



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 BIOLOGY

Higher Tier Paper 1H

H

Tuesday 12 May 2026

Afternoon

Time allowed: 1 hour 45 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. Do **not** write outside the box around each page or on blank pages.
- 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 100.
- 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 6 8 4 6 1 1 H 0 1

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ANSWER IN THE SPACES PROVIDED**



Answer **all** questions in the spaces provided.

0 1

Plants are made of cells and tissues.

0 1 . 1

Complete the sentences.

Choose answers from the box.

[3 marks]

epidermis

meristem

mesophyll

phloem

xylem

The tissue at the tips of roots and shoots that contains unspecialised cells
is called _____.

Lignin is found in the _____.

Translocation occurs in the _____.

One type of plant contains cells that produce substance X.

Substance X kills microorganisms.

0 1 . 2

What type of plant defence response is the production of substance X?

[1 mark]

Question 1 continues on the next page

Turn over ►



A scientist investigated the effect of substance **X** on the growth of different microorganisms.

The scientist:

- grew each microorganism on agar in separate Petri dishes
- added a paper disc soaked in substance **X** to the centre of each Petri dish
- measured the diameter of the zone of inhibition around each paper disc after 3 days.

Table 1 shows the results.

Table 1

Microorganism	Diameter of zone of inhibition in millimetres
A	18
B	12
C	23
D	31
E	34

0 1 . 3 Complete **Figure 1**.

You should:

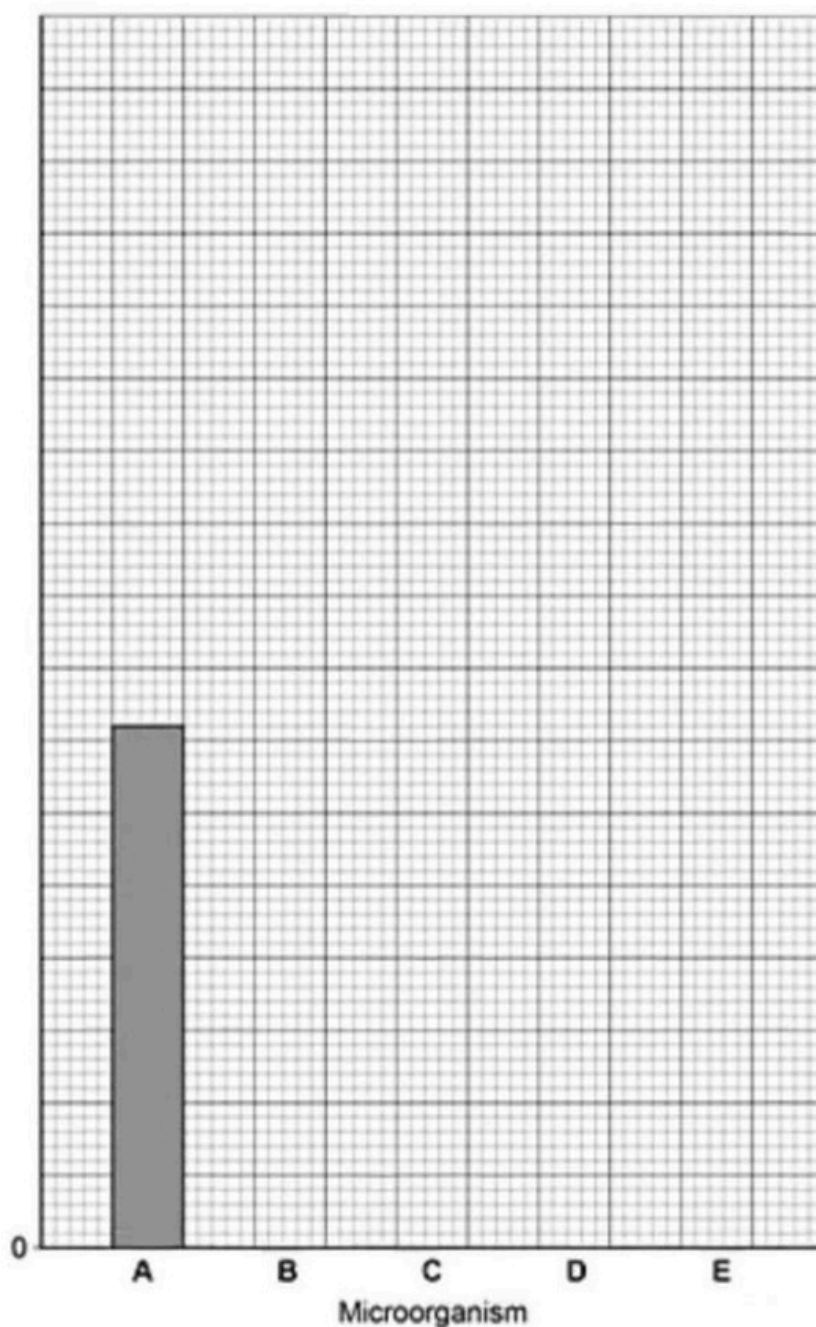
- label the *y*-axis
- add the scale to the *y*-axis
- plot the data from **Table 1** as a bar chart.

