AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE
COMBINED SCIENCE: TRILOGY

F

Foundation Tier
Biology Paper 1F

Tuesday 16 May 2023 Morning Time allowed: 1 hour 15 minutes

Materials

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

Instructions
- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

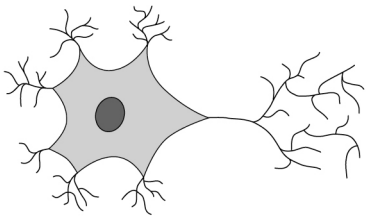
Information
- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Do not write outside the box

0 1 The human body is made of different types of cell.

0 1 . 1 Draw **one** line from each type of cell to the organ system where the cell is found.

[3 marks]

Type of cell	**Organ system**
 Brain cell	Circulatory system
 Red blood cell	Nervous system
	Reproductive system
 Sperm cell	Respiratory system

Do not write outside the box

0 1 . 2 Explain **one** way a sperm cell is adapted for its function.

[2 marks]

Question 1 continues on the next page

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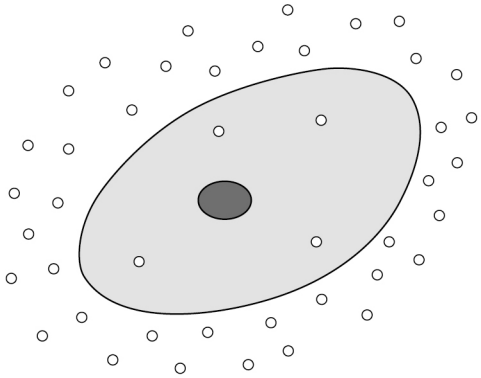
Figure 1 shows a cell.

Oxygen molecules are shown inside and outside the cell.

Figure 1



Key

○ Oxygen molecule

0 1 . 3 Give **one** way you can tell that the cell in **Figure 1** is **not** a plant cell.

[1 mark]

0 1 . 4 Which part of a cell controls the movement of substances into and out of the cell?

[1 mark]

Tick (✓) **one** box.

Cell membrane ☐

Cytoplasm ☐

Nucleus ☐

Do not write outside the box

0 1 . 5 What is the name of the process that moves oxygen molecules into the cell in **Figure 1**?

Give the reason for your answer.

[2 marks]

Tick (✓) **one** box.

Active transport ☐

Diffusion ☐

Osmosis ☐

Reason _____

_____

0 1 . 6 Name **two** substances that move **into** most cells in the body from the blood.

Do **not** refer to oxygen in your answer.

[2 marks]

1 _____

2 _____

11

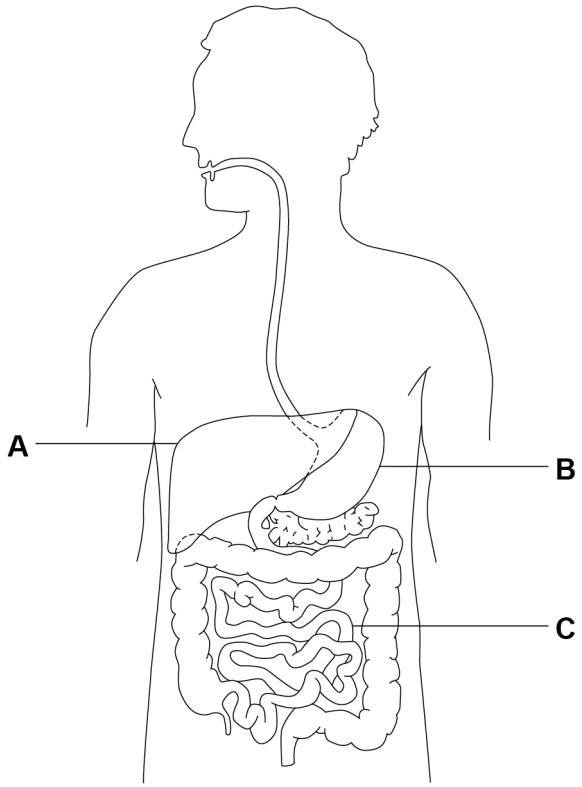
Turn over for the next question

Do not write outside the box

0 2 Enzymes break down food in the digestive system.

