

Please write clearly in block capitals.

Centre number

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Candidate number

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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.

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.

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



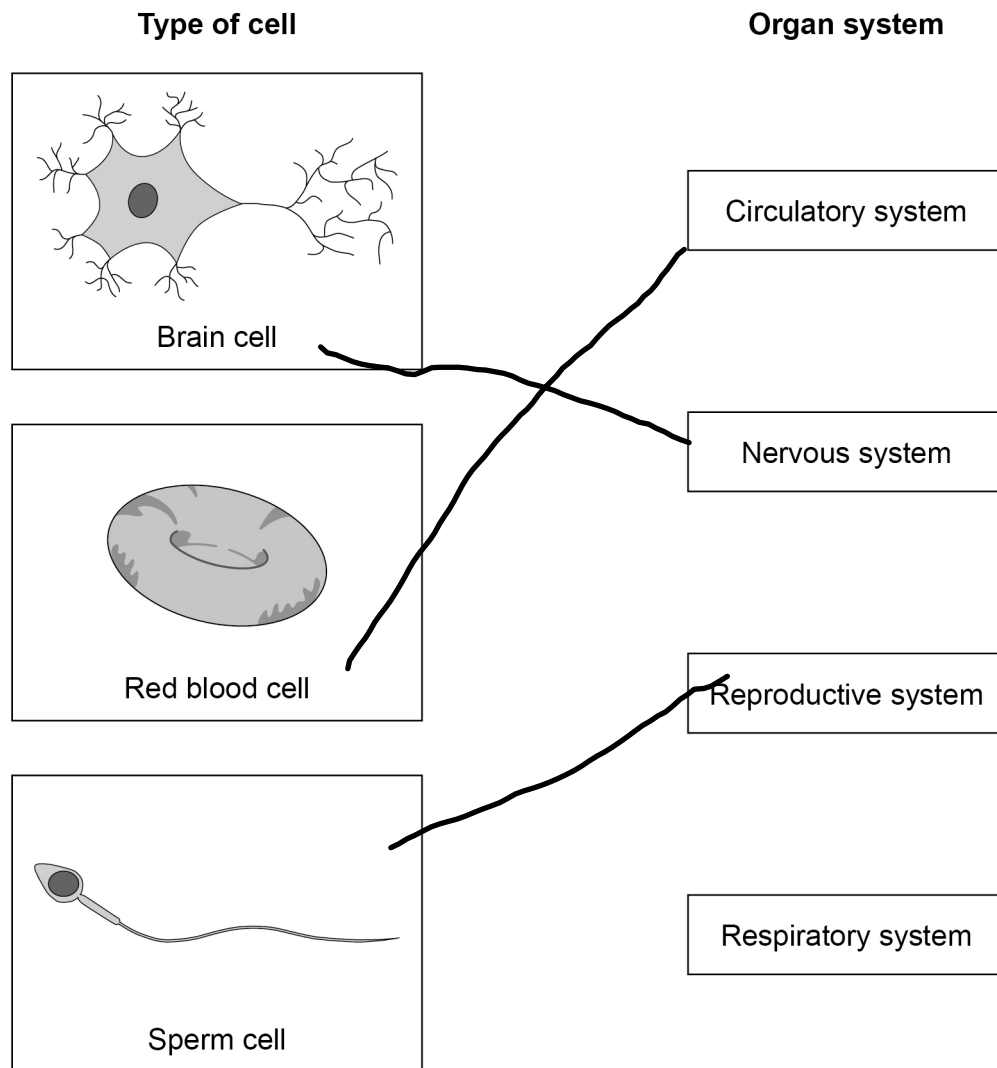
J U N 2 3 8 4 6 4 B 1 F 0 1

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]

