Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

BIOLOGY **0610/52**

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 **11** printed pages and **1** blank page.

DC (ST/FC) 133856/4
© UCLES 2017

CAMBRIDGE International Examinations

[Turn over

1 Starch is an important food source that is digested by the enzyme amylase to form the reducing sugar maltose.

$$\text{starch + water} \xrightarrow{\text{amylase}} \text{maltose}$$

You are going to investigate the effect of enzyme concentration on the rate of digestion of starch by amylase.

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). Put on the gloves and eye protection provided before starting the practical work.

Step 1 Label three test-tubes **A**, **B** and **C**.

Step 2 Put 5 cm^3 of starch solution into each of test-tubes **A**, **B** and **C**.

Step 3 Label another three test-tubes **A1**, **B1** and **C1**.

Step 4 Put 1 cm^3 of 3% amylase solution into test-tube **A1**.
Put 1 cm^3 of 2% amylase solution into test-tube **B1**.
Put 1 cm^3 of 1% amylase solution into test-tube **C1**.

Step 5 Place all six test-tubes into a water-bath at 60 °C and leave for three minutes.

Raise your hand when you are ready for hot water.

You will need to maintain the temperature of the water-bath between 55–60 °C during the whole experiment. Raise your hand for more hot water if needed.

Step 6 Use a marker pen to divide a dry white tile into three sections and label them **A**, **B** and **C** as shown in Fig. 1.1.

Step 7 Drop iodine solution onto the tile to form two rows of 8 drops approximately the same distance apart, in each of the sections **A**, **B** and **C** as shown in Fig. 1.1.

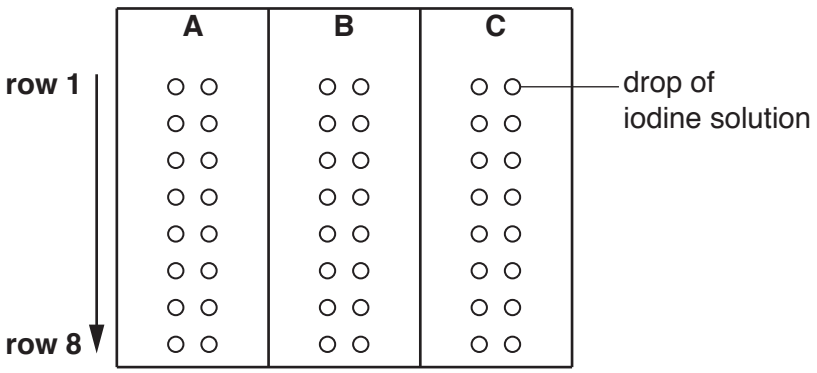


Fig. 1.1

Step 8 Dip a glass rod into the starch solution in test-tube **A** to remove some of the solution. Then touch the glass rod onto the surface of the first drop and then the second drop of iodine solution in row **1** on the section of the tile labelled **A**. Rinse and dry the glass rod.

Step 9 Repeat Step 8 using the amylase solution in test-tube **A1** and the drops of iodine solution in row **2** on the section of the tile labelled **A**.

© UCLES 2017

Step 10 Start a timer. Add the amylase solution in test-tube **A1** to the contents of test-tube **A**. Stir the mixture with a glass rod and **immediately** remove some of the mixture using the glass rod and touch it onto the surface of the first drop and then the second drop of iodine solution in row **3** on the section of the tile labelled **A**. Rinse and dry the glass rod.

Step 11 After **one** minute use the glass rod to remove some of the mixture from test-tube **A** and touch it onto the first drop and then the second drop of iodine solution in row **4** on the section of the tile labelled **A**. Rinse and dry the glass rod.

Step 12 Repeat step 11 for another **four** minutes or until all the starch has been digested. If starch was still present in row 8, record this in your table as > 5 minutes.

Step 13 Repeat steps 8 to 12 for test-tubes **B** and **B1**.

Step 14 Repeat steps 8 to 12 for test-tubes **C** and **C1**.

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

The table should include:
- the concentration of the amylase solution
- the **time** taken for all the starch to be digested for each enzyme concentration.