The bar for microorganism **A** has been plotted for you.

[3 marks]



Figure 1



0 1 . 4

How could the scientist use the results in **Table 1** to decide which microorganism substance **X** is most effective against?

[1 mark]

Turn over ►

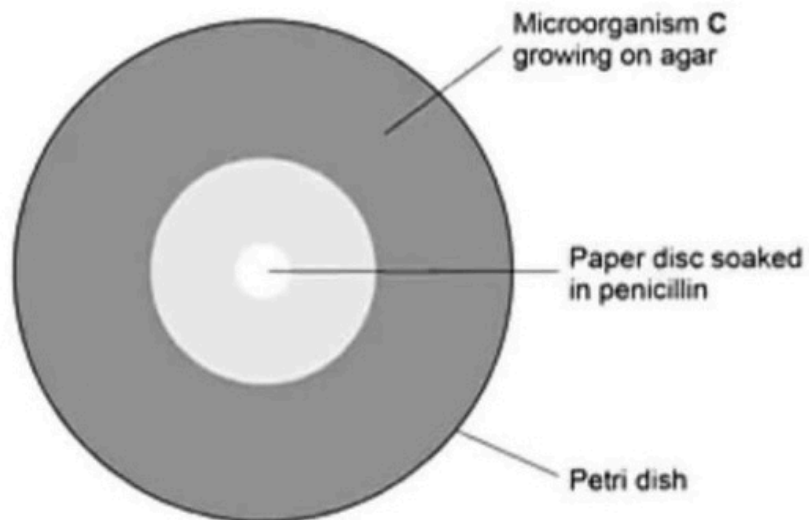


Penicillin is an antibiotic.

The scientist investigated the effectiveness of penicillin on microorganism C.

Figure 2 shows the results.

Figure 2



0 1 . 5

Calculate the area of the zone of inhibition in **Figure 2**.

Use the equation:

$$\text{area} = \pi r^2$$

Use $\pi = 3.14$

Give the unit.

[4 marks]

Area = _____ Unit _____

Question 1 continues on the next page**Turn over ►**

0 1 . 6 People eat leaves from the plant which produces substance X.

Table 2 shows information about substance X and about penicillin.

Table 2

Substance X	Penicillin
Found in a common garden plant	Extracted from mould grown in a laboratory
Effective on different types of microorganism	Effective on bacteria only
No bacteria are resistant to substance X	Some bacteria are resistant to penicillin
Concentration varies in each plant that produces it	Concentration can be precisely determined
Very few peer reviewed scientific studies about its effectiveness	be Widely studied and approved drug



Use information from **Table 2** and your own knowledge in your answer.

Extra space

18

Turn over ►



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0 2

Food is broken down in the digestive system.

0 2 . 1

The mouth, small intestine and large intestine are parts of the digestive system.

