Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/63**

Paper 6 Alternative to Practical **October/November 2019**

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.

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 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.

The blue dye DCPIP can be used to investigate photosynthesis. During photosynthesis the blue colour of the DCPIP changes and eventually disappears so that it becomes colourless. The remaining mixture appears green due to the chloroplast suspension.

A student investigated the effect of light on photosynthesis in a chloroplast suspension.

Step 1 The student crushed eight green leaves in an ice-cold buffer solution.

Step 2 The mixture of crushed leaves and buffer solution was then filtered to form a chloroplast suspension.

Step 3 The student was given two test-tubes. One test-tube was wrapped in aluminium foil to exclude light. The second test-tube was **not** covered in foil so that light could reach the contents of this test-tube.

Step 4 A plastic pipette was used to add 2 cm^3 of the chloroplast suspension to each of the two test-tubes.

Step 5 A syringe was used to add 5 cm^3 of DCPIP solution to both test-tubes. A stopper was placed in each test-tube.

Step 6 Both test-tubes were placed in a water-bath containing ice-cold water. The water-bath was positioned near a bright light.

Step 7 The test-tubes were left in the bright light for five minutes.

Step 8 After five minutes the student observed and noted the colour of the liquid in the test-tube that was **not** wrapped in foil. They removed the foil from the covered test-tube and observed the colour in this test-tube.

The student's results are shown in Fig. 1.1.

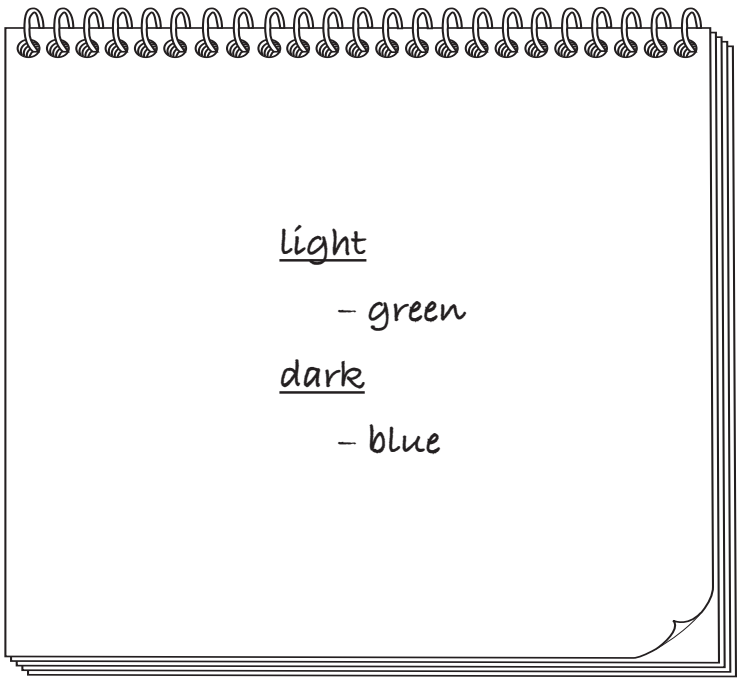

Fig. 1.1

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(a) (i) Prepare a table and record the results from Fig. 1.1.

View solution

[2]

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

View solution

independent variable.....

.....

dependent variable.....

.....

[2]

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

View solution

1 .....

.....

2 .....

.....

[2]

(iv) State a conclusion for these results.

View solution

.....

.....

..... [1]

(b) In step 6 both test-tubes were placed in a water-bath containing ice-cold water for five minutes. A thermometer was also placed in the water-bath.

View solution

Fig. 1.2 shows the thermometer at the start of the investigation and after five minutes.

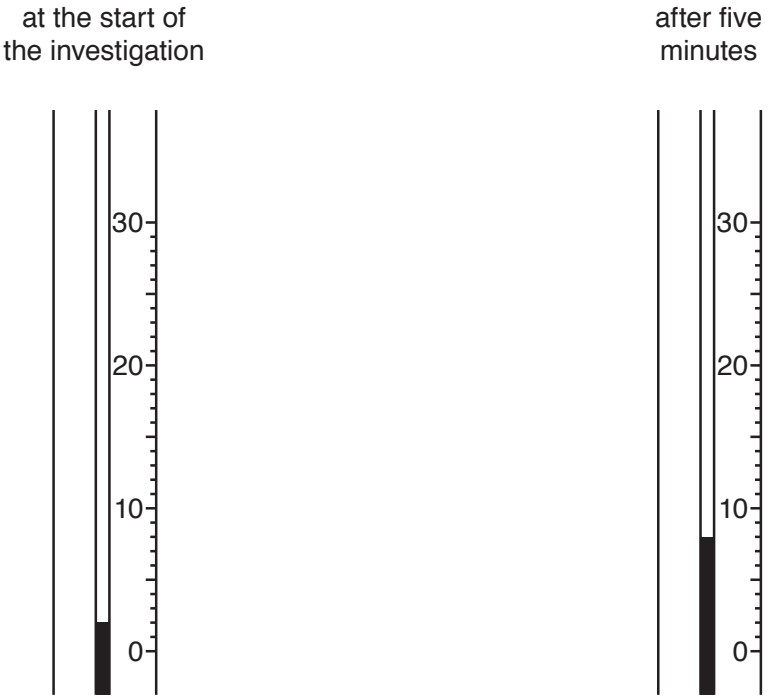

Fig. 1.2

Record the temperatures shown in Fig. 1.2. Include the units.

temperature at the start of the investigation .....

temperature after five minutes .....