Figure 2 shows the human digestive system.

Figure 2



The enzyme amylase digests starch.

0 2 . 1 Which part of the digestive system produces amylase?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐

Do not write outside the box

0 2 . 2 What molecules are produced when starch is digested?

[1 mark]

Tick (✓) **one** box.

Amino acids ☐

Fatty acids ☐

Sugars ☐

0 2 . 3 Where is digested food absorbed into the blood?

[1 mark]

Tick (✓) **one** box.

Liver ☐

Pancreas ☐

Small intestine ☐

Question 2 continues on page 9

Do not write outside the box

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ANSWER IN THE SPACES PROVIDED

Do not write outside the box

A student investigated the effect of pH on the digestion of starch by amylase.

This is the method used.

1. Put 1 drop of iodine solution into each well of a spotting tile.
2. Prepare amylase solution at pH 5
3. Mix the amylase solution with starch solution in a test tube.
4. Every 30 seconds remove a drop of the amylase–starch mixture.
   Add each drop to iodine solution in a different well of the spotting tile.
5. Record the colour of the iodine solution after the amylase–starch mixture has been added.
6. Repeat steps 2 to 5 using amylase solutions at different pH values.

0 2 . 4 What is the independent variable in this investigation?

[1 mark]

Tick (✓) **one** box.

pH of the amylase solution ☐

Time when the samples were taken ☐

Volume of iodine solution ☐

Question 2 continues on the next page

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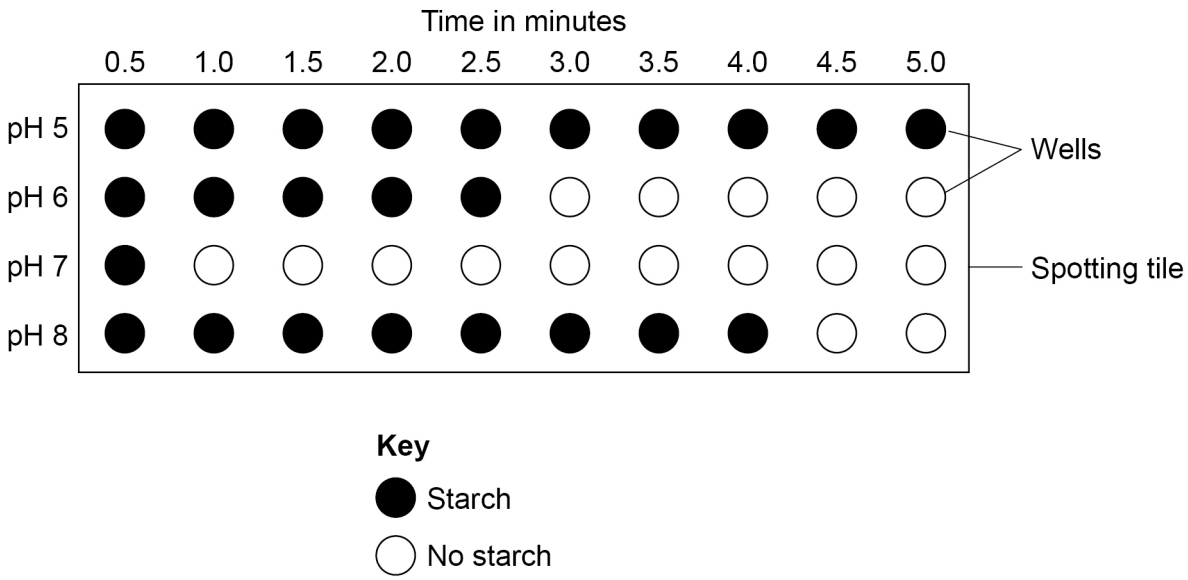
Figure 3 shows the results on the spotting tile.

Figure 3



0 2 . 5 What colours do the symbols in the key represent?

Choose answers from the box.

[2 marks]

black	**green**	**lilac**	**orange**	**white**

● _____

○ _____

Do not write outside the box

0 2 . 6 Look at the results for pH 6 in **Figure 3**.

How many minutes did it take for all the starch to be digested at pH 6?

