

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

F

Foundation Tier Paper 1F

Friday 10 May 2024

Morning

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.
- 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	
8	
TOTAL	



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

0 1

Plants are made of different tissues.

0 1 . 1

Which term describes a group of tissues working together?

[1 mark]

Tick (✓) **one** box.

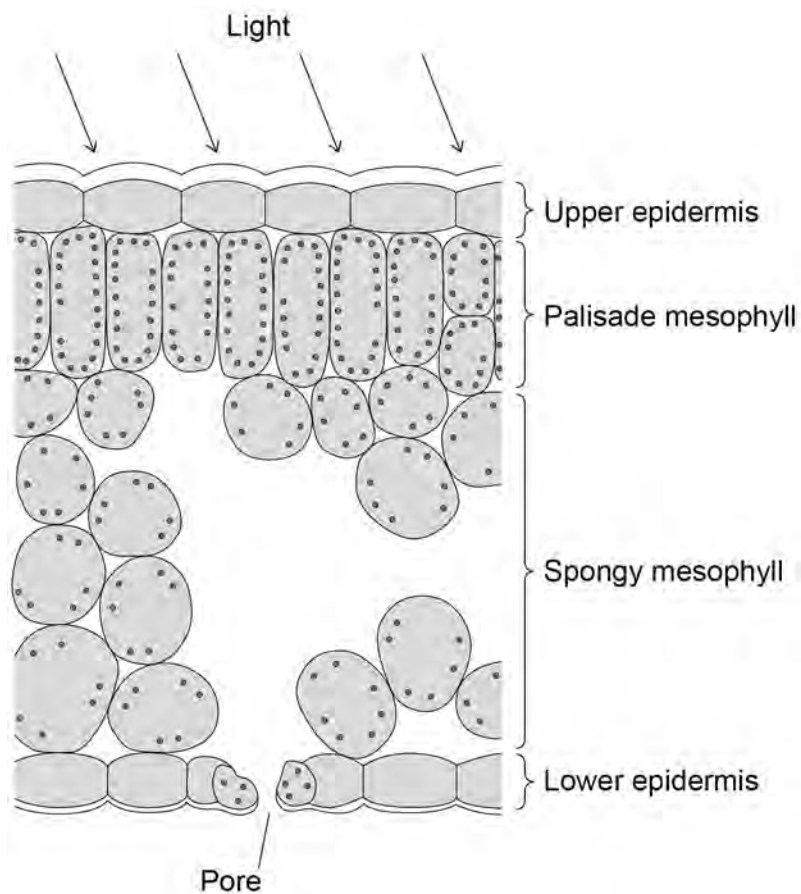
Organ

Organism

Organ system

Figure 1 shows the tissues in a leaf.

Figure 1



0 1 . 2 Draw **one** line from each leaf tissue to an important feature of the tissue.

[2 marks]

Leaf tissue	Feature
Palisade mesophyll	Contains many air spaces
Spongy mesophyll	Contains the most chloroplasts
	Made of dead cells

0 1 . 3 Xylem tissue transports water to the leaves.

Which term describes the loss of water from the leaves?

[1 mark]

Tick (✓) **one** box.

- Photosynthesis
- Respiration
- Transpiration

0 1 . 4 Which substance strengthens xylem tissue?

[1 mark]

Tick (✓) **one** box.

