SPECIMEN MATERIAL

GCSE
COMBINED SCIENCE: TRILOGY

F

Foundation Tier Paper 1: Biology 1F

Specimen 2018 Time allowed: 1 hour 15 minutes

Materials
For this paper you must have:
- a ruler
- a calculator.

Instructions
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- There are 70 marks available on this paper.
- 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.
- When answering questions 04.5 and 07.2 you need to make sure that your answer:
  - is clear, logical, sensibly structured
  - fully meets the requirements of the question
  - shows that each separate point or step supports the overall answer.

Advice
In all calculations, show clearly how you work out your answer.

Please write clearly, in block capitals.

Centre number ☐☐☐☐☐ Candidate number ☐☐☐☐

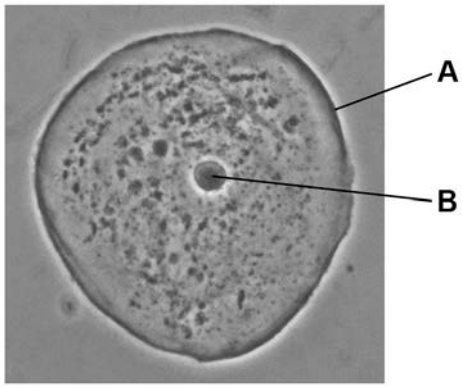
Surname ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Forename(s) ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Candidate signature _____

0 1 **Figure 1** shows an animal cell.

Figure 1



0 1 . 1 What is structure **A**?

[1 mark]

Tick **one** box.

- Cell membrane ☐
- Cell wall ☐
- Chromosome ☐
- Cytoplasm ☐

0 1 . 2 What is structure **B**?

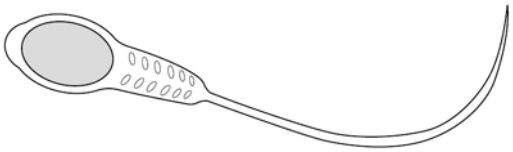
[1 mark]

Tick **one** box.

- Chloroplast ☐
- Mitochondria ☐
- Nucleus ☐
- Vacuole ☐

0 1 . 3 **Figure 2** shows a sperm cell.

Figure 2



Describe how a sperm cell is adapted to carry out its function.

[1 mark]

Question 1 continues on the next page

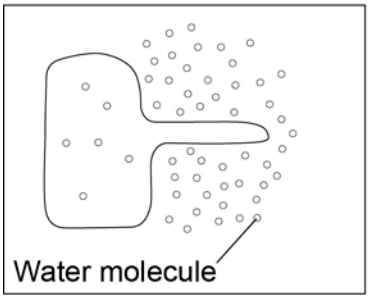
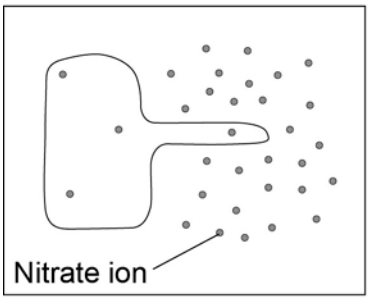
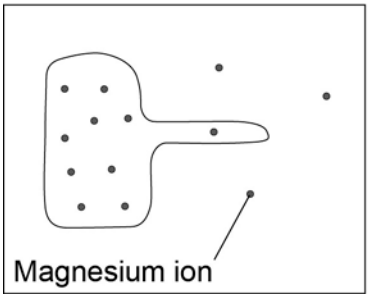
0 1 . 4 Substances can move into and out of cells by three processes.

The diagrams show the concentration of different substances inside and outside a root hair cell.

How would each substance move into the root hair cell?

