Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

2568718348

BIOLOGY **5090/61**

Paper 6 Alternative to Practical **May/June 2017**

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 **10** printed pages and **2** blank pages.

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

1 **(a)** Catalase is an enzyme found in many tissues. Catalase breaks down hydrogen peroxide, forming water and oxygen.

Fig. 1.1 shows the apparatus used by a student to investigate the effect of pH on the activity of catalase. The gas syringe was used to measure the volume of oxygen produced at each pH.

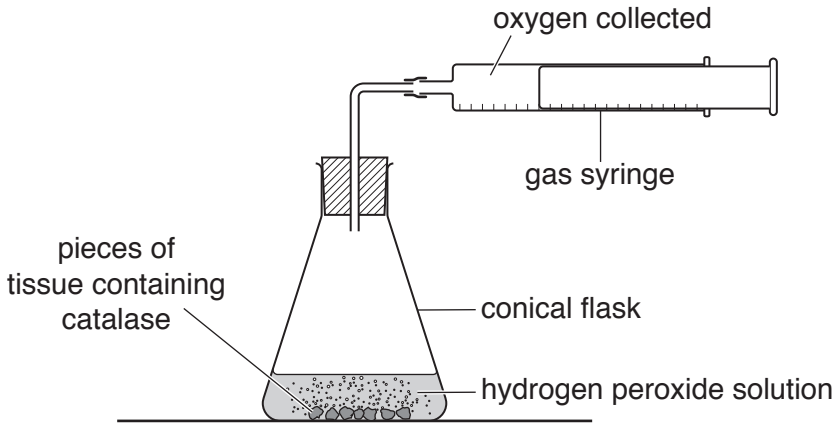

Fig. 1.1

The student carried out the experiment at a pH of 7.0 and measured the volume of oxygen produced during a period of five minutes.

He then mixed fresh samples of tissue containing catalase, and hydrogen peroxide solution at pH values of 5.0, 6.0, 8.0 and 9.0 and measured the volume of oxygen produced during five minutes for each pH.

The results are shown in Table 1.1.

Table 1.1

pH	volume of oxygen produced during five minutes / cm^3
5.0	12
6.0	45
7.0	88
8.0	57
9.0	8

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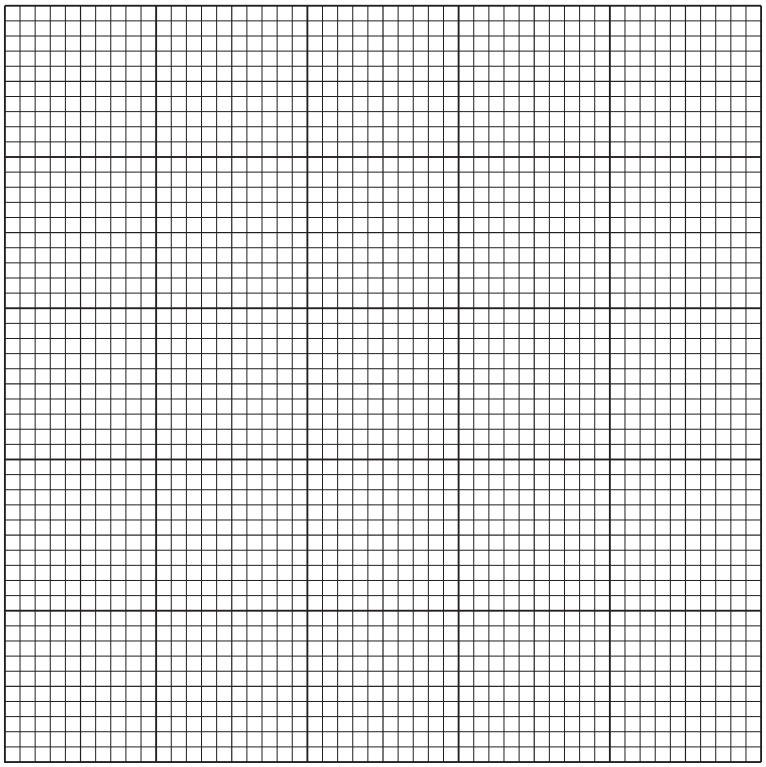
(i) Using the data in Table 1.1, plot a line graph to show the effect of pH on the activity of catalase.
Join the points on your graph with ruled, straight lines.