Record your results in your table as you carry out the practical work.

[5]

(ii) Describe how you decided the time at which all the starch had been digested by the amylase.

.....

.....[1]

(iii) The starch has been digested into simple (reducing) sugars. Describe how you could test the liquid in the test-tubes to show they contain reducing sugars.

.....

.....

.....

.....[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 all the test-tubes were left in the water-bath for three minutes before the enzyme was added to the starch.

.....

.....

.....[1]

(iii) Explain why step 9 was carried out before mixing the enzyme and starch together.

.....

.....

.....[1]

(c) (i) Identify **two** sources of error in the method used in steps 10, 11 and 12.

1 .....

.....

2 .....

.....
[2]

© UCLES 2017

(ii) For **one** of the errors you identified in **(c)(i)**, describe how the method could be improved to reduce the error.

.....

.....

.....[1]

(d) In another experiment some students made starch agar that contained 100 mg per cm^3 of starch.

The starch agar was stained using iodine and was then cut into blocks that measured 2 cm × 3 cm × 0.5 cm.

(i) Calculate the total mass of starch in each of the blocks of starch agar.

Show your working.

..... mg
[3]

Six small beakers containing 20 cm^3 of 5% amylase solution were placed in water-baths at different temperatures. One of the blocks containing starch from **(d)(i)** was placed into each of the beakers.

The time taken for all the starch to disappear was measured.

The results of the experiment are shown in Table 1.1.

