Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/61**

Paper 6 Alternative to Practical **May/June 2021**

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. Any blank pages are indicated.

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1 A student investigated the effect of the concentration of sugar solutions on osmosis in potato cells.

Step 1 The student labelled four test-tubes **A**, **B**, **C** and **D**.

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

(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 The student was given four potato cylinders which had all been cut from one potato. The diameters of the potato cylinders were all the same but the lengths of the potato cylinders varied.

View solution

Step 4 The student cut all four potato cylinders to exactly 40 mm in length.

Step 5 One potato cylinder was put into each labelled test-tube. The potato cylinders were left in the sugar solutions for 20 minutes.

Step 6 After 20 minutes the potato cylinders were removed from the test-tubes.

Fig. 1.1 is a diagram showing the actual size of the potato cylinders from test-tubes **A**, **B**, **C** and **D** at the end of step 6.

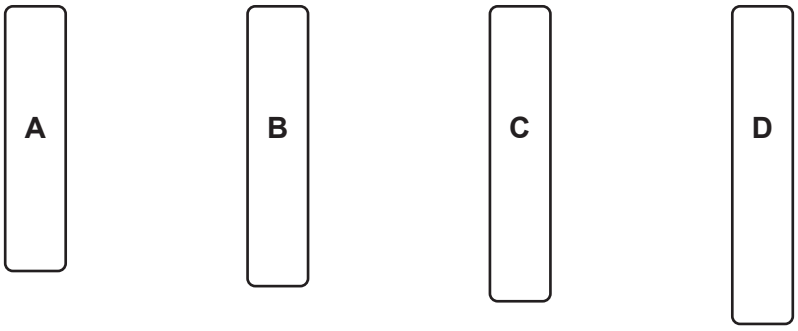

Fig. 1.1

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

Measure the length of each of the potato cylinders in Fig. 1.1 and record these measurements in your table.

[3]

(iii) Explain why it was important that the potato cylinders were all cut to the same length in step 4.

.....

.....

..... [1]

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

..... [1]

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

1 .....

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2 .....

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[2]

(vi) Describe **one** safety precaution that should be taken while preparing the potato cylinders in step 4.

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..... [1]

(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 .....

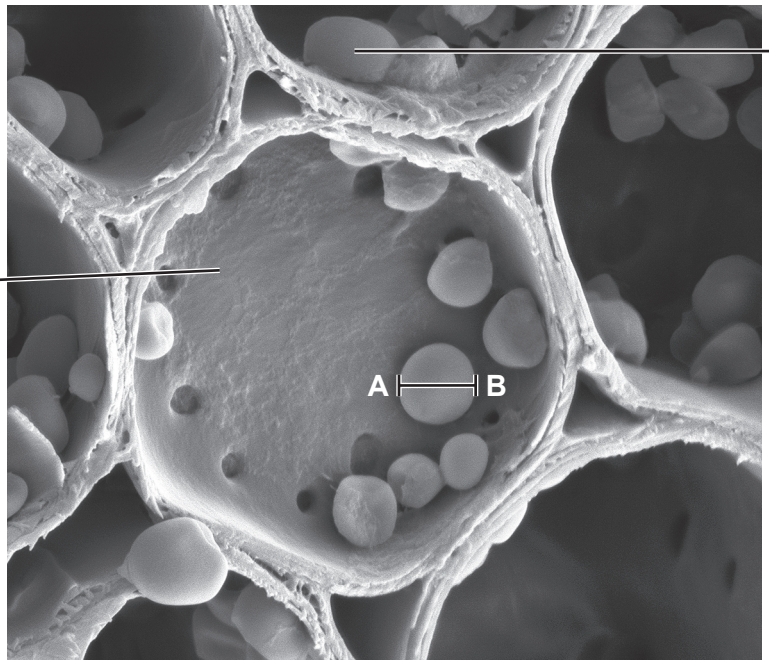
positive test result .....

.....

[2]

Fig. 1.2 is a photomicrograph of some plant cells that contain starch grains.

View solution



magnification ×800

Fig. 1.2

(ii) Draw a large diagram of cell **X** in Fig. 1.2.

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. 1.2.

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. 1.2 and the formula:

$$\text{magnification} = \frac{\text{length of line } \mathbf{AB} \text{ on Fig. 1.2}}{\text{actual diameter of the starch grain}}$$

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

.....

[3]

[Total: 25]

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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.