[1 mark]

_____ minutes

0 2 . 7 What was the optimum pH for the amylase to work?

Use **Figure 3**.

[1 mark]

Tick (✓) **one** box.

pH 5 ☐ pH 6 ☐ pH 7 ☐ pH 8 ☐

8

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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0 3 Plants need water for photosynthesis.

0 3 . 1 Where do plants obtain water for photosynthesis from?

[1 mark]

Plants lose water from their leaves through small pores called stomata.

0 3 . 2 What is the evaporation of water from leaves called?

[1 mark]

Tick (✓) **one** box.

Active transport ☐

Respiration ☐

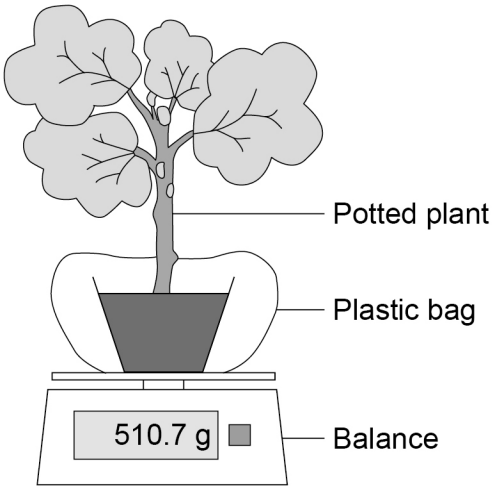
Transpiration ☐

Question 3 continues on the next page

A student investigated the mass of water lost from a plant.

Figure 4 shows the apparatus.

Figure 4



This is the method used.

1. Seal a plastic bag around the pot of a potted plant.

2. Place the plant on a balance in a room at 20 °C.

3. Record the mass.

4. Record the mass every hour for 5 hours.

5. Calculate the total mass of water lost from the plant after each hour.

Do not write outside the box

Table 1 shows the results.

Table 1

Time in hours	Mass in grams	Total mass of water lost in grams
0	510.7	0.0
1	508.9	1.8
2	507.1	3.6
3	505.3	5.4
4	503.5	7.2
5	**X**	9.0

0 3 . 3 Calculate mass **X** in **Table 1**.

[2 marks]