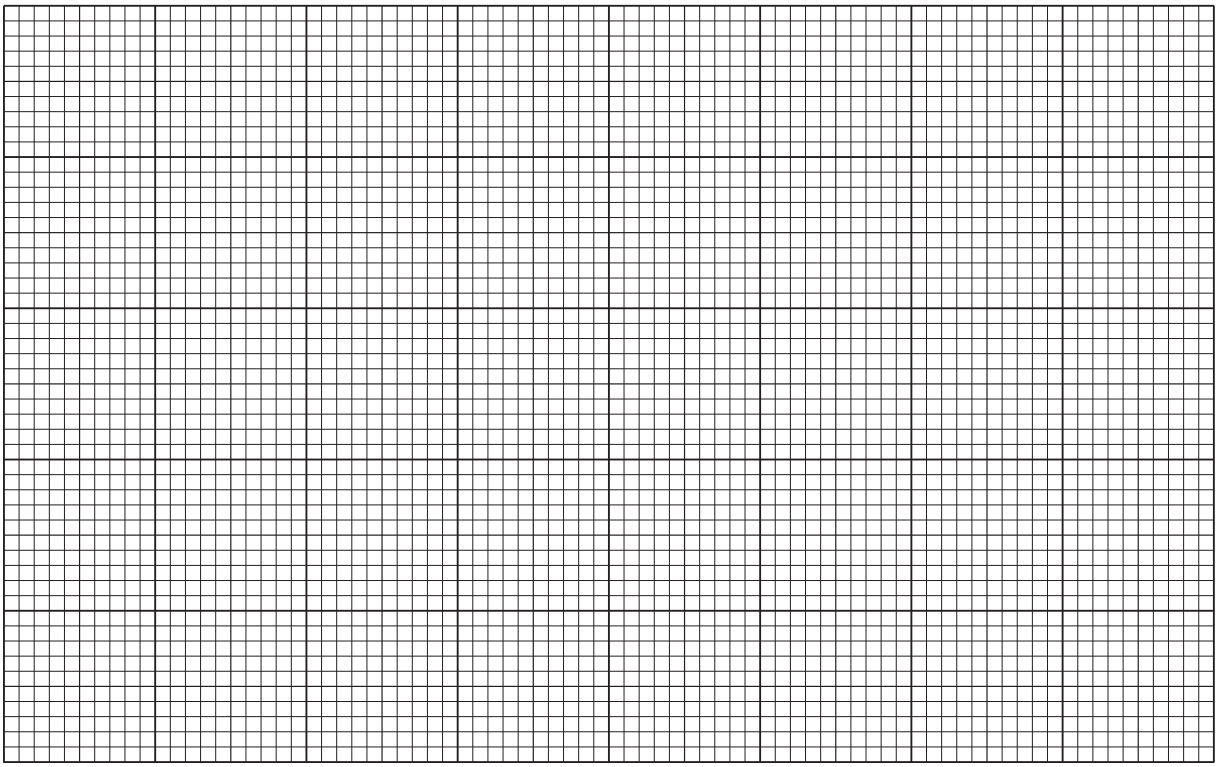
Table 1.1

temperature / °C	time taken for starch to disappear / s	rate of reaction / mg per s
20	1500	0.2
30	375	0.8
40	200	1.5
50	125	2.4
60	65	4.6
70	88	

(ii) Complete Table 1.1 by writing in the rate of reaction at 70 °C. [1]

© UCLES 2017

(iii) Plot a graph on the grid to show the effect of temperature on the rate of reaction.



[4]

[Total: 23]

2 Fig. 2.1 is a photomicrograph of the epidermis of a leaf. It shows epidermal cells, guard cells and stomata.

Each stoma is surrounded by two guard cells containing chloroplasts.

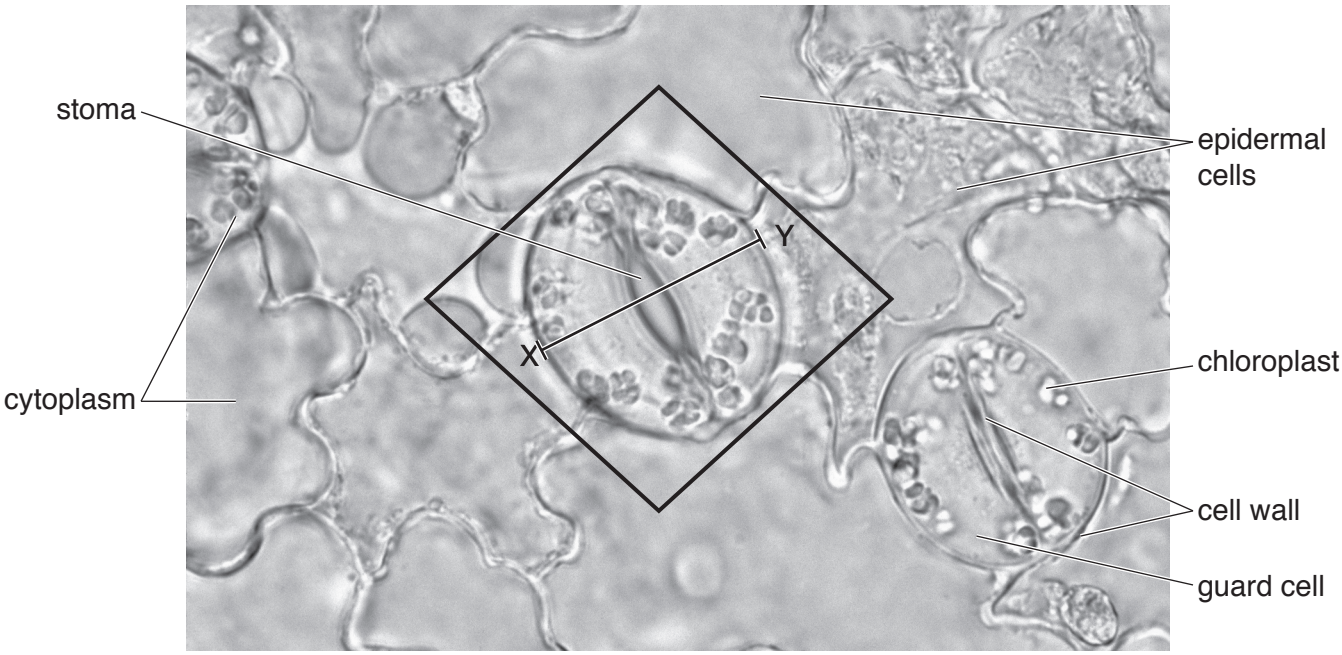


Fig. 2.1

(a) **(i)** Complete Table 2.1 to show **two** visible differences between epidermal cells and guard cells.

