Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

BIOLOGY **5090/61**

Paper 6 Alternative to Practical **May/June 2018**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Write your answers in the spaces provided on the Question Paper.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **9** printed pages and **3** blank pages.

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CAMBRIDGE International Examinations

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

1 A student investigated the digestion of protein in mammals.

He used:

- a solution of protein that is milky in appearance
- a solution of an enzyme that is found in the stomach of mammals
- a pH solution with a particular pH value
- some distilled water.

He knew that, as the protein was digested, the protein solution would turn from milky to clear.

He set up four test-tubes, **A**, **B**, **C** and **D**, and put 5 cm^3 of protein solution into each one.
He then placed the four test-tubes in a water bath for 5 minutes.

After 5 minutes, he added other solutions to the 4 test-tubes so that their contents were as shown:

A	**B**	**C**	**D**
5 cm^3 protein solution	5 cm^3 protein solution	5 cm^3 protein solution	5 cm^3 protein solution
5 drops of distilled water	5 drops of pH solution	5 drops of distilled water	5 drops of pH solution
5 cm^3 distilled water	5 cm^3 distilled water	5 cm^3 enzyme solution	5 cm^3 enzyme solution

He returned the 4 test-tubes to the water bath and observed them for the next 5 minutes.

At 3 minutes, the contents of test-tube **D** became clear.

At 5 minutes, the contents of test-tube **C** became clear.

At 5 minutes, the contents of test-tubes **A** and **B** remained milky.

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(a) Use this information to complete the table, including the column heading.

..... /	observations			
	A	**B**	**C**	**D**
0	milky	milky		
1	milky	milky		
2	milky	milky		
3	milky	milky		
4	milky	milky		
5	milky	milky		

[3]

(b) Explain what the student could conclude about the digestion of protein from these results.

.....

.....

.....

.....[2]

(c) **(i)** Suggest a suitable temperature for the water in the water bath and explain why that temperature should be used.

.....

.....

.....[2]

(ii) Suggest a suitable piece of apparatus:

for measuring the volume of enzyme solution .....

for adding the pH solution ..... [2]

(iii) Explain why distilled water was added to test-tubes **A**, **B** and **C**.

.....

.....[1]

(d) Giving full experimental details, design an experiment **based on test-tube D** to investigate the effect of different pH values on the action of this enzyme.

.....

.....

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.....

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.....

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.....

.....

.....[5]

(e) State and explain **one** safety precaution that should be taken when this experiment is carried out.

.....

.....[2]

[Total: 17]

