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

H

Higher Tier Paper 1H

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.

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

Do not write outside the box

0 1 A person has coronary heart disease.

0 1 . 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 1 . 2 Explain why putting pressure on the heart helps the person.

[2 marks]

Do not write outside the box

0 1 . 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 1 . 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 1 . 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 1 continues on the next page

Do not write outside the box

Table 1 shows the effect of smoking on the risk of developing different cardiovascular diseases.

Table 1

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

0 1 . 6 Give **two** conclusions that can be made from the data in **Table 1**.

[2 marks]

1 _____

_____

2 _____

_____

0 1 . 7 Complete **Figure 1**.

You should:

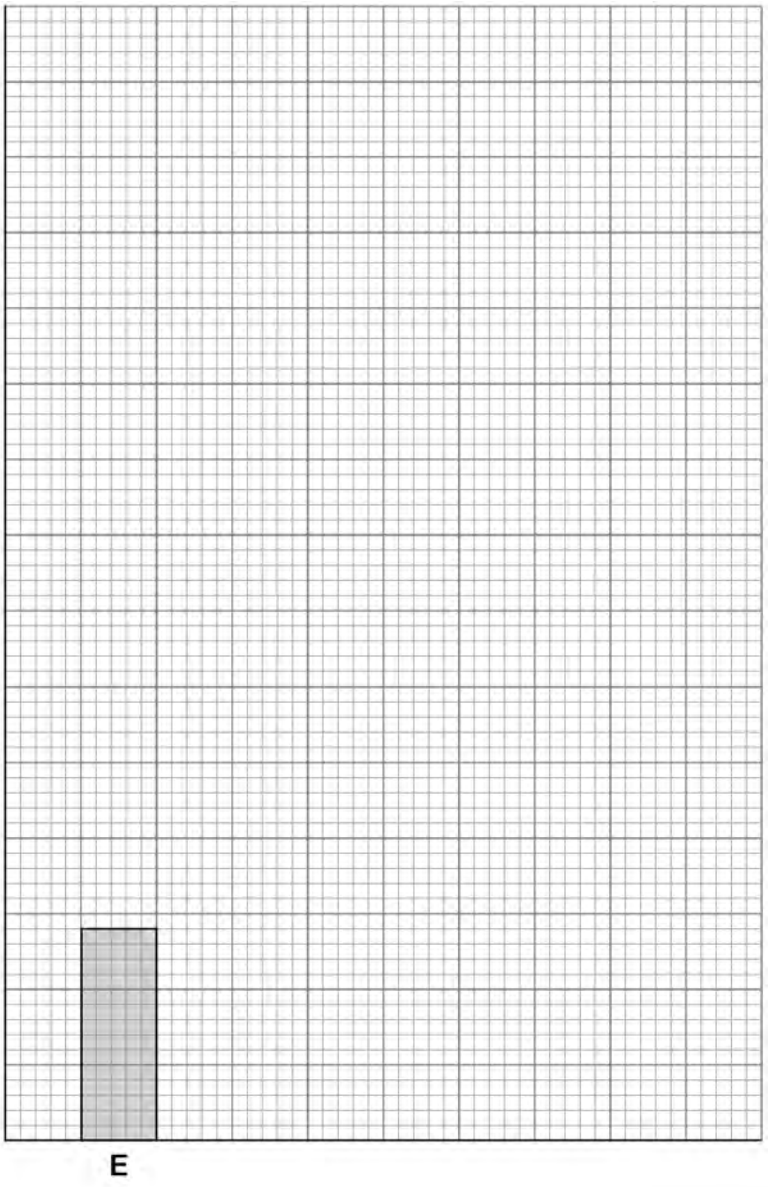
- label the y-axis
- add the correct scale to the y-axis
- plot the data from **Table 1**
- label each bar.

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

[4 marks]

Do not write outside the box

Figure 1



0 1 . 8 Describe **one** lifestyle factor that can increase the risk of cardiovascular disease.

Do **not** refer to smoking in your answer.

[1 mark]

14

Do not write outside the box

0 2 Cystic fibrosis (CF) is an inherited disorder caused by a faulty gene.

