AQA

Surname _____

Forename(s) _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE

BIOLOGY

F

Foundation Tier Paper 1F

8461/1F

Friday 10 May 2024 **Morning**

Time allowed: 1 hour 45 minutes

At the top of the page, write your surname and forename(s), your centre number, your candidate number and add your signature.

[Turn over]

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.**
- **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.**

DO NOT TURN OVER UNTIL TOLD TO DO SO

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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]

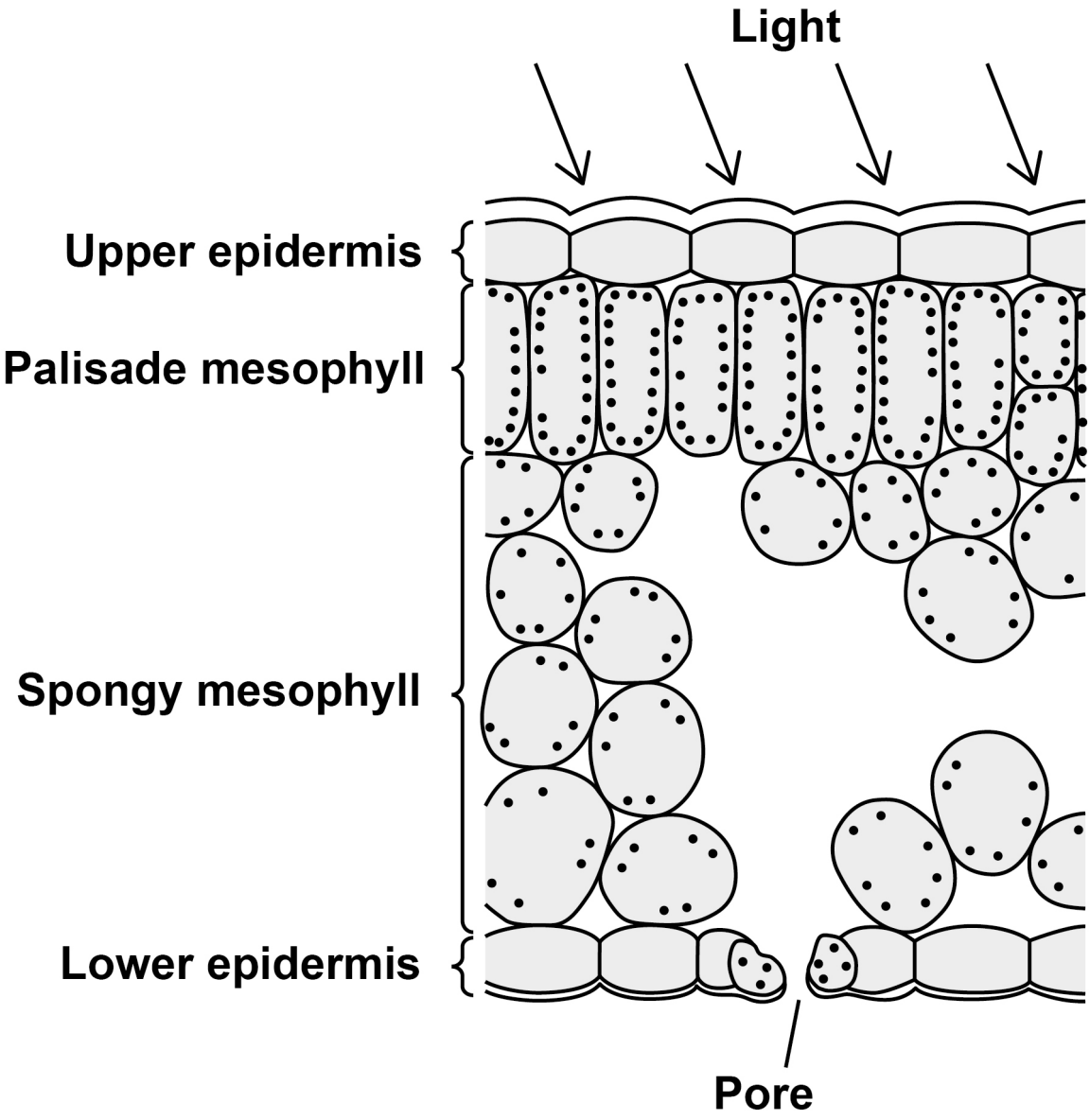
Tick (✓) ONE box.