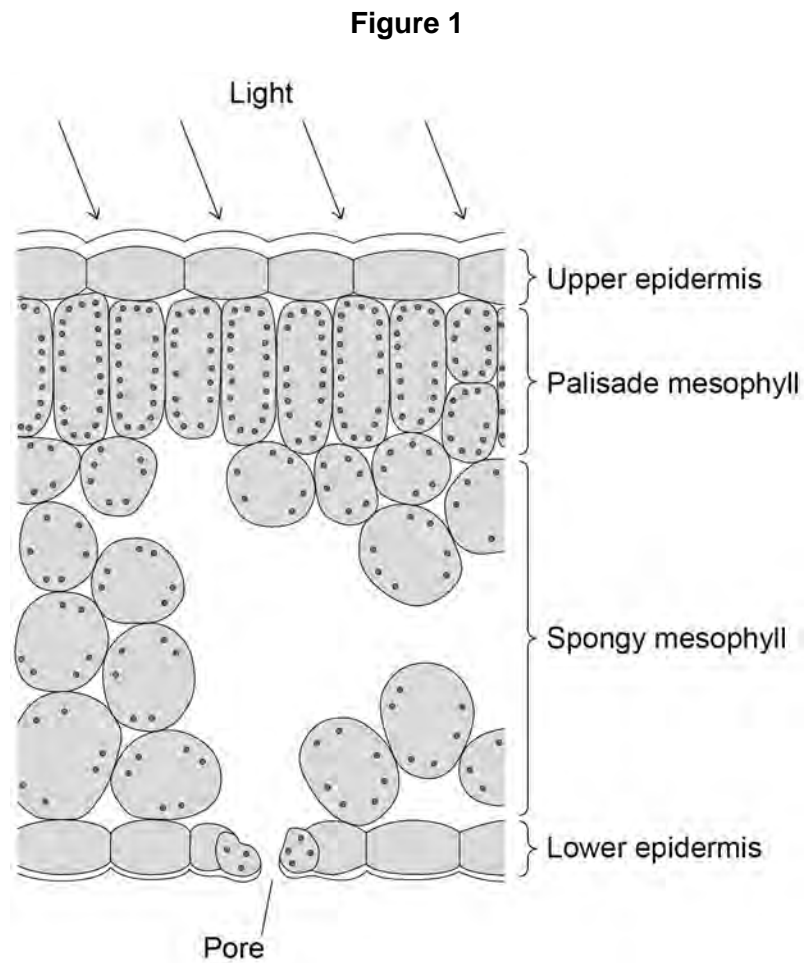
- Glucose
- Lignin
- Starch

Question 1 continues on the next page

Turn over ►



Figure 1 is repeated below.



0 1 . 5 The upper epidermis is transparent.

Explain why the upper epidermis needs to be transparent.

Use **Figure 1**.

[2 marks]



0 1 . 6 Complete the sentences.

Choose answers from the box.

[2 marks]

chloroplasts

guard cells

meristems

stomata

The pores in the lower epidermis of a leaf are called _____.

The opening and closing of the pores in the lower epidermis is controlled

by _____.

Question 1 continues on the next page

Turn over ►



Figure 2 shows two cells from phloem tissue.

Figure 2

Figure 2 cannot be reproduced here due to third-party copyright restrictions.

It is a photograph showing two cells from phloem tissue from page numbers 111-120 of the following publication:

Cytochemical Localization of Adenosine Triphosphatase in the Phloem of *Pisum sativum* and its Relation to the Function of Transfer Cells, *Planta* Vol. 2 by B J Bentwood and J Cronshaw

0 1 . 7 Part **A** in **Figure 2** contains cell sap.

Name part **A** in **Figure 2**.

[1 mark]



Sugars move from cell **Y** into cell **X** against the concentration gradient.

Energy is needed to move sugars against the concentration gradient.

0 1 . 8 Which process moves sugars against the concentration gradient?

[1 mark]

Tick (✓) **one** box.

Active transport

Diffusion

Osmosis

0 1 . 9 Which cell structures are needed to provide energy to move sugars?

[1 mark]

Tick (✓) **one** box.

Chloroplasts

Chromosomes

Mitochondria

12

Turn over for the next question

Turn over ►



0 2

Pathogens cause disease.

0 2 . 1

How does the skin defend the human body against pathogens?

[1 mark]

The stomach contains acid to kill pathogens.

A scientist investigated the effect of acid on the survival of bacteria.

This is the method used.

1. Prepare four test tubes each with 10 cm³ of culture solution.
2. Use acid to adjust the pH of the solutions to be pH1, pH2, pH3 and pH5
3. Add 1 cm³ of bacteria mixture to each test tube.
4. Take a 0.1 cm³ sample from each test tube and record the number of live bacteria.
5. Keep the test tubes at 37 °C for 24 hours.
6. Repeat step 4.

Table 1 shows some of the results.

Table 1

Time in hours	Number of live bacteria			
	pH1	pH2	pH3	pH5
0	210	210	210	216
24	23	X	63	185



0 2 . 2 What fraction of the bacteria present at 0 hours for **pH3** survived for 24 hours?