0 2 . 1 Where in a cell would the CF gene be found?

[1 mark]

Do not write outside the box

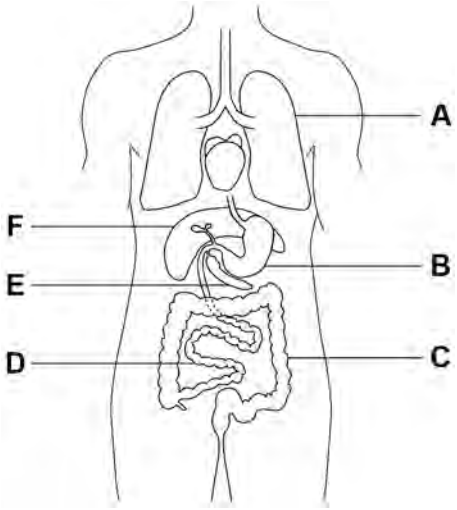
CF affects many organs in the body.

The main organs affected are:

- the lungs
- the pancreas
- the small intestine.

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

Figure 2



Which letters in **Figure 2** 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 2 continues on the next page

Do not write outside the box

0 2 . 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 2 . 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 2 . 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

Turn over for the next question

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

0 3 Cake and bread each contain the same two types of carbohydrate.

0 3 . 1 Describe the chemical tests that could be used to show the presence of the two types of carbohydrate in cake.

Include a risk assessment in your answer.

[6 marks]

Question 3 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 3 . 2 What was the dependent variable in the investigation?

[1 mark]

0 3 . 3 Give **one** control variable the student should have used in the investigation.

[1 mark]

Do not write outside the box

0 3 . 4 During the investigation, the bread began to taste sweet in the student's mouth.

Explain why the bread tasted sweet.

[3 marks]

0 3 . 5 Suggest **one** reason why the results of the investigation were **not** valid.

Do **not** refer to control variables in your answer.

[1 mark]

12

Turn over for the next question

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

0 4 Plants contain many different tissues.

0 4 . 1 Complete the sentences.

[3 marks]

The leaf tissue that contains the most chloroplasts is

the _____ .

The leaf tissue that contains many air spaces is

the _____ .

The plant tissue that can differentiate throughout the life of the plant is

the _____ .

0 4 . 2 Xylem tissue transports water through a plant.

The walls of xylem cells contain cellulose.

Name **one other** substance that strengthens xylem tissue.

[1 mark]

_____

0 4 . 3 Phloem tissue transports dissolved sugars around a plant.

Name the process that transports dissolved sugars around a plant.

[1 mark]

_____

Question 4 continues on the next page

Do not write outside the box

Figure 3 shows two plant cells.

Figure 3

Figure 3 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 4 . 4 Name part **Y** in **Figure 3**.

[1 mark]

Do not write outside the box

0 4 . 5 The phloem tissue transports sugars to other parts of the plant.

The concentration of dissolved sugars in the phloem cell in **Figure 3** is higher than in cell **X**.

Explain how sub-cellular structures help to move dissolved sugars from cell **X** into the phloem cell.

[5 marks]

0 4 . 6 New phloem cells form when unspecialised plant cells differentiate and become specialised.

Describe **one** change in structure that occurs when an unspecialised cell differentiates to form a phloem cell.

Use **Figure 3**.

[1 mark]

