Oxford Cambridge and RSA

Accredited

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

F

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

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

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.

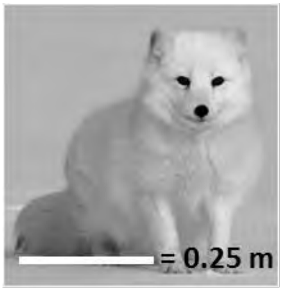
1 The pictures show four foxes from different parts of the world.

Which fox has the largest surface area:volume ratio?

A

B

C

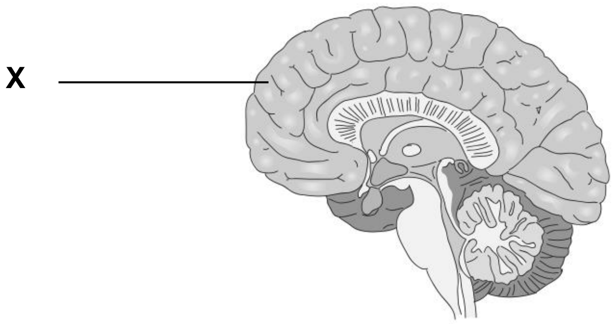


D

Your answer ☐

[1]

2 The diagram shows the brain.
What is the name of part **X**?



A cerebellum

B cerebrum

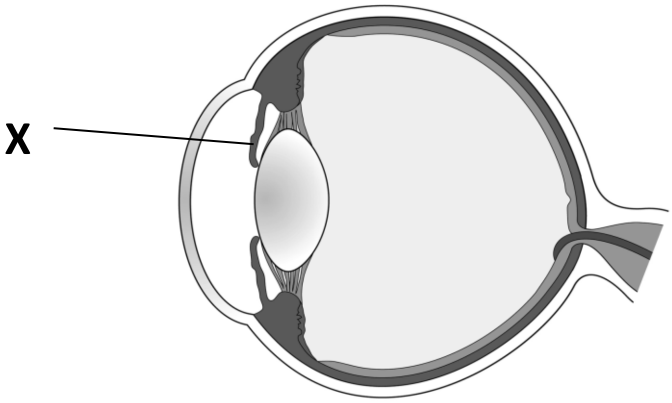
C hypothalamus

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 x10.

The magnification on the objective lens is x4.

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 of these hormones is involved in the control of the menstrual cycle?

A insulin

B progesterone

C testosterone

D auxin

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 Through which type of cell do plants take in water?

A guard cell

B phloem cell

C root hair cell

D xylem cell

Your answer ☐ **[1]**

10 What is the process when water goes out of plant leaves into the air?

A osmosis

B photosynthesis

C translocation

D transpiration

Your answer ☐ **[1]**

11 The image below shows plant shoots growing towards sunlight.

What is this an example of?

A negative gravitropism

B negative phototropism

C positive gravitropism

D positive phototropism

Your answer

[1]

12 How many strands are 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 What substance does Benedict's reagent test for?

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 in to 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.

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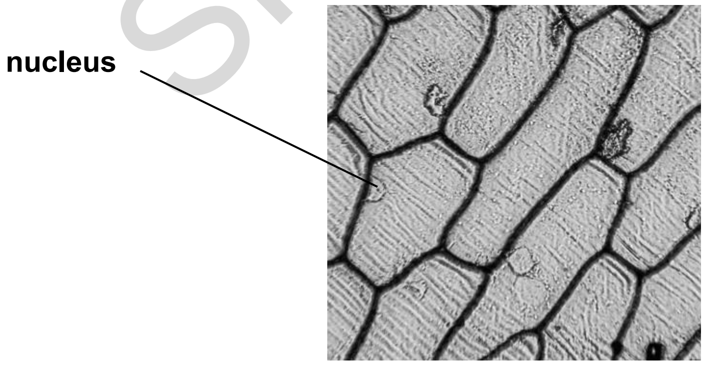
.... **[2]**

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



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

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.... **[2]**

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

……………………………………………………………………………………………………

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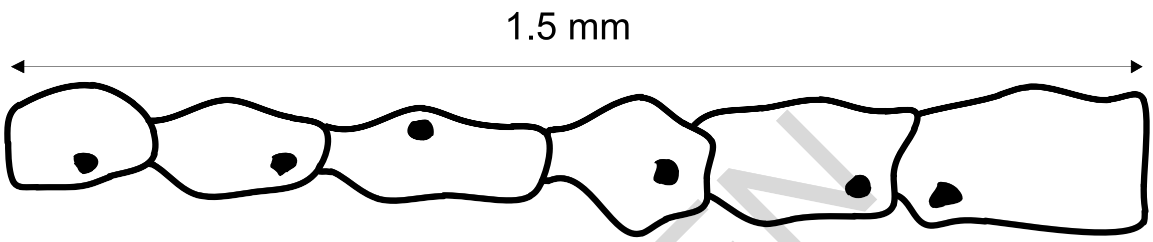
…………………………………………………………………………………………….. **[2]**

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



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 response is a reflex and **not** controlled consciously by the brain.