Give your answer in its simplest form.

[2 marks]

Fraction surviving = _____

0 2 . 3 How many more bacteria were killed at pH1 than at pH5 in 24 hours?

Complete the following steps.

[3 marks]

Calculate the number of bacteria killed at pH1 _____

Calculate the number of bacteria killed at pH5 _____

Calculate how many more bacteria were killed at pH1 than at pH5 _____

Number = _____

0 2 . 4 A student calculated value **X** in **Table 1** to be 43

Suggest how the student calculated this value.

[2 marks]



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ANSWER IN THE SPACES PROVIDED**



0 3

Measles is caused by a virus.

0 3 . 1

The measles vaccine is given to children to prevent them becoming ill with measles.

Draw **one** line from each blood component to its function when someone is vaccinated against measles.

[2 marks]**Blood component****Function**

Platelets

Help clot the blood where the vaccine was injected

Produce antibodies to the measles virus

White blood cells

Produce the measles skin rash

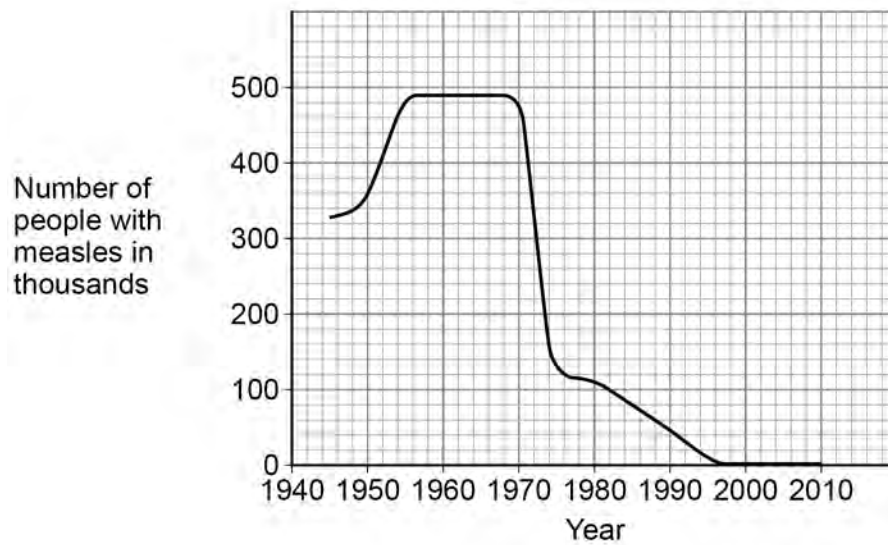
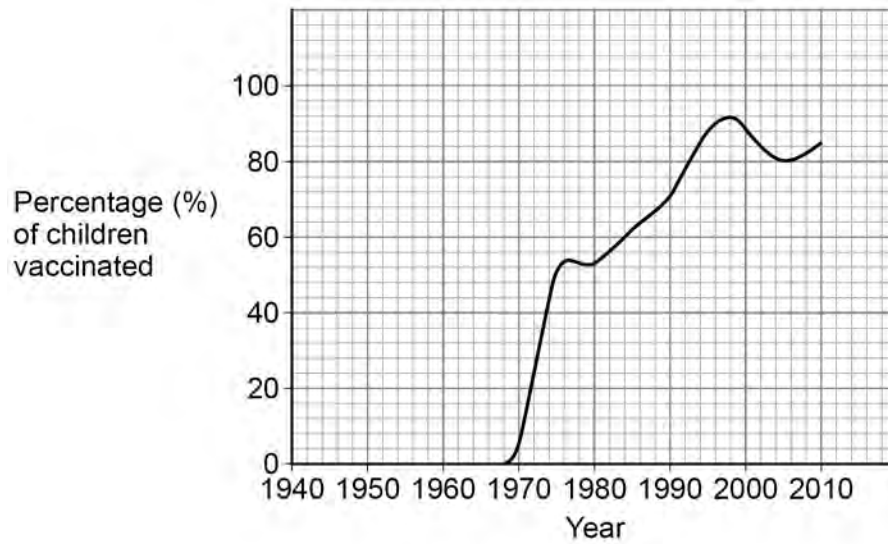
Transport oxygen to the measles virus

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

Figure 3 shows information about trends in the UK for:

- percentage of children vaccinated
- the number of people with measles.

