Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/51**

Paper 5 Practical Test **October/November 2017**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

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.

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.

For Examiner's Use	
1	
2	
Total	

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

CAMBRIDGE International Examinations

[Turn over

1 Fruits such as apples and bananas contain chemicals called polyphenols. An enzyme, polyphenol oxidase, is also present. It catalyses a reaction which converts the polyphenols into brown-coloured compounds.

This reaction happens when the cells are damaged and exposed to oxygen in the air.

$$\text{polyphenols} + \text{oxygen} \xrightarrow{\text{polyphenol oxidase}} \text{brown-coloured compounds}$$

You are going to investigate the effect of pH on the enzyme polyphenol oxidase in apples.

Read all the instructions but DO NOT CARRY THEM OUT until you have drawn a table for your results in the space provided in 1(a)(i).

You should use the gloves and eye protection provided when you are carrying out the practical work.

Step 1 Label five Petri dishes **A**, **B**, **C**, **D** and **E**.

Step 2 Pour the water from the container labelled **water** into Petri dish **A**.

Step 3 Pour the solution labelled **B** into the Petri dish labelled **B**.

Step 4 Repeat step 3 for each of the solutions labelled **C**, **D** and **E** and the Petri dishes labelled **C**, **D** and **E**.

Step 5 Dip the end of one piece of Universal Indicator paper into the solution in Petri dish **A**. Compare the colour of the indicator paper to the colour chart provided to identify the pH of the solution. Record the pH in your table in **1(a)(i)**.

Step 6 Repeat step 5 for Petri dishes **B**, **C**, **D** and **E**.

Step 7 Cut the apple provided in half vertically and remove the peel. Put the peel into the container labelled **waste**. When cutting, take care to cut downwards on to the white tile and away from your hands.

Step 8 Cut five slices from the apple, avoiding the core. Each apple slice should be approximately 30 mm × 10 mm × 5 mm in size. Keep the rest of the apple for step 11.

Step 9 On the white tile, chop one of the apple slices into small pieces and then use a spatula to crush the pieces to a pulp.

Chop and crush the four remaining apple slices. Keep each of the crushed apple slices separate from each other on the white tile, as shown in Fig. 1.1.

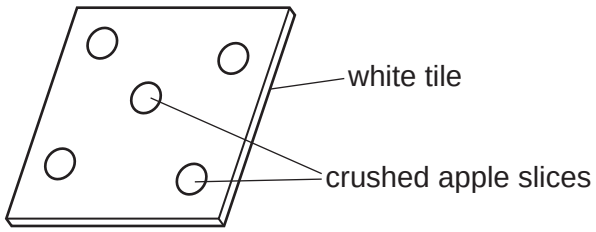

Fig. 1.1

Step 10 Place one of the crushed apple slices into each of the solutions in Petri dishes **A**, **B**, **C**, **D** and **E**. Put the lids on the Petri dishes and leave them for two minutes.

Step 11 If the cut surface of the rest of the apple has started to turn brown, cut the brown layer away. Cut another 30 mm × 10 mm × 5 mm slice. Chop and crush this apple slice in the same way as in step 9. Leave this crushed apple slice on the white tile and label it **control**.

Put any leftover apple into the container labelled **waste**.

Step 12 Remove the lid of Petri dish **A** and carefully tilt the base so the liquid runs away from the crushed apple. Pour the liquid into the beaker labelled **waste liquid**. Make sure that the crushed apple does not fall into the waste liquid.

Do not replace the lid of the Petri dish.

Step 13 Repeat step 12 for each of the Petri dishes labelled **B**, **C**, **D** and **E**.

Step 14 Determine the colour intensity of the crushed apple in each Petri dish using the key shown in Table 1.1. Record the results in your table in **1(a)(i)**.

Step 15 Determine the colour intensity of the crushed apple in each Petri dish after 10 minutes and after 20 minutes. Record the results in your table in **1(a)(i)**.
While you are waiting continue with the other questions.

Table 1.1

colour of crushed apple slice	no brown colour	light brown	dark brown
colour intensity value	1	2	3

(a) (i) Prepare a table to record your results.

Your table should include:
- the colour intensity value for the crushed apple slices
- the pH of each solution.

