



# Cambridge IGCSE™

CANDIDATE  
NAME

CENTRE  
NUMBER

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## 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	
<b>Total</b>	

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

- 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<sup>3</sup> 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 <sup>3</sup> sugar solution / cm <sup>3</sup>	volume of distilled water / cm <sup>3</sup>	concentration of sugar solution / mol per dm <sup>3</sup>
<b>A</b>	20	0	1.0
<b>B</b>	12	8	0.6
<b>C</b>	8	12	
<b>D</b>	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**.

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**.

(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]





(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.

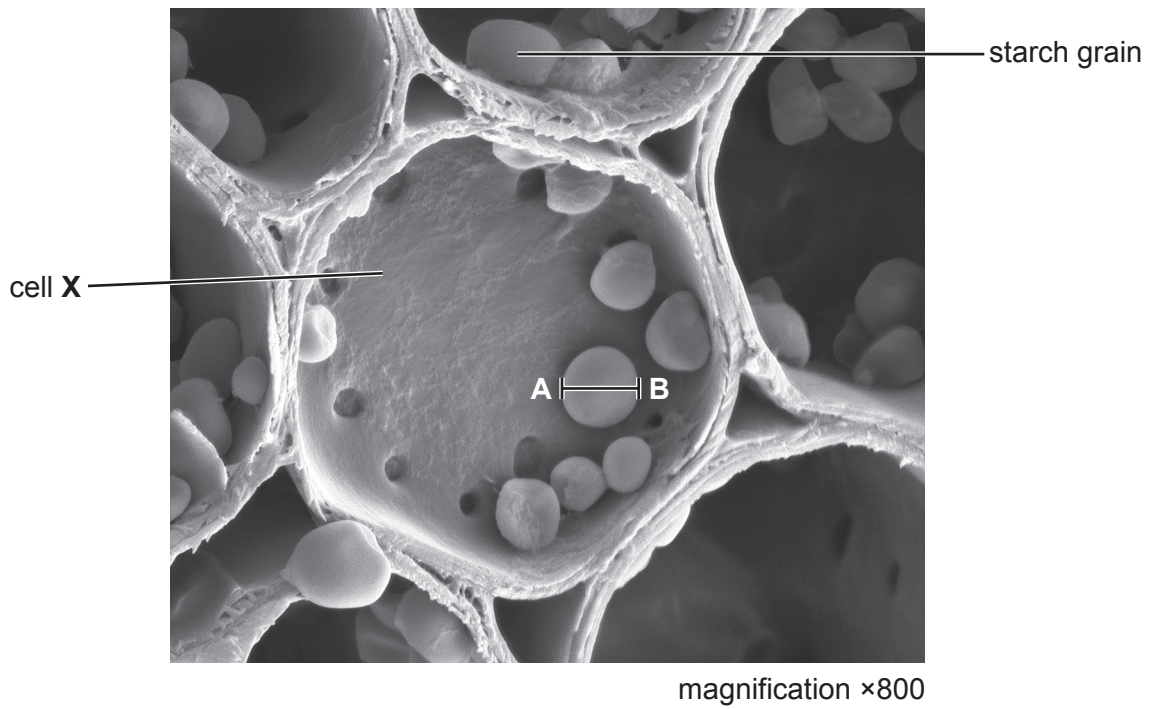
solution .....

positive test result .....

.....

[2]

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



**Fig. 1.1**

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

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:

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

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

.....  
[3]

[Total: 26]