Name **two other** organs in the digestive system.**[1 mark]**

and

0 2 . 2

Name the type of enzyme that digests protein.

[1 mark]

0 2 . 3

Explain how an enzyme breaks down protein.

[4 marks]

Extra space

Question 2 continues on the next page

Turn over ►



0 2 . 4 Disease C affects the digestive system.

In disease C, the immune system attacks a protein found in food.

Complete the sentences.

[2 marks]

During the immune response, one type of white blood cell engulfs the protein in a process called _____.

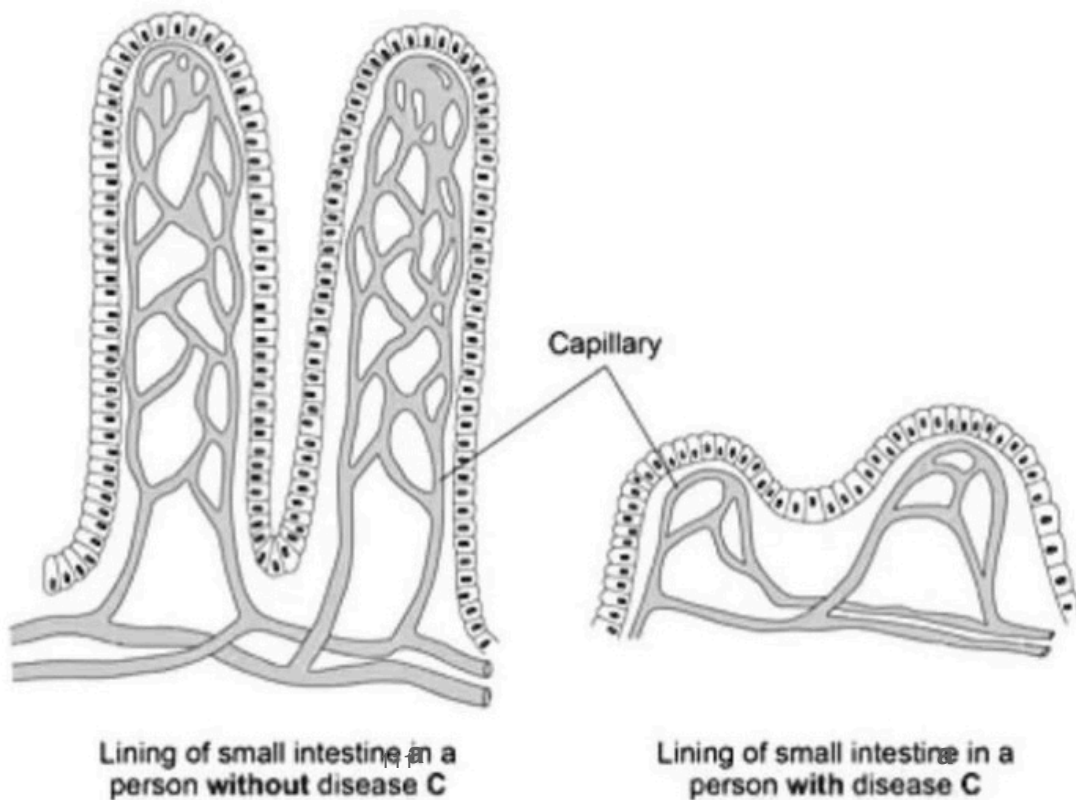
A different type of white blood cell produces molecules that attach to the protein.

These molecules are called _____.

0 2 . 5 In disease C, the lining of the small intestine is damaged.

Figure 3 shows the lining of the small intestine in a person without disease C and a person with disease C.

Figure 3



A person without disease **C** is able to gain body mass more easily than a person with disease **C**.

Explain why.

[2 marks]

0 2 . 6

Disease **C** is estimated to affect 1 in 100 people in the UK.

In 2024, the UK population was 69 million.

How many people were estimated to have disease **C** in 2024?

[1 mark]

Tick (✓) **one** box.