[6]

(ii) List the pH values from the most effective to the least effective in preventing the browning of the apple slices.

.....[1]

(iii) State the purpose of the control set up in step 11.

.....

.....

.....[1]

Table 1.2 shows the pH of some household products.

Table 1.2

household product	olive oil	lemon juice	milk	water	salt water	baking soda
pH	no value	2.0	6.6	7.0	7.6	9.0

(iv) Using the results of your investigation, suggest which of the household products in Table 1.2 could be used to treat cut apples to prevent them from going brown. Explain your choice.

household product .....

explanation .....

.....
[2]

(b) (i) State **one** variable that has been kept constant in the investigation you have carried out.

Describe how this variable has been kept constant.

variable .....

how it has been kept constant .....

.....
[2]

(ii) Explain why the lids were not put back on to the Petri dishes after the solutions were poured away in steps 12 and 13.

.....

.....

.....[1]

(c) Explain why the method used to find the colour intensity value for the crushed apple slices in step 14 is a source of error.

.....

.....

.....[1]

(d) Identify **one** source of error in steps 8, 9 or 10 and suggest an improvement for this error.

source of error .....

.....

improvement .....

.....

.....

[2]

(e) The enzyme polyphenol oxidase and the substrate polyphenol can be extracted from crushed apples. The substrate turns brown when the enzyme is present.

Some students were provided with extracts of the enzyme and the substrate.

Describe a method the students could use to find the optimum temperature of the enzyme.

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.....[6]

(f) In another experiment, enzymes were extracted from two different fruits.

These enzyme extracts were heated at 65 °C for a total of 60 minutes.

During this time samples were removed every 15 minutes.

The samples were tested to find out how much enzyme activity remained.

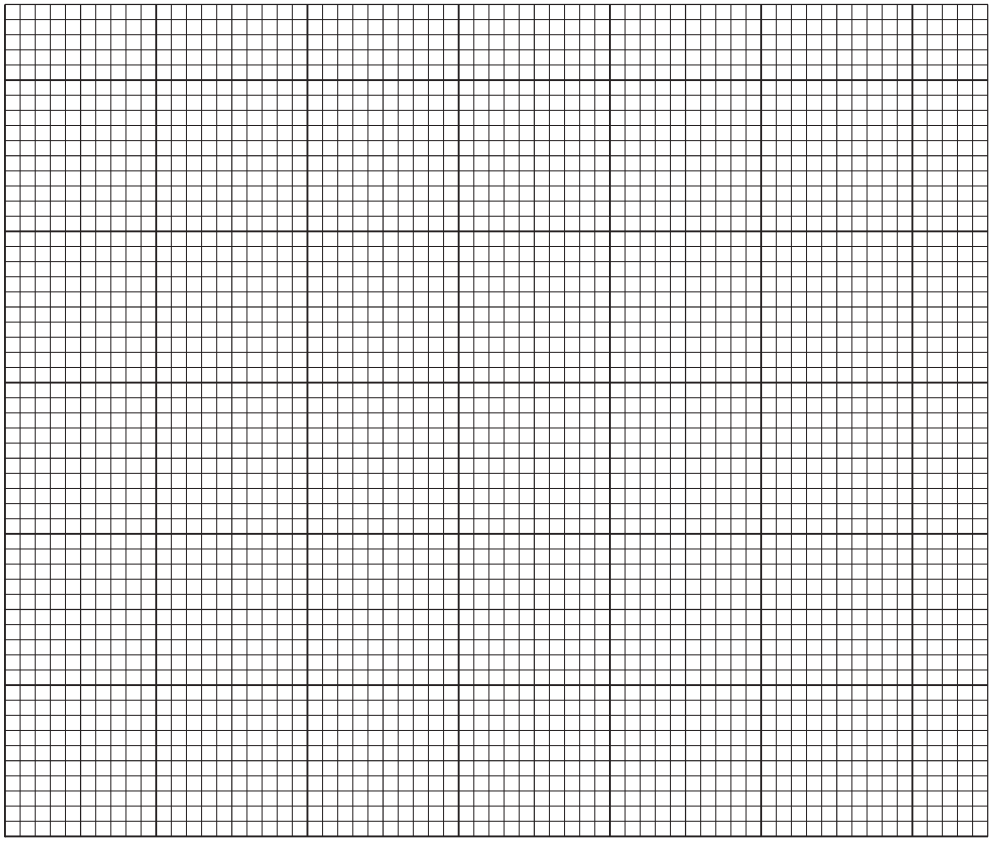
Table 1.3 shows the results of the experiment.