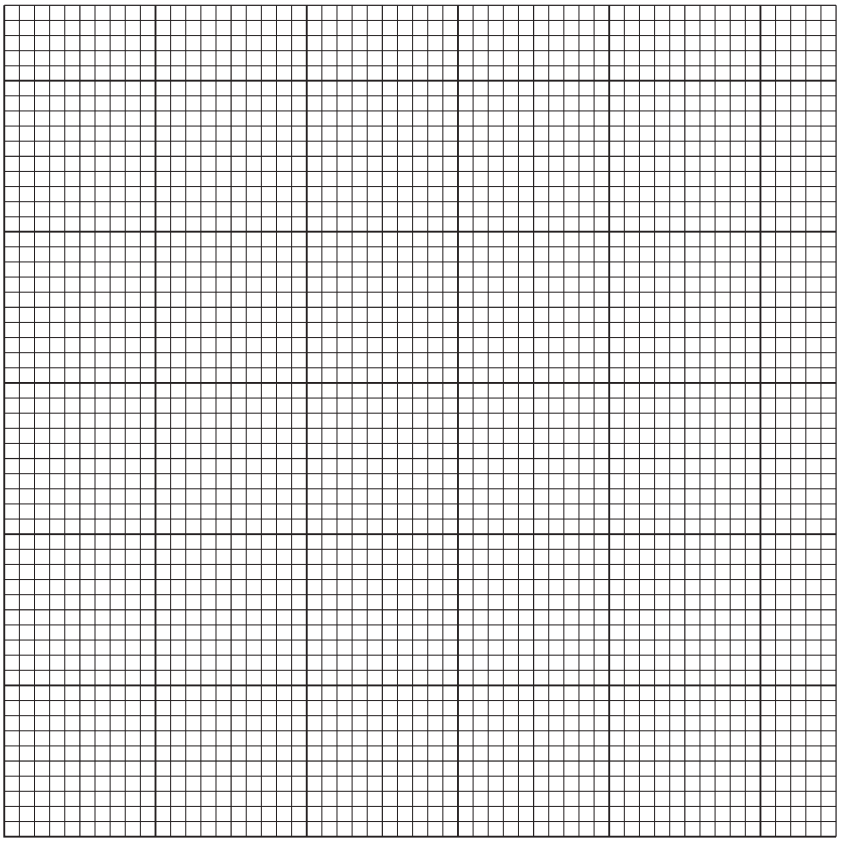
View solution

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.

.....

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.....

.....

..... [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]

(iv) State the variable that was measured (dependent variable) in this investigation.

..... [1]

(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

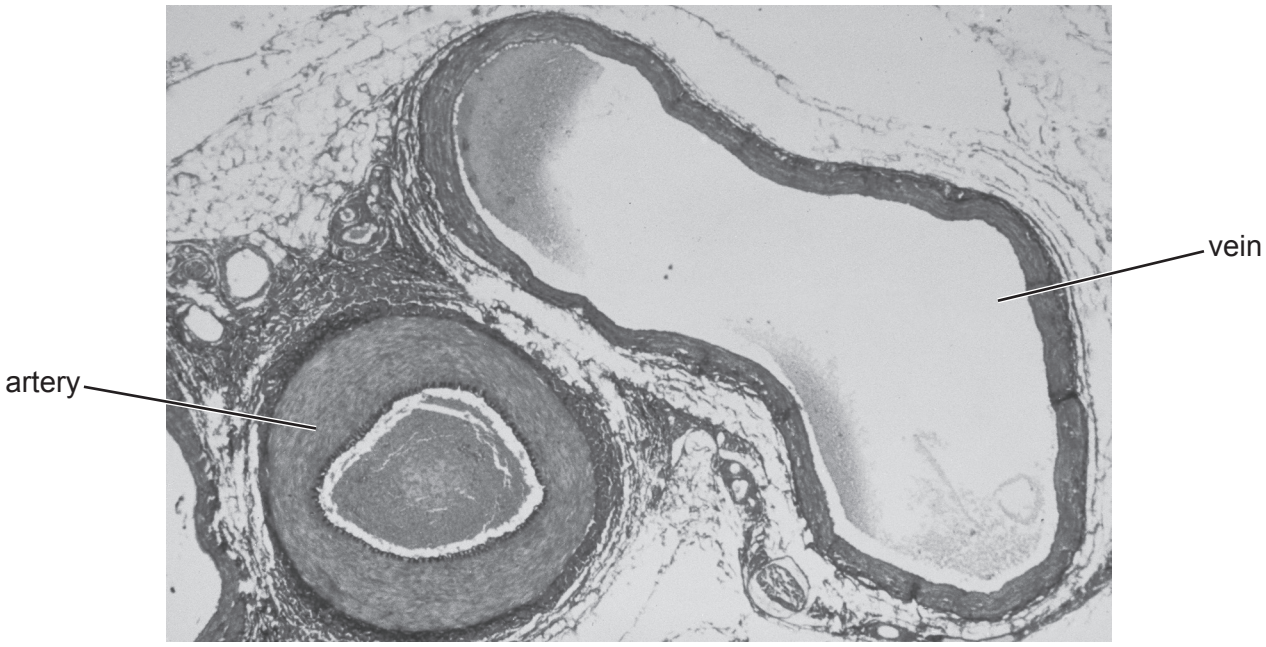

Fig. 2.1

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

similarity .....

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difference 1 .....

.....

difference 2 .....

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[3]

[Total: 15]

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