0 1 . 2

Explain **one** way a sperm cell is adapted for its function.**[2 marks]**

sperm cell has a tail to
swim

Question 1 continues on the next page

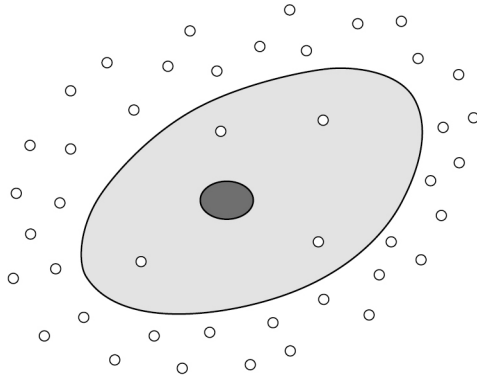
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Figure 1 shows a cell.

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]

it doesn't have cell wall

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

☐


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 because the concentration of
oxygen particle is higher
outside the cell

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 glucose

2 Amino acids

11

Turn over for the next question

Turn over ►

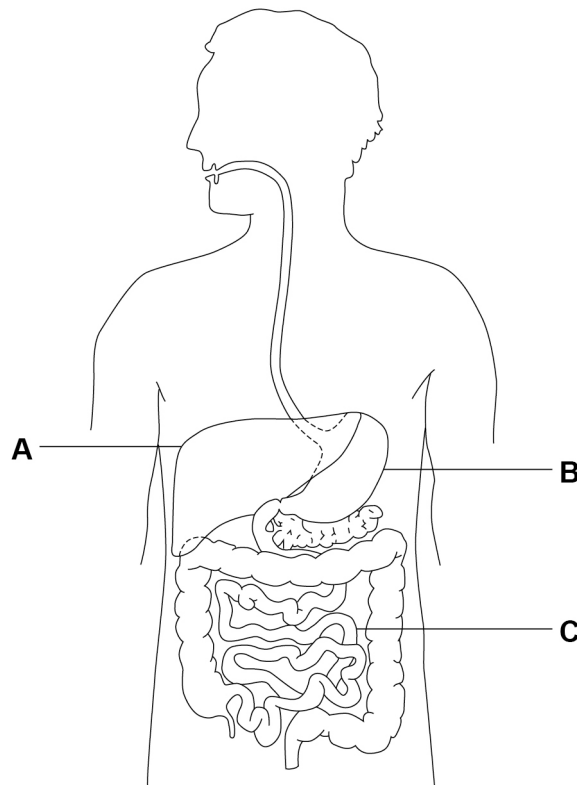


0 2

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 ☒



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

Turn over ►



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ANSWER IN THE SPACES PROVIDED**