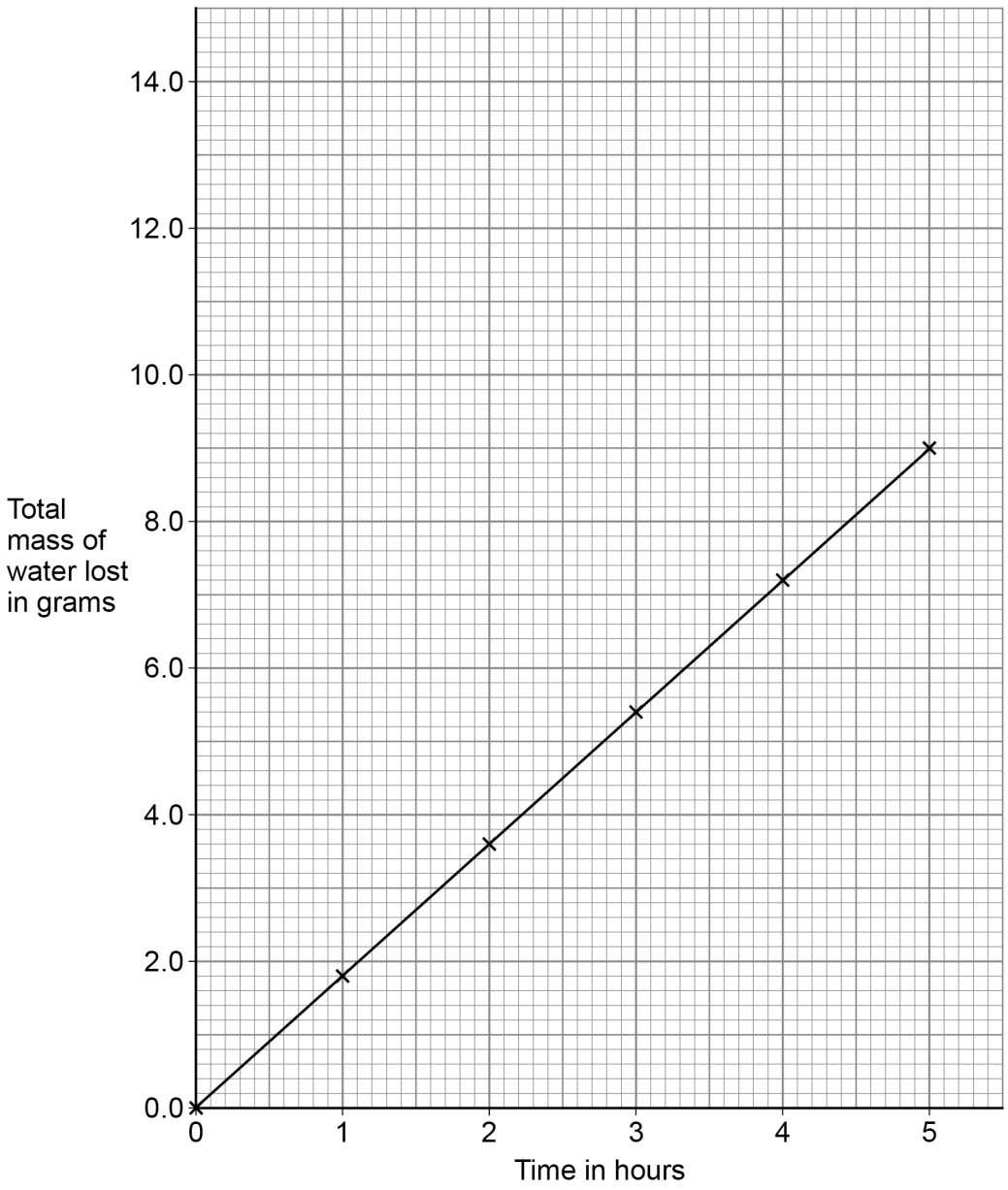
Mass **X** = _____ grams

Question 3 continues on the next page

Do not write outside the box

Figure 5 shows the results.

Figure 5



Do not write outside the box

0 3 . 4 What was the rate of water loss from the plant?

[1 mark]

Tick (✓) **one** box.

0.9 grams/hour ☐

1.8 grams/hour ☐

9.0 grams/hour ☐

0 3 . 5 The investigation was repeated at a **lower** temperature.

Draw **one** line on **Figure 5** to show how the results would be different at a **lower** temperature.

[2 marks]

0 3 . 6 Suggest **one** change to the investigation that would **increase** the rate of water loss from the plant.

Do **not** refer to temperature in your answer.

[1 mark]

_____

_____

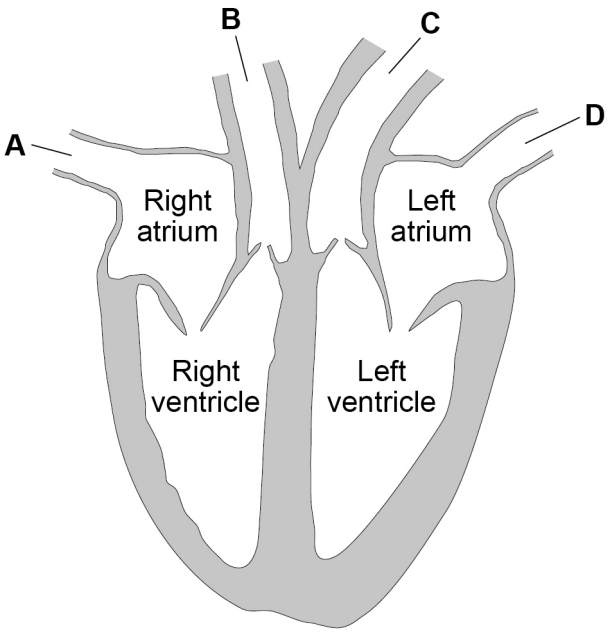
8

Turn over for the next question

Do not write outside the box

0 4 **Figure 6** shows a human heart.

Figure 6



0 4 . 1 The vena cava carries blood into the heart from the body.

Which blood vessel in **Figure 6** is the vena cava?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

Do not write outside the box

0 4 . 2 Which chamber of the heart pumps blood to the body?

