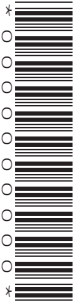# OCR
Oxford Cambridge and RSA

GCSE (9–1) Biology A (Gateway Science) **F**
J247/01 Paper 1 (Foundation Tier)
Sample Question Paper

Date – Morning/Afternoon
Time allowed: 1 hour 45 minutes

Version 2

You must use:
- a scientific or graphical calculator
- a ruler

SPECIMEN

First name	
Last name	

Centre number		Candidate number	

INSTRUCTIONS
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION
- The total mark for this paper is **90**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document consists of **24** pages

SECTION A

Answer **all** the questions.

You should spend a maximum of 30 minutes on this section.

1 The pictures show four foxes.

Which fox has the largest surface area : volume ratio?
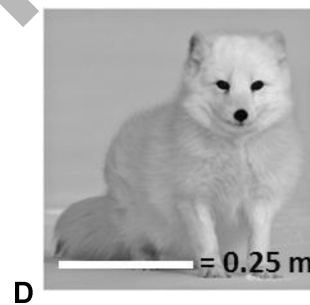
Your answer [ ]

[1]

2 The diagram shows the brain.

X
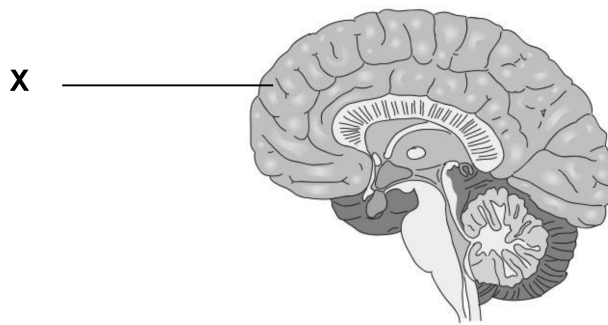
What is the name of part **X**?

A Cerebellum

B Cerebrum

C Hypothalamus

D Medulla

Your answer ☐ **[1]**

3 The diagram shows the eye.
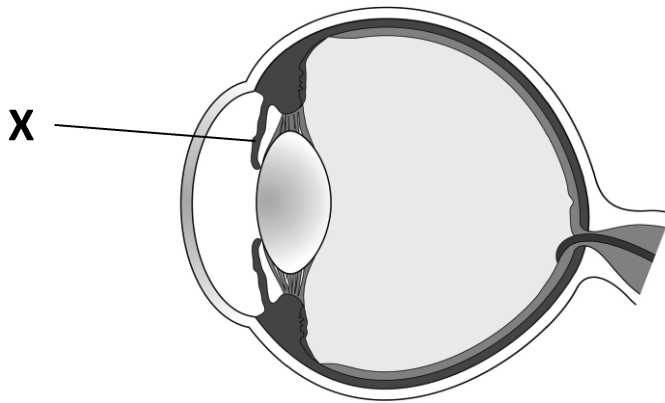
What is the name of part **X**?

A Cornea

B Iris

C Lens

D Pupil

Your answer ☐ **[1]**

4 A student uses a microscope.

- The magnification on the eyepiece lens is ×10.

- The magnification on the objective lens is ×4.

What is the total magnification?

A 2.5

B 6

C 14

D 40

Your answer ☐ **[1]**

5 What are proteins made of?

    A Amino acids

    B Fatty acids

    C Nucleotides

    D Sugars

Your answer ☐ **[1]**

6 Which hormone is involved in controlling the menstrual cycle?

    A Auxin

    B Insulin

    C Progesterone

    D Testosterone

Your answer ☐ **[1]**

7 What is the word equation for aerobic respiration?

    A Carbon dioxide + water → glucose + oxygen

    B Glucose + carbon dioxide → oxygen + water

    C Glucose + oxygen → carbon dioxide + water

    D Oxygen + water → glucose + carbon dioxide

Your answer ☐ **[1]**

8 What type of reactions are photosynthesis and respiration?

	photosynthesis	respiration
A	endothermic	endothermic
B	endothermic	exothermic
C	exothermic	endothermic
D	exothermic	exothermic

Your answer [1]

9 Which type of plant cell takes in water?

A Guard cell

B Phloem cell

C Root hair cell

D Xylem cell

Your answer [1]

10 Which process takes water out of plant leaves into the air?

A Osmosis

B Photosynthesis

C Translocation

D Transpiration

Your answer [1]

11 Plant shoots grow towards sunlight.

Which term describes this behaviour?

A Negative gravitropism

B Negative phototropism

C Positive gravitropism

D Positive phototropism

Your answer [ ] **[1]**

12 How many strands are there in a DNA molecule?

A 1

B 2

C 3

D 4

Your answer [ ] **[1]**

13 In DNA, which base does A (adenine) pair with?

A A

B C

C G

D T

Your answer [ ] **[1]**

14   Which substance gives a positive test with Benedict's reagent?

    A   Lipid

    B   Protein

    C   Starch

    D   Sugar

Your answer ☐   **[1]**

15   Which molecule is **not** a polymer?

    A   DNA

    B   Lipid

    C   Protein

    D   Starch

Your answer ☐   **[1]**

SECTION B

Answer **all** the questions.

16 A student prepares onion cell slides to view under a microscope.

(a) Put the stages in the correct order by writing the numbers **1** to **5** in the boxes.

	add a drop of iodine solution
	cut the onion into pieces
	peel off a thin layer of onion tissue
	put on a cover slip
	put the onion tissue on a slide

[2]

(b) Explain why the iodine solution is used.

....

....

.... **[2]**

(c) Look at the image of some onion cells.
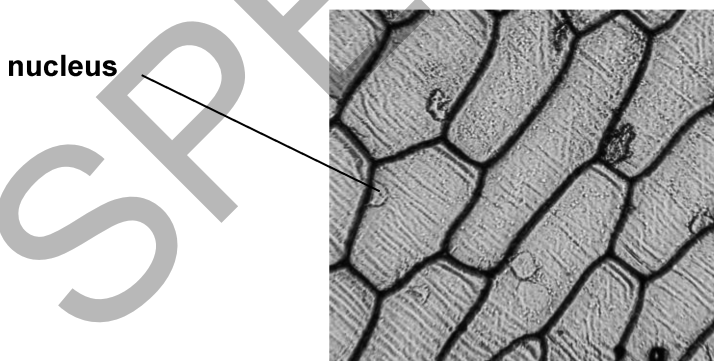
nucleus

(i) Explain how the contents of the nucleus allow it to carry out its function.

....

....

.... **[2]**

(ii) Explain why there are **no** chloroplasts in these onion cells.

....

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.... **[2]**

(d) The diagram shows a layer of onion cells.
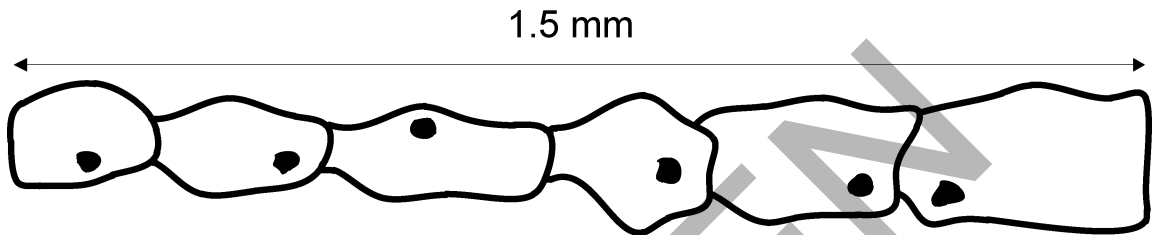
1.5 mm

The actual length of the layer is 1.5 mm.

Calculate the average length of one onion cell.

Answer = ………………… mm **[2]**

(e) A student thinks that using the highest magnification of a microscope is always best.

Explain why this may **not** be true.

....

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.... **[2]**

17 A boy picks up a hot plate and quickly drops it.

This is a reflex action.

(a) Describe the sequence of events that happens in his nervous system during this reflex action.

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.... **[5]**

(b) Explain why it is important that this action is a reflex and **not** controlled consciously by the brain.

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.... **[3]**

18 A student wants to compare the transpiration rates of two plants.

The plants have different sized leaves.

Fig. 18.1 shows how she sets up her experiment.
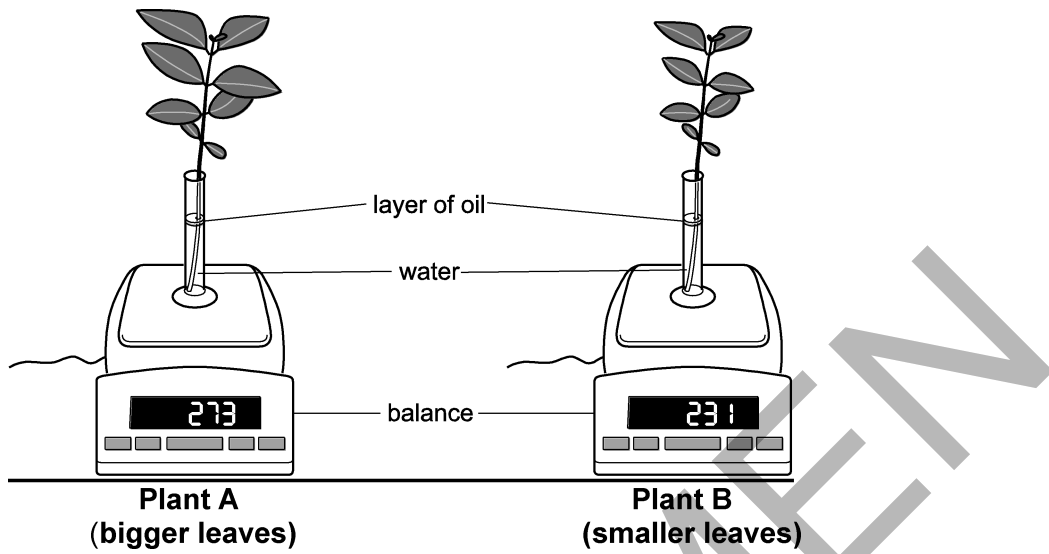
Fig 18.1

(a) Suggest why the student put a layer of oil on top of the water.

....

....

.... **[2]**

(b) The student makes sure that each plant has the same number of leaves.

Which other experimental conditions should she keep the same?

....

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.... **[3]**

(c)* The table shows the results of the experiment shown in **Fig. 18.1**.

	Plant A (bigger leaves)	**Plant B (smaller leaves)**
Mass at start (g)	261	273
Mass after 24 hours (g)	228	231

Write a conclusion with an explanation about this experiment.

Use the results and calculations in your answer.

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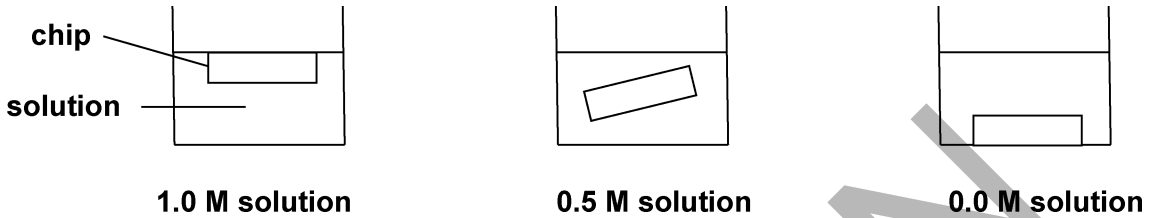... **[6]**

19 A student investigates how different concentrations of sucrose solutions affect potatoes.

Three chips are cut from a potato.

Each chip is 5.0 cm long.

Each chip is left in a different concentration of sucrose solution for two hours.

1.0 M solution **0.5 M solution** **0.0 M solution**

These are the results.

Concentration of sucrose solution	Length of potato chip	
	Start (cm)	**After two hours (cm)**
1.0 M	5.0	4.5
0.5 M	5.0	5.0
0.0 M	5.0	5.5

(a) What process causes some of the chips to change length in this experiment?

.... **[1]**

(b) Explain why the length of the chip increases in the **0.0 M solution**.

....

....

.... **[2]**

(c) Explain why the length of the chip stays the same in the **0.5 M solution**.

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.... **[2]**
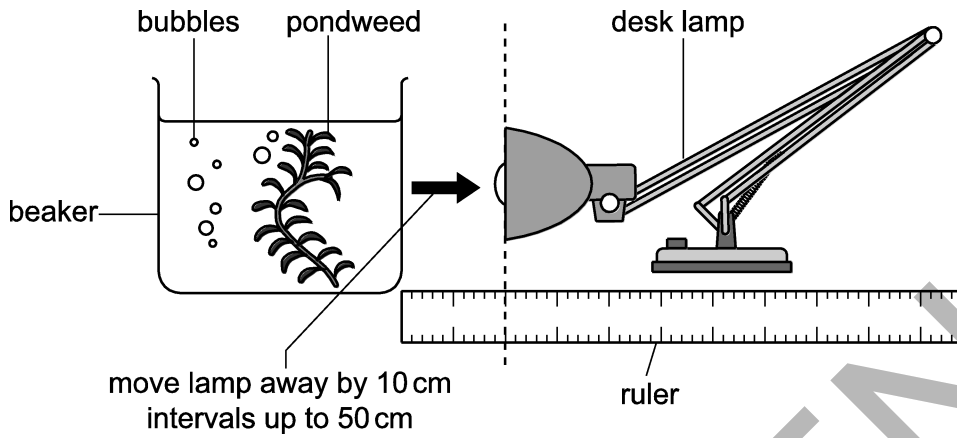
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TURN OVER FOR THE NEXT QUESTION

20 A student investigates how light intensity affects the rate of photosynthesis in pondweed.

The diagram shows how he sets up his investigation.

He plans to place the lamp at distances of 10 cm, 15 cm and 20 cm from the beaker.

He plans to measure how much gas is given off from the pondweed in 10 seconds.

(a) His teacher says he could improve his plan.

Write down **two** improvements he could make to his plan.

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....

....

.... **[2]**

(b) The student counts the number of bubbles to get a measure of the amount of gas given off in photosynthesis.

Give **two** reasons why counting bubbles is **not** an accurate way of measuring the amount of gas given off.

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.... **[2]**

(c) What is the gas given off in photosynthesis?

.... **[1]**

(d) Explain why the amount of this gas given off is **not** a true measure of the rate of photosynthesis.

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.... **[2]**

(e) (i) Sketch a line on the axes below to show the results you would expect.

number of
bubbles in 10
seconds

distance between lamp
and beaker
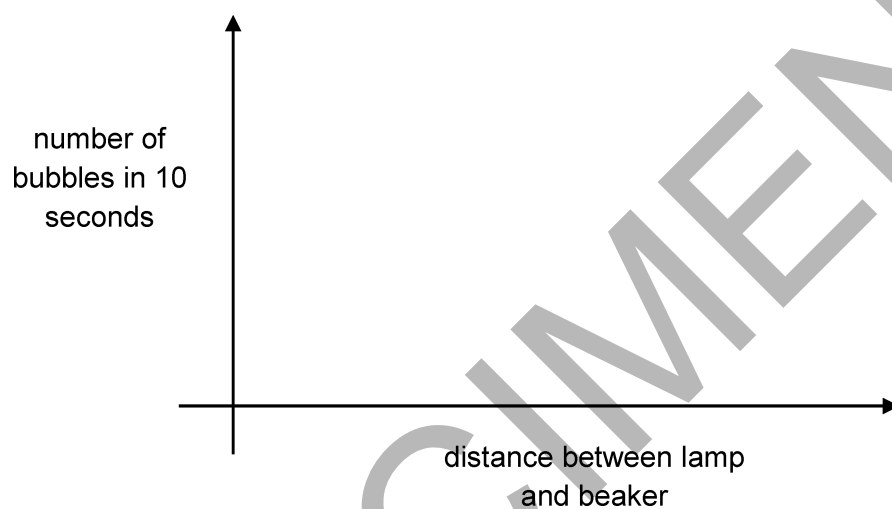
[2]

(ii) Explain the shape of the graph. **Two** explanations are required.

....

....

.... **[2]**

21 Some students investigate the effect of the ratio of surface area : volume on the rate of diffusion in animal cells.

1. They use three different sized gelatine cubes stained blue with pH indicator.

2. They put the cubes into a beaker of hydrochloric acid.

3. They measure the time for each cube to completely change colour.
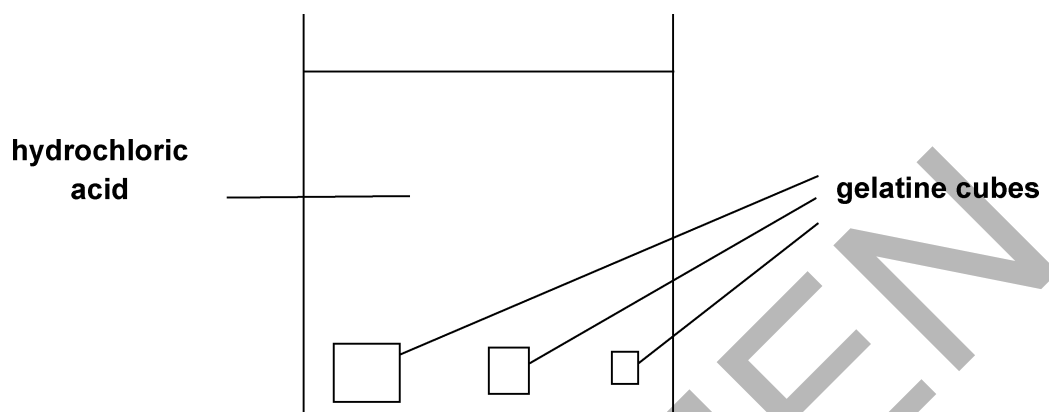
The table shows their results.

length of 1 side of cube (cm)	surface area : volume ratio	time to completely change colour in seconds
1	…………	132
2	3:1	328
3	2:1	673

(a) (i) Calculate the surface area : volume ratio for the cube with sides of 1 cm.

Answer = ……………………… **[1]**

J247/01

(ii) Calculate the rate of colour change for each of the three cubes.

Write your answers in the table below.

Show your answers in standard form.

Length of 1 side of cube (cm)	Rate of colour change (s⁻¹)
1	…………………………
2	…………………………
3	…………………………

[2]

(iii) Use the results and your calculations in parts **(i)** and **(ii)**.

Explain why most single celled organisms do **not** need a transport system (e.g. the circulatory system of multi-cellular organisms).

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.... [2]

(b) Oxygen enters red blood cells by diffusion.

Describe and explain how red blood cells are adapted for the efficient uptake and transport of oxygen.

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.... [5]

22 The fat in milk is broken down by the enzyme lipase.

A group of students investigate the effect of temperature on this breakdown of fat.

In their investigation they use an indicator called phenolphthalein.

Phenolphthalein is pink in alkali conditions but colourless in pH values below 8.

Step 1 One student puts 5 drops of phenolphthalein and 5 ml of full fat milk into a test tube.

Step 2 She adds 1 ml of lipase and stirs the mixture.

Step 3 She measures the time for the pink indicator colour to disappear.

The other students repeat these three steps but at different temperatures.

stirring rod

1 ml lipase solution

add in turn:
5 drops phenolphthalein
5ml milk
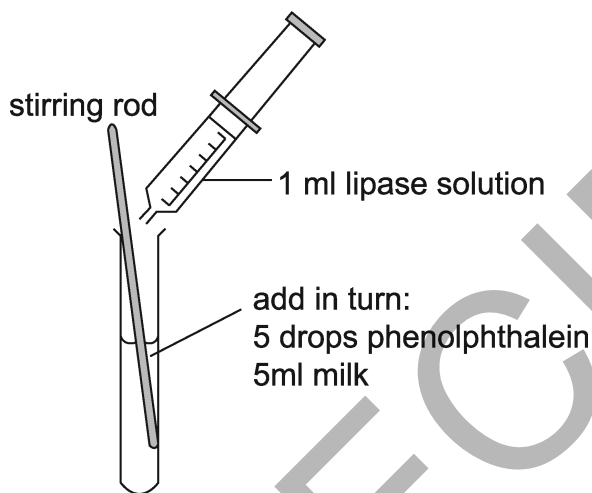
Table 22.1 shows the group's results.

Temperature (°C)	Time for pink colour to disappear (s)
20	480
40	240
60	270
80	960

Table 22.1

(a) The pH falls as the fat in milk breaks down.

Explain why.

....

....

....   **[2]**

(b) Plot a graph of the results in **Table 22.1** and draw a line of best fit.
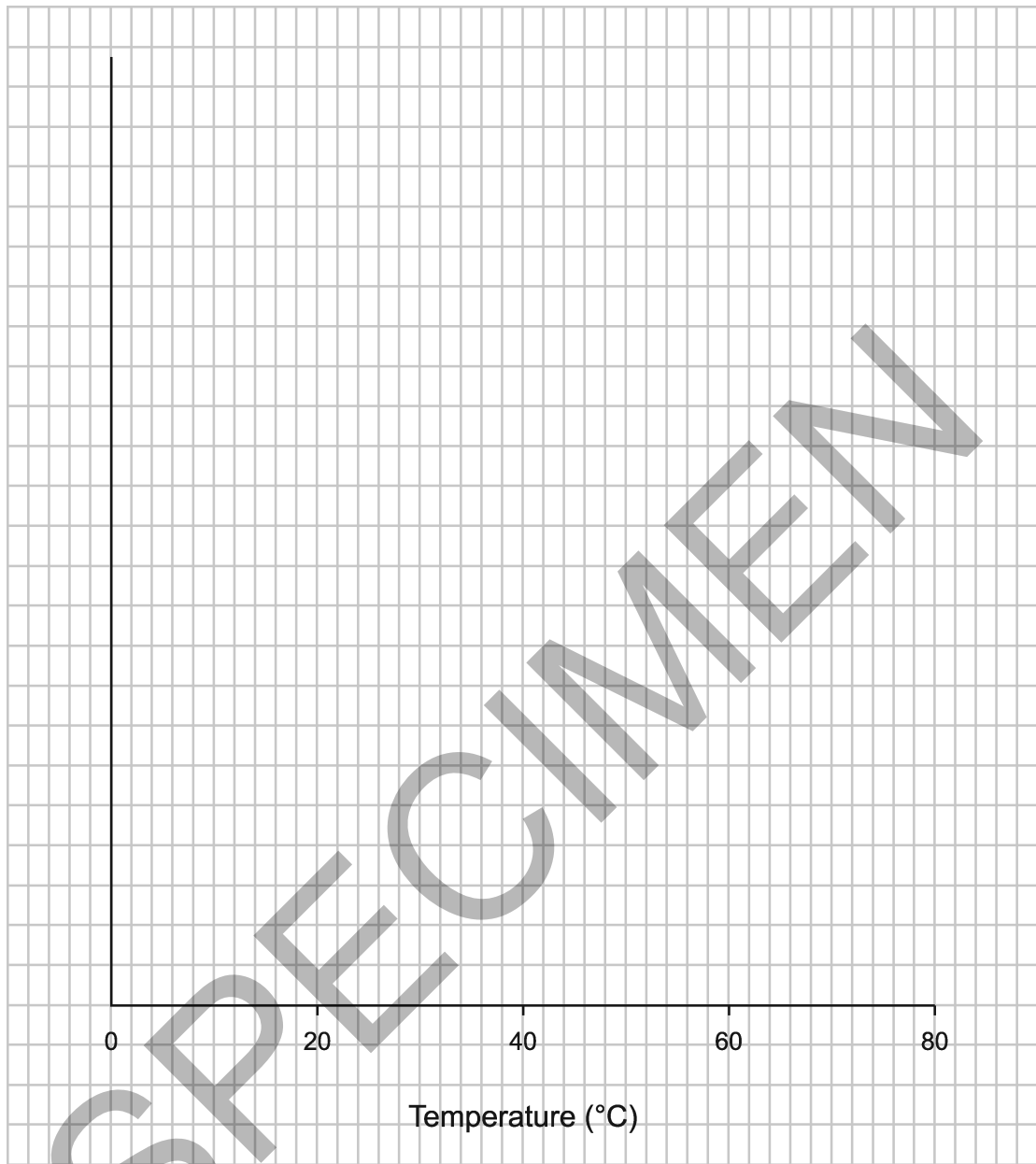
Temperature (°C)

[5]

(c) Explain why the results at 20°C and 40°C are different.

....

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....

.... **[3]**

(d) Explain why the results at 80°C and 40°C are different.

....

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.... **[3]**

(e) (i) One student says that the results show that the optimum temperature for lipase is 40°C.

The teacher says that she **cannot** say for certain that it is 40°C.

Explain why.

....

.... **[1]**

(ii) Give **two** modifications that the students could make to their method to find a more accurate value for the optimum temperature.

....

....

.... **[2]**

(f) The students rounded each time to the nearest 10 seconds.

They rounded the times because they found it difficult to judge exactly when the pink colour had disappeared.

Describe and explain **two** ways the method could be improved to give more accurate measurements.

1 ....

....

2 ....

.... **[2]**

END OF QUESTION PAPER

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