- ☐ **Organ**
- ☐ **Organism**
- ☐ **Organ system**

[Turn over]

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

[Turn over]

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]

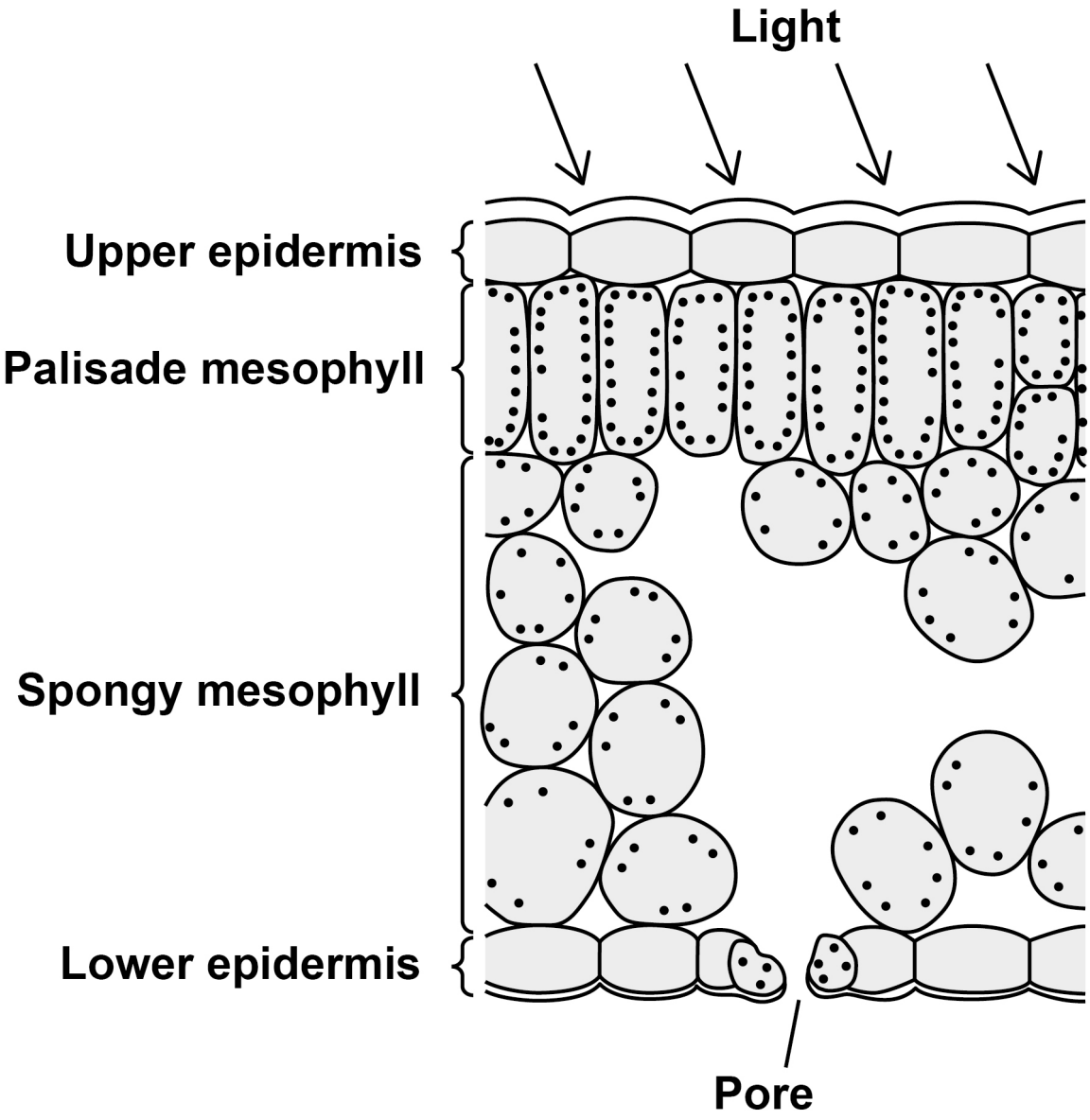
Tick (✓) ONE box.

