Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/51**

Paper 5 Practical Test **May/June 2021**

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	
Total	

This document has **12** pages. Any blank pages are indicated.

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1 You are going to investigate the effect of the concentration of sugar solutions on osmosis in potato cells.

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)(ii).

You should use the safety equipment provided while you are carrying out the practical work.

Step 1 Label four test-tubes **A**, **B**, **C** and **D** and put them into the test-tube rack.

Step 2 Use the volumes of 1 mol per dm^3 sugar solution and distilled water shown in Table 1.1 to make solutions containing different concentrations of sugar in each test-tube.

Use the syringes provided to make your solutions.

(a) (i) Complete Table 1.1 by writing in the concentration of the sugar solution in test-tube **C**.

Table 1.1

test-tube	volume of 1 mol per dm^3 sugar solution / cm^3	volume of distilled water / cm^3	concentration of sugar solution / mol per dm^3
A	20	0	1.0
B	12	8	0.6
C	8	12	
D	0	20	0.0

[1]

Step 3 Put the potato cylinders on a white tile and cut each cylinder to exactly 40 mm in length.

Step 4 Add one potato cylinder to each of test-tubes **A**, **B**, **C** and **D**.

View solution

Step 5 Leave the potato cylinders in the test-tubes for 20 minutes.

While you are waiting continue with the other questions.

Step 6 After 20 minutes empty the contents of test-tube **A** into the container labelled **waste**.

Step 7 Use the forceps to remove the potato cylinder from the waste container and place it on the white tile.

Step 8 Measure the length of the potato cylinder from test-tube **A** and record this measurement, in **millimetres**, in your table in **1(a)(ii)**. Put the potato cylinder from test-tube **A** onto a paper towel.

Step 9 Repeat steps 6, 7 and 8 for the potato cylinders in test-tubes **B**, **C** and **D**.

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(ii) Prepare a table to record your results in the space provided.

[4]

(iii) Explain why it was important that the potato cylinders were all cut to the same length in step 3.

.....

.....

..... [1]

(iv) Identify the variable that you changed in this investigation (independent variable).

..... [1]

(v) Suggest **two** improvements that you could make to the method you have used in this investigation.

1 .....

.....

2 .....

.....

[2]

(vi) Describe **one** safety precaution you took while preparing the potato cylinders in step 3.

.....

.....

..... [1]

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(b) Plan an investigation to find out the effect of temperature on osmosis in plant tissue.

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..... [6]

View solution

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(c) Potato cells contain starch grains.

(i) State the solution that would be used to test for the presence of starch and give the result of a positive test.

solution .....

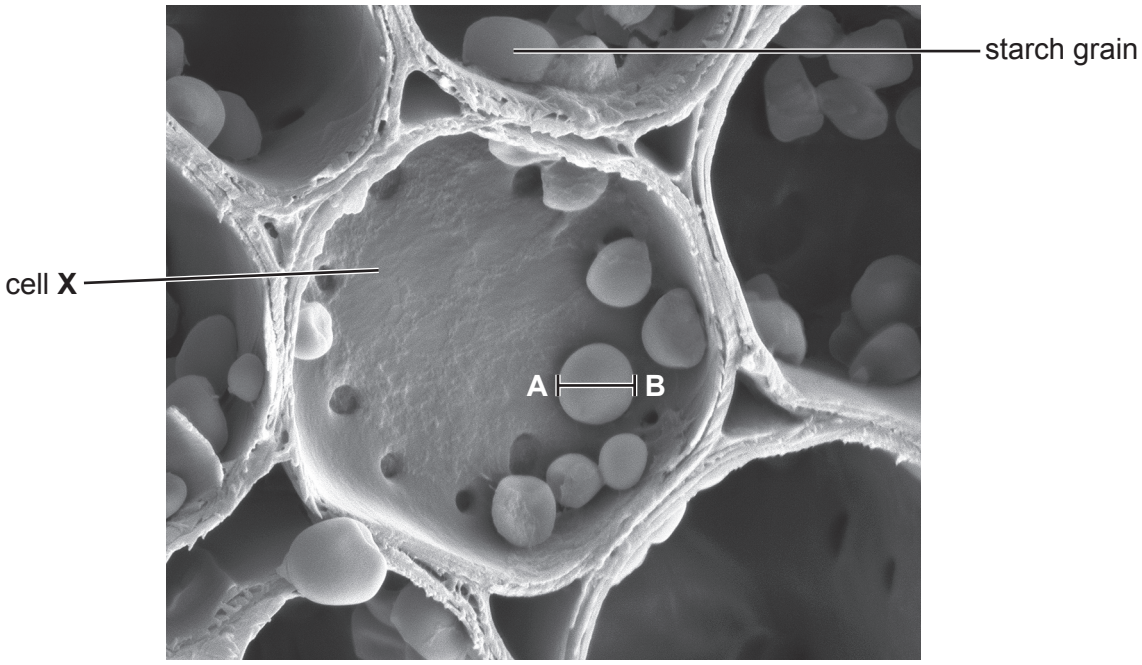
positive test result .....