[1 mark]

Tick (✓) **one** box.

- Left atrium ☐
- Left ventricle ☐
- Right atrium ☐
- Right ventricle ☐

0 4 . 3 What is the name of the blood vessel that carries blood to the heart muscle?

[1 mark]

Tick (✓) **one** box.

- Aorta ☐
- Coronary artery ☐
- Pulmonary artery ☐

Question 4 continues on the next page

Do not write outside the box

The heart and some blood vessels contain valves.

0 4 . 4 Which type of blood vessel has valves?

[1 mark]

Tick (✓) **one** box.

Artery ☐

Capillary ☐

Vein ☐

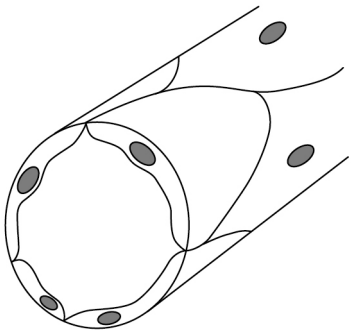
0 4 . 5 What is the function of valves?

[1 mark]

Do not write outside the box

Figure 7 shows a blood capillary.

Figure 7



0 4 . 6 Explain **one** way the capillary is adapted for its function.

[2 marks]

Question 4 continues on the next page

Do not write outside the box

Table 2 shows information about the blood of four people.

Table 2

Person	Concentration of blood component in number/mm^3		
	Red blood cells	**White blood cells**	**Platelets**
W	5 000 000	15 000	200 000
X	4 700 000	5 500	20 000
Y	8 000 000	7 200	250 000
Z	4 900 000	6 400	225 000

0 4 . 7 Person **W** has 5 000 000 red blood cells in 1 mm^3 of blood.

What is 5 000 000 written in standard form?

[1 mark]

Tick (✓) **one** box.

5 × 1 000 000 ☐

5 × 10^6 ☐

5 × 10^7 ☐

50 × 10^5 ☐

Do not write outside the box

0 4 . 8 Draw **one** line from each description to the person in **Table 2** it describes.

[2 marks]

Description	Person in Table 2
	Person **W**
Person most likely to have an infection	Person **X**
Person whose blood will **not** clot properly	Person **Y**
	Person **Z**

Question 4 continues on the next page

Do not write outside the box

0 4 . 9 The greater the height above sea level, the less oxygen there is in the air.

People who live high above sea level have more red blood cells than people who live at sea level.

Some athletes train in mountains high above sea level.

Explain why having more red blood cells will improve an athlete's performance.

[3 marks]

13

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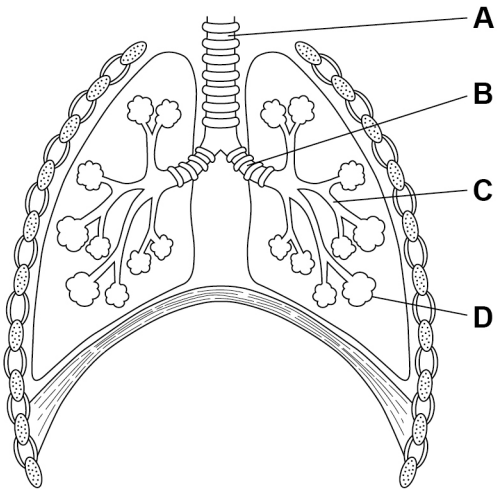
0 5 **Figure 8** shows the human breathing system.

Figure 8



0 5 . 1 Name parts **A** and **B**.

Choose answers from the box.

[2 marks]

alveolus	**bronchus**	**capillary**	**trachea**

A _____

B _____

0 5 . 2 Where does gas exchange happen in the breathing system?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

Turn over ►

Do not write outside the box

0 5 . 3 Give **two** ways that the lungs are adapted for efficient gas exchange.

[2 marks]

1 _____

_____

2 _____

_____

Table 3 shows the percentage of gases in air breathed into the lungs and air breathed out of the lungs**.**

Table 3

Gas	**Percentage (%) in air breathed in**	**Percentage (%) in air breathed out**
Oxygen	21	16
Carbon dioxide	0.04	4
Nitrogen	78	78

Do not write outside the box

0 5 . 4 Explain the **differences** in the air breathed into the lungs and the air breathed out of the lungs.