6.9×10^{-6}

☐

6.9×10^{-3}

☐

6.9×10^4

☐

6.9×10^5

☐

Question 2 continues on the next page

Turn over ►



Bile is produced in the digestive system to help the digestion of fats.

0 2 . 7

Complete the sentence.

[1 mark]

The organ that produces bile is the _____.

0 2 . 8

Bile emulsifies fats in the small intestine.

In a controlled investigation, different concentrations of bile were shaken with fat in a test tube.

Lipase was then added to the contents of the test tube.

A scientist measured:

- the diameter of the fat droplets after emulsification
- lipase activity on the fat droplets.

Table 3 shows the results.

Table 3

Percentage (%) concentration of bile	Diameter of fat droplets in micrometres	Lipase activity in arbitrary units
0.0	49	5
0.5	32	30
1.0	16	55
1.5	10	110
2.0	8	110



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Describe the effect of concentration of bile on:

- the diameter of the fat droplets
- lipase activity.

Use data from **Table 3** in your answer.

[3 marks]

15

Turn over for the next question

Turn over ►



0 3

The inside surface of the human cheek is made of cells.

0 3 . 1

Cheek cells are animal cells.

Describe **two** differences between a cheek cell and a bacterial cell.**[2 marks]**

1 _____

2 _____

0 3 . 2Explain why the inside surface of the human cheek is described as a tissue and **not** as an organ.**[2 marks]**



A student prepared a sample of cheek cells to view using a microscope.

0 3 . 3 The student collected the cells from the inside surface of their cheek using a swab.

Table 4 shows the student's risk assessment.

Table 4

Hazard	Risk	Control measure
Swab contains cells from inside the mouth		

Complete **Table 4** to show the risk assessment for the collection of the cells from the student's cheek.

[2 marks]

0 3 . 4 The student transferred cells from the swab onto a microscope slide.

The student placed the slide on the microscope stage.

When the student looked through the microscope eyepiece, the cells could **not** be seen.

Suggest **one** change the student could make when using the microscope so that the cells could be seen.

[1 mark]

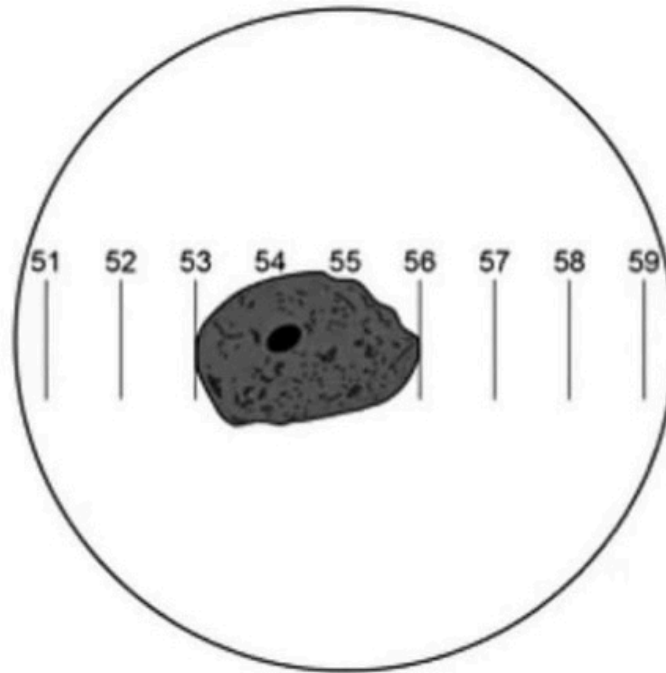
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0 3 . 5 A special type of microscope ruler was used to measure the length of a cheek cell.

Figure 4 shows the cell seen using the microscope. Only a small part of the ruler is visible.

Figure 4



The total length of the ruler was 0.25 cm.

The ruler was divided into 100 sections.



Calculate the length of the cell in **Figure 4**.

Give your answer in micrometres (μm).