Table 2.1

feature	epidermal cell	guard cell

[2]

(ii) Make a large drawing of the two guard cells and the stoma shown inside the box on Fig. 2.1.

[4]

(b) Measure the total width of the guard cells and stoma along the line **XY** on Fig. 2.1. Include the units.

Total width of the guard cells and stoma on Fig. 2.1 .....

Draw a line **on your drawing** in the same position as the line **XY**.

Measure width of the guard cells and stoma on your drawing. Include the units.

Total width of the guard cells and stoma on your drawing .....

Calculate the magnification of your drawing using the formula:

$$\text{magnification} = \frac{\text{width on your drawing}}{\text{width on Fig. 2.1}}$$

Show your working and give your answer to the nearest whole number.

.....

[3]

(c) Fig. 2.2 shows the rate of water gain by absorption and the rate of water loss by transpiration in a plant during a 24-hour period on a hot sunny day.

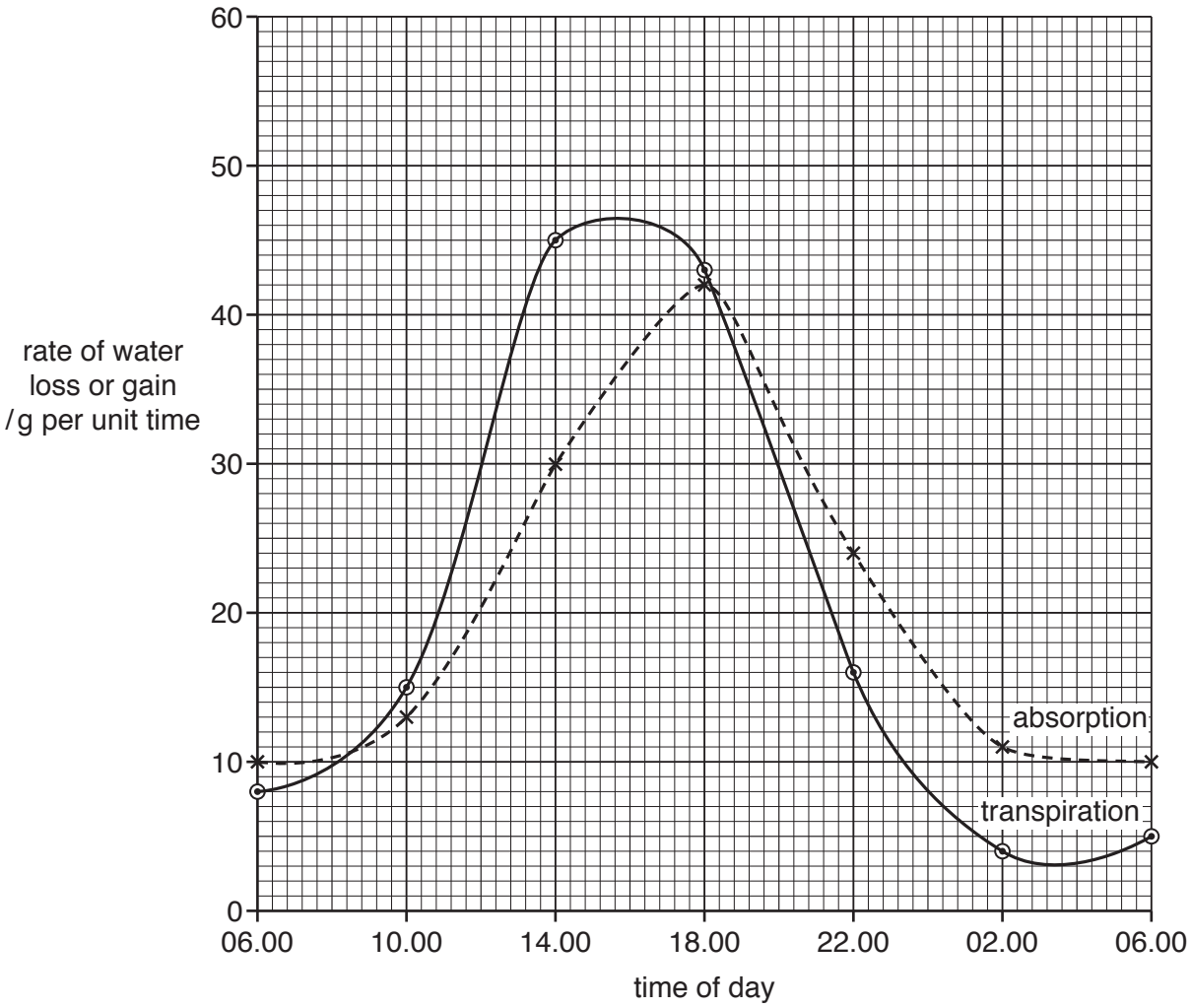


Fig. 2.2

