Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/53**

Paper 5 Practical Test **October/November 2019**

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 regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **10** printed pages and **2** blank pages.

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1 Photosynthesis occurs in chloroplasts. A chloroplast suspension can be made by extracting the chloroplasts from green leaves.

You are going to investigate the effect of light on photosynthesis in a chloroplast suspension.

The blue dye DCPIP can be used to investigate photosynthesis. During photosynthesis the dark blue colour of the DCPIP changes and eventually disappears so that it becomes colourless.

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 wear the gloves and eye protection provided during the practical work in question 1.

Step 1 You are provided with eight green leaves. Tear the leaves into small pieces and place them into the mortar (bowl).

Step 2 Pour all of the ice-cold solution from the beaker labelled **isolation medium** into the mortar (bowl).

Step 3 Use the pestle (or spoon) to grind the leaves in the isolation medium for three minutes.

Step 4 Place three layers of muslin into the funnel. Put the funnel into the large test-tube labelled **C**.

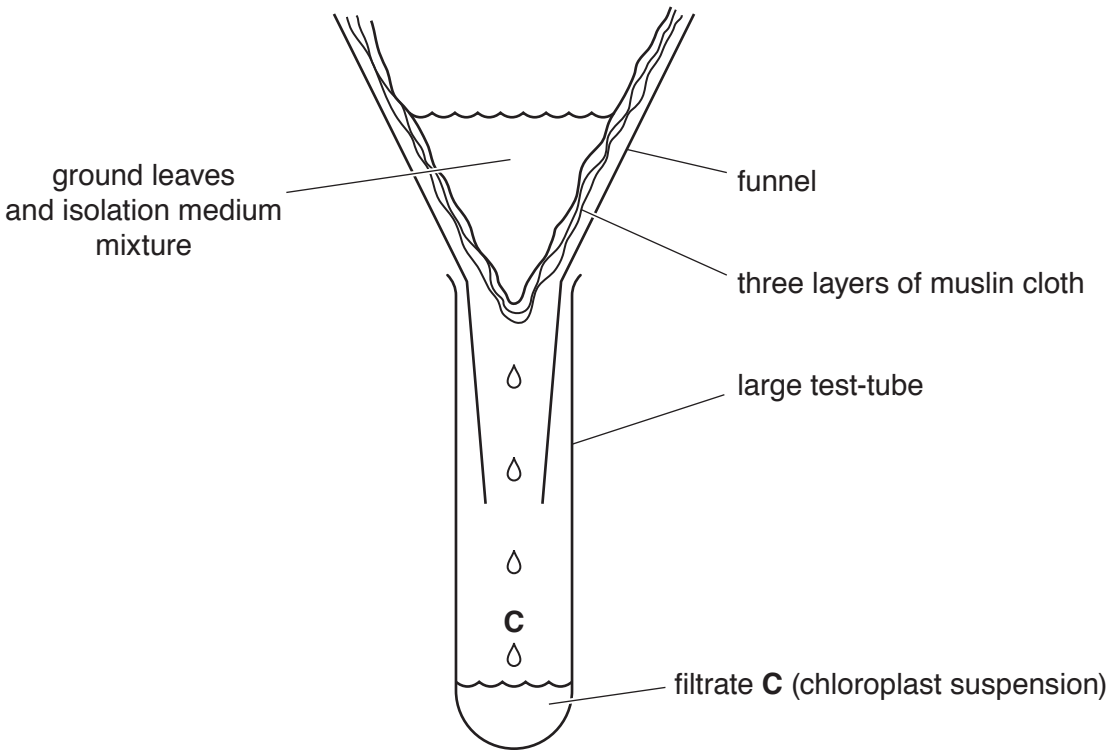

Fig. 1.1

Step 5 Carefully hold the edges of the muslin and pour the ground leaves and isolation medium mixture from the mortar (bowl) into the muslin-lined funnel. When most of the liquid has filtered into the large test-tube, as shown in Fig. 1.1, place the muslin and funnel in the **waste** container.

Step 6 Raise your hand when you are ready for ice-cold water to be added to the water-bath.

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Step 7 Wrap aluminium foil around one empty test-tube to exclude light. Leave the opening at the top of the test-tube uncovered. Do **not** wrap the second test-tube. Place both test-tubes into the test-tube rack.

Step 8 Use the plastic pipette to add 2 cm^3 of filtrate **C** to each of the empty test-tubes.

Step 9 Use a 5 cm^3 syringe to add 5 cm^3 of DCPIP solution to each of the two test-tubes. Place a stopper in both test-tubes. Stand both test-tubes in the water-bath and position the water-bath near a bright light source or lamp.