- ☐ **Glucose**
- ☐ **Lignin**
- ☐ **Starch**

[Turn over]

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, on the opposite page. [2 marks]

0 1 . 6

Complete the sentences.

Choose answers from the list. [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 _____ .

BLANK 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**

[Turn over]

0 1 . 9

Which cell structures are needed to provide energy to move sugars? [1 mark]

Tick (✓) ONE box.

- ☐ **Chloroplasts**
- ☐ **Chromosomes**
- ☐ **Mitochondria**

12

0 2

Pathogens cause disease.

0 2 . 1

How does the skin defend the human body against pathogens? [1 mark]

_____

_____

_____

[Turn over]

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, on the opposite page, 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 = _____

[Turn over]

REPEAT OF 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 . 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]

_____

_____

_____

_____

_____

_____

[Turn over]

8

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

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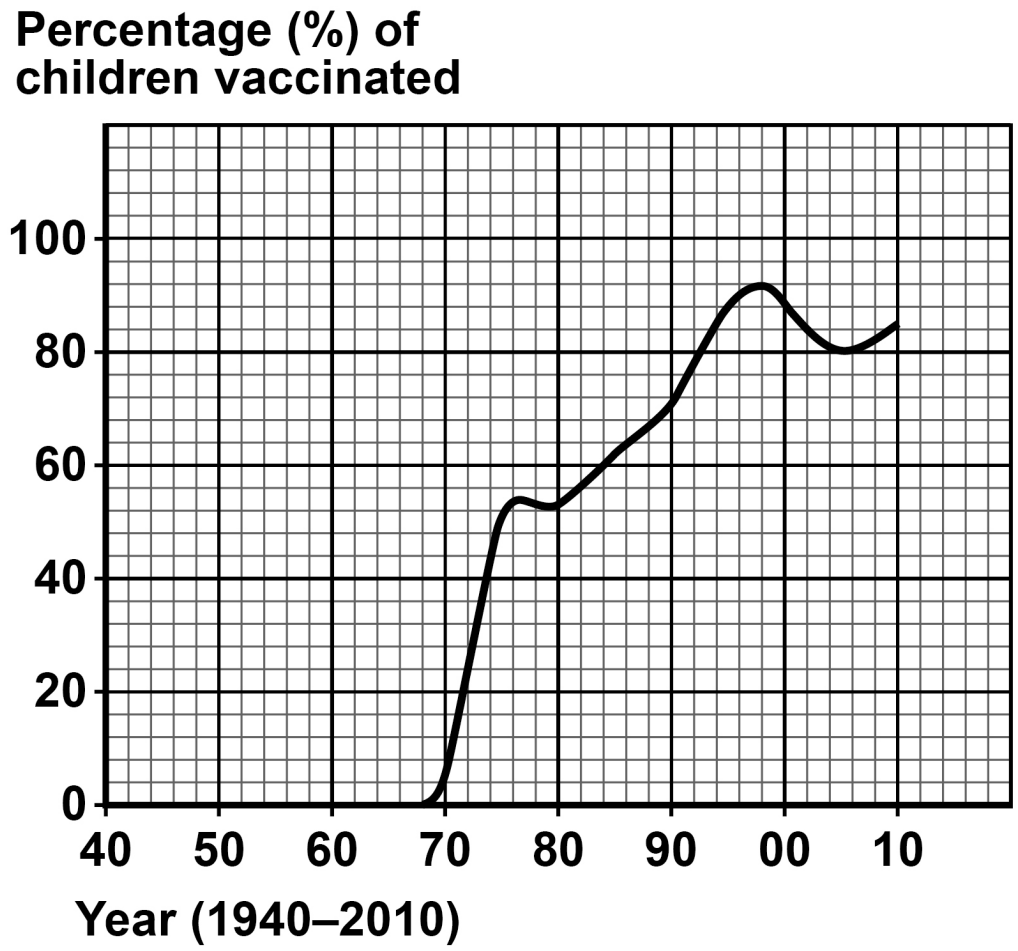
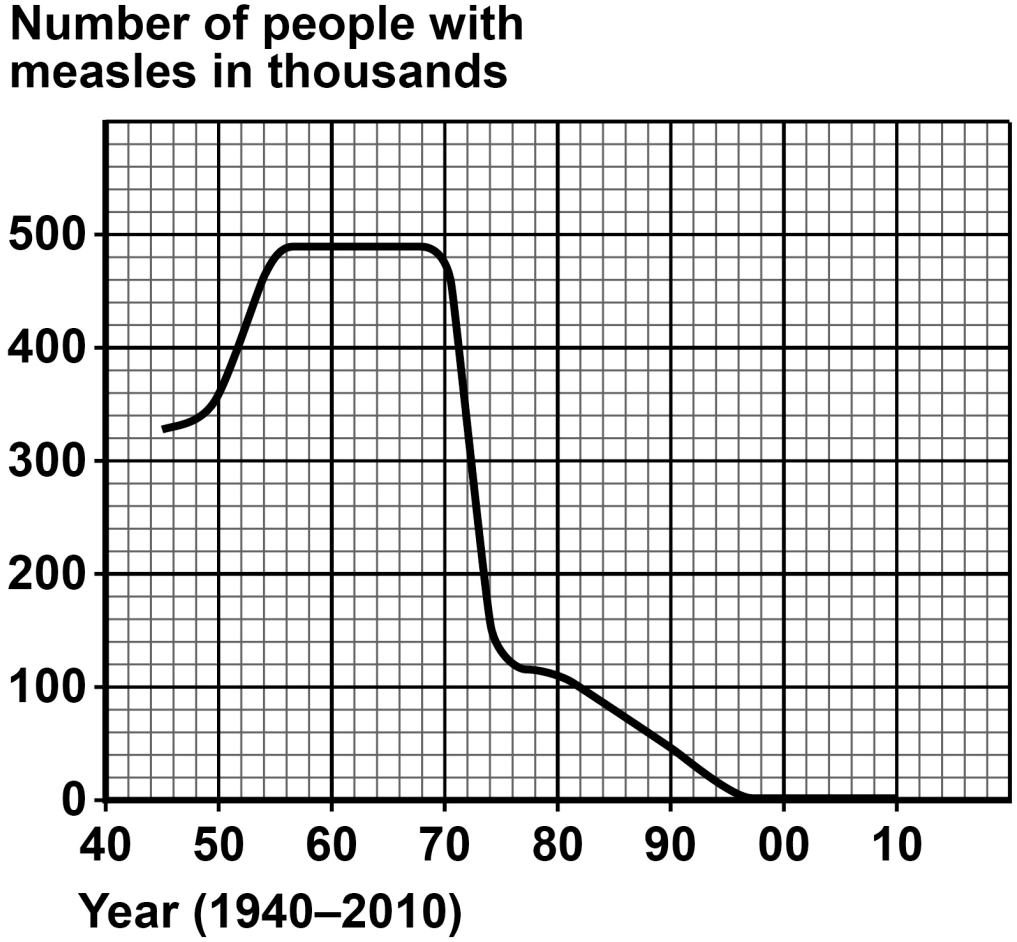
[Turn over]

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]

_____

_____

[Turn over]

BLANK PAGE

0 3 . 3

Describe the trend in the NUMBER OF PEOPLE WITH MEASLES from 1945 to 1975.