[4]

(ii) Using the information in Table 1.1 and your graph, describe the effect of pH on the activity of catalase.

.....

.....

.....

.....

.....[3]

(iii) State **two** variables, other than temperature, that should have been kept constant in this investigation.

1 .....

2 .....
[2]

(iv) Giving full experimental details, describe how you could use the apparatus shown in Fig. 1.1 to investigate the effect of temperature on the activity of catalase.

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.....[5]

(v) State **one** safety precaution you would take when you carry out this experiment. Explain why this precaution is needed.

.....

.....

.....

.....[2]

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(b) The enzyme Savinase® is a protease used in many biological detergents. Biological detergents are used to wash clothes. Fig. 1.2 shows the effect of temperature on the activity of Savinase®.

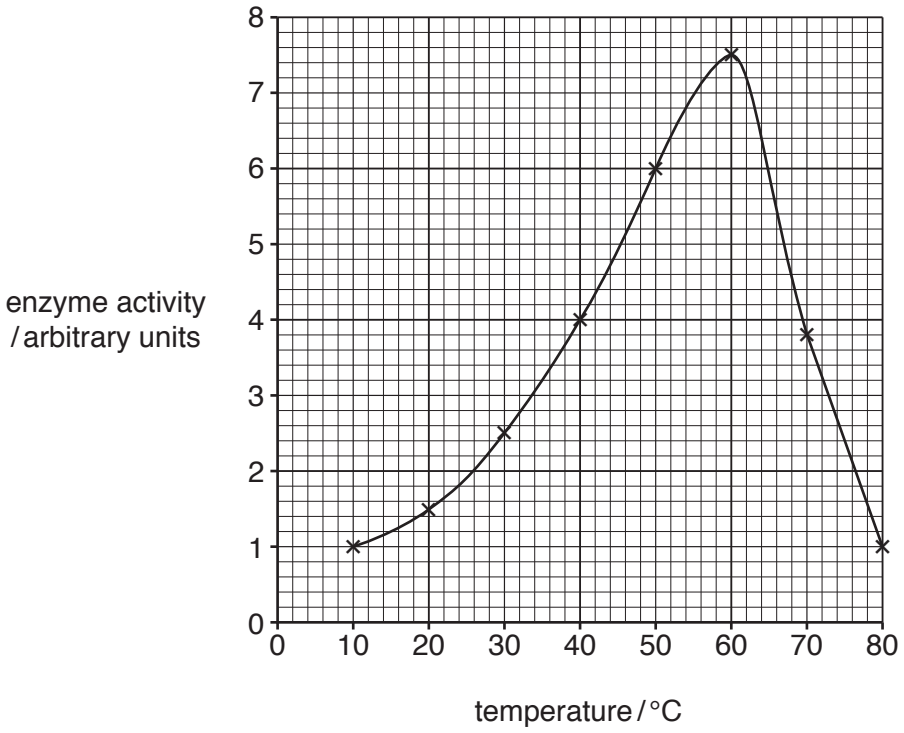

Fig. 1.2

(i) Use Fig. 1.2 to find the optimum temperature for Savinase® activity.

.....°C
[1]

(ii) Suggest why Savinase® is added to biological detergents.

.....

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.....

.....

.....[2]

[Total: 19]

2 Fig. 2.1 shows blood cells as seen using a light microscope.

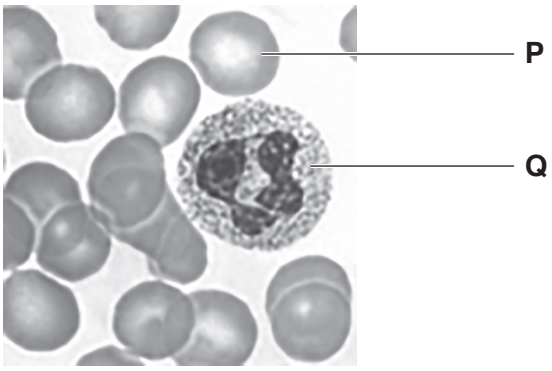

Fig. 2.1

(a) In the space below, make a drawing of the cell labelled **Q** in Fig. 2.1, magnified ×2.
You do not need to label your drawing.