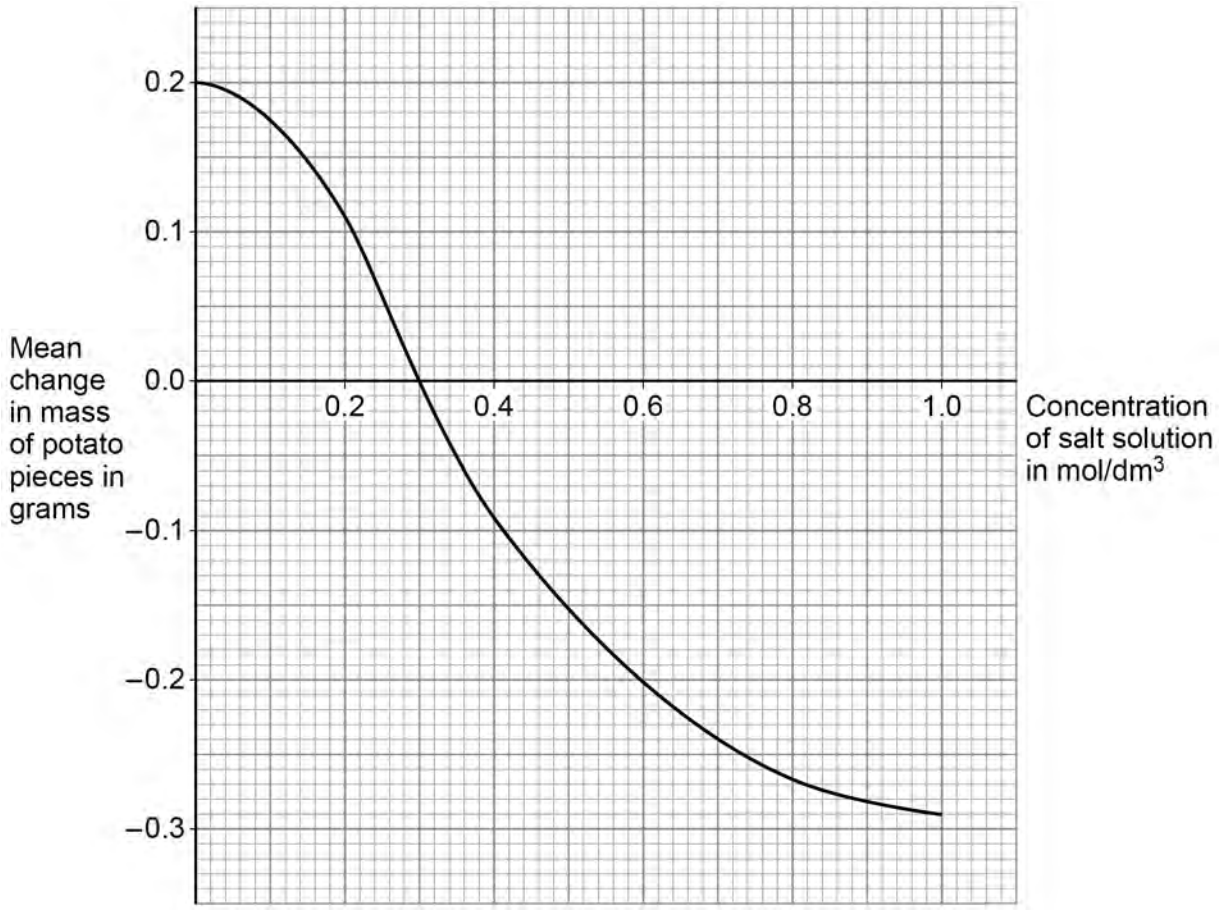
12

Do not write outside the box

0 5 A student investigated the effect of concentration of salt solution on the mass of uncooked potato pieces.

Figure 4 shows the results.

Figure 4



0 5 . 1 Plan a method that could be used to obtain the results in **Figure 4**.

[6 marks]

Do not write outside the box

0 5 . 2 Explain the result for the potato pieces in the 0.6 mol/dm^3 salt concentration.

[3 marks]

0 5 . 3 Explain why the result for the potato pieces at 1.0 mol/dm^3 was different from the result at 0.6 mol/dm^3.

[2 marks]

11

Do not write outside the box

0 6 This question is about pathogens.

A scientist investigated antibiotic resistance in bacteria.

0 6 . 1 Name **one** antibiotic.