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

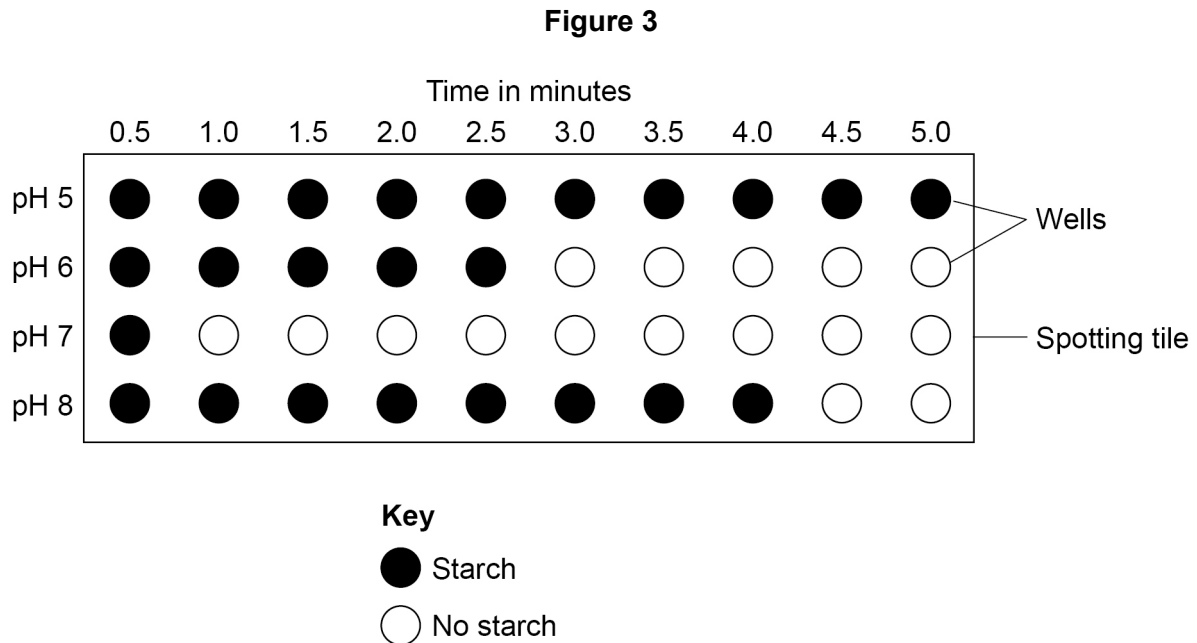
☐

Question 2 continues on the next page

Turn over ►



Figure 3 shows the results on the spotting tile.



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

Choose answers from the box.

[2 marks]

black	green	lilac	orange	white
-------	-------	-------	--------	-------

● Black

○ orange



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]

3

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

Turn over ►



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0 3

Plants need water for photosynthesis.

0 3 . 1

Where do plants obtain water for photosynthesis from?

[1 mark]soil

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

☐

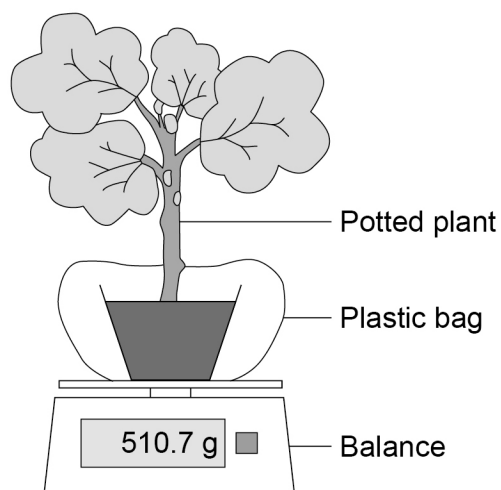
Transpiration

☒**Question 3 continues on the next page****Turn over ►**

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.

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]

