Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

7448808338

BIOLOGY **5090/62**

Paper 6 Alternative to Practical **May/June 2020**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Blank pages are indicated.

DC (LK/TP) 179857/6

[Turn over

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

1 In the beetroot plant, cells in the root contain a red pigment. This pigment remains in the cells unless the cells are damaged. If beetroot tissue is placed in water and the cells are damaged, the pigment leaves the cells and colours the water.

Some students investigated the effect of temperature on the release of the red pigment from beetroot tissue.

They followed these instructions:

- Cut four cylinders of beetroot tissue, each 30 mm × 10 mm.
- Wash the beetroot cylinders in the beaker of rinsing water.
- Label four test-tubes **A**, **B**, **C** and **D**.
- Place one beetroot cylinder in each test-tube.
- Place test-tube **A** in a beaker of water at 20 °C.
- Make three water-baths at initial temperatures of 40 °C, 60 °C and 80 °C.
- Place test-tube **B** in the 40 °C water-bath, test-tube **C** in the 60 °C water-bath and test-tube **D** in the 80 °C water-bath.
- Add water from each of the water-baths to the test-tube placed in it until the beetroot cylinder is just covered with the water.
- Leave the beetroot cylinders for 5 minutes and then remove the cylinders from the test-tubes.
- Place the test-tubes in the test-tube rack and observe the water in them.

(a) The table shows what the students observed.

test-tube	**A**	**B**	**C**	**D**
colour of water	**lightest red** →			**darkest red**

(i) Suggest why the beetroot cylinders were all cut to 30 mm × 10 mm.

.....

..... [2]

(ii) Explain why the beetroot cylinders were washed before starting the investigation.

.....

..... [1]

(iii) Suggest what the students concluded from their observations and explain your answer.

conclusion .....

.....

explanation .....

.....
[2]

(iv) State **two** possible sources of error in the method used. For each, explain how the method could be improved.

source of error 1 .....

improvement 1 .....

.....

source of error 2 .....

improvement 2 .....

.....
[4]

(b) Another student used an instrument called a colorimeter to obtain a numerical value for the colour in each test-tube. She did the experiment twice.

(i) Explain how repeating the experiment makes the observations of colour more reliable.

..... [1]

Some of the readings from the colorimeter are shown in the table.

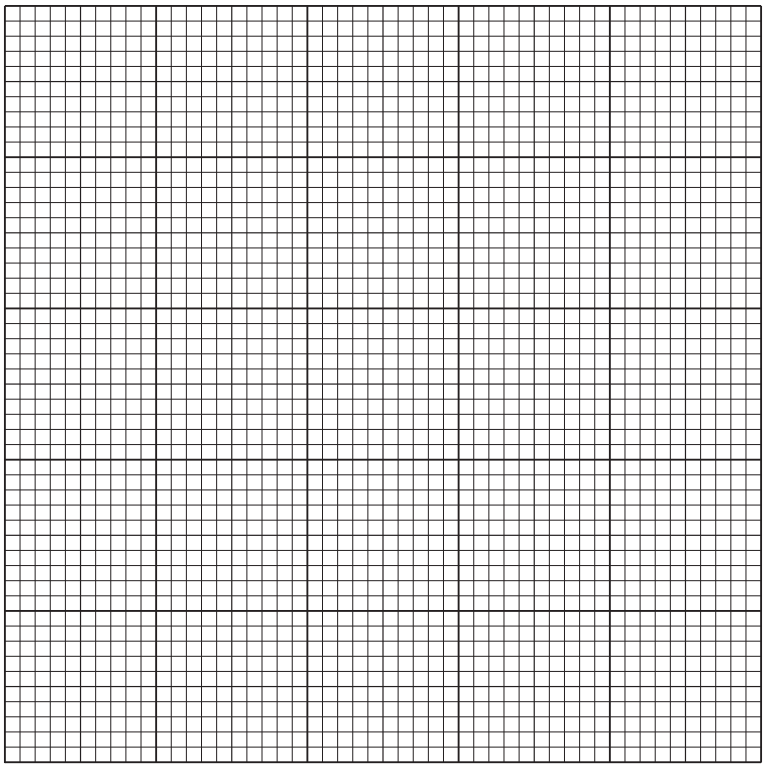
temperature / °C	colorimeter reading / arbitrary units		
	experiment 1	experiment 2	average
20	0.6	1.6	.....
40	1.6	2.8	.....
60	4.9	4.7	.....
80	.....	9.8	.....

(ii) The colorimeter reading at 80 °C for experiment 1 was:

Insert this reading into the table of results. [1]

(iii) Calculate the average reading for each temperature and complete the table. [2]

(iv) On the grid construct a line graph to show the relationship between temperature and **average** colorimeter readings. Join your points with ruled, straight lines.



[4]

(v) Use your graph to determine the average colorimeter reading for 55 °C.

Show your working on your graph.