Figure 3



0 3 . 2 What year was the measles vaccine first used?

Use **Figure 3**.

[1 mark]

0 3 . 3 Describe the trend in the **number of people with measles** from 1945 to 1975.

Use **Figure 3**.

[3 marks]

In **1998**, a scientific paper was published suggesting a link between condition **X** and one type of measles vaccine.

0 3 . 4 What happened to the **percentage of children vaccinated** against measles after the scientific paper was published in 1998?

Use **Figure 3**.

[1 mark]

Question 3 continues on the next page

Turn over ►



0 3 . 5 Why might the claims made in the scientific paper have affected the percentage of children vaccinated?

[1 mark]

Tick (✓) **one** box.

The measles pathogen did not exist in the UK anymore.

Parents were worried their children would get condition **X**.

The health service in the UK did not have any vaccines.

0 3 . 6 In 2010, the scientific paper linking condition **X** and the measles vaccine was shown to be based on false claims.

What should scientists do with scientific research to help detect false claims?

[1 mark]

Tick (✓) **one** box.

Have the research peer reviewed.

Publish the research on the internet.

Send a research questionnaire to the public.

0 3 . 7 The person who wrote the scientific paper was paid to research the link between condition **X** and the measles vaccine.

Why are the claims in the scientific paper likely to be considered **not** valid?

[1 mark]

10



A student investigated three types of bread.

For each type of bread, the student:

- put a square piece of bread into their mouth
- did **not** chew the bread
- recorded the time taken for the bread to taste sweet.

Table 2 shows the results.

Table 2

Type of bread	Time taken for bread to taste sweet in seconds
Brown	43
White	35
Wholemeal	57

0 4 . 2 Complete the sentences.

Choose answers from the box.

[2 marks]

amylase	fat	lipase	protease	sugar
---------	-----	--------	----------	-------

The starch in the bread was broken down by the
enzyme _____.

The enzyme broke down the starch into _____.



0 4 . 3 What was the independent variable in the investigation?

[1 mark]

Tick (✓) **one** box.

The size of the piece of bread

The temperature of the mouth

The type of bread

0 4 . 4 Give **two** conclusions that can be made from the results in **Table 2**.

[2 marks]

1 _____

2 _____

Question 4 continues on the next page

Turn over ►



Table 2 is repeated below.

Table 2

Type of bread	Time taken for bread to taste sweet in seconds
Brown	43
White	35
Wholemeal	57

The student improved the investigation.

Table 3 shows the results.

Table 3

Type of bread	Time taken for bread to taste sweet in seconds			
	Test 1	Test 2	Test 3	Mean
Brown	38	43	45	42
White	35	31	39	35
Wholemeal	58	55	61	X

0 4 . 5 What did the student do to improve the investigation?

Use **Table 2** and **Table 3**.

[2 marks]



0 4 . 6 Calculate value **X** in **Table 3**.

[2 marks]

X = _____ seconds

0 4 . 7 Why should the student do the investigation with more people?

[1 mark]

Tick (✓) **one** box.

Each person's sense of taste is different.

More people would make the investigation safer.

There are many different types of bread.

14

Turn over for the next question

Turn over ►



0 5

Cancer occurs when there is uncontrolled cell division.

0 5 . 1Which **two** factors can cause cancer?**[2 marks]**Tick (✓) **two** boxes.

Antibiotics

Ionising radiation

Monoclonal antibodies

Salmonella

Viruses

0 5 . 2

What type of cell division occurs in cancerous cells?

[1 mark]Tick (✓) **one** box.

Binary fission

Fertilisation

Mitosis



0 5 . 3 Complete the sentences.

Choose answers from the box.

[2 marks]

decrease

fertilise

grow

replicate

Before a cell divides, the cell needs to _____.

Before a cell divides, the DNA in the nucleus needs to _____.

