Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2475685270

BIOLOGY **5090/31**

Paper 3 Practical Test **May/June 2020**

1 hour 15 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

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 [ ].

For Examiner's Use	
1	
2	
3	
Total	

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

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[Turn over

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In order to plan the best use of your time read through the questions on this paper carefully before starting the practical work.

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.

You are going to investigate the effect of temperature on the release of the red pigment from beetroot tissue.

You are provided with four cylinders of freshly cut beetroot tissue in water.

- Label four test-tubes **A**, **B**, **C** and **D**.
- Use the knife provided to cut each of the four cylinders to 30 mm in length on the white tile.
- Use the forceps to pick up the beetroot cylinders and wash them in the beaker labelled **washing water** to remove any red pigment from the surface.
- Place one cylinder in each test-tube.
- Use the hot and cold water available to prepare three water-baths using the labelled beakers, at temperatures of approximately 40 °C, 60 °C and 80 °C. Raise your hand to indicate if you require more hot water. **Take care using the hot water.**
- Place test-tube **A** in the beaker of water labelled **room temperature**. Record the temperature of the water in this beaker.

  ..... °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.
- Use the pipette to add water from each water-bath to the test-tube placed in it until the water level is approximately 1 cm above the top of the beetroot cylinder.
- Start the stop-clock or note the time .....
- Leave the beetroot cylinders in the water for five minutes.
- You may continue with questions **(a)(ii)** and **(iii)** while you are waiting.
- After five minutes, shake each test-tube and observe the colour of the water.

(a) (i) Complete the table including the appropriate temperature for each test-tube.

colour of water	**lightest red** → **darkest red**			
test-tube				
temperature / °C				

[4]

(ii) Suggest why the cylinders were all cut to 30 mm length.

..... [1]

(iii) State **one** possible source of error in the method used. Explain how the method could be improved.

source of error .....

improvement .....

.....
[2]

(iv) Suggest what you can conclude from your observations and explain your answer.

conclusion .....

.....

explanation .....

.....
[2]

(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:

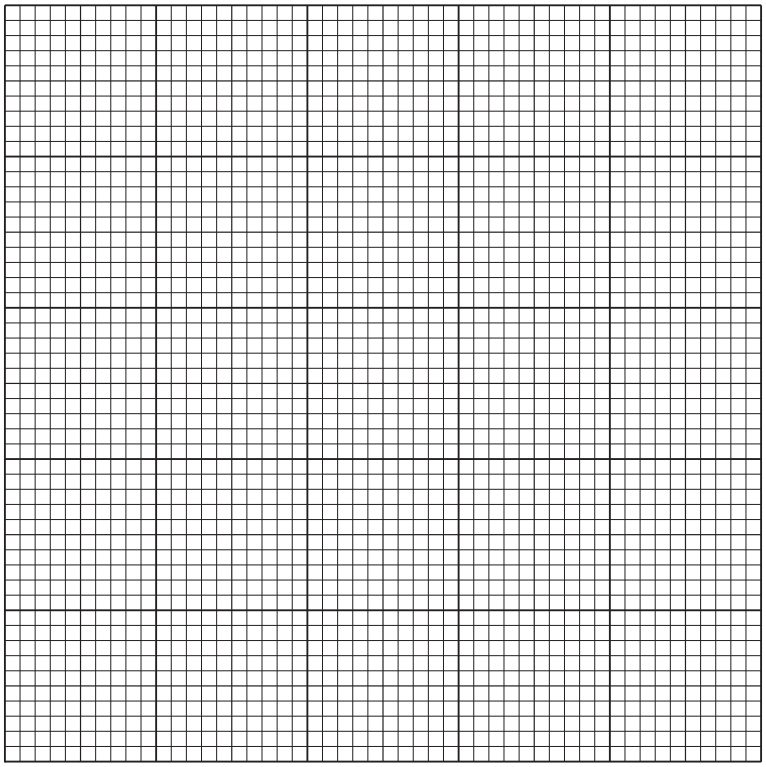


Insert this reading into the table of results. [1]

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(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.

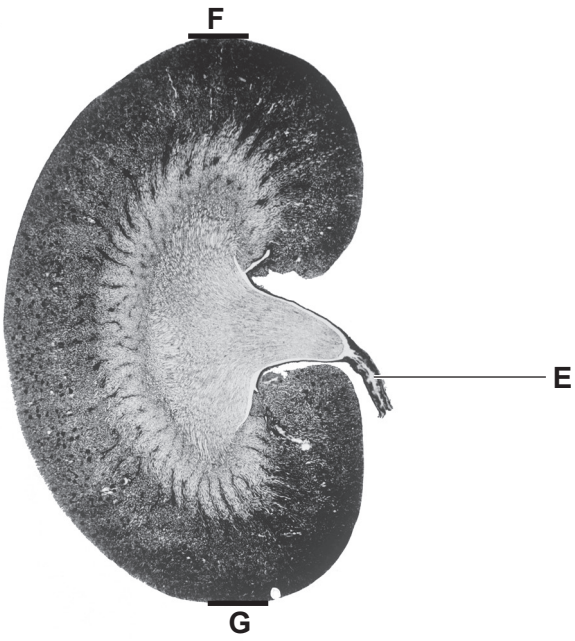
Show your working on your graph.

..... arbitrary units [2]

[Total: 19]

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]

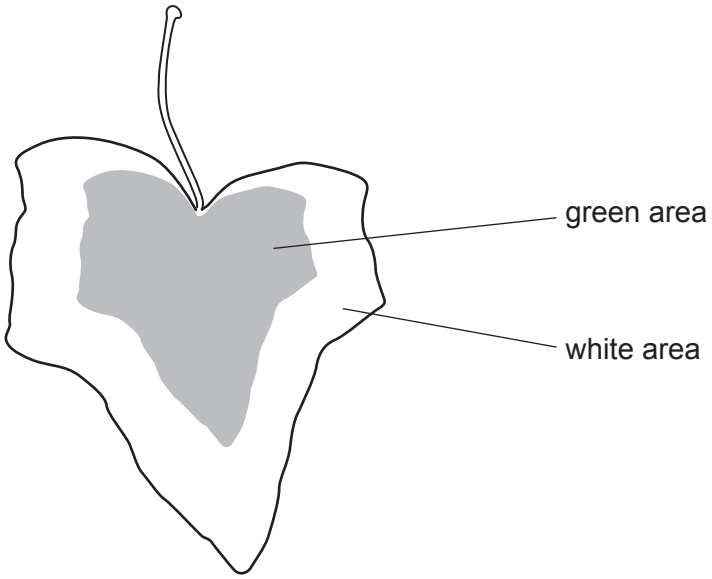
[Total: 12]

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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 .....

.....

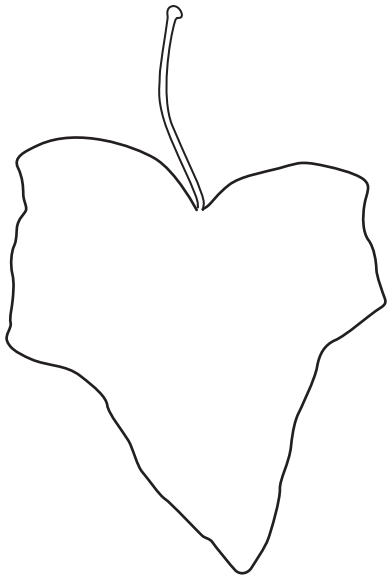
.....

[2]

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(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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