AQA

Please write clearly in block capitals.

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

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.

| For Examiner's Use | |
|---|---|
| Question | Mark |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| **TOTAL** | |

**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.

Do not write outside the box

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.

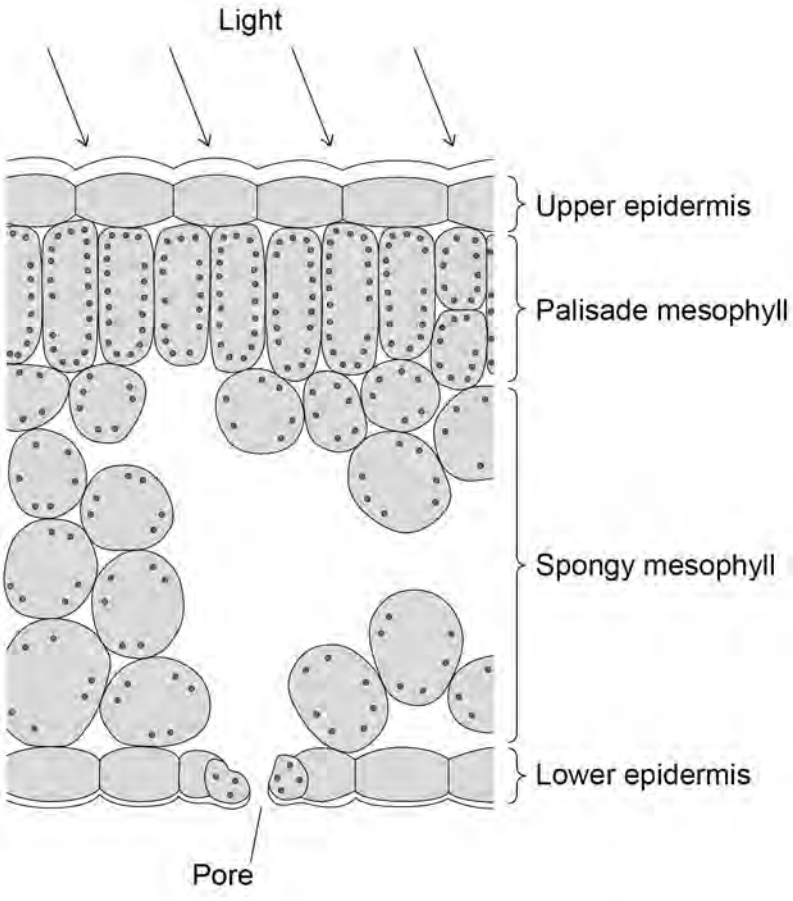
Organ ☐

Organism ☐

Organ system ☐

**Figure 1** shows the tissues in a leaf.

**Figure 1**



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**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**

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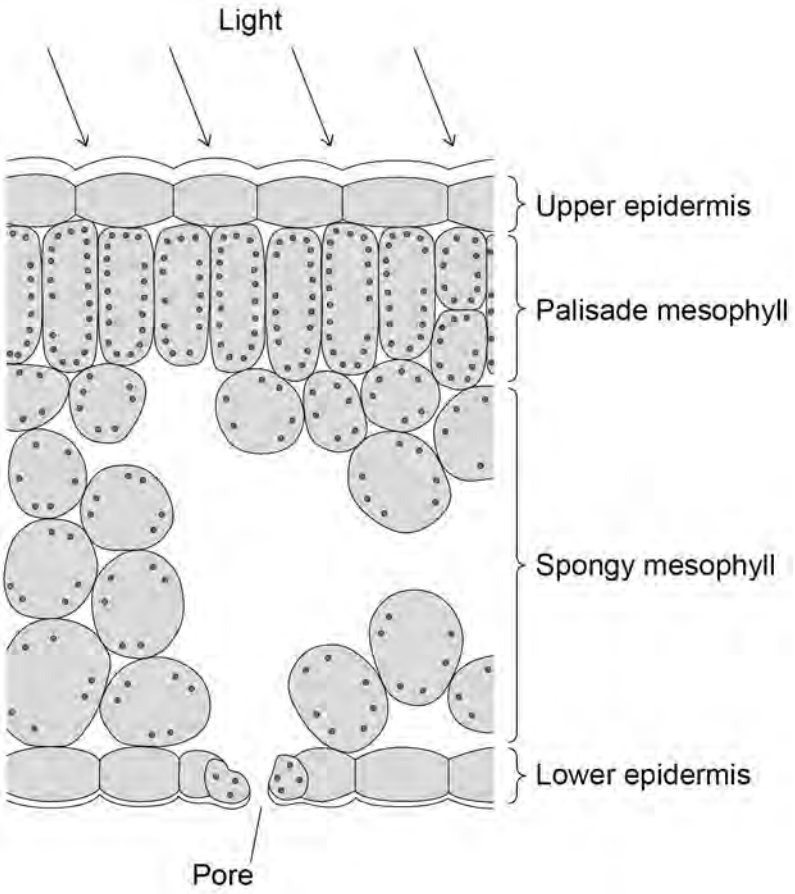
**Figure 1** is repeated below.

