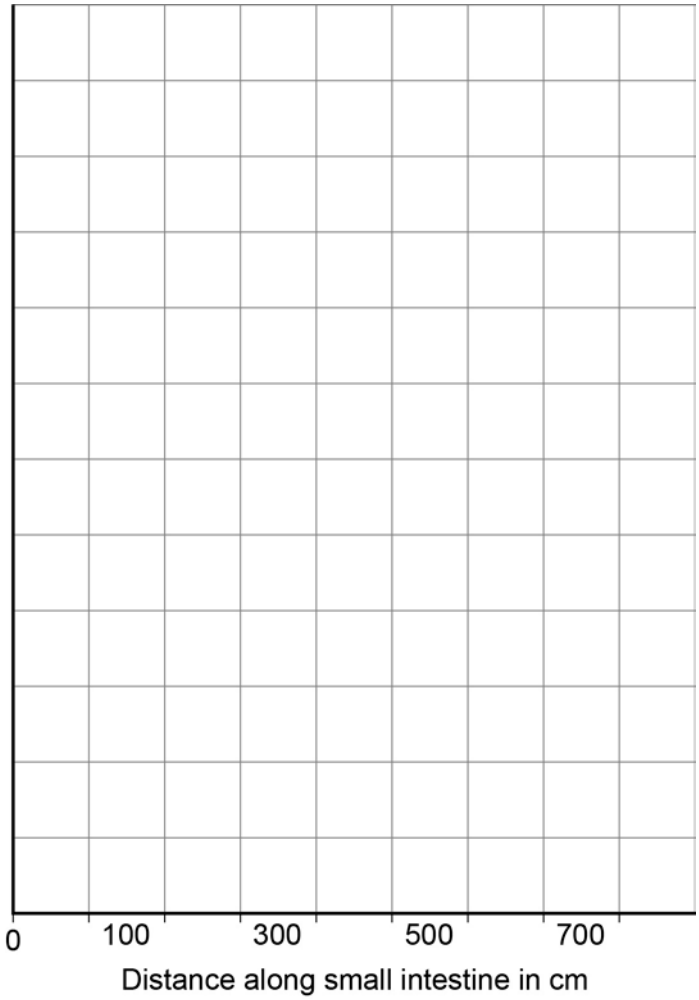
_____ cm

0 7 . 2 Use the data in **Table 3** to plot a bar chart on **Figure 11**.

- Label the *y*-axis.
- Choose a suitable scale.

[4 marks]

Figure 11



Question 7 continues on the next page

Look at **Figure 11** on **page 27**.

0 7 . 3 Describe how the concentration of glucose changes as distance increases along the small intestine.

[2 marks]

0 7 . 4 Explain why the concentration of glucose in the small intestine changes between 100 cm and 300 cm.

[2 marks]

0 7 . 5 Explain why the concentration of glucose in the small intestine changes between 300 cm and 700 cm.

[3 marks]

Turn over for the next question

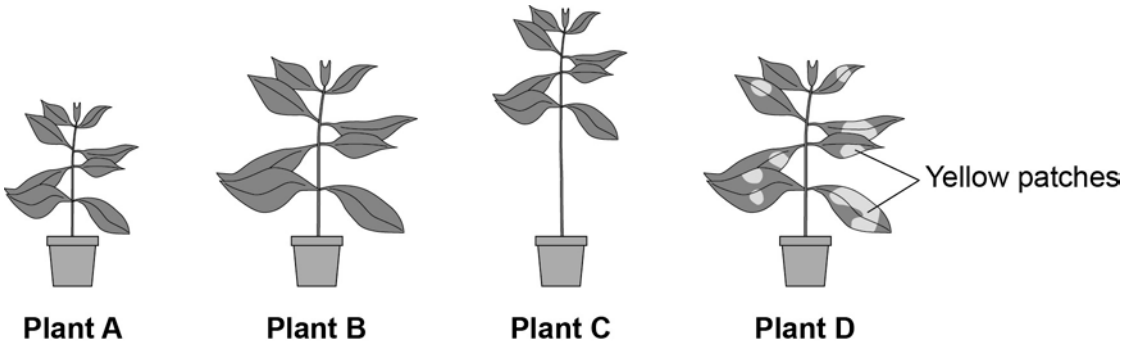
0 8 To be healthy, plants need the right amount of mineral ions from the soil.