[2 marks]

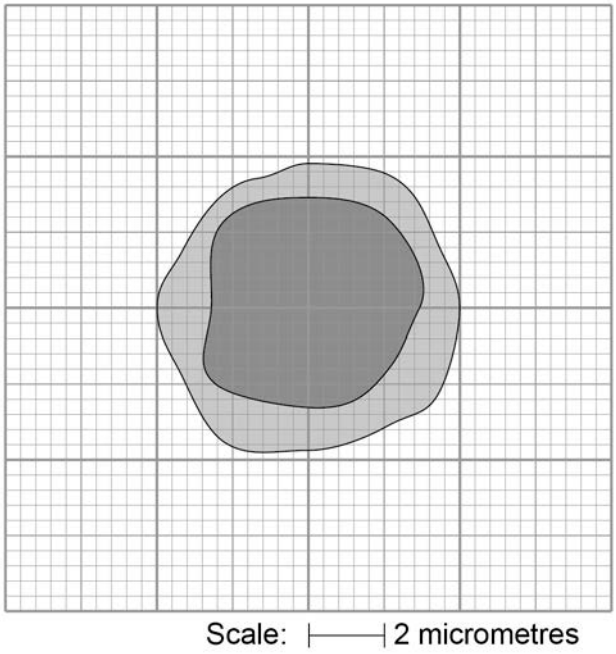
Draw **one** line from each root hair cell to the correct process.

Root hair cell	Process
	Active transport
	Diffusion
	Osmosis

Turn over for the next question

0 2 **Figure 3** shows a scale drawing of one type of cell in blood.

Figure 3



0 2 . 1 Use the scale to determine the width of the cell.

Give your answer to the nearest micrometre.

[1 mark]

Width of cell = _____ micrometres

0 2 . 2 Complete **Table 1**.

[3 marks]

Table 1

Part of the blood	Function
	Carries oxygen around the body
	Protects the body against infection
Plasma	

0 2 . 3 Platelets are fragments of cells.

Platelets help the blood to clot.

Suggest what might happen if the blood did **not** clot.

[1 mark]

Turn over for the next question

0 3 Respiration can happen aerobically or anaerobically.

Respiration transfers energy from glucose.

0 3 . 1 Draw **one** line from each type of respiration in human cells to the correct information.

[2 marks]

Type of respiration in human cells	Information
Aerobic respiration	Produces ethanol
Anaerobic respiration	Uses oxygen
	Uses carbon dioxide
	Produces lactic acid

0 3 . 2 **Table 2** shows the amount of energy released by aerobic and anaerobic respiration.

Table 2

	Energy in kJ transferred from 1 g of glucose
Aerobic respiration	16.1
Anaerobic respiration	1.2

Suggest why human cells might respire anaerobically, even though only a small amount of energy is transferred.

[1 mark]

0 3 . 3 Yeast is used in the brewing and baking industries.

Why is yeast used in these industries?

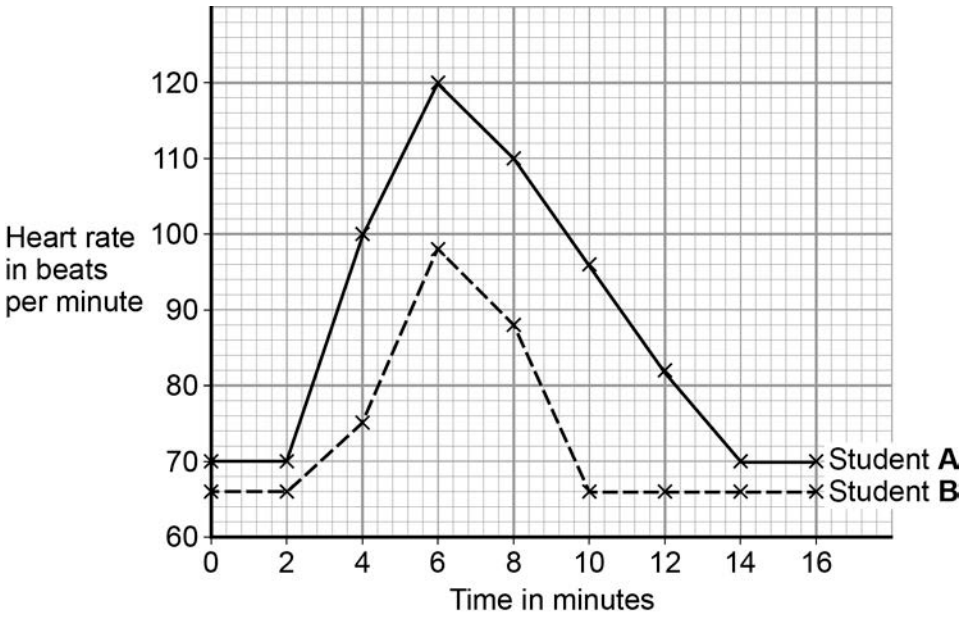
[4 marks]

Turn over for the next question

0 4 Some students investigated how exercise affects heart rate.