**Figure 1**




**0 1 . 5** The upper epidermis is transparent.

Explain why the upper epidermis needs to be transparent.

Use **Figure 1**.

**[2 marks]**

*Do not write outside the box*

**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**

*Do not write outside the box*

**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]**

Do not write outside the box

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**

Do not write outside the box

**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 $cm^3$ of culture solution.
2. Use acid to adjust the pH of the solutions to be pH1, pH2, pH3 and pH5
3. Add 1 $cm^3$ of bacteria mixture to each test tube.
4. Take a 0.1 $cm^3$ 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 |

Do not write outside the box

**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]**

8

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**ANSWER IN THE SPACES PROVIDED**

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**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 |
|---|---|
| | Help clot the blood where the vaccine was injected |
| Platelets | 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**

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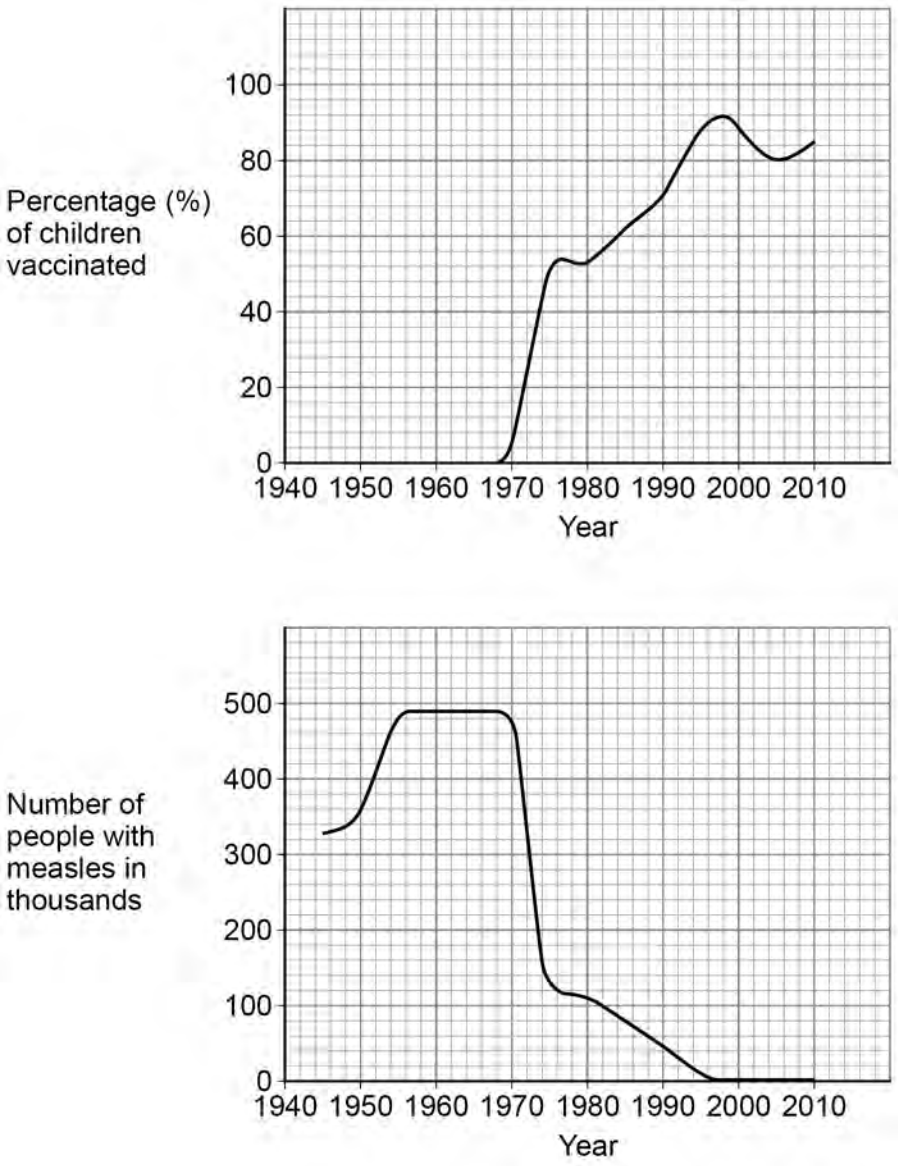
**Figure 3** shows information about trends in the UK for:

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

**Figure 3**



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**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**

*Do not write outside the box*

**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**

*Do not write outside the box*

**0 4** Starch and sugar are two types of carbohydrate.

**0 4 . 1** Describe the chemical tests that a student could use to show if bread contains:

- starch
- sugar.

You should include the results of a positive test **and** a negative test for each type of carbohydrate.

**[4 marks]**

**Question 4 continues on the next page**

*Do not write outside the box*

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 _____.

*Do not write outside the box*

**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**

*Do not write outside the box*

**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]**

Do not write outside the box

**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**

*Do not write outside the box*

**0 5** Cancer occurs when there is uncontrolled cell division.

**0 5 . 1** Which **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 ☐

*Do not write outside the box*

**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 _____.

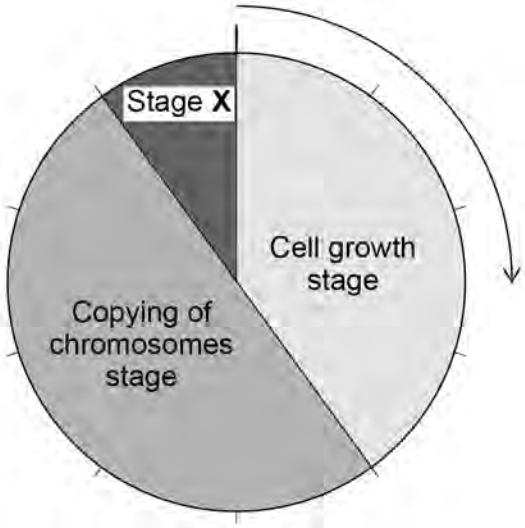
Before a cell divides, the DNA in the nucleus needs to _____.

**Question 5 continues on the next page**

*Do not write outside the box*

**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. ☐

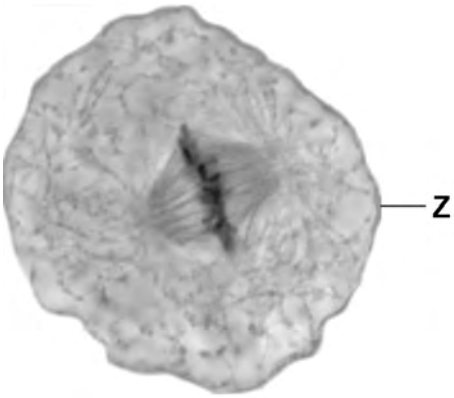
The cell increases in size and mass. ☐

The number of mitochondria increases. ☐

*Do not write outside the box*

**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**

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**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

Do not write outside the box

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**

Do not write outside the box

**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 $cm^3$ of 0.1 $mol/dm^3$ 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 _____

_____

Do not write outside the box

**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**

*Do not write outside the box*

**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** ☐

*Do not write outside the box*

**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**

Do not write outside the box

**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/dm$^3$

14

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**Turn over for the next question**

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**ANSWER IN THE SPACES PROVIDED**

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**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]**