Figure 12 shows four plants.

The plants were grown in four different growing conditions:

- sunny area, with nitrate and magnesium added to the soil
- sunny area, with magnesium but **no** nitrate added to the soil
- sunny area, with nitrate but **no** magnesium added to the soil
- dark area, with nitrate and magnesium added to the soil.

Figure 12



0 8 . 1 Which plant was grown with no **nitrate**?

[1 mark]

Tick **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 8 . 2 Which plant was grown with no **magnesium**?

[1 mark]

Tick **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 8 . 3 Give **one** variable that was kept constant in this experiment.

[1 mark]

0 8 . 4 Plants need other minerals for healthy growth such as potassium ions and phosphate ions.

A farmer wanted to compare the percentage of minerals in two types of manure.

- Cow manure from her own farm.
- Chicken manure pellets she could buy.

Table 4 shows data for each type of manure.

Table 4

	Phosphate ions in %	**Potassium ions in %**
Cow manure	0.4	0.5
Chicken manure pellets	2.5	2.3

Suggest **one** advantage and **one** disadvantage of using the chicken manure pellets compared to the cow manure.

[2 marks]

Advantage

Disadvantage

Turn over for the next question

There are no questions printed on this page

0 9 Plants transport water and mineral ions from the roots to the leaves.

0 9 . 1 Plants move mineral ions:

- from a low concentration in the soil
- to a high concentration in the root cells.

What process do plants use to move these minerals ions into root cells?

[1 mark]

Tick **one** box.

Active transport	☐
Diffusion	☐
Evaporation	☐
Osmosis	☐

0 9 . 2 Describe how water moves from roots to the leaves.

[2 marks]

Question 9 continues on the next page

Plants lose water through the stomata in the leaves.

The epidermis can be peeled from a leaf.

The stomata can be seen using a light microscope.

Table 5 shows the data a student collected from five areas on one leaf.

Table 5

Leaf area	Number of stomata	
	Upper surface	Lower surface
1	3	44
2	0	41
3	1	40
4	5	42
5	1	39
Mean	**2**	**X**

0 9 . 3 Describe how the student might have collected the data in **Table 5**.

[3 marks]

0 9 . 4 What is the median number of stomata on the upper surface of the leaf?

[1 mark]

0 9 . 5 Calculate the value of **X** in **Table 5**.

Give your answer to 2 significant figures.

[2 marks]

Mean number of stomata on lower surface of leaf = _____

0 9 . 6 The plant used in this investigation has very few stomata on the upper surface of the leaf.

Explain why this is an **advantage** to the plant.

[2 marks]

Turn over for the next question

1 0 Tobacco mosaic virus (TMV) is a disease affecting plants.

Figure 13 shows a leaf infected with TMV.

Figure 13

Image of a leaf infected with TMV not reproduced here due to third party copyright restrictions.

1 0 . 1 All tools should be washed in disinfectant after using them on plants infected with TMV.

Suggest why.

[1 mark]

1 0 . 2 Scientists produced a single plant that contained a TMV-resistant gene.

Suggest how scientists can use this plant to produce **many** plants with the TMV-resistant gene.

[1 mark]

1 0 . 3 Some plants produce fruits which contain glucose.

Describe how you would test for the presence of glucose in fruit.

[2 marks]

1 0 . 4 TMV can cause plants to produce less chlorophyll.

This causes leaf discoloration.

Explain why plants with TMV have stunted growth.

[4 marks]

Turn over for the next question

1 1 Microorganisms cause infections.

The human body has many ways of defending itself against microorganisms.

1 1 . 1 Describe **two** ways the body prevents the entry of microorganisms.

[2 marks]

1 _____

_____

2 _____

_____

1 1 . 2 In 2014 the Ebola virus killed almost 8000 people in Africa.

Drug companies have developed a new drug to treat Ebola.

Explain what testing must be done before this new drug can be used to treat people.

[6 marks]

END OF QUESTIONS

There are no questions printed on this page