Figure 4 shows their results.

Figure 4



0 4 . 1 What was Student **B**'s resting heart rate?

[1 mark]

Resting heart rate = _____ beats per minute

0 4 . 2 The students started running at 2 minutes.

What evidence for this is in **Figure 4**?

[1 mark]

_____

_____

0 4 . 3 For how many minutes did the students run?

[1 mark]

Tick **one** box.

2 ☐

4 ☐

6 ☐

14 ☐

0 4 . 4 Student **B** is fitter than Student **A**.

Use **Figure 4** to give **two** pieces of evidence that support this statement.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 5 There are other changes in the body during exercise.

Explain why these changes occur.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

There are no questions printed on this page

0 5 When an organism grows, new cells are produced by cell division.

0 5 . 1 What type of cell division happens to produce new body cells?

[1 mark]

Tick **one** box.

- Differentiation ☐
- Meiosis ☐
- Mitosis ☐

0 5 . 2 Why can cancers grow very large?

[1 mark]

Tick **one** box.

- Cancer cells are specialised ☐
- Cell division is slow ☐
- Cell division is uncontrolled ☐

0 5 . 3 Give **one** factor which increases the risk of getting cancer.

[1 mark]

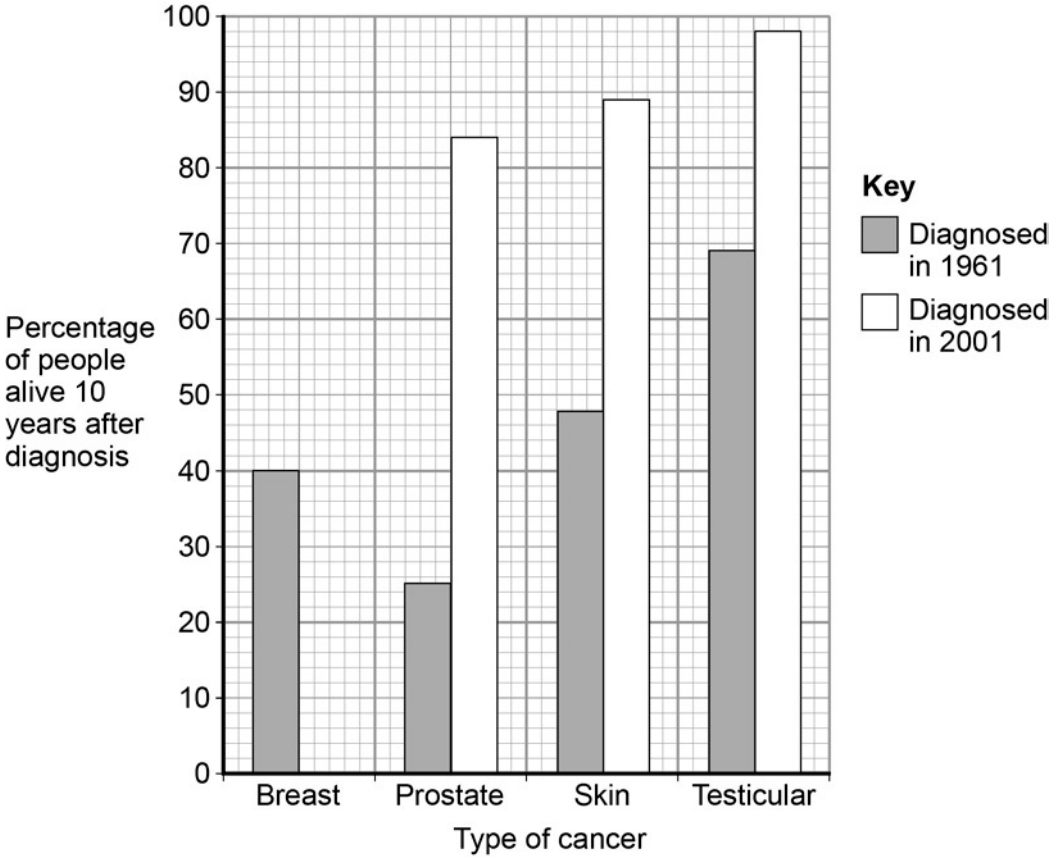
Question 5 continues on the next page

Survival rates for people with cancer have improved a lot.

People who are alive 10 years after diagnosis are usually considered to be cured.