*Do not write outside the box*

**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**

*Do not write outside the box*

**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:

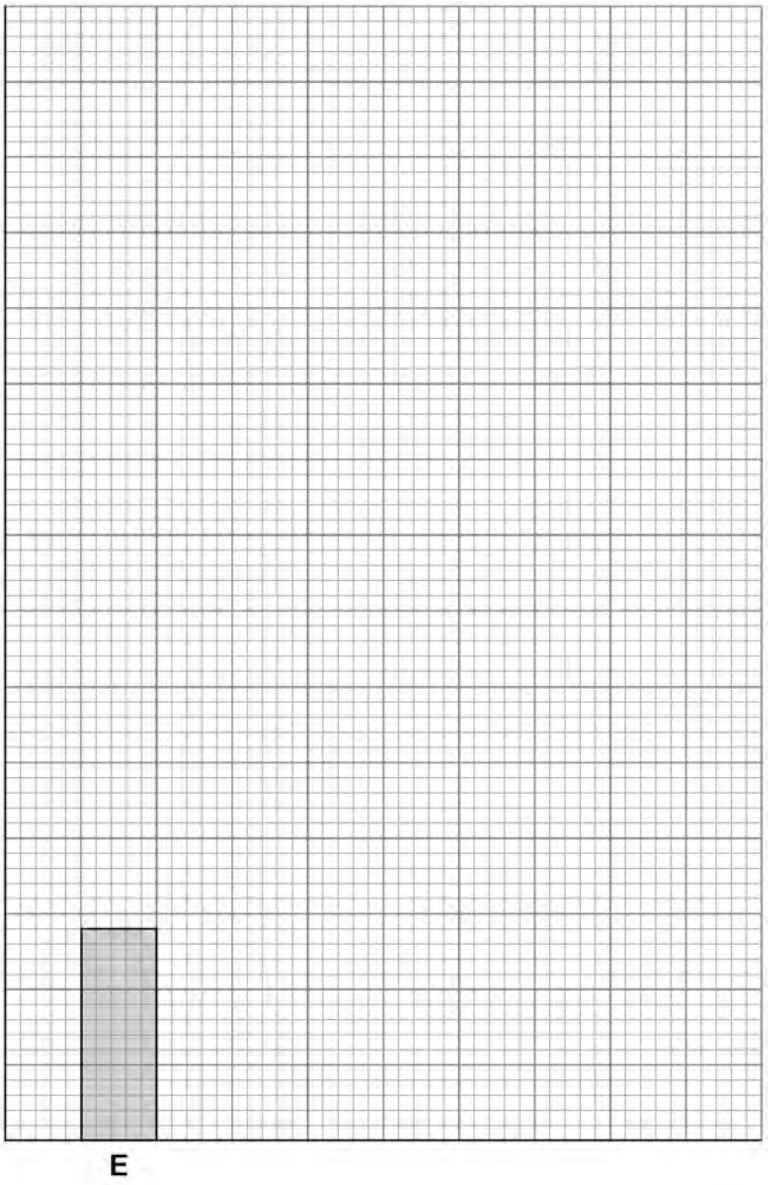
- label the y-axis
- add the correct scale to the y-axis
- plot the data from **Table 5**
- label each bar.

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

**[4 marks]**

*Do not write outside the box*

**Figure 6**




**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 ►**

Do not write outside the box

**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]**

*Do not write outside the box*

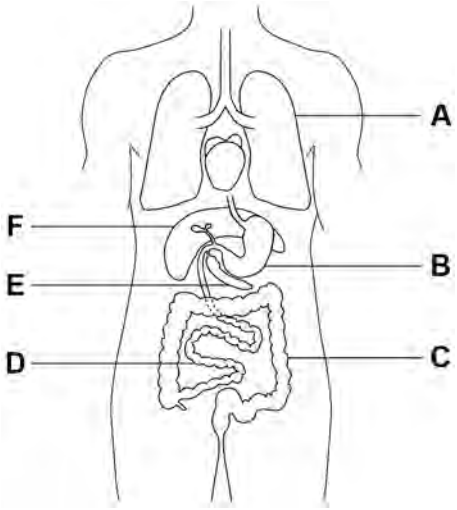
CF affects many organs in the body.

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**

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**0 8 . 3** The pancreas produces several digestive enzymes.

CF reduces the amount of each enzyme that reaches the small intestine.

Explain why a person with CF has:

- difficulty digesting food
- difficulty gaining body mass.

**[6 marks]**

Do not write outside the box

**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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**ANSWER IN THE SPACES PROVIDED**