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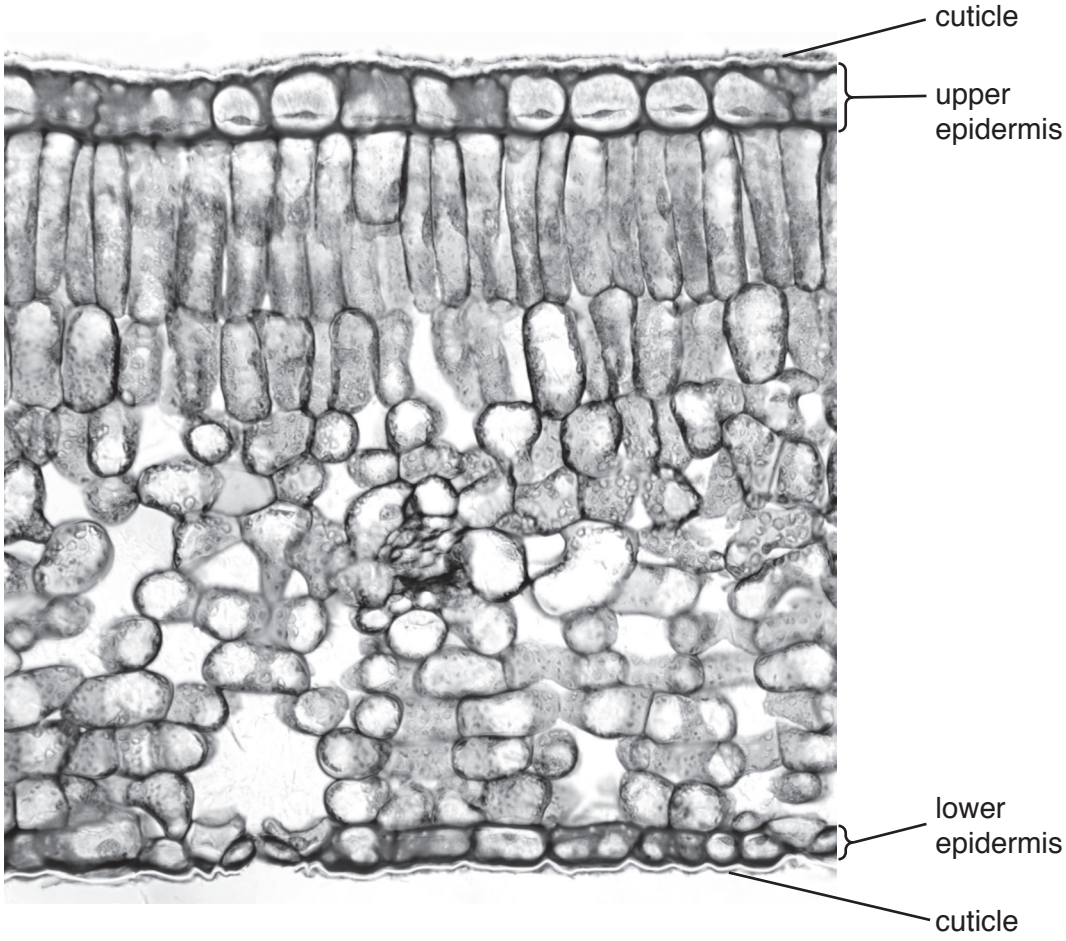
2 The photomicrograph shows a vertical section of a leaf as seen under a microscope.



(a) **(i)** On the photomicrograph, draw ruled labelling lines to identify:

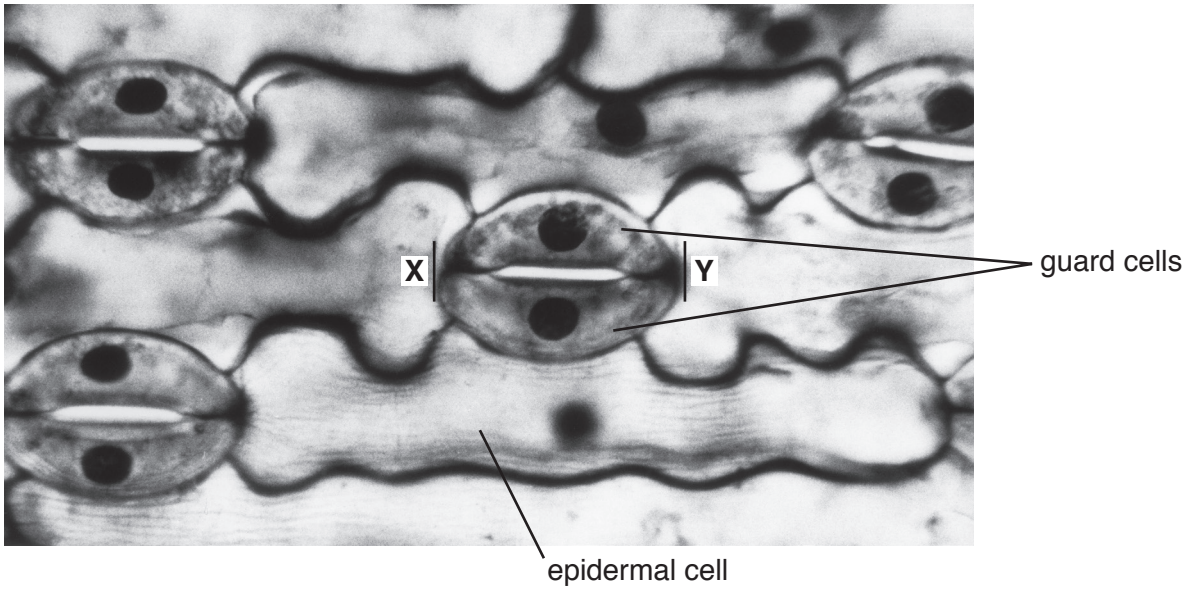
- a palisade cell (label your line **P**)
- a guard cell (label your line **G**). [2]