Figure 5 shows data for people diagnosed with cancer in 1961 and 2001.

Figure 5



0 5 . 4 78% of people diagnosed with breast cancer in 2001 were alive 10 years later.

Complete **Figure 5** to show this information.

[1 mark]

0 5 . 5 Which type of cancer diagnosed in 1961 had the highest survival rate?

[1 mark]

Tick **one** box.

- Breast ☐
- Prostate ☐
- Skin ☐
- Testicular ☐

0 5 . 6 Which type of cancer shows the biggest improvement in the percentage of people alive after 10 years?

[1 mark]

Tick **one** box.

- Breast ☐
- Prostate ☐
- Skin ☐
- Testicular ☐

0 5 . 7 Suggest **two** reasons why the survival rates for all cancers have increased.

[2 marks]

1 _____

_____

2 _____

_____

Turn over for the next question

0 6 Pathogens cause infectious diseases in animals and plants.

0 6 . 1 Draw **one** line from each disease to the type of pathogen that causes the disease.

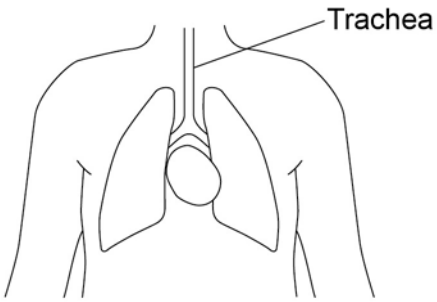
[3 marks]

Disease	Type of pathogen
Gonorrhoea	Bacterium
Malaria	Fungus
Measles	Protist
	Virus

Some parts of the human body have adaptations to reduce the entry of live pathogens.

Look at **Figure 6**.

Figure 6



0 6 . 2 Explain how the trachea is adapted to reduce the entry of live pathogens.

[4 marks]

Question 6 continues on the next page

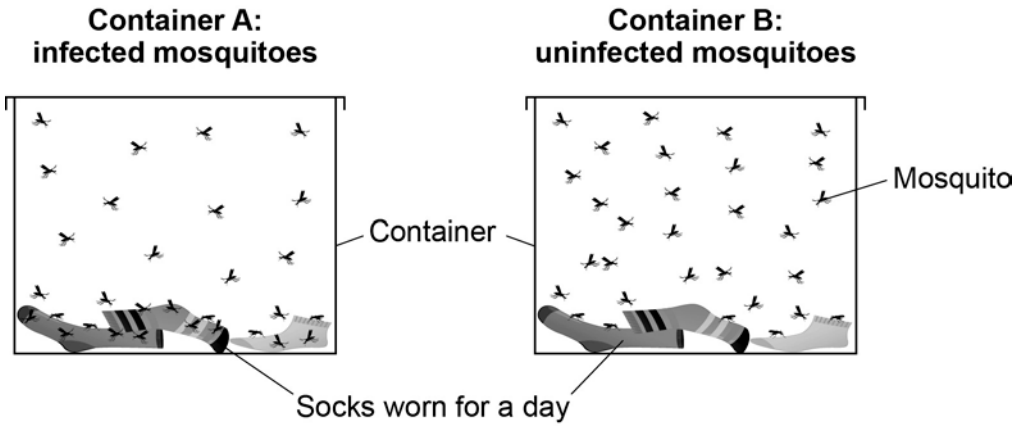
Malaria is a serious disease that can be fatal.

Malaria is spread to humans by infected mosquitoes.

Scientists investigated the behaviour of mosquitoes to understand how the spread of malaria could be controlled.

Figure 7 shows the equipment the scientists used.

Figure 7



This is the method used.

1. 30 mosquitoes **infected with malaria** were placed in Container **A**.
2. 30 **uninfected** mosquitoes were placed in Container **B**.
3. The total number of times the mosquitoes landed on the socks was recorded.

0 6 . 3 Name the dependent variable and suggest **one** control variable in this investigation.

[2 marks]

Dependent variable _____

Control variable _____

0 6 . 4 Infected mosquitoes landed on the socks three times more often than uninfected mosquitoes.

Explain how this information can be used to reduce the spread of malaria.

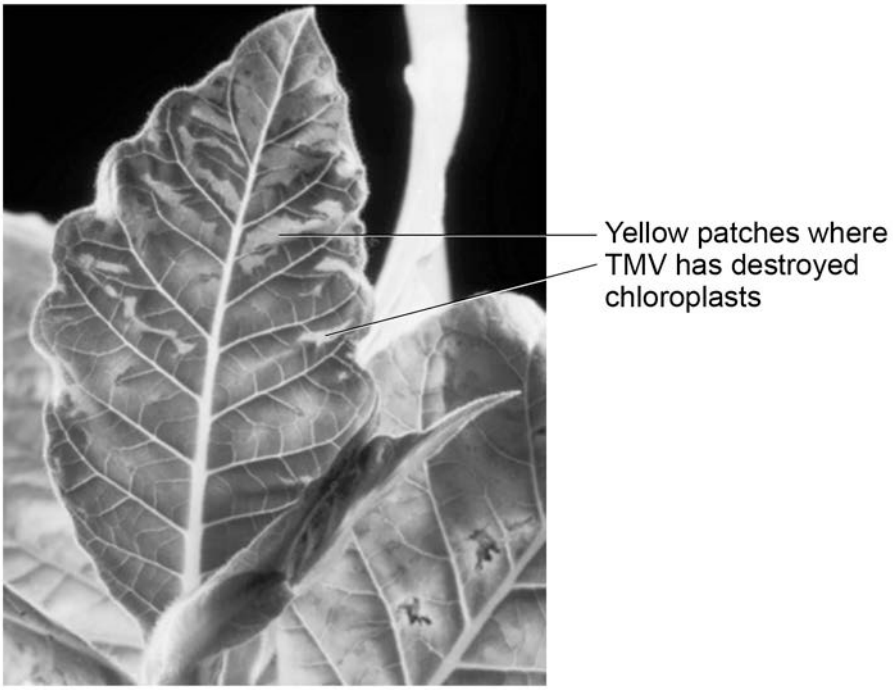
[2 marks]

Question 6 continues on the next page

0 6 . 5 Tobacco mosaic virus (TMV) affects many species of plant.

Figure 8 shows a leaf infected with TMV.

Figure 8



TMV destroys chloroplasts in the leaf.

Explain how this could affect the growth of the plant.

[3 marks]

Turn over for the next question

0 7 Plants absorb light to photosynthesise.

0 7 . 1 What is the correct word equation for photosynthesis?

[1 mark]

Tick **one** box.

carbon dioxide + glucose ⟶ oxygen + water ☐

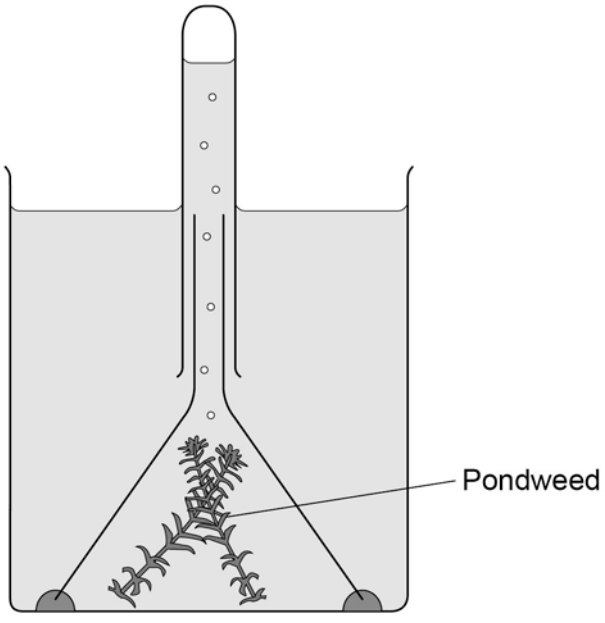
glucose + oxygen ⟶ carbon dioxide + water ☐

oxygen + water ⟶ carbon dioxide + glucose ☐

water + carbon dioxide ⟶ oxygen + glucose ☐

0 7 . 2 **Figure 9** shows some of the apparatus that can be used to measure the rate of photosynthesis.

Figure 9



The rate of photosynthesis in the pondweed is affected by different colours of light.

Describe a method you could use to investigate this.

You should include:

- what you would measure
- variables you would control.

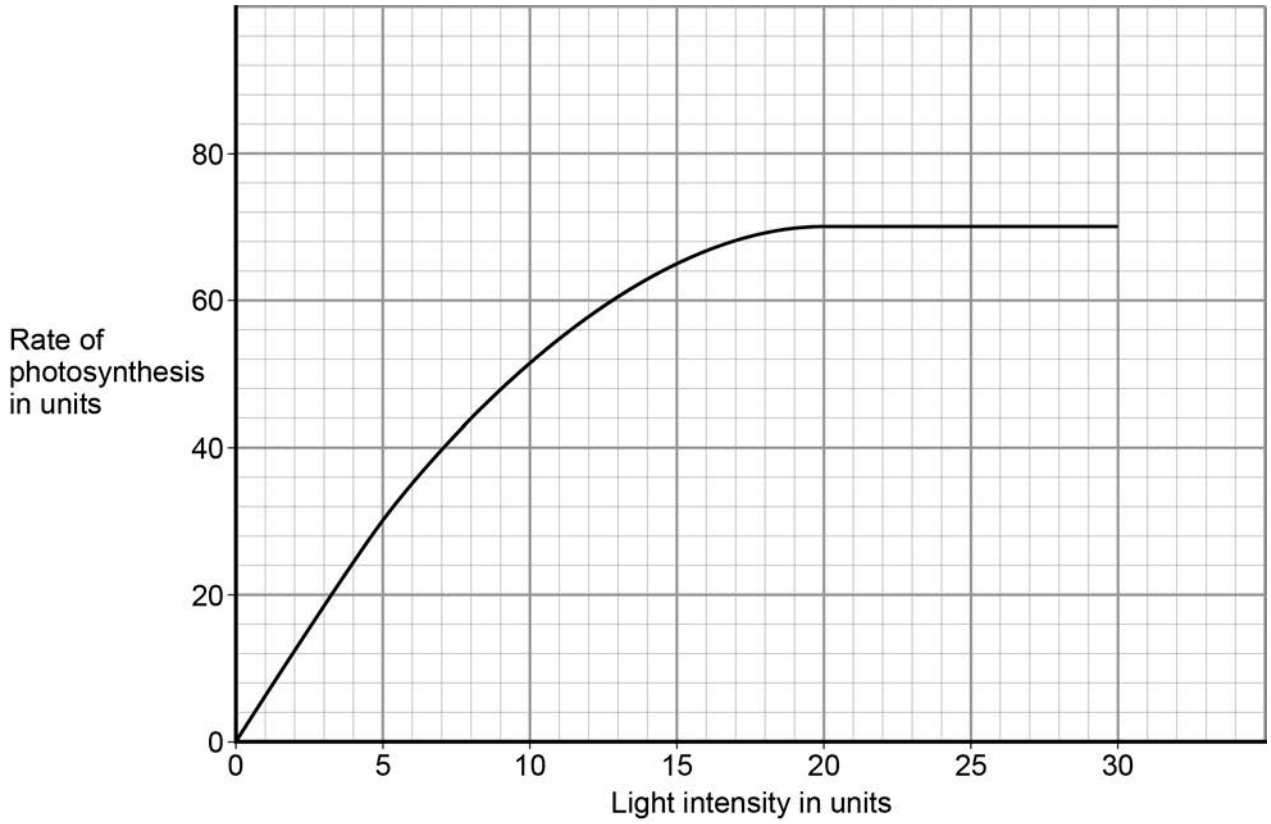
[6 marks]

Question 7 continues on the next page

A scientist carried out a similar investigation.

Her results are shown in **Figure 10**.

Figure 10



0 7 . 3 The scientist said:

'Light stops being a limiting factor at a light intensity of 20 units.'

Give evidence from **Figure 10** to support this statement.

[1 mark]

0 7 . 4 What could be limiting the rate of photosynthesis at a light intensity of 25 units?

Give **one** factor.

[1 mark]

Turn over for the next question

0 8 Amylase is an enzyme that digests starch.

A student investigated the effect of pH on the activity of amylase.

This is the method used.

1. Mix amylase solution and starch suspension in a boiling tube.
2. Put the boiling tube into a water bath at 25 °C.
3. Remove a drop of the mixture every 30 seconds and test it for the presence of starch.
4. Repeat the investigation at different pH values.

Table 3 shows the students' results.

Table 3

pH	Time when no starch was detected in minutes
5.0	7.0
5.5	4.5
6.0	3.0
6.5	2.0
7.0	1.5
7.5	1.5
8.0	2.0

0 8 . 1 The student concluded pH 7.25 was the optimum pH for the amylase enzyme.

This is **not** a valid conclusion.

Suggest **two** reasons why.

[2 marks]

1 _____

_____

2 _____

_____

Question 8 continues on the next page

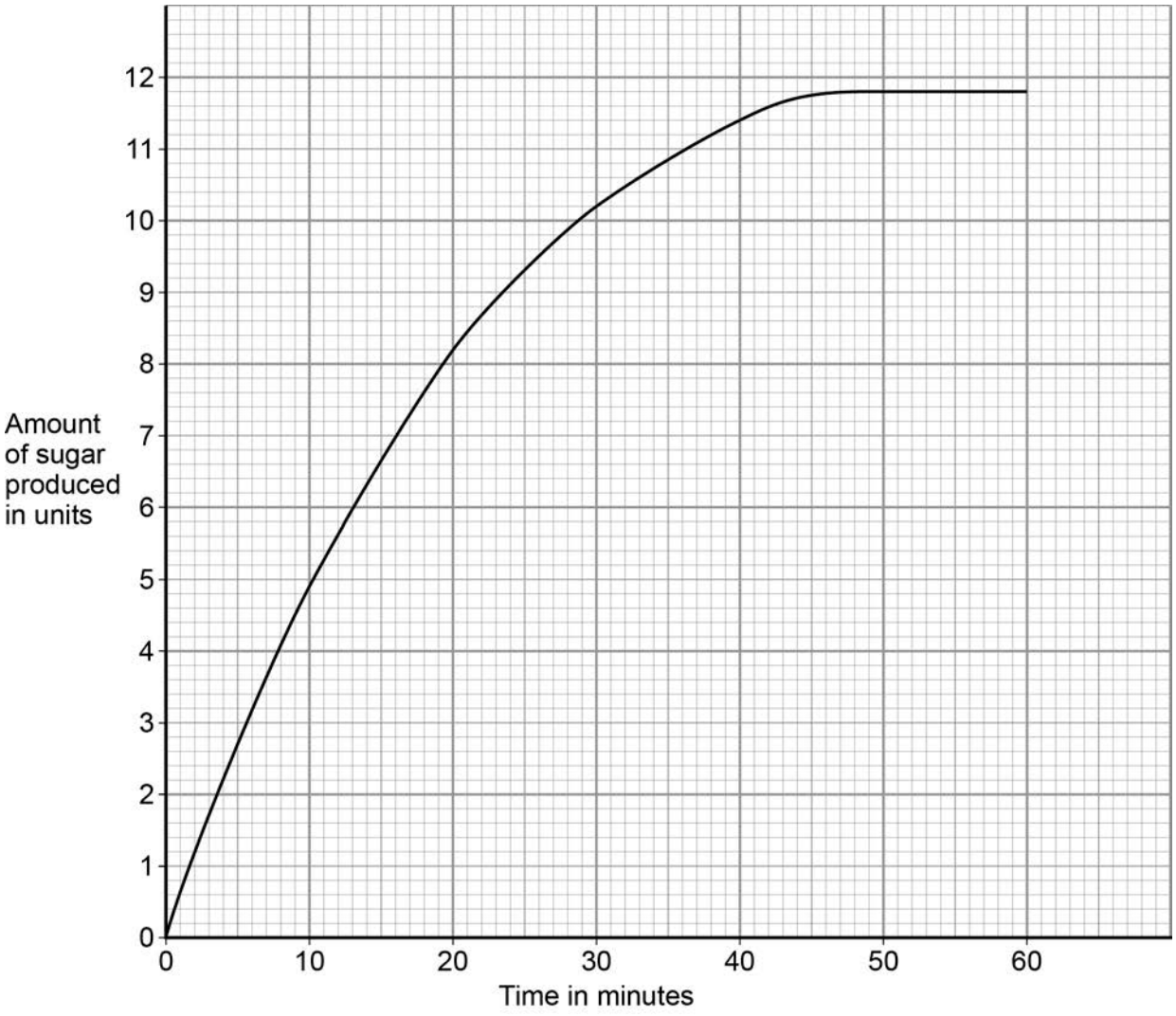
The student did another investigation.

This is the method used.

1. Put amylase solution and starch suspension into a boiling tube.
2. Make the pH 7.25.
3. Put the boiling tube into a water bath at 25 °C.
4. Measure the amount of sugar produced every 30 seconds.

The results are shown in **Figure 11**.

Figure 11



0 8 . 2 Calculate the mean rate of sugar produced per minute during the first 5 minutes.

[2 marks]

Mean rate = _____ units per minute

0 8 . 3 Iodine solution is added to a sample taken from the boiling tube after 10 minutes and 60 minutes.

Suggest what you would see in these samples.

[2 marks]

After 10 minutes _____

After 60 minutes _____

0 8 . 4 The scientist repeated the investigation at 37 °C.

Draw a line on **Figure 11** to show the predicted results.

[2 marks]

Turn over for the next question

0 9 In 2014 there was an outbreak of Ebola virus disease (EVD) in Africa.

At the time of the outbreak there were:

- no drugs to treat the disease
- no vaccines to prevent infection.

0 9 . 1 By March 2015 there were an estimated 9850 deaths worldwide from EVD.

The number of deaths is an estimate.

Suggest why it is an estimate rather than an exact number.

[1 mark]

0 9 . 2 Why were no antibiotics used to treat EVD?

[1 mark]

After the outbreak began, drug companies started to develop drugs and vaccines for EVD.

A drug has to be thoroughly tested and trialled before it is licensed for use.

Testing, trialling and licensing new drugs usually takes several years.

0 9 . 3 Draw **one** line from each word about drug testing to the definition of the word.

[2 marks]

Word about drug testing	Definition
Dose	Side effects making the person ill
Efficacy	The concentration of the drug to be used and how often the drug should be given
Toxicity	Whether the drug works to treat the illness

0 9 . 4 The results of drug testing and drug trials are studied in detail by other scientists.

Only then can the results be published by the drug company.

Suggest **one** reason why the results are studied by other scientists.

[1 mark]

END OF QUESTIONS

There are no questions on this page

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Figure 1: Epithelial cell © Biophoto Associates/Science Photo Library
Figure 8: Leaf with TMV © Nigel Cattlin/Getty Images