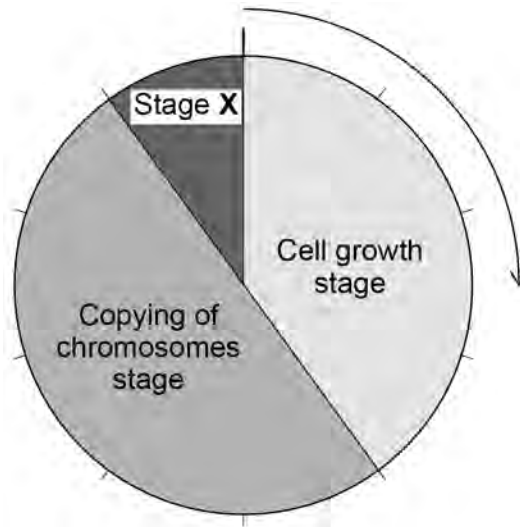
Question 5 continues on the next page

Turn over ►



Figure 4 shows the cell cycle.

Figure 4



0 5 . 4 What percentage of the time taken for the cell cycle does the cell growth stage take?

Use Figure 4.

[1 mark]

Tick (✓) **one** box.

10% 20% 40% 90%

0 5 . 5 What happens during stage X of the cell cycle in Figure 4?

[1 mark]

Tick (✓) **one** box.

Chromosomes are pulled to each end of the cell.

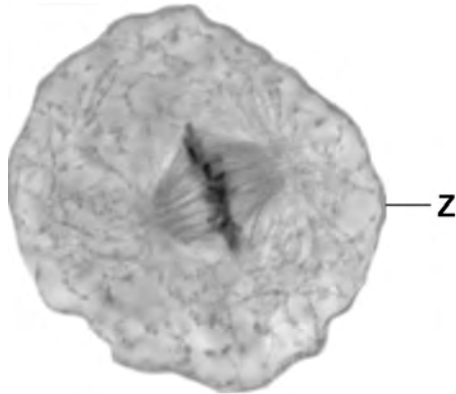
The cell increases in size and mass.

The number of mitochondria increases.



Figure 5 shows an animal cell during cell division.

Figure 5



0 5 . 6 Name structure **Z** in **Figure 5**.

[1 mark]

Question 5 continues on the next page

Turn over ►



0 5 . 7 The image of the cell in **Figure 5**:

- is magnified 800 times
- has a width of 50 mm.

Calculate the real width of the cell in **Figure 5**.

Give your answer in micrometres (μm).

Use the equation:

$$\text{real width of cell} = \frac{\text{width of image of cell}}{\text{magnification}}$$

1 mm = 1000 μm

[3 marks]

Real width of cell = _____ μm



Some drugs can treat cancer.

0 5 . 8 Complete the sentences.

Choose answers from the box.

[2 marks]

cells

people

plants

viruses

Preclinical testing of cancer drugs is done using _____.

To check if the drug is safe, the drug is tested on _____.

0 5 . 9 In drug trials some patients are given a tablet which does **not** contain the drug.

What name is given to the tablet that does **not** contain the drug?

[1 mark]

14

Turn over for the next question

Turn over ►



0 6

A student investigated the effect of different concentrations of salt solution on the mass of uncooked pieces of potato.

This is the method used.

1. Cut four pieces of a potato to the same size.
2. Record the mass of each piece of potato.
3. Put one of the pieces of potato into a beaker containing 100 cm³ of 0.1 mol/dm³ salt solution.
4. Repeat step 3 using the other pieces of potato, each in a different concentration of salt solution.
5. After 20 minutes, remove the pieces of potato from the solutions.
6. Record the mass of each piece of potato.

0 6 . 1

Give **two** control variables the student used in the investigation.

[2 marks]

1 _____

2 _____



0 6 . 2 The student needed to be sure the measurements were as accurate as possible.

What should be done to each piece of potato after removing from the solution and before measuring the mass?

[1 mark]

0 6 . 3 Name the piece of apparatus the student could use to measure the mass of the pieces of potato.

[1 mark]

Question 6 continues on the next page

Turn over ►



Table 4 shows the results.

Table 4

Piece of potato	Concentration of salt solution in mol/dm ³	Mass of piece of potato in grams			Percentage (%) change in mass of piece of potato
		At start	After 20 minutes	Change	
A	0.1	6.2	6.5	+ 0.3	+ 4.8
B	0.3	6.8	6.5	- 0.3	- 4.4
C	0.5	6.5	5.8	- 0.7	- 10.8
D	0.7	6.0	4.9	- 1.1	X

0 6 . 4 What was the resolution of the apparatus used for measuring mass?