[4 marks]

Length = _____ μm

0 3 . 6

A cell was viewed using an electron microscope.

One structure found in the cell had a length of 20 nm.

In a drawing, the length of the structure was 1 cm.

What is the scale of the drawing of the structure?

[1 mark]

Tick (✓) **one** box.

×500

☐

×5 000

☐

×500 000

☐

×5 000 000

☐

12

Turn over ►



0 4

Red blood cells transport oxygen from the lungs.

0 4 . 1

Most human cells contain a nucleus.

Suggest **one** reason why red blood cells do **not** contain a nucleus.

[1 mark]

A drop of blood was placed at the bottom of a test tube of water.

The red blood cells burst.

The red pigment inside the red blood cells was released.

After 30 minutes, all of the water in the test tube became red.

0 4 . 2

Explain how diffusion causes all of the water in the test tube to become red.

[2 marks]



0 4 . 3 A higher water temperature would cause all of the water to become red more quickly.

Explain why.

[2 marks]

Question 4 continues on the next page

Turn over ►



0 4 . 4 The rate of diffusion of a substance into three cells was measured.

Each cell:

- had the same volume
- had a different surface area
- had the same concentration of solutes inside.

Table 5 shows the results.

Table 5

Cell	Rate of diffusion in arbitrary units
A	167
B	382
C	489

Which conclusion about the surface areas of the cells in **Table 5** is correct?

[1 mark]

Tick (✓) **one** box.

Cell **A** has a larger surface area than cell **B**.

☐

Cell **B** has a larger surface area than cell **C**.

☐

Cell **C** has a larger surface area than cell **A**.

☐


0 4 . 5

Explain why large, multicellular organisms need transport systems.

[3 marks]

0 4 . 6

Name one factor that can affect the rate of diffusion into cells.

Do not refer to temperature or to surface area in your answer.

[1 mark]

10

Turn over for the next question

Turn over ►



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0 5

Living organisms respire.

0 5 . 1

Fungi are living organisms.

Name **one** plant disease caused by a fungal pathogen.

[1 mark]

Yeast is a type of fungus.

Yeast can respire anaerobically.

0 5 . 2

Complete the word equation for anaerobic respiration in yeast.

[1 mark]

glucose $\longrightarrow$ _____ + _____

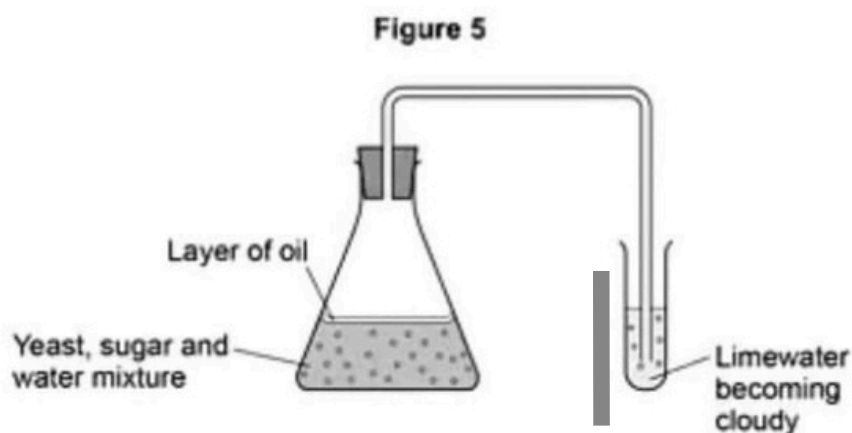
Question 5 continues on the next page

Turn over ►



A student measured the rate of anaerobic respiration in yeast.

Figure 5 shows some of the apparatus used.



0 5 . 3

Explain why the student used a layer of oil on top of the yeast, sugar and water mixture.

[2 marks]

The student compared the effect of different types of sugar on the rate of anaerobic respiration in yeast.

0 5 . 4

Describe how a change to the **apparatus** in **Figure 5** would allow the student to get a more valid comparison.