[4]

(b) **(i)** Identify cell **P** and cell **Q**.

P .....

Q .....

[2]

(ii) Use Fig. 2.1 to describe how the appearance of cell **Q** differs from that of cell **P**.

.....

.....[1]

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(c) Fig. 2.2 shows a plant cell as seen using a light microscope.

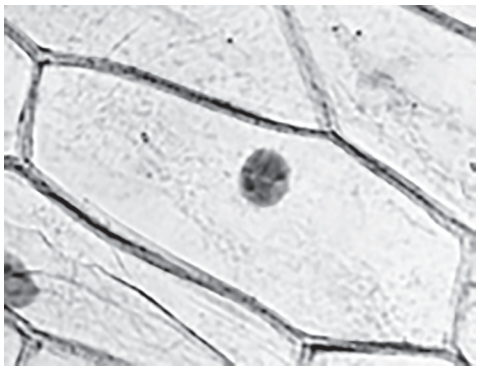

Fig. 2.2

Complete Table 2.1 to compare cell **Q** in Fig. 2.1 and the plant cell in Fig. 2.2.

Table 2.1

feature	cell Q	plant cell
cell wall		
nucleus		

[2]

[Total: 9]

3 Ivy is a plant with green leaves that vary in size. A student noticed that ivy leaves were different in width on plants growing in shady positions compared with plants growing in bright, sunny positions.

To investigate this further, she collected a sample of 10 leaves from plants growing in shady positions and 10 leaves from plants growing in sunny positions.

Some of these leaves are shown in Fig. 3.1.

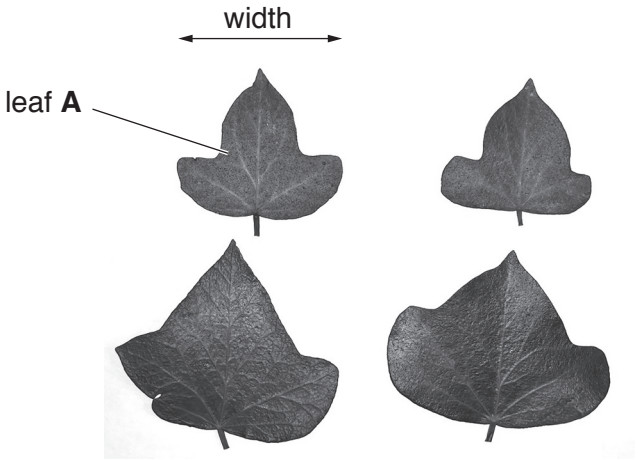

Fig. 3.1

(a) **(i)** Measure and record the maximum width of leaf **A** in Fig. 3.1.

.....[2]

(ii) The magnification of Fig. 3.1 is ×0.5.

Calculate the **actual** maximum width of leaf **A**. Show your working.

.....mm
[2]

(b) The student measured the maximum width of the 20 leaves she collected.
The results are shown in Table 3.1.

Table 3.1

leaf number	maximum width of leaf from shady position/mm	maximum width of leaf from sunny position/mm
1	38	43
2	48	35
3	49	29
4	54	39
5	43	34
6	46	30
7	40	29
8	47	35
9	43	31
10	54	22
mean maximum width/mm		

(i) Complete Table 3.1 by calculating the mean maximum width of leaves from a shady position and the mean maximum width of leaves from a sunny position. [2]

(ii) State **two** conclusions that can be made from the results in Table 3.1.

1 .....

.....

2 .....

.....
[2]

(iii) Suggest **one** way to improve the reliability of the results for this investigation.

.....[1]

(c) Suggest how having different sized leaves in shady and sunny positions might be an advantage to the ivy plant.

.....

.....

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.....

.....

.....[3]

[Total: 12]

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