Table 1.3

sample time / min	percentage of enzyme activity remaining	
	apricot	avocado
0	100	100
15	5	40
30	0	25
45	0	20
60	0	10

(i) Plot a line graph on the grid of enzyme activity against sample time.

You should plot the data for the apricot and for the avocado.



[5]

(ii) State a conclusion for these results.

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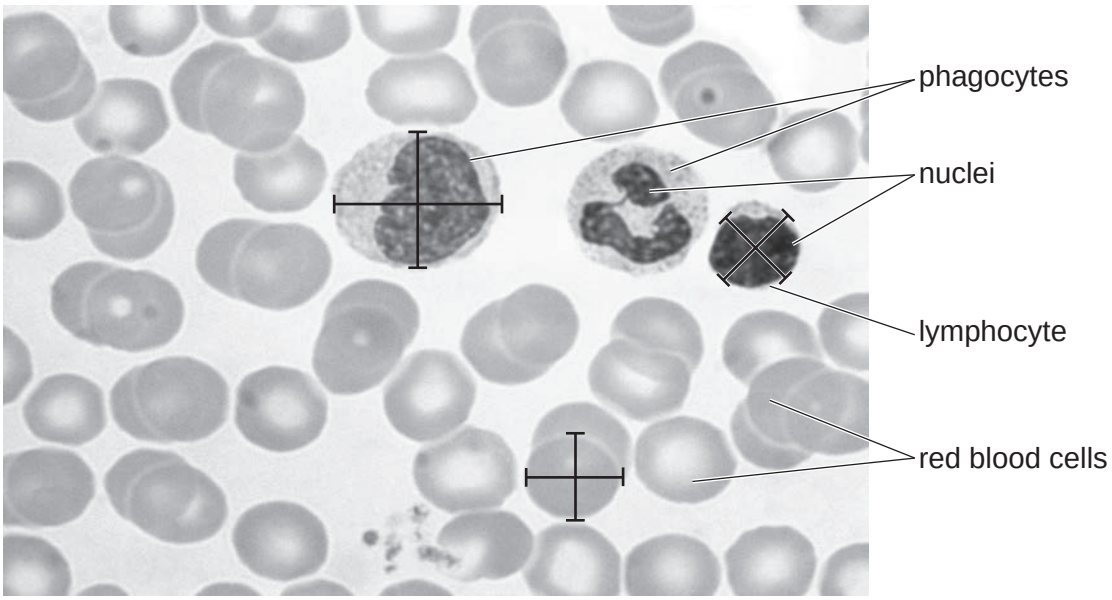
.....[1]

[Total: 28]

2 Fig. 2.1 is a photomicrograph of some blood cells.



magnification ×1500

Fig. 2.1

(a) (i) State **two** visible differences between the red blood cells and the white blood cells (phagocytes and lymphocytes) in Fig. 2.1.

1 .....

.....

2 .....

.....

[2]

(ii) Make a large drawing of the two cells labelled **phagocytes** in Fig. 2.1.

[4]

(b) (i) Measure the diameters of the three marked blood cells, along both the lines drawn on each of the cells, in Fig. 2.1. Record these measurements in Table 2.1.

Add the missing units to Table 2.1.

Calculate the average diameter for each type of blood cell and write your results in Table 2.1.

Table 2.1

type of blood cell	diameter 1 /.....	diameter 2 /.....	average diameter /.....
red blood cell			
lymphocyte			
phagocyte			

[3]

(ii) Calculate the actual average diameter of the red blood cell using your answer in **2(b)(i)** and the following equation.

$$\text{magnification} = \frac{\text{average diameter of the red blood cell in Fig. 2.1}}{\text{actual average diameter of the red blood cell}}$$

Give your answer in micrometres (μm) to the nearest whole number. 1 mm = 1000 μm

Show your working.

.....μm
[3]

[Total: 12]

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