[4 marks]

0 5 . 5 The percentages given in each column of **Table 3** do **not** add up to 100%.

Suggest **one** reason why.

[1 mark]

10

Turn over for the next question

Do not write outside the box

0 6 Communicable and non-communicable diseases are major causes of ill health.

0 6 . 1 Which disease is a **non-communicable** disease?

[1 mark]

Tick (✓) **one** box.

AIDS ☐

Cancer ☐

Gonorrhoea ☐

Malaria ☐

Obesity is a risk factor for many non-communicable diseases.

0 6 . 2 Give **one** non-communicable disease that obesity is a risk factor for.

Do **not** refer to the diseases given in Question **06.1** in your answer.

[1 mark]

0 6 . 3 National policies are used to help people who are obese to lose weight.

One national policy is to reduce the amount of sugar added to food and drinks.

Suggest **one other** national policy that could help people to lose weight.

[1 mark]

Do not write outside the box

0 6 . 4 Body mass index (BMI) is one measure of obesity.

BMI is calculated using the equation:

$$\text{BMI} = \frac{\text{body mass in kg}}{(\text{height in m})^2}$$

Table 4 shows how BMI is used to describe an adult's BMI category.

Table 4

BMI	**BMI category**
<18.5	Underweight
18.5 to 24.9	Healthy weight
25.0 to 29.9	Overweight
>29.9	Obese

A person is 1.64 m tall and has a mass of 69 kg.

Determine the **BMI category** for this person.

Use the BMI equation and **Table 4**.

[3 marks]

The person's BMI category is _____

Question 6 continues on the next page

Do not write outside the box

Scientists investigated the effect of smoking and of BMI on the birth mass of babies.

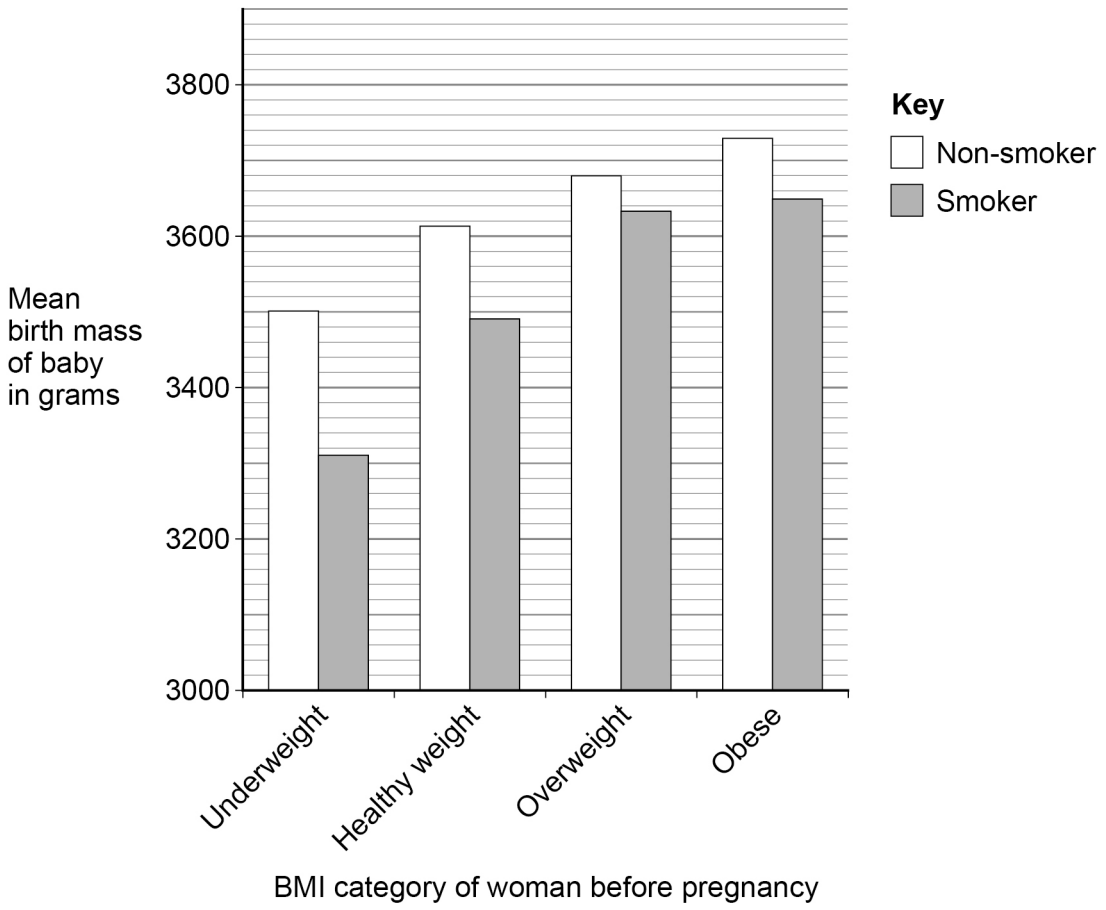
Women's BMI categories were determined before the women became pregnant.

0 6 . 5 Suggest why BMI categories were determined **before** the women became pregnant.

[1 mark]

Figure 9 shows the results.

Figure 9



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0 6 . 6 Give **two** conclusions that can be made from **Figure 9**.

[2 marks]

1 _____

_____

2 _____

_____

0 6 . 7 Measles is a communicable disease.

A virus causes measles.

Describe how the measles virus is transferred from person to person.

[2 marks]

_____

_____

_____

_____

Question 6 continues on the next page

Do not write outside the box

Athlete's foot is a communicable disease.

A fungus causes athlete's foot.

The athlete's foot fungus infects the skin on feet.

0 6 . 8 Scientists estimate that 17% of the UK population have athlete's foot.

The estimated UK population is 67 961 900

Calculate how many people are estimated to have athlete's foot.

[2 marks]

Estimated number of people with athlete's foot = _____

0 6 . 9 Athlete's foot fungus grows in moist conditions.

Suggest **one** way a person could reduce their chance of catching athlete's foot.

[1 mark]

14

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Turn over for the next question

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0 7 **Figure 10** shows onion cells viewed using a light microscope.

Figure 10

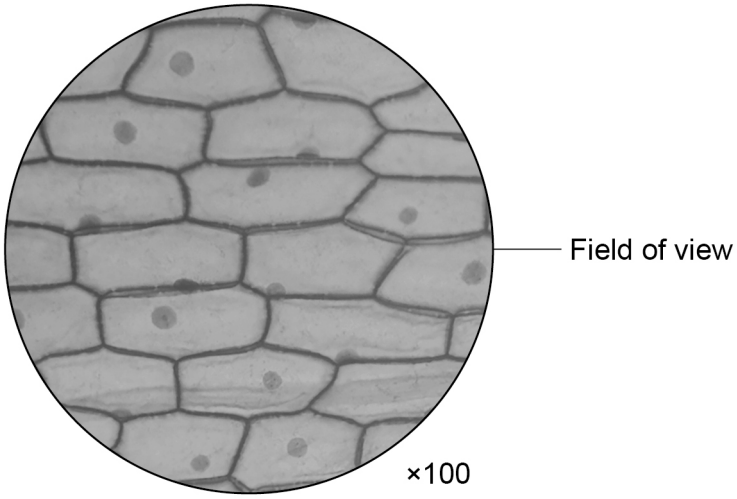
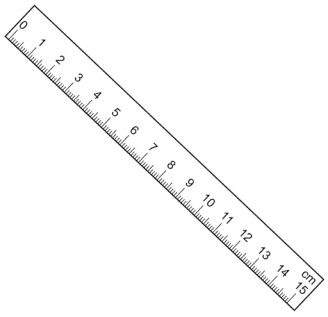


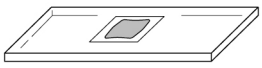
Figure 11 shows the apparatus given to a student.

Figure 11

Microscope



15 cm transparent ruler



Prepared slide of onion cells

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Describe how the student could use the apparatus to estimate the **mean** length of onion cells on the slide.

[6 marks]

6

END OF QUESTIONS

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Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

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