$$510.7 - 9$$

Mass **X** = 501.7 grams

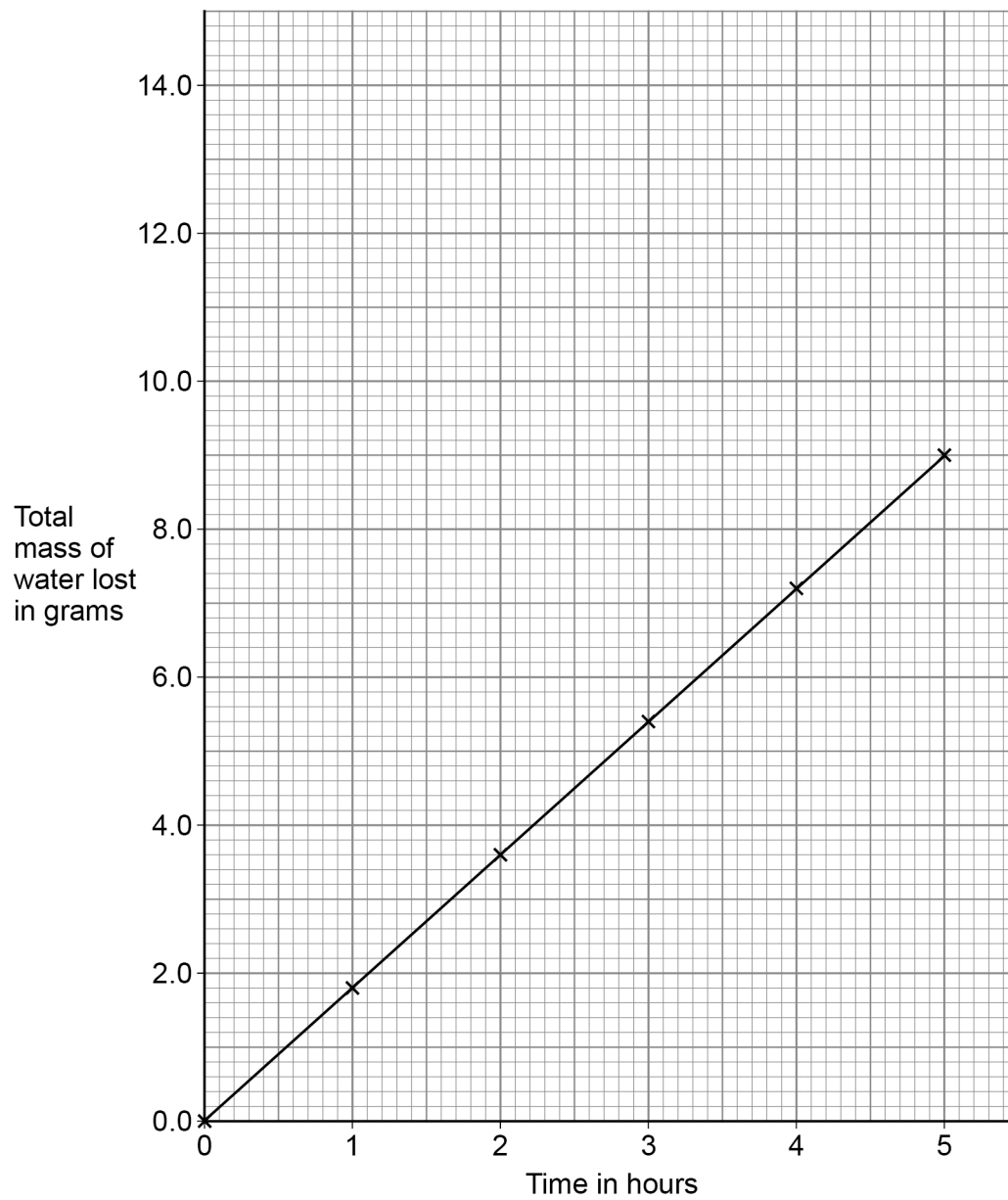
Question 3 continues on the next page

Turn over ►



Figure 5 shows the results.

Figure 5



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]

increase in light intensity

8

Turn over for the next question

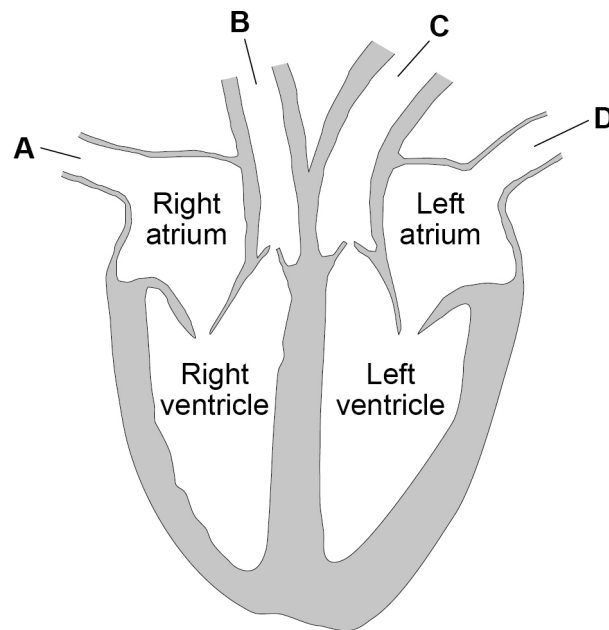
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0 4

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 ☐



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

Turn over ►



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?