(ii) Complete the table to compare the upper and lower surfaces of the leaf.

feature	upper surface	lower surface
cuticle		
epidermis		

[2]

(b) The photomicrograph shows a part of the surface of the epidermis of a leaf.



magnification ×800

In the space below make a large drawing of the cells labelled ‘guard cells’ and ‘epidermal cell’ as they appear in the photomicrograph.

[5]

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(c) **(i)** Measure and record the maximum length of the guard cells between **X** and **Y** on the photomicrograph.

.....

Draw a line in the same position on your drawing.

Measure and record the length of this line.

.....
[3]

(ii) Use your measurements in **(c)(i)** to calculate the magnification of your drawing compared to the **actual size** of the guard cells between **X** and **Y**.

Show your working.

x .....[3]

[Total: 15]

3 A student investigated the effect of exercise on her pulse rate.

She cycled for 5 km and then recorded her pulse rate every minute for 5 minutes as she rested.

Her results are shown in the table.

time after exercise / minutes	**pulse rate / beats per minute**
0	180
1	112
2	94
3	88
4	86
5	84

(a) Describe how she could measure her pulse rate.

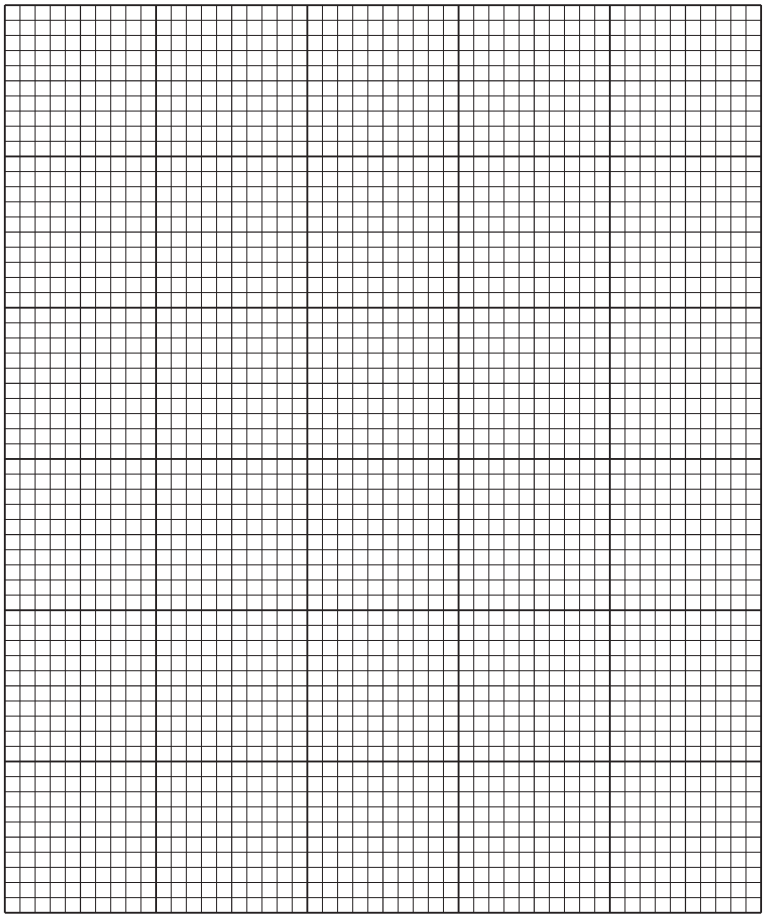
.....

.....

.....

.....[2]

(b) **(i)** On the grid below, construct a graph to show the student's results. Join your points with ruled, straight lines.



[4]

(ii) Describe how the student's pulse rate changes following her exercise.

.....

.....

.....

.....[2]

[Total: 8]

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