[1 mark]



Table 6 shows the results.

Table 6

Type of sugar	Rate of anaerobic respiration in arbitrary units
Fructose	19.7
Glucose	39.5
Maltose	34.6
Sucrose	22.2

0 5 . 5

Calculate the percentage increase in the rate of anaerobic respiration of glucose compared with fructose.

Give your answer to 3 significant figures.

[4 marks]

Percentage increase (3 significant figures) = _____ %

Question 5 continues on the next page

Turn over ►



Anaerobic respiration can also occur in the muscle cells of humans.

0 5 . 6

Give the word equation for anaerobic respiration in humans.

[1 mark]

0 5 . 7

Anaerobic respiration in humans results in oxygen debt.

What does 'oxygen debt' mean?

[1 mark]

0 5 . 8

Describe how lactic acid is removed from body cells.

[2 marks]



0 6

Photosynthesis is an endothermic reaction.

0 6 . 1

Why is photosynthesis described as an endothermic reaction?

[1 mark]

A student investigated the effect of temperature on the rate of photosynthesis in pondweed.

0 6 . 2

Between 0 °C and 40 °C, a 10 °C increase in temperature doubles the rate of photosynthesis.

The rate of photosynthesis at 5 °C was 2 arbitrary units.

Estimate the rate of photosynthesis at 40 °C.

[1 mark]

Rate of photosynthesis = _____ arbitrary units

0 6 . 3

Above 50 °C, the enzymes responsible for photosynthesis change and the reaction stops.

Explain how a change to an enzyme stops photosynthesis.

[2 marks]

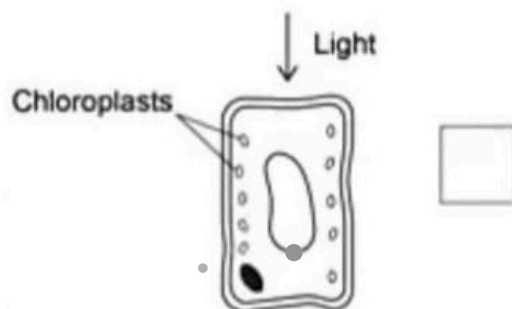
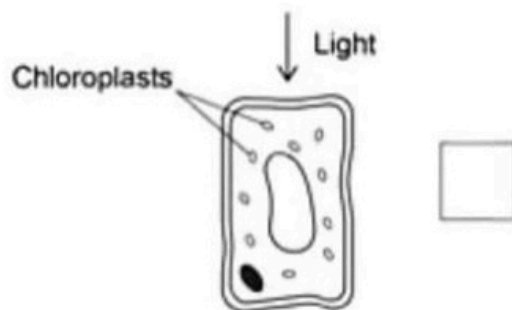
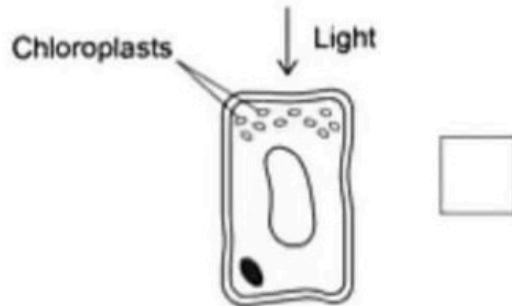
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0 6 . 6

Which of the following shows a palisade cell exposed to very low light intensity?

[2 marks]Tick (✓) **one** box.

Give the reason for your answer.



Reason _____

Question 6 continues on the next page

Turn over ►



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0	6	.	7
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Plants can continue to grow at night, in the absence of light.

Explain how a plant produces new cells for growth when there is no light.