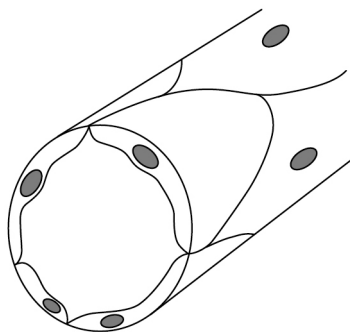
[1 mark]

to stop blood flowing in
wrong direction



Figure 7 shows a blood capillary.

Figure 7



0 4 . 6

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

[2 marks]

they are one cell thick to shorten
the diffusion distance

Question 4 continues on the next page

Turn over ►



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 mm³ of blood.

What is 5 000 000 written in standard form?

[1 mark]

Tick (✓) **one** box.

$5 \times 1\,000\,000$

☐

5×10^6

☒

5×10^7

☐

50×10^5

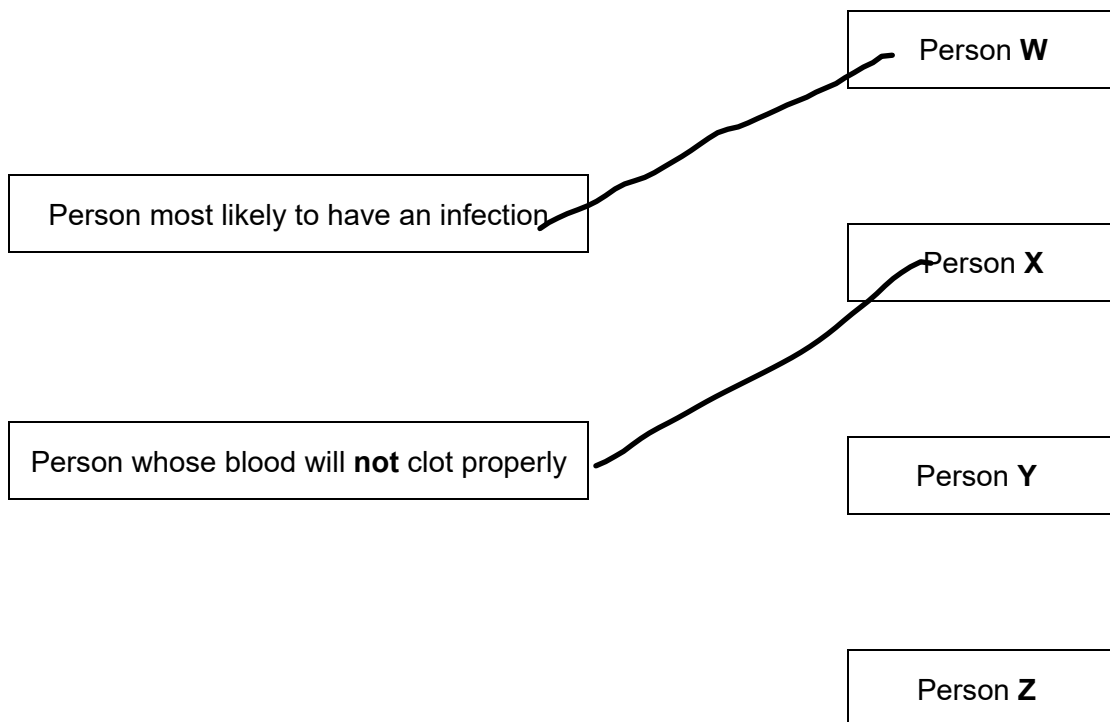
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0 4 . 8 Draw **one** line from each description to the person in **Table 2** it describes.