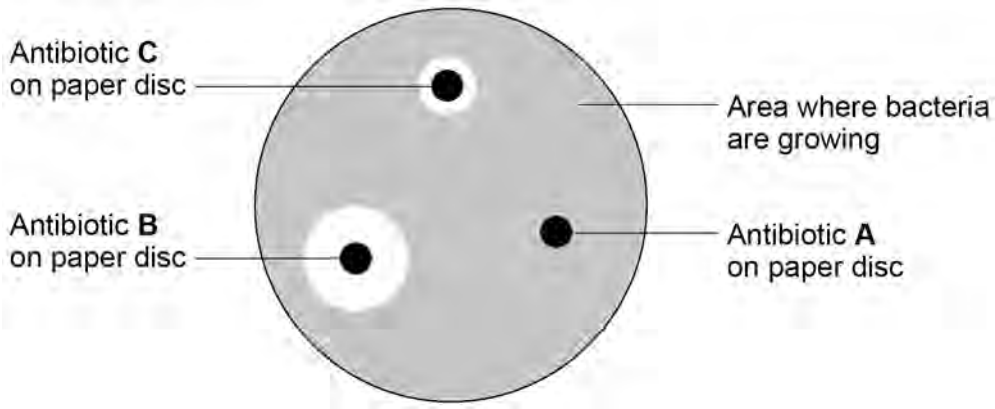
[1 mark]

The scientist grew one type of bacterium on agar in a Petri dish.

The scientist placed paper discs each containing a different antibiotic on the agar.

Figure 5 shows the appearance of the Petri dish after 2 days.

Figure 5



Do not write outside the box

0 6 . 2 A student said:

‘The bacterium is resistant to antibiotic **C**.’

Explain how the results in **Figure 5** show that the student is **not** correct.

[2 marks]

0 6 . 3 Suggest why doctors are concerned about antibiotic resistance.

[2 marks]

Question 6 continues on the next page

Do not write outside the box

Diseases caused by viruses **cannot** be treated using antibiotics.

0 6 . 4 Suggest why viruses **cannot** be grown on agar.

[1 mark]

0 6 . 5 Why is it difficult for scientists to develop drugs to destroy viruses?

[1 mark]

0 6 . 6 Which disease is caused by a virus that damages white blood cells?

[1 mark]

Tick (✓) **one** box.

AIDS ☐

Gonorrhoea ☐

Measles ☐

Salmonella ☐

8

Do not write outside the box

0 7 A student investigated the effect of different factors on photosynthesis.

The student used three leaves growing on the same plant.

Each leaf was treated in a different way.

After 48 hours the student tested each leaf for starch.

Table 3 shows the results.

Table 3

Leaf tested	Treatment	Result after 48 hours
1	Upper and lower surfaces covered with black paper	No starch present
2	Upper and lower surfaces covered and sealed with transparent plastic	No starch present
3	**Not** covered	Starch present

0 7 . 1 Explain the results for the three leaves.

[5 marks]

Question 7 continues on the next page

Do not write outside the box

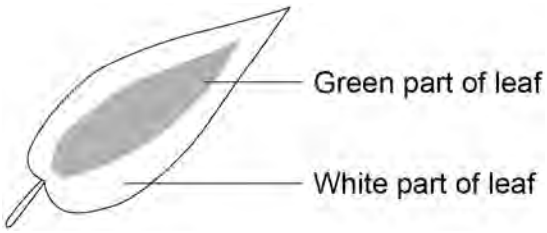
In another investigation the student used a different type of plant.

The plant was left uncovered in the light for 48 hours.

After 48 hours the student tested a leaf from the plant for starch.

Figure 6 shows the leaf before it was tested for starch.

Figure 6



0 7 . 2 Complete **Table 4** to show the results you would expect for the starch test on the leaf in **Figure 6**.

[1 mark]

Table 4

Part of leaf tested	**Result after 48 hours**
Green	
White	

0 7 . 3 Explain the results you gave in Question **07.2**.

[2 marks]

Do not write outside the box

In some leaves, the green parts become yellow because of an ion deficiency.

0 7 . 4 Which ion is deficient in a plant with yellow leaves?

[1 mark]

0 7 . 5 Give the scientific term that describes the yellow colour of the leaves.

[1 mark]

0 7 . 6 The rate of photosynthesis is affected by different factors.

How could the oxygen produced during photosynthesis be used to measure the **rate** of photosynthesis?