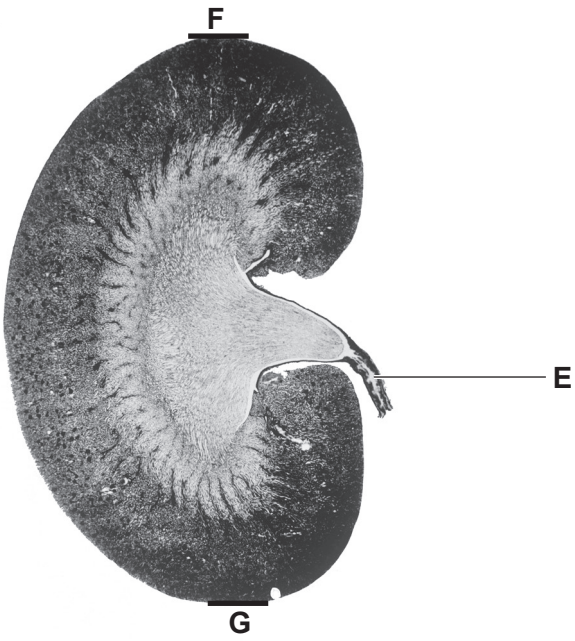
..... arbitrary units [2]

[Total: 19]

[Turn over

2 The photograph shows a section through a human organ.

(a) (i) Identify this organ ..... [1]



(ii) Name the structure labelled **E** ..... [1]

(b) In the space below, make a large drawing of this organ as it appears in the photograph.

[5]

(c) (i) **On the photograph**, draw a straight line between **F** and **G**.

Measure and record the length of this line.

..... mm [2]

(ii) The actual length of this organ is 12 cm. Use your measurement in **(c)(i)** to calculate the magnification of the organ in the photograph.

Space for working.

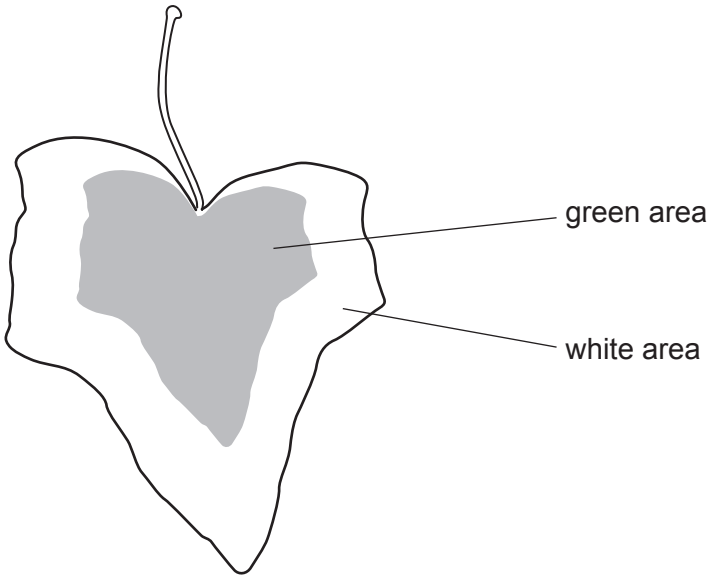
magnification × ..... [3]

[Total: 12]

Question 3 starts on page 10.

3 Variegated leaves have green areas that contain chlorophyll and white areas where chlorophyll is absent.

A student investigated the factors needed for photosynthesis to take place. He used a plant with leaves that were all variegated as shown below.



(a) He began by placing the plant in a dark room for 24 hours.

Explain why this was necessary.

.....

..... [1]

(b) He then picked a leaf, immediately prepared it and tested it for the presence of starch.

(i) Name the testing reagent he used. ..... [1]

(ii) Name a suitable piece of apparatus for adding the reagent in this test.

..... [1]

(iii) Describe and explain the appearance of the two areas of the leaf after he had carried out this test for starch.

description .....

explanation .....

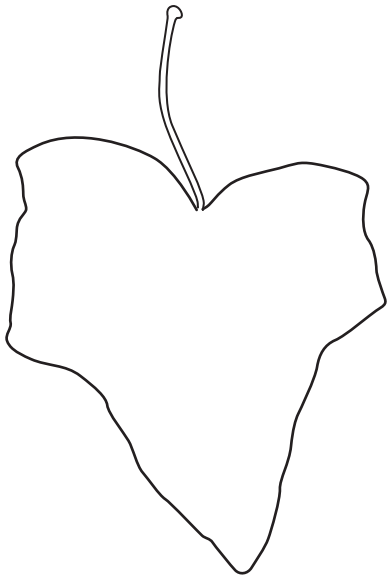
.....

.....

[2]

(c) He moved the plant into bright sunlight for a day and then tested another leaf for the presence of starch.

(i) Complete and label the diagram of the leaf to show any colours the student observed at the end of this test.



[3]

(ii) State your conclusion from this investigation about the factors needed for photosynthesis.

.....

..... [1]

[Total: 9]

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