[2 marks]

Description

Person in Table 2



Question 4 continues on the next page

Turn over ►



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]

More oxygen can be transported
oxygen is needed for aerobic
respiration
so more energy can be released

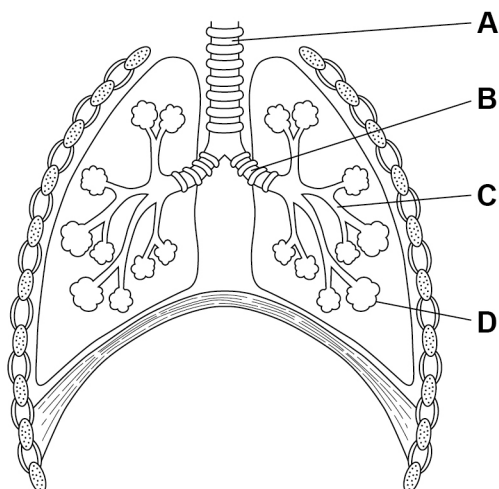
13



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 tracheaB Bronchus

0 5 . 2

Where does gas exchange happen in the breathing system?

[1 mark]

Tick (✓) **one** box.

A

☐

B

☐

C

☐

D

☒

Turn over ►



0 5 . 3

Give **two** ways that the lungs are adapted for efficient gas exchange.**[2 marks]**1 Many alveoli2 large surface area

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



0 5 . 4

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

[4 marks]

less oxygen in exhaled air because
body has used some oxygen for
respiration
more carbon dioxide in exhaled air
because carbon dioxide is produced
in respiration
no difference in percentage of
nitrogen because it is not used
by body

0 5 . 5

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

Suggest **one** reason why.

[1 mark]

there are other gases present

10

Turn over for the next question

Turn over ►



0 6

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

0 6 . 1Which 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 . 2Give **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]****Diabetes****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]****taxes on high energy**

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]

$$\text{BMI} = \frac{69}{1.64^2}$$

The person's BMI category is 25.6

Question 6 continues on the next page

Turn over ►



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

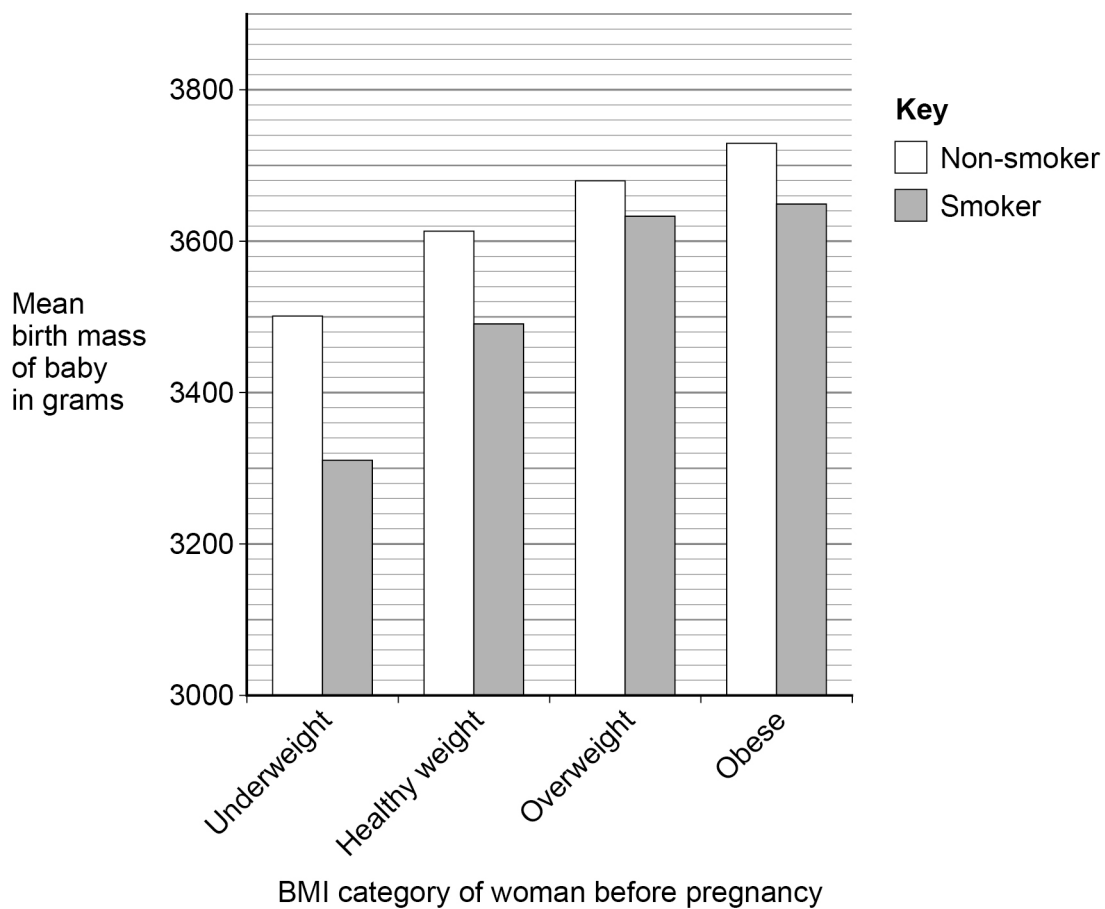
Suggest why BMI categories were determined **before** the women became pregnant.