Compare the trends shown in Fig. 2.2 for absorption and transpiration of water during the 24-hour period.

.....

.....

.....

.....[2]

(d) Fig. 2.3 shows the apparatus used to measure water uptake by a leafy shoot. The leafy shoot is sealed tightly into a glass tube which is connected to a capillary tube containing water.

As the leafy shoot loses water through its leaves it absorbs water from the apparatus. Air is pulled into the open end of the capillary tube as the water moves towards the leafy shoot.

The distance moved by the air in the capillary tube can be measured on the scale and used to calculate the volume of water absorbed by the leafy shoot.

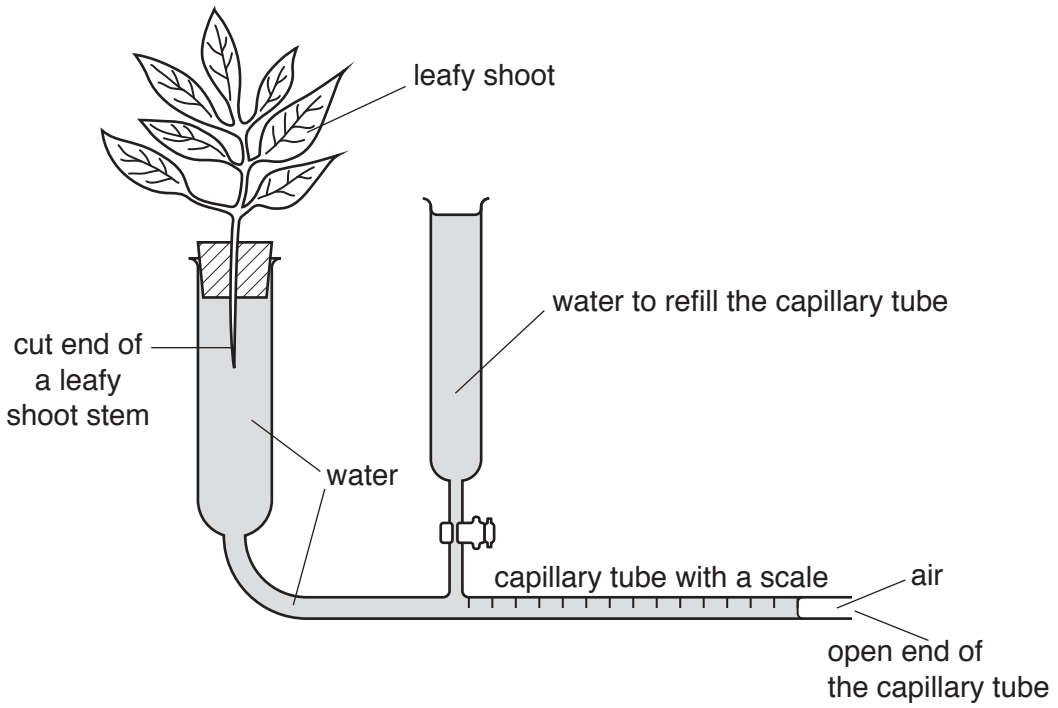


Fig. 2.3

Describe how you would use this apparatus to investigate the effect of temperature **OR** humidity on the rate of water absorption by a leafy shoot.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[6]

[Total: 17]

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© UCLES 2017