[5 marks]

Extra space

18



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0 7

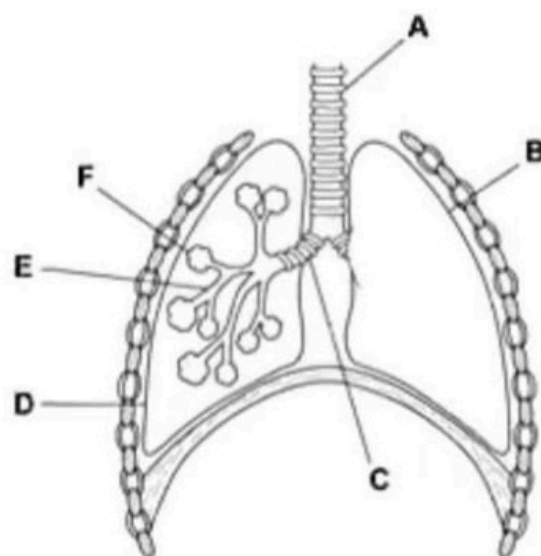
Smoking affects the respiratory system.

A smoker has:

- a tumour in the left lung
- narrowed bronchi
- a reduced surface area for gas exchange.

Figure 6 shows the human respiratory system viewed from the front.

Figure 6



0 7 . 1

Which parts of the respiratory system are affected in the smoker?

[1 mark]

Tick (✓) **one** box.

A, C and F

☐

A, D and E

☐

B, C and F

☐

B, D and E

☐


Smoking a vape is an alternative to smoking cigarettes.

07.4

Vapes were introduced in 2003.

Suggest **one** reason why the health effects of smoking vapes are **not** well understood.

[1 mark]

Scientists compared the effects of smoking cigarettes with the effects of smoking vapes.

The scientists grew human capillaries in the laboratory.

The scientists collected blood samples from:

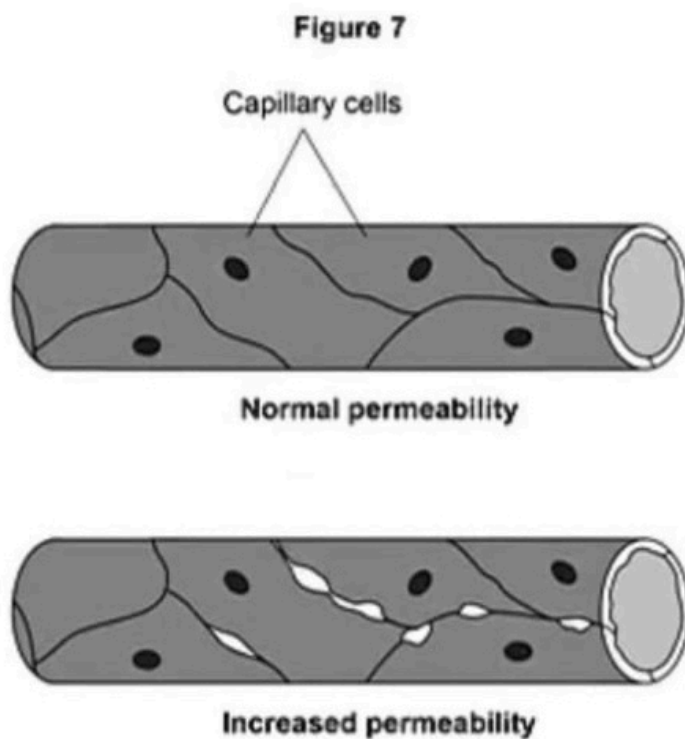
- cigarette smokers
- vape smokers
- non-smokers.

Each blood sample was added to some capillaries.

The scientists measured the effect of the blood on the permeability of the capillaries.



Figure 7 shows information about permeability of capillaries.



0 7 . 5

Suggest why increased permeability of capillaries in the human body may cause a problem.

Use information from **Figure 7**.