Step 10 Start the stop-clock and wait five minutes.

Step 11 After five minutes observe the colour in the uncovered test-tube and record it in your table in **1(a)(i)**.

Step 12 Remove the aluminium foil from the other test-tube. Immediately observe the colour of the liquid in the test-tube. Record this in your table in **1(a)(i)**.

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

View solution

[3]

(ii) Identify the variable that was changed (independent variable) and the variable that was measured (dependent variable) in this investigation.

independent variable .....

.....

dependent variable .....

.....

[2]

(iii) State **two** variables that have been kept constant in this investigation.

1 .....

.....

2 .....

.....

[2]

(iv) State a conclusion for these results.

.....

.....

..... [1]

(b) The investigation was not repeated.

View solution

(i) Suggest why it would be advisable to repeat the investigation.

.....

.....

..... [1]

(ii) Identify **two** other sources of error in this investigation.

View solution

error 1 .....

.....

error 2 .....

.....

[2]

(iii) Suggest an improvement for **one** of the errors you have identified in **1(b)(ii)**.

View solution

.....

.....

..... [1]

(c) A student wanted to investigate the effect of temperature on the rate of photosynthesis in a chloroplast suspension.

View solution

Describe how the student could carry out this investigation using DCPIP.

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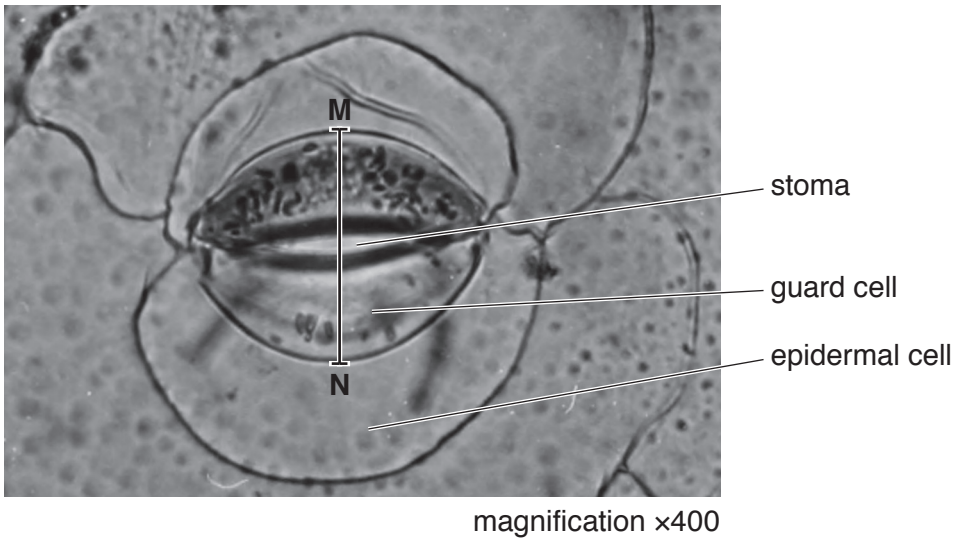
..... [6]

[Total: 18]

2 Fig. 2.1 is a photomicrograph of part of the lower epidermis of a leaf.



magnification ×400

Fig. 2.1

(a) (i) Make a large drawing of Fig. 2.1. Do not label your drawing.

View solution

[4]

(ii) Measure the length of the line **MN** on Fig. 2.1.

View solution

length of line **MN** .....mm

Calculate the actual width of the guard cells and the stoma indicated by line **MN** in Fig. 2.1. Use the equation and information in Fig. 2.1.

$$\text{magnification} = \frac{\text{length of line MN on Fig. 2.1}}{\text{actual width of the guard cells and the stoma}}$$

Give your answer to two decimal places.

.....mm
[3]

(b) A student investigated the effect of sucrose concentration on stomatal opening.

Strips of epidermis from leaves were placed in different concentrations of sucrose solution for one hour.

The student measured the width of 10 stomatal openings from the epidermis in each sucrose solution.

View solution

The results are shown in Table 2.1.

Table 2.1

percentage concentration of sucrose	width of stomatal opening / μm										
	1	2	3	4	5	6	7	8	9	10	average
0	5	6	7	5	5	6	7	5	7	6	5.9
5	3	4	3	3	4	3	2	3	3	2	
20	1	2	1	2	1	1	5	1	2	1	1.7

(i) Circle **one** measurement in Table 2.1 that could be anomalous. [1]

(ii) Calculate the average width of stomatal opening in the 5% sucrose solution.

View solution

Include the unit.

.....
[2]

(c) Pineapple plants are adapted to grow in hot dry conditions.