.....

[2]

Fig. 1.1 is a photomicrograph of some plant cells that contain starch grains.

View solution



magnification ×800

Fig. 1.1

(ii) Draw a large diagram of cell **X** in Fig. 1.1.

View solution

Label **one** starch grain on your drawing.

[5]

(iii) Line **AB** represents the diameter of the starch grain. Measure the length of line **AB** on Fig. 1.1.

View solution

length of line **AB** ..... mm

Calculate the actual diameter of the starch grain using your measurement for line **AB**, the information in Fig. 1.1 and the formula:

$$\text{magnification} = \frac{\text{length of line AB on Fig. 1.1}}{\text{actual diameter of the starch grain}}$$

Give your answer to **two** significant figures.

.....

[3]

[Total: 26]

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2 **(a)** A student monitored their pulse rate after exercise. The student's pulse rate before exercise was 62 beats per minute.

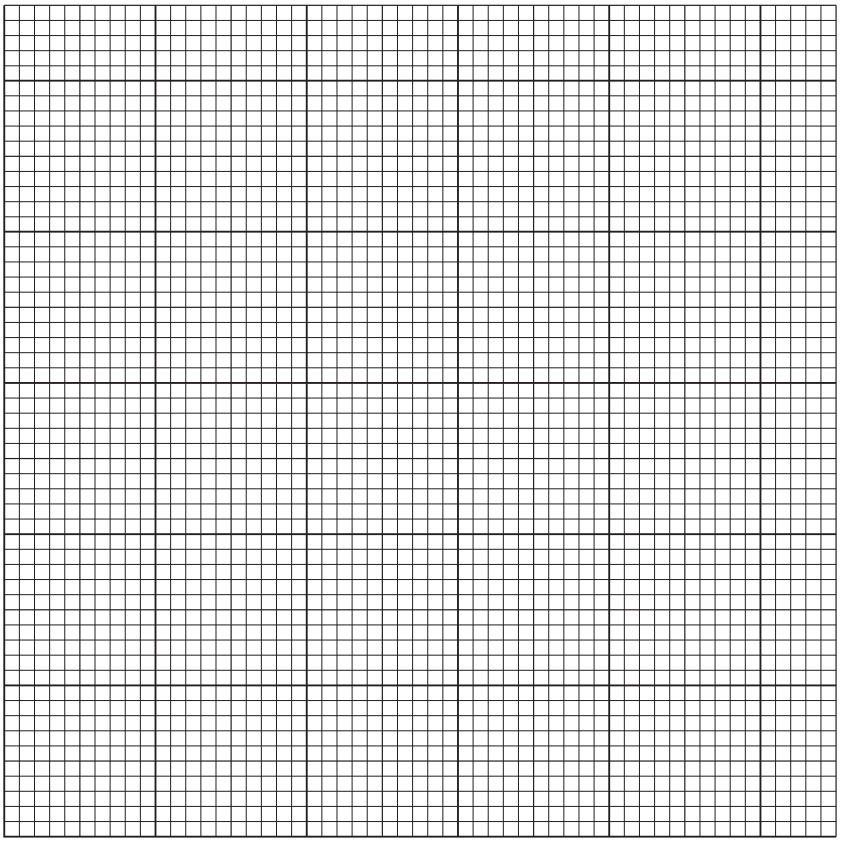
View solution

The results are shown in Table 2.1.