[1 mark]

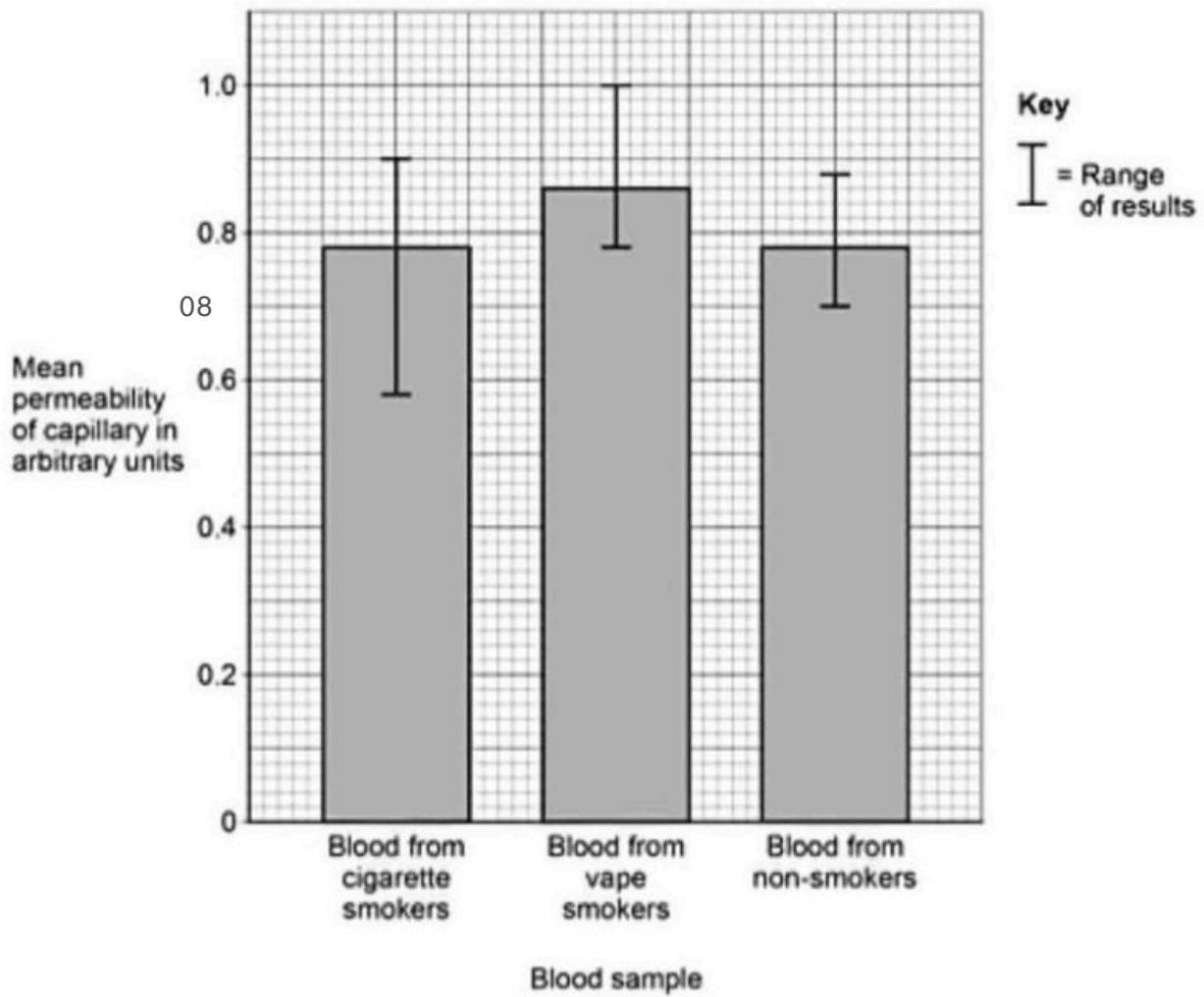
Question 7 continues on the next page

Turn over ►



Figure 8 shows the results of the investigation.

Figure 8



07.6 The results of the investigation were peer reviewed and published.

Why is peer review of scientific investigations important?

[1 mark]



07.7

A newspaper article stated:

'Smoking vapes is more damaging to blood vessels than smoking cigarettes.'

Evaluate the statement.

You should refer to **Figure 8** in your answer.**[3 marks]**

14

END OF QUESTIONS