[1 mark]

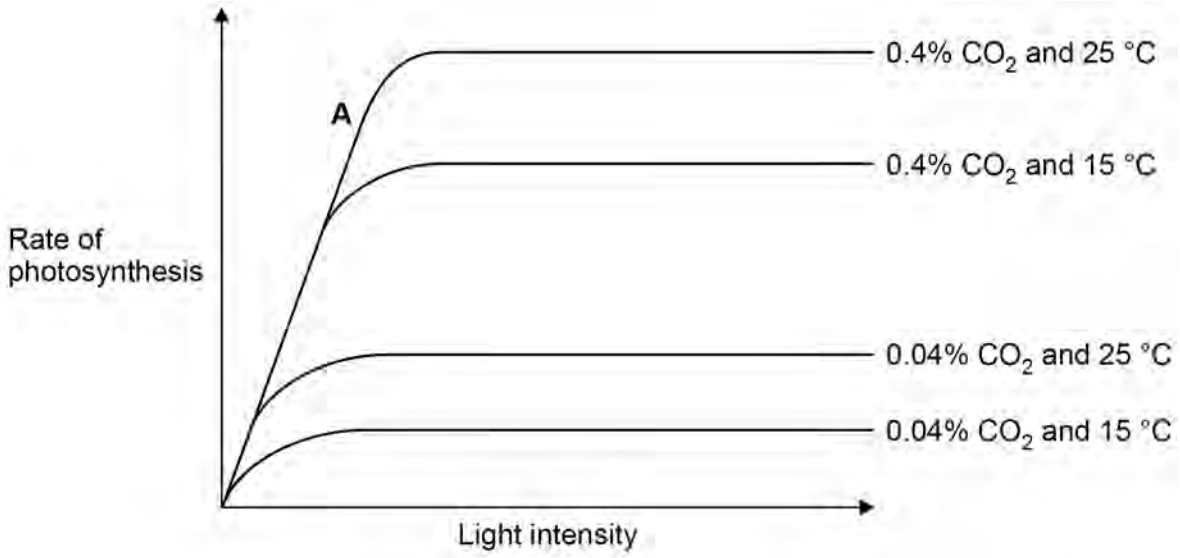
Question 7 continues on the next page

Do not write outside the box

Light, carbon dioxide and temperature are limiting factors of photosynthesis.

Figure 7 shows how the rate of photosynthesis is affected by light, carbon dioxide and temperature.

Figure 7



0 7 . 7 At point **A** on **Figure 7**, light is a limiting factor.

What is meant by a 'limiting factor'?

[1 mark]

Do not write outside the box

0 7 . 8 Explain the effect of increasing temperature and increasing carbon dioxide concentration on the rate of photosynthesis shown in **Figure 7**.

[4 marks]

0 7 . 9 Photosynthesis investigations often use a light source.

The spreading out of light from a source obeys the inverse square law.

The inverse square law links light intensity to distance from the light source.

Which of the following shows the inverse square law?

[1 mark]

Tick (✓) **one** box.

light intensity $\propto \frac{1}{\text{distance}^2}$ ☐

light intensity $\propto$ distance^2 ☐

$\frac{1}{(\text{light intensity})^2} \propto$ distance^2 ☐

$\frac{1}{(\text{light intensity})^2} \propto \frac{1}{\text{distance}^2}$ ☐

17

Do not write outside the box

0 8 Cancer is caused by changes in cells that result in uncontrolled cell division.

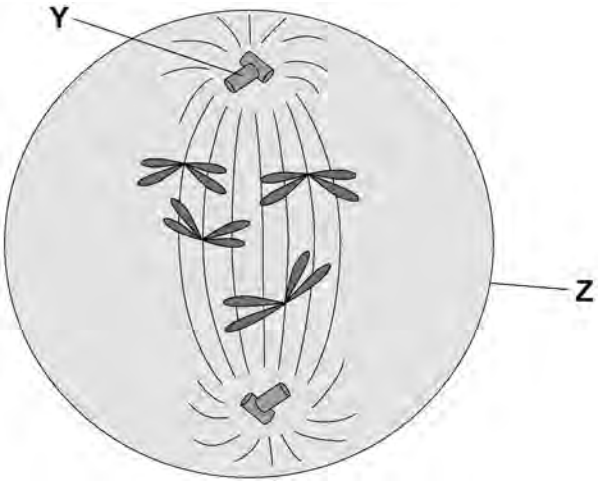
0 8 . 1 Before a cell begins to divide, its DNA replicates to form two copies of each chromosome.