Use FIGURE 3, on pages 24 and 25. [3 marks]

[Turn over]

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, on pages 24 and 25. [1 mark]

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.**

[Turn over]

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]

_____

_____

_____

[Turn over]

10

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]

[Turn over]

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 list. [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 _____ .

[Turn over]

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, on page 34. [2 marks]

1 _____

_____

_____

2 _____

_____

_____

[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

[Turn over]

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

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**

[Turn over]

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 list. [2 marks]

- **decrease**
- **fertilise**
- **grow**
- **replicate**

Before a cell divides, the cell needs to

_____ .

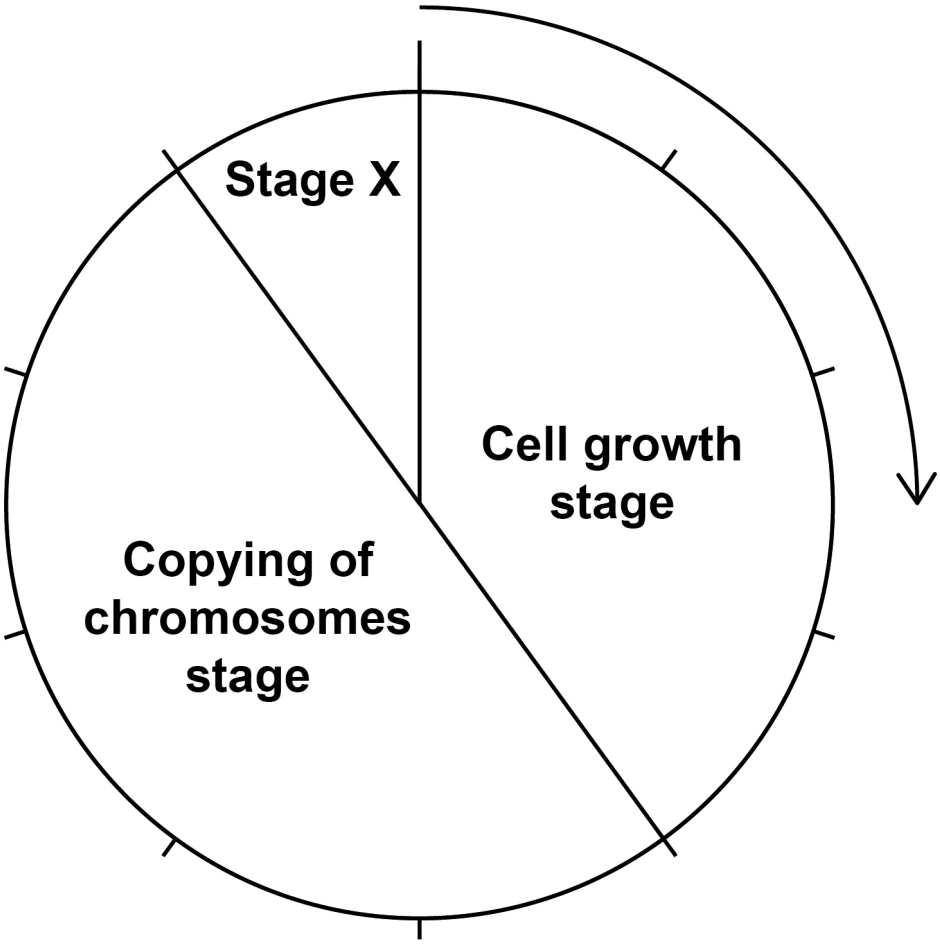
Before a cell divides, the DNA in the nucleus needs to

_____ .

[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?