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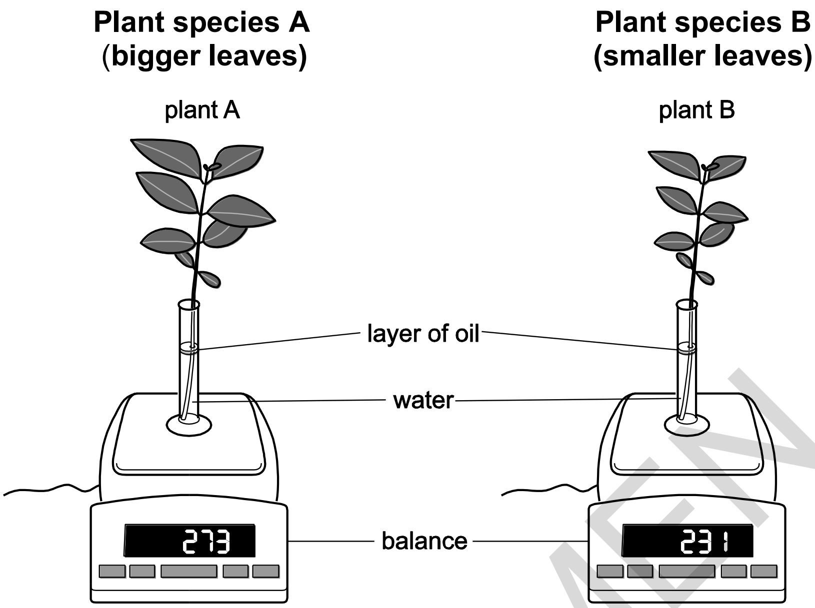
.... **[3]**

18 Emma wants to compare the transpiration rates of two types of plant.

The plants have different sized leaves.

The diagram shows how she sets up her experiment.



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

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………

…………………………………………………………………………………………………… **[2]**

(b) Emma wants to compare the transpiration rate of the two types of plant.

She 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 Emma's results.

	Plant species A (bigger leaves)	Plant species 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 data/calculations in your answer.

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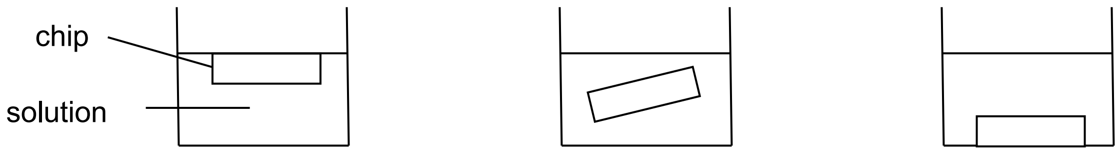
.... **[6]**

19 An investigation is done to investigate changes in potatoes placed in different sucrose solutions.

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.



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

These are the results after two hours:

chip in **1.0M solution** 4.5 cm

chip in **0.5M solution** 5.0 cm

chip in **0.0M solution** 5.5 cm

(a) In this experiment what process causes some of the chips to change length?

.... **[1]**

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

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.... **[2]**

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

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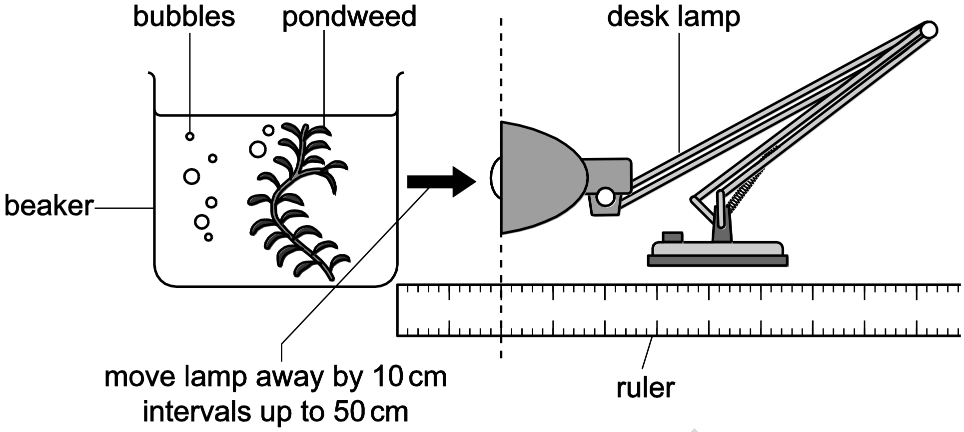
…………………………………………………………………………………………………… **[2]**

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

The diagram shows how he sets up his investigation.



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

Puj plans to measure how much gas the pondweed gives off 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) Puj 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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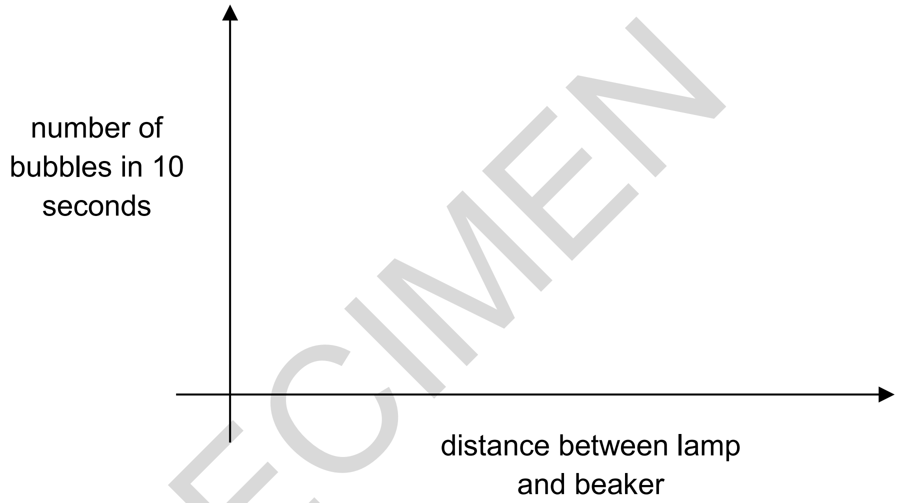
.... **[2]**

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



[2]

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

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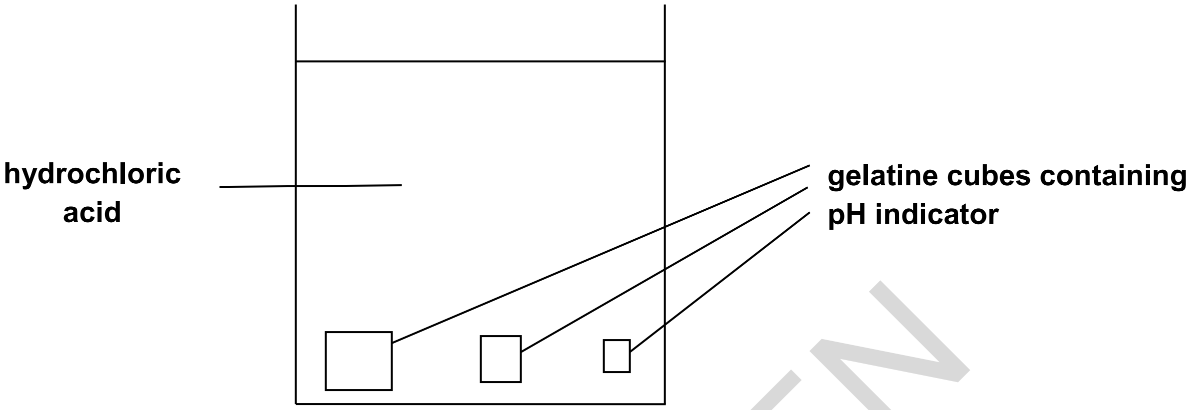
....

.... **[2]**

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

They use hydrochloric acid and gelatine cubes stained blue with pH indicator.

They put different sized cubes into a beaker of hydrochloric acid and time how long it takes for the cubes to completely change colour.



The table shows their results.

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

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

answer = ……………………… **cm^{-1}** **[1]**

(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 A group of students investigate the effect of temperature on the breakdown of the fat in milk by the enzyme lipase.

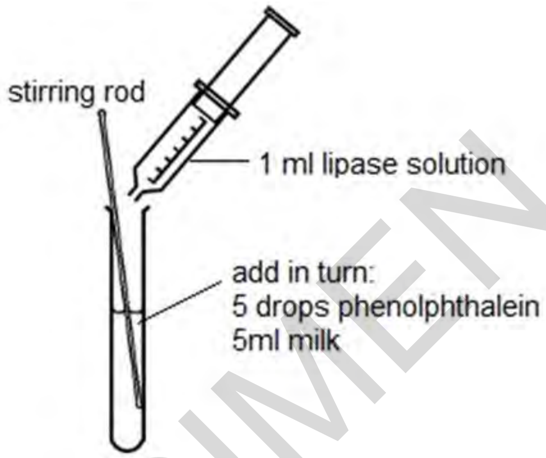
In their investigation they use an indicator called phenolphthalein.

Phenolphthalein is pink in alkali conditions but becomes colourless when the pH falls below pH8.

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

She adds 1 ml of lipase, stirs the mixture and times how long it takes to lose the pink colour.

Other students repeat this but at different temperatures.



The table shows the group's results.

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

(a) Explain why the pH falls when lipase breaks down the fat in milk.

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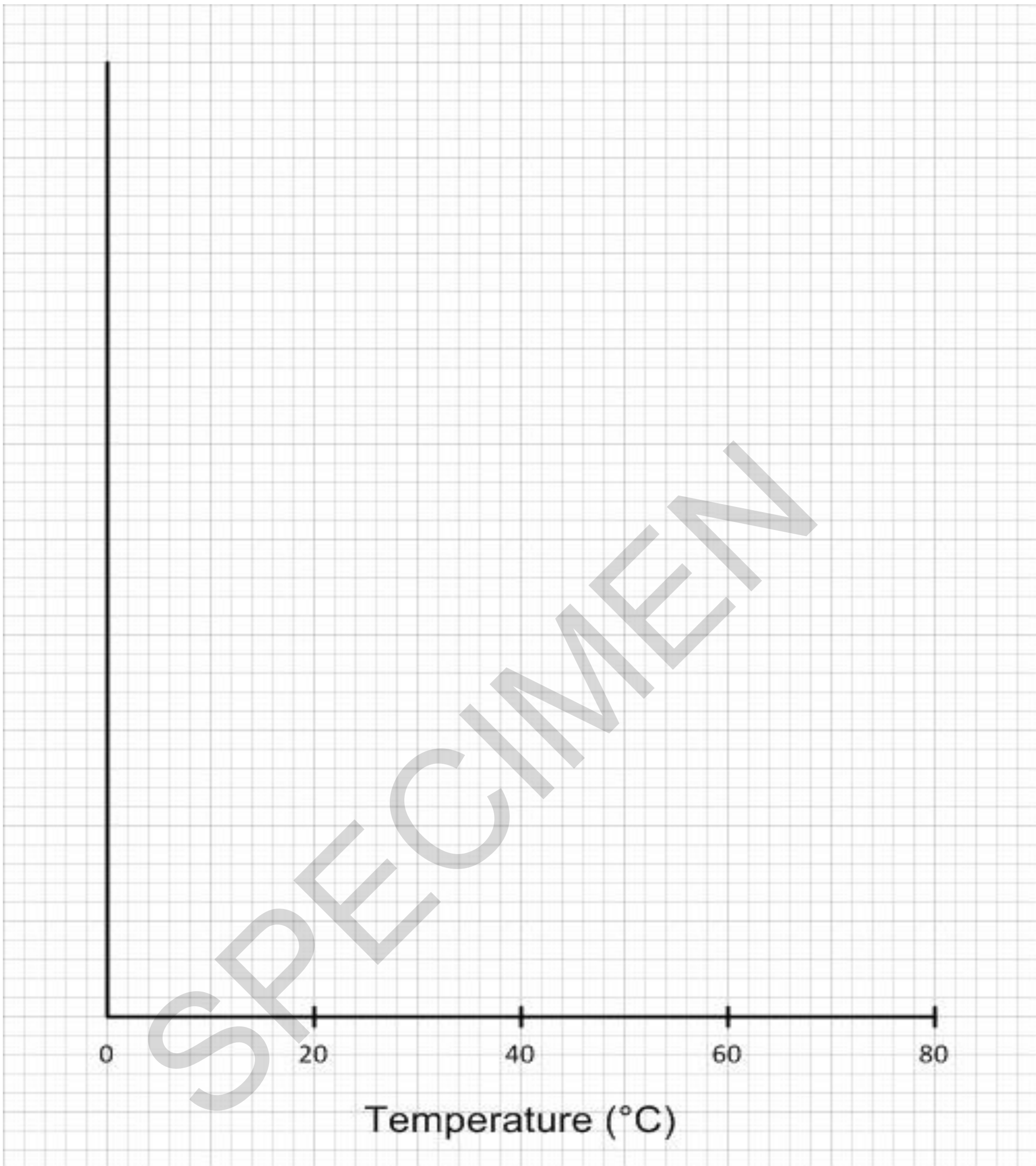
.... **[2]**

(b) Plot a graph of the results and draw a line of best fit.



[5]

(c) Explain the difference between the results at 20°C and 40°C.

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.... **[3]**

(d) Explain the difference between the results at 80°C and 40°C.

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.... **[3]**

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

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

Explain why.

....

.... **[1]**

(ii) Give **two** reasons how the students could modify their method to find out the optimum temperature more accurately.

....

.... **[2]**

(f) The students rounded their times to the nearest 10 seconds.

They did this 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 ....

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2 ....

.... **[2]**

END OF QUESTION PAPER