Use Table 4.

[1 mark]

Tick (✓) **one** box.

0.01 g 0.1 g 1.0 g 1.1 g

0 6 . 5 Which piece of potato had the greatest change in mass in the investigation?

[1 mark]

Tick (✓) **one** box.

A B C D



0 6 . 6 Calculate value **X** in **Table 4**.

Use the equation:

$$\text{percentage change in mass} = \frac{\text{change in mass in grams}}{\text{mass at start in grams}} \times 100$$

Give your answer to 1 decimal place.

[3 marks]

X (1 decimal place) = _____ %

0 6 . 7 What is the best way to present the data in **Table 4**?

[1 mark]

Tick (✓) **one** box.

Bar chart

Line graph

Pie chart

Question 6 continues on the next page

Turn over ►



0 6 . 8 Complete the sentences.

[3 marks]

Some of the pieces of potato decreased in mass because the potato cells

lost _____.

The decrease in mass was due to a process called _____.

The structure surrounding each cell in a piece of potato is

partially _____.

0 6 . 9 **Table 4** is repeated below.

Table 4

Piece of potato	Concentration of salt solution in mol/dm ³	Mass of piece of potato in grams			Percentage (%) change in mass of piece of potato
		At start	After 20 minutes	Change	
A	0.1	6.2	6.5	+ 0.3	+ 4.8
B	0.3	6.8	6.5	- 0.3	- 4.4
C	0.5	6.5	5.8	- 0.7	- 10.8
D	0.7	6.0	4.9	- 1.1	X

Estimate the concentration of salt solution that would **not** cause a change in mass of these pieces of potato.

[1 mark]

Concentration = _____ mol/dm³

14



Turn over for the next question

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Turn over ►



0 7

A person has coronary heart disease.

0 7 . 1

Which blood vessels are affected by coronary heart disease?

[1 mark]Tick (✓) **one** box.

Arteries

Capillaries

Veins

A person's heart stops beating.

The person stops breathing.

A first-aider pushes down on the person's chest.

Pushing down on the person's chest puts pressure on the heart.

0 7 . 2

Explain why putting pressure on the heart helps the person.

[2 marks]



0 7 . 3 The first-aider also forces air into the person's lungs by blowing into their mouth.

Describe how forcing air into the person's lungs helps the person.

[1 mark]

0 7 . 4 The person's heart starts to beat again and the person starts breathing.

The person has a high level of cholesterol in their blood.

Name **one** type of drug that would decrease the level of cholesterol in the person's blood.

[1 mark]

0 7 . 5 A doctor decides that the person needs to have a stent fitted.

Explain how a stent works to treat coronary heart disease.

[2 marks]

Question 7 continues on the next page

Turn over ►



Table 5 shows the effect of smoking on the risk of developing different cardiovascular diseases.

Table 5

Cardiovascular disease	Percentage (%) increase in risk compared to people who have never smoked
E	14
F	20
G	29
H	70

0 7 . 6 Give **two** conclusions that can be made from the data in **Table 5**.

[2 marks]

1 _____

2 _____

0 7 . 7 Complete **Figure 6**.

You should:

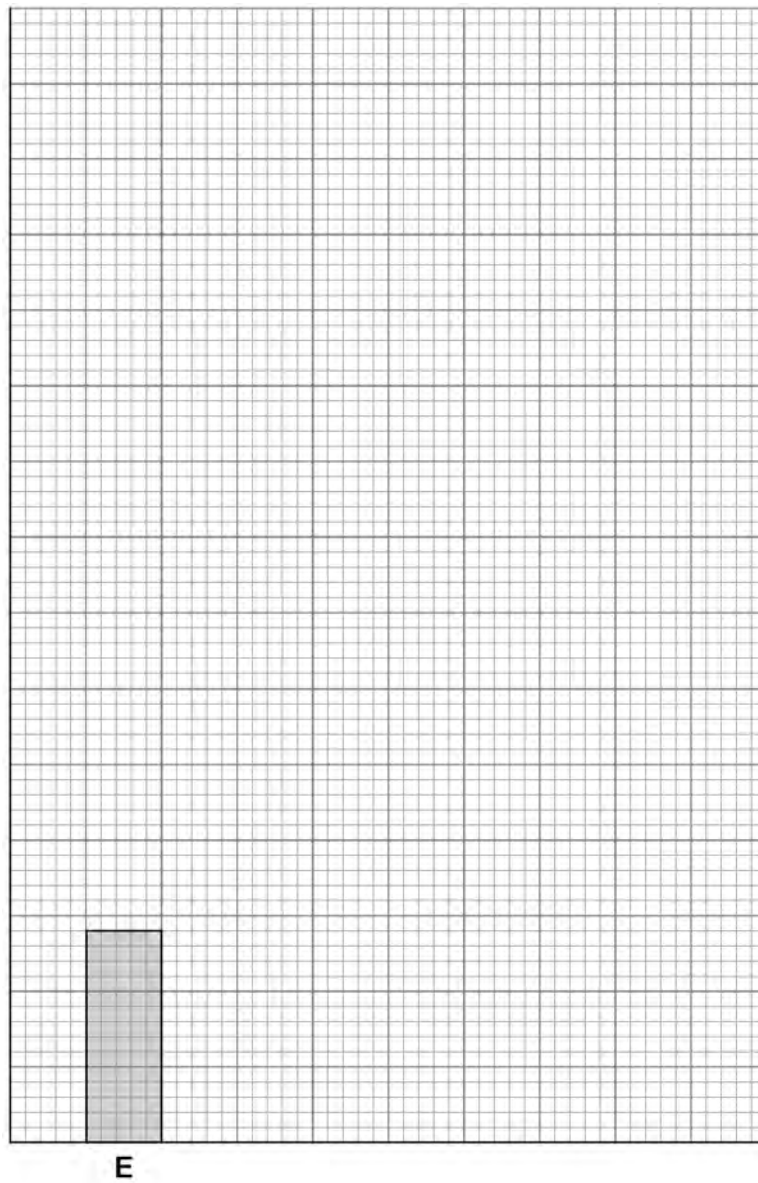
- label the y-axis
- add the correct scale to the y-axis
- plot the data from **Table 5**
- label each bar.

The bar for cardiovascular disease **E** has been plotted for you.

[4 marks]



Figure 6



Cardiovascular disease

0 7 . 8

Describe **one** lifestyle factor that can increase the risk of cardiovascular disease.Do **not** refer to smoking in your answer.

[1 mark]

14

Turn over ►



0 8

Cystic fibrosis (CF) is an inherited disorder caused by a faulty gene.

0 8 . 1

Where in a cell would the CF gene be found?

[1 mark]



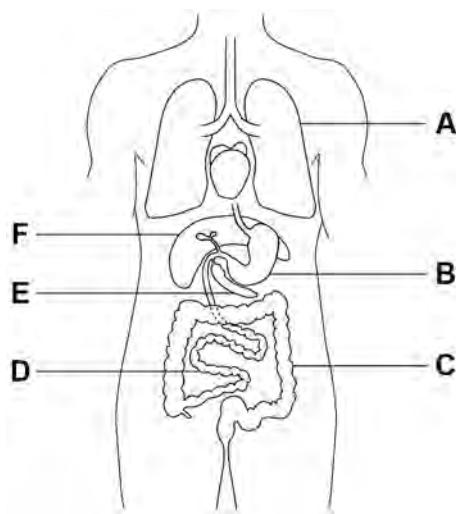
CF affects many organs in the body.

The main organs affected are:

- the lungs
- the pancreas
- the small intestine.

0 8 . 2 **Figure 7** shows organs of the human body.

Figure 7



Which letters in **Figure 7** show the lungs, the pancreas and the small intestine?

[1 mark]

Tick (✓) **one** box.

A, D and E

A, E and F

B, C and D

B, C and F

Question 8 continues on the next page

Turn over ►



0 8 . 4

Gas exchange happens in the alveoli in the lungs.

Describe **three** features of the alveoli that help maximise gas exchange.

[3 marks]

1 _____

2 _____

3 _____

0 8 . 5

CF reduces the amount of oxygen that can enter the blood from the alveoli.

Explain how a reduced amount of oxygen entering the blood will affect the human body.

[3 marks]

14

END OF QUESTIONS



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