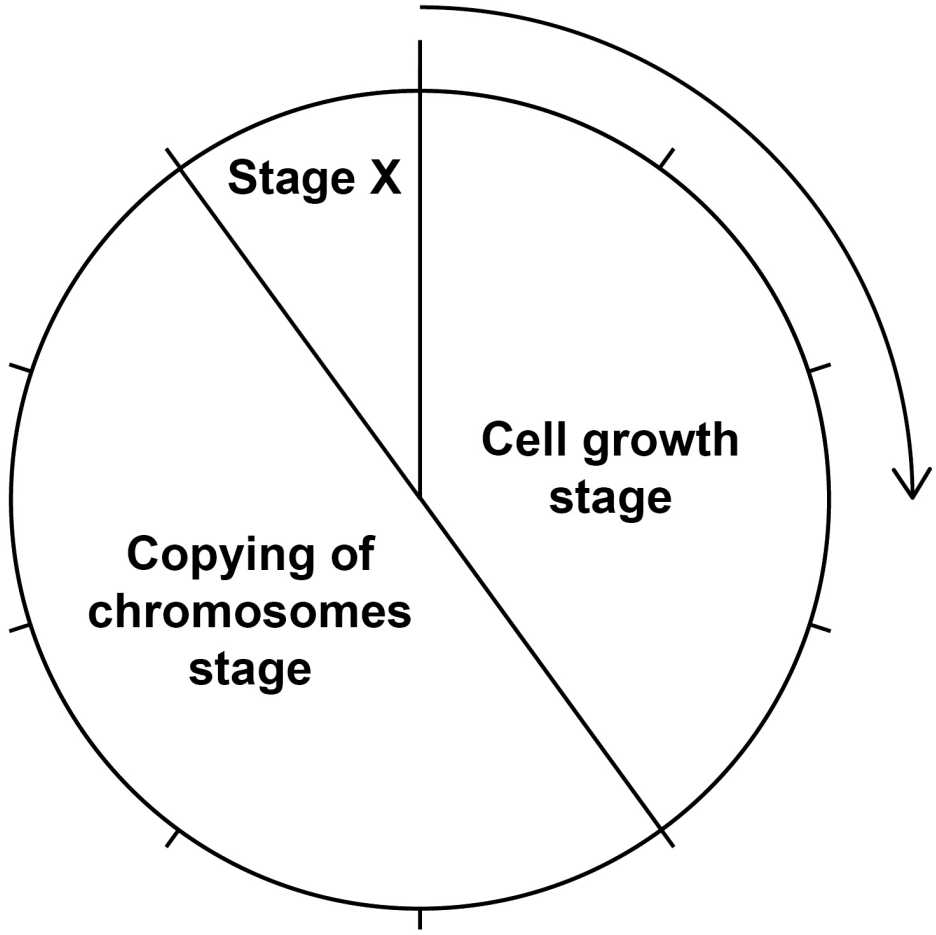
Use FIGURE 4. [1 mark]

Tick (✓) ONE box.

- ☐ **10%**
- ☐ **20%**
- ☐ **40%**
- ☐ **90%**

[Turn over]

REPEAT OF FIGURE 4



0 5 . 5

What happens during stage X of the cell cycle in FIGURE 4? [1 mark]