Table 2.1

time after exercise / minutes	pulse rate / beats per minute
0	156
1	108
2	78
3	66
4	62
5	62

(i) Plot a line graph on the grid of the data in Table 2.1. Include a line of best fit.



[4]

(ii) Describe the relationship shown in your graph, between pulse rate and time after exercise.

.....

.....

.....

.....

..... [2]

(iii) Calculate the percentage change in pulse rate from 0 minutes to 5 minutes using the data in Table 2.1.

Give your answer to **two** decimal places.

Space for working.

.....%
[3]

(b) The student monitored their pulse rate after exercise on three separate days and calculated their average pulse rate from the data they collected.

View solution

The results are shown in Table 2.2.

Table 2.2

time after exercise / minutes	pulse rate / beats per minute			average pulse rate / beats per minute
	day 1	day 2	day 3	
0	156	154	158	156
1	108	107	106	107
2	78	80	76	78
3	66	67	65	66
4	62	120	64	63
5	62	60	61	61

Explain why the student correctly calculated the average pulse rate at 4 minutes after exercise as 63 beats per minute rather than 82 beats per minute.

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.....

..... [2]

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(c) Fig. 2.1 shows a cross-section of an artery and a vein as seen using a light microscope.

View solution

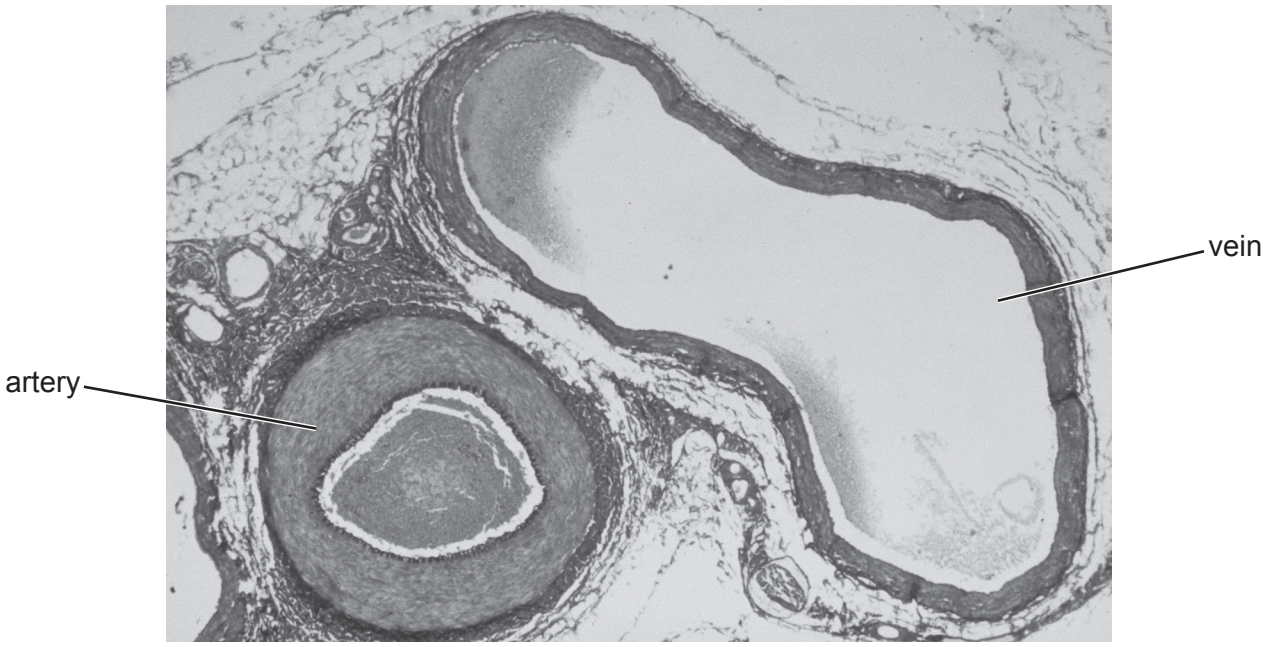

Fig. 2.1

State **one** visible similarity and **two** visible differences between the artery and the vein shown in Fig. 2.1.

similarity .....

.....

difference 1 .....

.....

difference 2 .....

.....

[3]

[Total: 14]

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