[2]

(c) The investigation was not repeated.

View solution

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

.....

.....

..... [1]

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(ii) Identify **one** other source of error in this investigation and suggest an improvement for this error.

View solution

error.....

.....

improvement .....

.....

.....

[2]

(d) 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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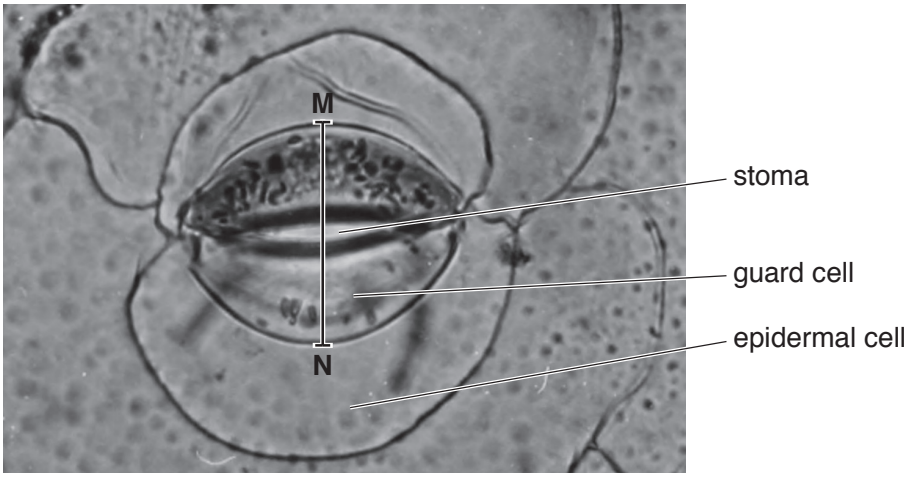
..... [6]

[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]

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(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]


View solution

(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.

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]


View solution

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

Include the unit.

.....
[2]

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

View solution

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]

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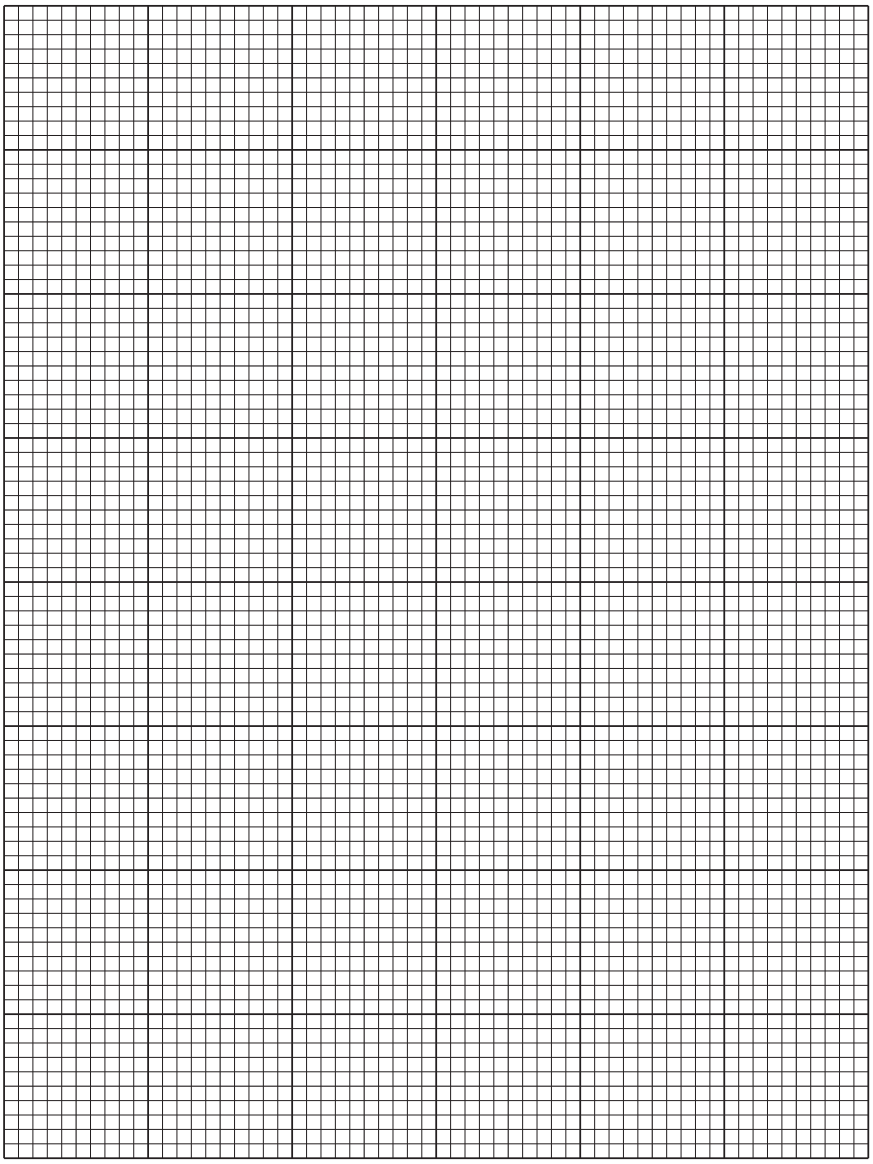
(ii) Plot a bar chart on the grid to show the data in Table 2.2.

View solution



[3]

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

View solution

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..... [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]

View solution

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

procedure .....

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safety.....

..... [4]

[Total: 22]

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