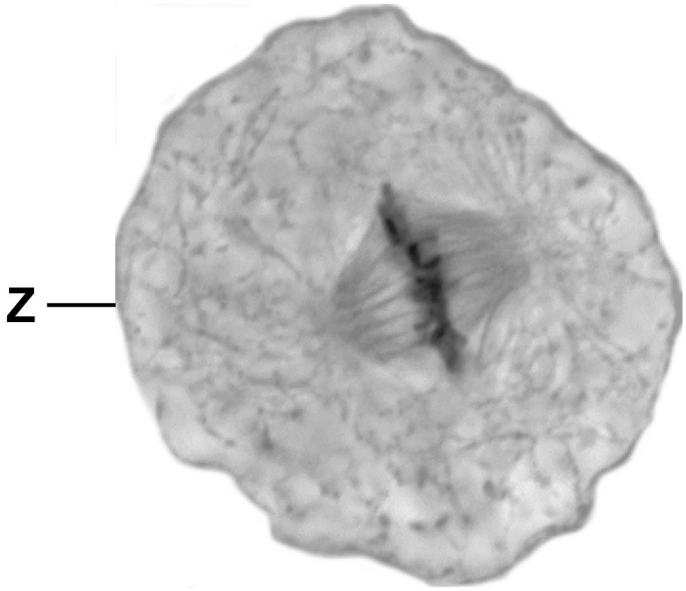
Tick (✓) ONE box.

- ☐ **Chromosomes are pulled to each end of the cell.**
- ☐ **The cell increases in size and mass.**
- ☐ **The number of mitochondria increases.**

[Turn over]

FIGURE 5 shows an animal cell during cell division.

FIGURE 5



0 5 . 6

Name structure Z in FIGURE 5. [1 mark]

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

[Turn over]

Some drugs can treat cancer.

0 5 . 8

Complete the sentences.

Choose answers from the list. [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]

_____

_____

[Turn over]

14

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 _____

_____

_____

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]

_____

_____

[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**

[Turn over]

BLANK PAGE

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**

[Turn over]

REPEAT OF 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 . 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) = _____ %

[Turn over]

0 6 . 7

What is the best way to present the data in TABLE 4, on page 58?
[1 mark]

Tick (✓) ONE box.

- ☐ **Bar chart**
- ☐ **Line graph**
- ☐ **Pie chart**

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

[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]

[Turn over]

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]

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 _____

_____

_____

[Turn over]

REPEAT OF 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 . 7

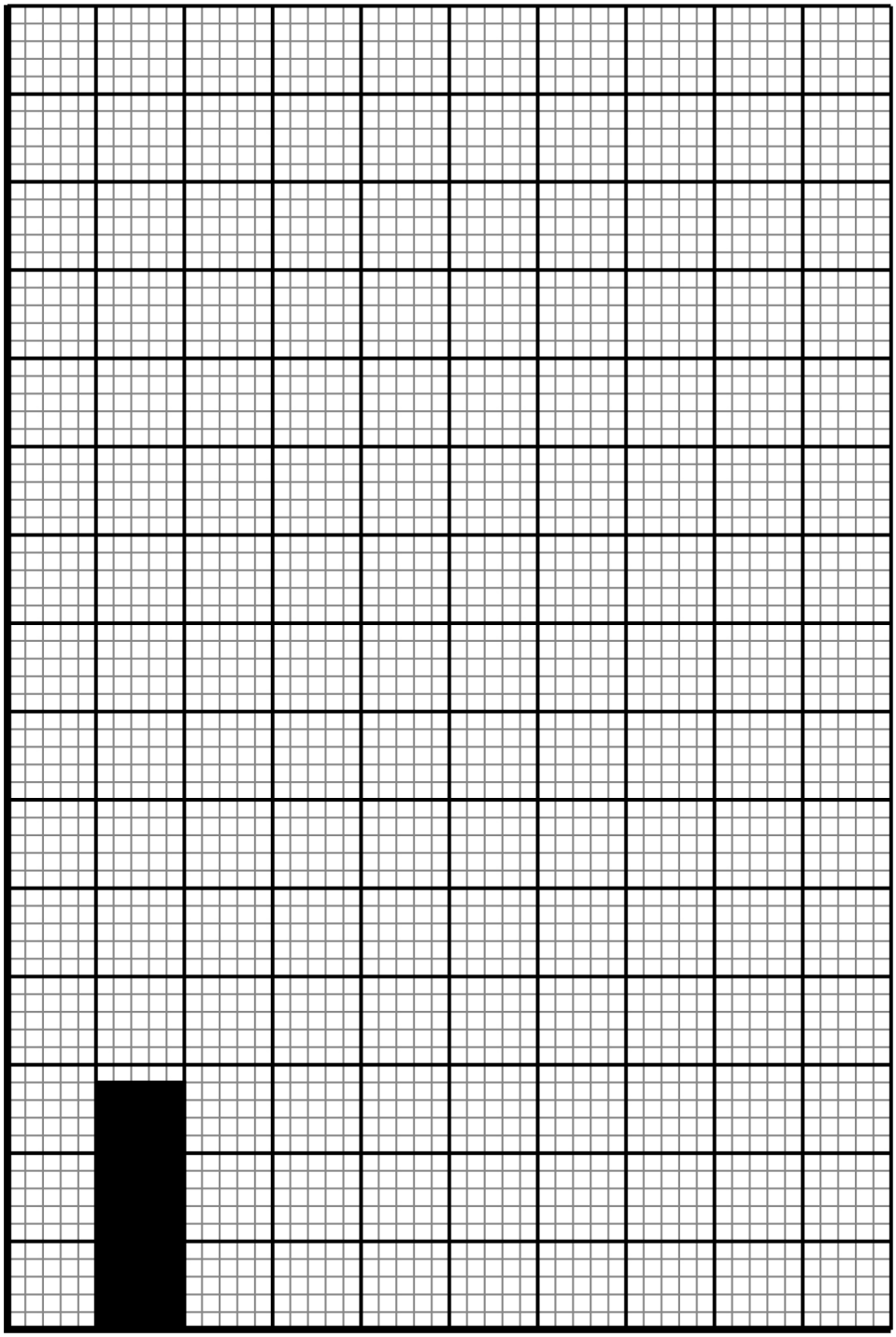
Complete FIGURE 6, on the opposite page.

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



E

Cardiovascular disease

[Turn over]

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

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]

_____

_____

[Turn over]

CF affects many organs in the body.

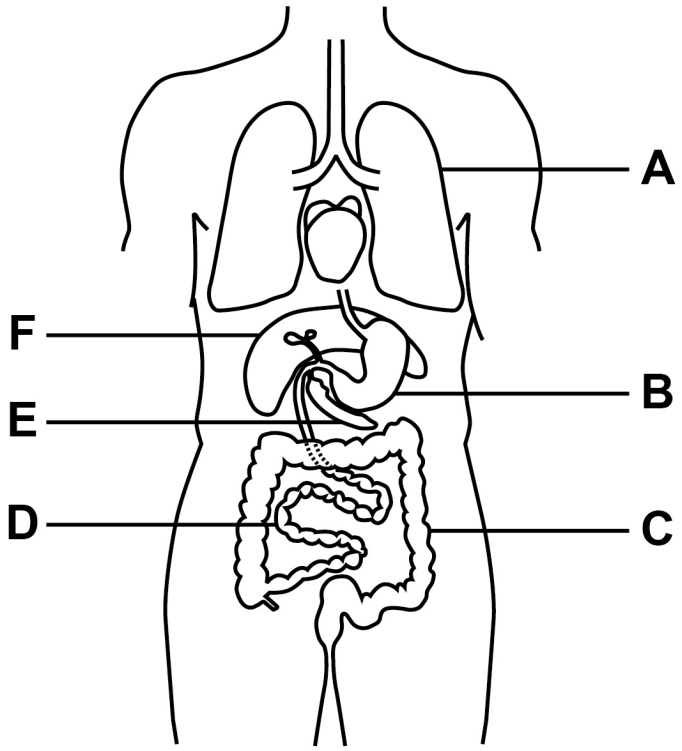
The main organs affected are:

- **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**

[Turn over]

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]

[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 _____

_____

_____

[Turn over]

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]

END OF QUESTIONS

14

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

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