[1 mark]

Women will gain mass

Figure 9 shows the results.

Figure 9



06.6

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

[2 marks]

- 1 Smokers had babies with lower birth mass
- 2 non smokers with higher BMI had heavier babies

06.7

Measles is a communicable disease.

A virus causes measles.

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

[2 marks]

coughs and sneezes spread virus in droplets and virus are inhaled

Question 6 continues on the next page

Turn over ►



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]

$$\frac{17}{100} \times 67961900$$

Estimated number of people with athlete's foot = 11553523

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]

Dry feet thoroughly



Turn over for the next question

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0 7

Figure 10 shows onion cells viewed using a light microscope.

Figure 10

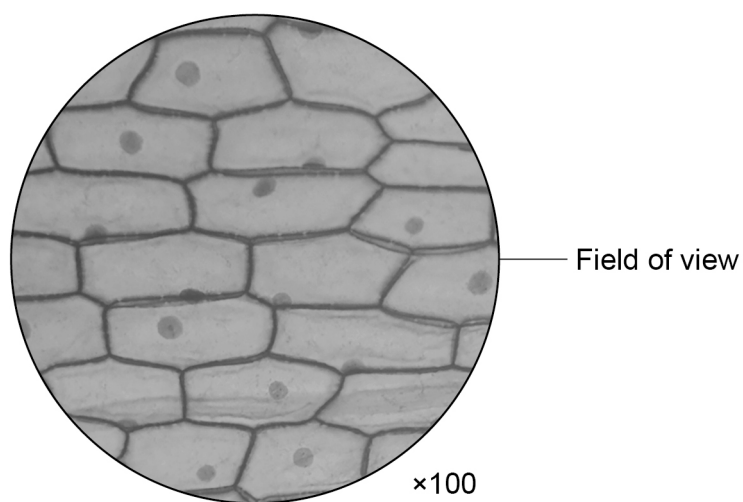
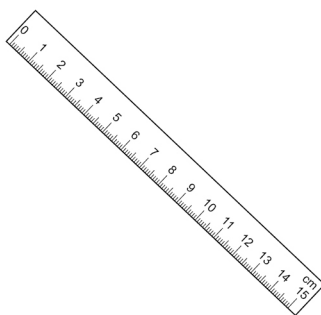


Figure 11 shows the apparatus given to a student.

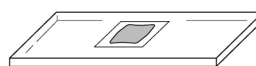
Figure 11



Microscope



15 cm transparent
ruler



Prepared slide
of onion cells



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

[6 marks]

place ruler on microscope stage
focus on scale on ruler
measure diameter in millimeters
replace the ruler with slides and
focus on cells .
use same magnification
estimate the numbers of cells that fit
across field of view
to calculate the mean length of onion
cells divide the diameter with field of
view by three cells

6

END OF QUESTIONS



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