Describe **one other** change that occurs in a cell **before** the cell begins to divide.

[1 mark]

Figure 8 shows a cell during one of the stages of cell division.

Figure 8



0 8 . 2 Name structure **Z** in **Figure 8**.

[1 mark]

Do not write outside the box

0 8 . 3 Structure **Y** in **Figure 8** is a cylinder.

For structure **Y**:

- real volume = 24 500 000 nm^3
- real radius = 125 nm.

The length of a cylinder is calculated using the equation:

$$\text{length} = \frac{\text{volume}}{\pi \times \text{radius}^2}$$

The length of the image of structure **Y** in **Figure 8** is 4 mm.

Calculate the magnification of structure **Y** in **Figure 8**.

Use $\pi = 3.14$

[6 marks]

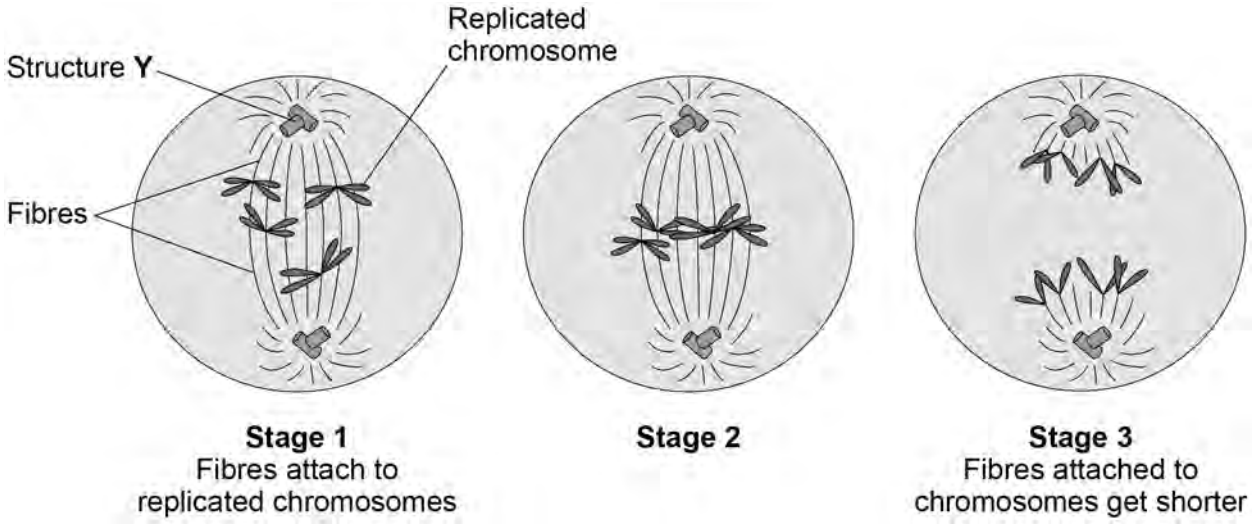
Magnification = × _____

Question 8 continues on the next page

Do not write outside the box

Figure 9 shows some of the stages of cell division.

Figure 9



Some cancer drugs prevent cell division.

Drug **X** prevents the fibres from attaching to the replicated chromosomes in **stage 1**.

0 8 . 4 Explain why a cell **cannot** complete division when affected by drug **X**.

[2 marks]

Do not write outside the box

0 8 . 5 Give the reason why a drug that stops cell division helps to treat cancer.

[1 mark]

0 8 . 6 New cancer drugs are tested in clinical trials.

Preclinical testing happens before clinical trials.

What is involved in preclinical testing of drugs?

[1 mark]

Tick (✓) **one** box.

Testing the drugs for side effects ☐

Testing the drugs on live tissues in a laboratory ☐

Testing the drugs to find the optimum dose ☐

Testing the drugs with chemicals in a laboratory ☐

12

END OF QUESTIONS

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

Do not write outside the box

Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

Do not write outside the box

Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED