Cambridge Assessment International Education

Cambridge Pre-U

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

0123456789

BIOLOGY **9790/04**

Paper 4 Practical **For examination from 2020**

SPECIMEN PAPER **2 hours 30 minutes**

You must answer on the question paper.

You will need: The materials and apparatus listed in the Confidential Instructions.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This specimen paper has been updated for assessments from 2020. The specimen questions and mark schemes remain the same. The layout and wording of the front covers have been updated to reflect the new Cambridge International branding and to make instructions clearer for candidates.

For Examiner's Use	
Section A	
Section B	
Total	

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 3 Pre-U Certificate.

This document has **16** pages. Blank pages are indicated.

Section A

Answer **all** the questions.

You are recommended to spend no longer than **90 minutes** on question 1.

1 You should read through the whole of this question carefully and then plan your use of the time to make sure that you finish all the work that you would like to do.

The enzyme lipase catalyses the hydrolysis of ester bonds in triglycerides. Its activity is affected by the presence of bile salts.

Full fat milk will be used as the source of triglycerides.

You are to investigate the effect of different concentrations of bile salts on the rate of hydrolysis of triglycerides in milk.

You are provided with a 1% solution of lipase and a 5% solution of bile salts.

Proceed as follows.

1 Use the syringes and the small beakers to prepare a number of different concentrations of bile salts using the 5% bile salts solution and water provided. You will need a maximum of 10 cm^3 of each bile salts solution.

(a) Complete the table below to show how you have prepared the different solutions.

final concentration of bile salts / %	volume of 5% bile salts solution / cm^3	volume of water / cm^3

[3]

(b) Suggest suitable controls for this experiment.

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2 Label test-tubes with the concentrations of bile salts that you have prepared.

3 Prepare the labelled test-tubes with milk, sodium carbonate solution, bile salts solutions and thymolphthalein solution, using the following quantities:

- 5.0 cm^3 of milk
- 5.0 cm^3 of sodium carbonate solution
- 1.0 cm^3 of the appropriate bile salts solution
- three drops of thymolphthalein.

4 Label a test-tube or test-tubes with the control or controls that you have decided to use, and prepare these appropriately

5 Put a bung into each test-tube in turn and invert twice so that the contents are a uniform blue colour.

6 Put some warm water in a beaker to act as a water-bath. The beaker should be about half-full. Adjust the temperature of the water to 50 °C (± 2 °C).

7 Place the test-tubes prepared in steps **3** and **4** into the water-bath.

8 Stir the lipase solution with the glass rod provided. Put 2.0 cm^3 of the lipase solution into as many labelled, clean test-tubes as you need for the concentrations of bile salts that you are testing and your controls. Place them in the water-bath.

9 Prepare the space on page **4** to record your results.

(c) **(i)** As pH falls, the blue colour of the thymolphthalein will fade until it is colourless.

Describe how this is used to gain information about the rate of hydrolysis of the lipid in the milk by lipase.

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(ii) Measure and record the temperature in the water-bath at appropriate points during the experiment. Record your measurements in the space below.

[1]

10 After all the test-tubes have been in the water-bath for at least **five minutes**, add the lipase solution, from each test-tube, to the test-tubes containing the milk and bile salts solutions, and, where appropriate, to the control test-tubes as well.

Immediately after adding the lipase solution insert a bung into each test-tube and invert twice to mix the contents.

(d) You should record your results in a logical way, to show the effect of bile salts on the rate of triglyceride hydrolysis by lipase in the space below.

Record and justify any further decisions that you make about your investigation in the space below the table.

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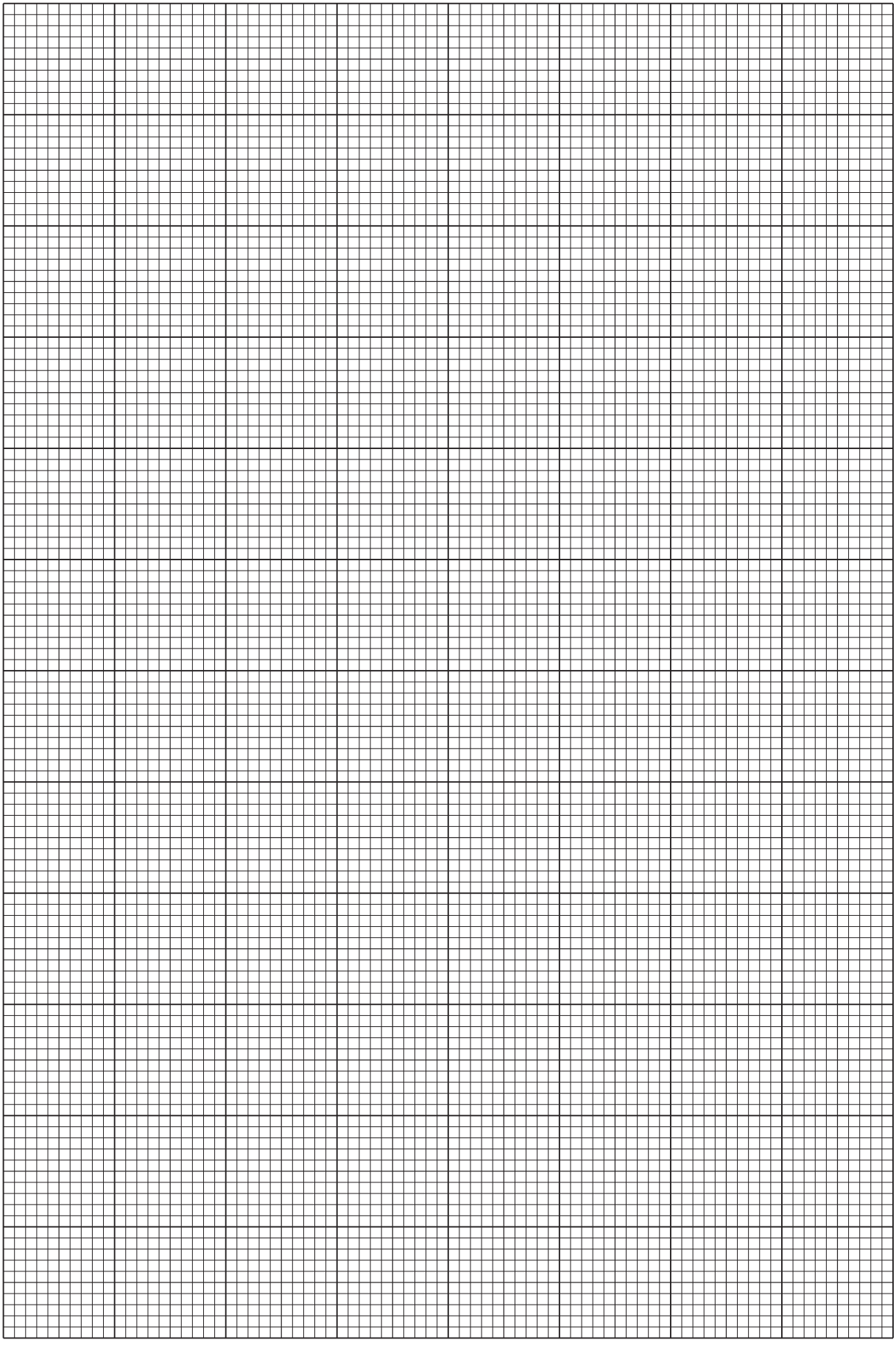
(e) Plot a graph of your results on the grid below to show the effect of the concentration of bile salts on the rate of hydrolysis of triglycerides.



[5]

(f) Describe **and** explain the pattern of results shown by your graph.

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(g) Identify the limitations and sources of error in this investigation.

Explain how you would improve the method you used in this investigation to give more accurate and valid results.

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Section B

Answer **all** the questions.

You are recommended to spend no longer than **60 minutes** on question 2.

2 You should read through the whole of this question carefully and then plan your use of the time to make sure that you finish all the work that you would like to do.

R1 is a transverse section of the spinal cord of a small mammal.

(a) (i) Make a low-power plan drawing of **R1**.

Label your plan drawing.

[6]

(ii) Use a ruler to measure the actual size of the specimen on slide **R1** and the size of your drawing between the same points. Put a line on your drawing to show the size that you have measured. Calculate the magnification of your drawing.

Show your working.

magnification ..... [2]

(b) Use the high-power lens of your microscope to locate a cell body of a motor neurone in **R1**.

Make a labelled drawing to show the cell body.
Annotate your drawing to indicate the functions of the structures you have drawn.

Use the eyepiece graticule and stage micrometer to measure the diameter of the cell body.
Indicate the actual diameter on your drawing and show how you have derived your answer.

[8]

(c) Slide **R2** is a transverse section of part of the brain of a small mammal.

Compare, using a hand lens and your microscope, the structure and appearance of **R1** and **R2**.

Present your comparison as a table in the space below.

[5]

(d) Fig. 2.1 is an electron micrograph that shows a cross section of a neurone.

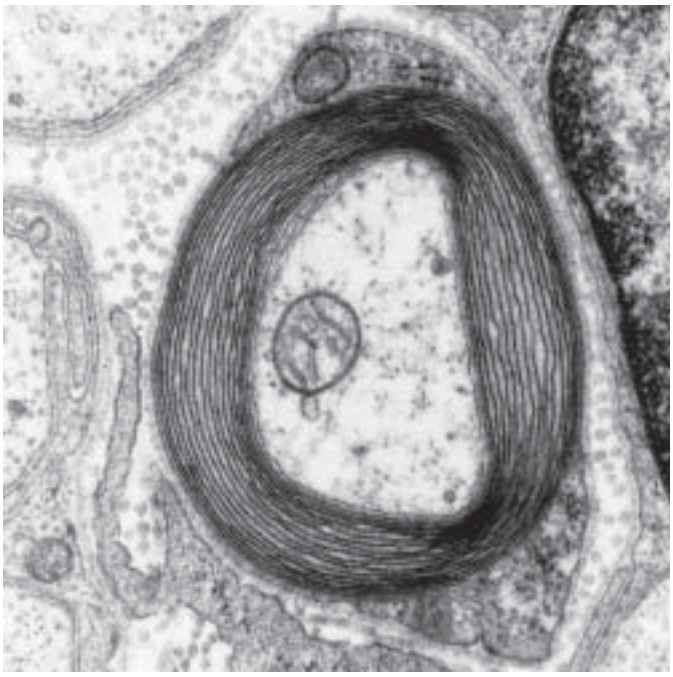

Fig. 2.1

(i) Describe the appearance of the section of the neurone. You may use drawings or diagrams to illustrate your answer.

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(ii) Explain how the structural features you describe in **(i)** are related to the function of the neurone.

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(e) Fig. 2.2 is an electron micrograph that shows a junction between two neurones in the brain.

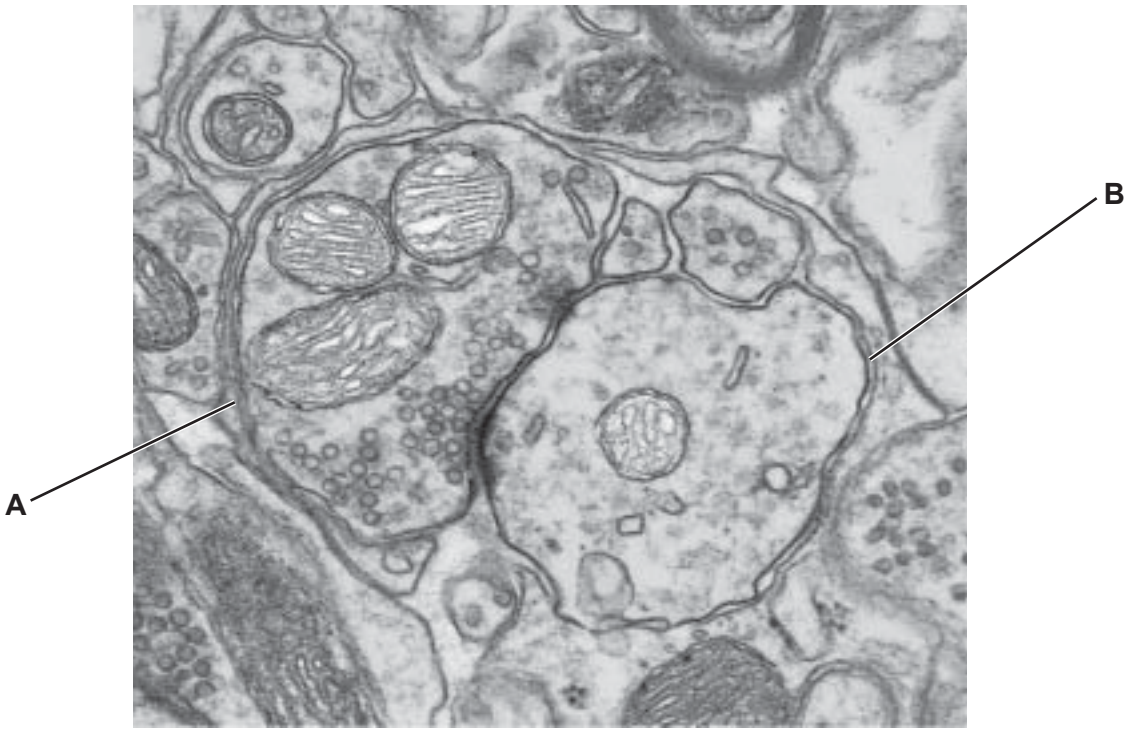

Fig. 2.2

Identify neurones **A** and **B** and relate the appearance of these structures to their function. You may use the space opposite for any diagrams you may wish to draw to illustrate your answer.

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