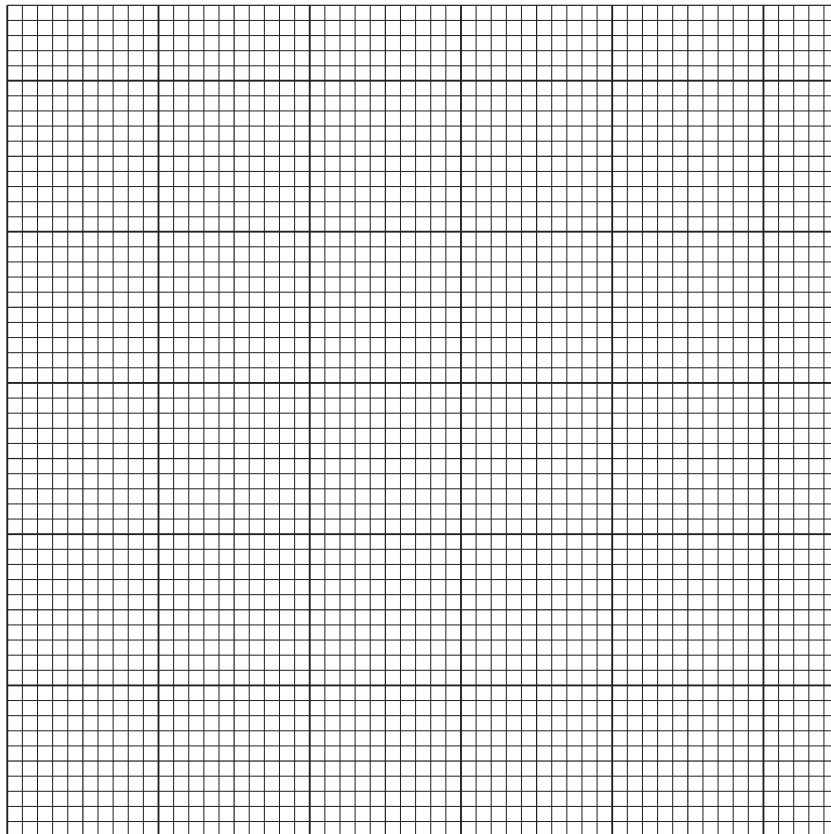
- 2 (a) A student monitored their pulse rate after exercise. The student's pulse rate before exercise was 62 beats per minute.

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.

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.

.....

.....

.....

..... [2]

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

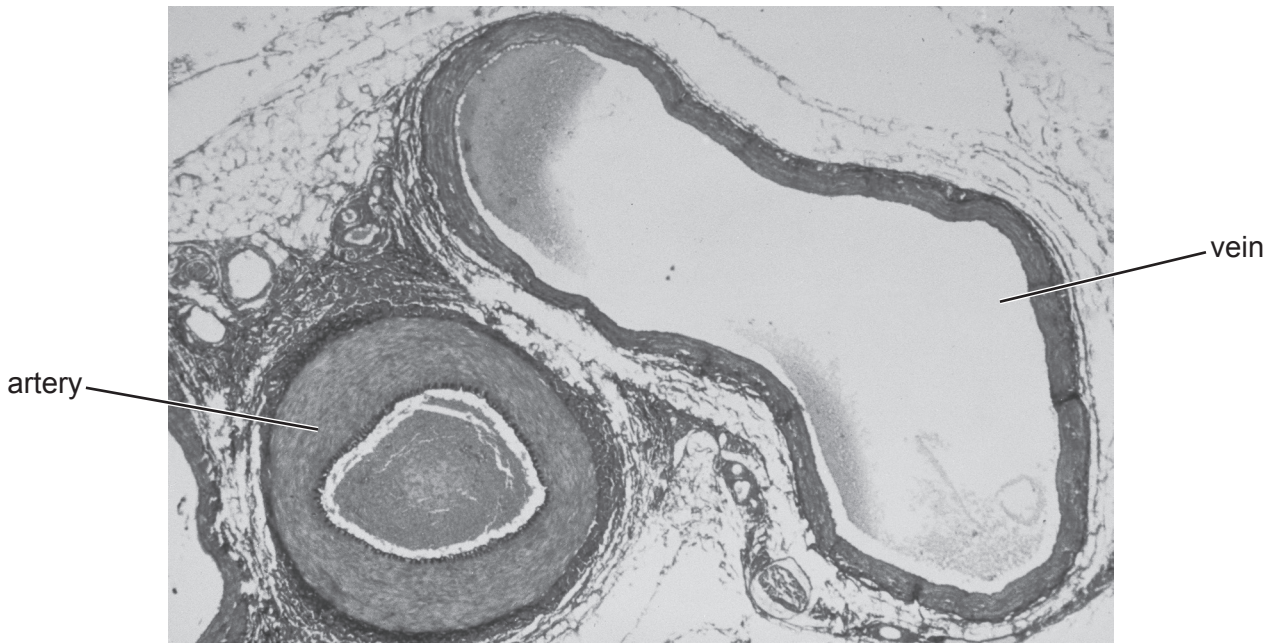


Fig. 2.1

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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