Scientists investigated the number of stomata open, in pineapple plants, at different times of day.



The data is shown in Table 2.2 (00:00 is midnight).

Table 2.2

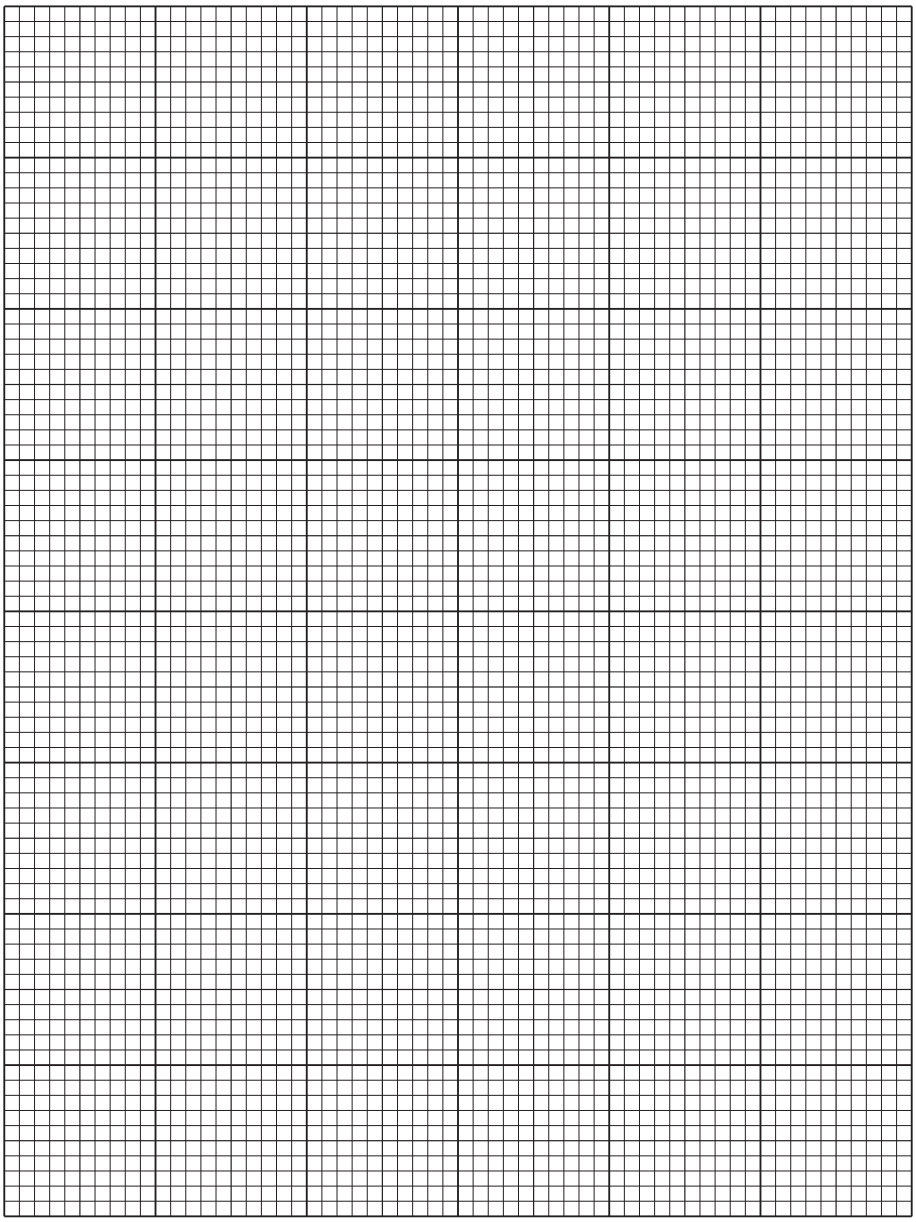
time of day	average number of stomata open per mm^2
00:00	77
04:00	61
08:00	22
12:00	4
16:00	10
20:00	51

(i) Calculate the percentage change in the average number of open stomata per mm^2 between 16:00 hours and 20:00 hours.

Space for working.

.....%
[2]

(ii) Plot a bar chart on the grid to show the data in Table 2.2.



[3]

(iii) Describe, using your graph, how the average number of open stomata per mm^2 changes throughout the day.

.....

.....

.....

.....

..... [2]

(d) When fruit ripens the starch contained within it is converted into reducing sugars.

View solution

(i) State the name of the substance that is used to test for the presence of starch.

..... [1]

(ii) Describe how you could safely show a reducing sugar was present in a sample of pineapple fruit juice.

procedure .....

.....

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.....

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safety .....

..... [4]

[Total: 22]

View solution

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