Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/63**

Paper 6 Alternative to Practical **May/June 2022**

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.

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1 Fig. 1.1 shows some raisins, which are made by drying grapes. Raisins contain high concentrations of sugars.



Fig. 1.1

Osmosis is the movement of water across a partially permeable membrane from a dilute solution to a concentrated solution.

A student investigated the effect of temperature on the rate of osmosis.

Step 1 The student labelled one empty beaker **cold** and one empty beaker **hot**.

Step 2 50 cm^3 of cold water was poured into the **cold** beaker.

Step 3 10 raisins were lined up along a ruler. Each raisin was touching end to end.

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Step 4 The total length of the line of 10 raisins was measured. The student recorded this measurement in their notebook.

Step 5 The group of 10 raisins was placed in the **cold** beaker.

Step 6 50 cm^3 of hot water was poured into the **hot** beaker.

Step 7 A second group of 10 raisins was lined up along the ruler, each touching end to end. The length of the line was measured and recorded. Fig. 1.2 shows the measurements the student recorded during step 4 and step 7.

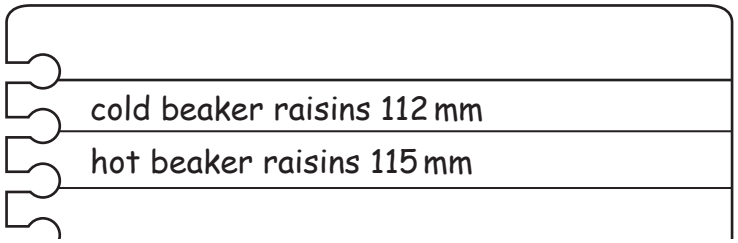

Fig. 1.2

Step 8 The second group of 10 raisins was placed in the **hot** beaker.

Step 9 The temperatures of the water in each beaker were measured. The thermometers are shown in Fig. 1.3.

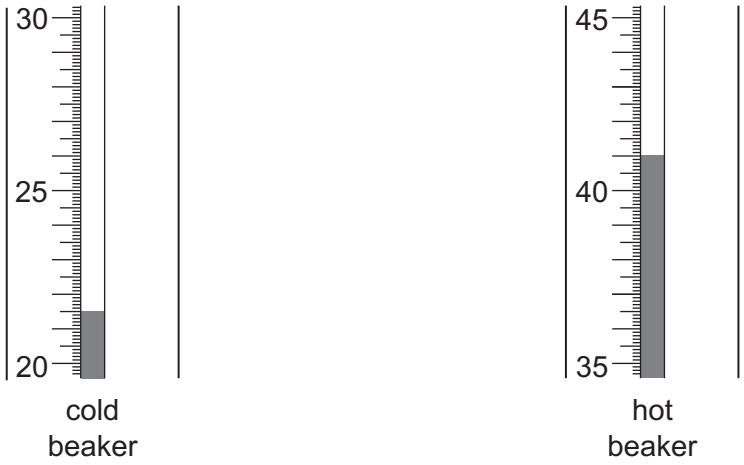

Fig. 1.3

(a) (i) State the temperatures shown on the thermometers in Fig. 1.3. Include the unit.

View solution

water temperature in the **cold** beaker .....

water temperature in the **hot** beaker .....

[2]

Step 10 A stop-clock was started.

Step 11 After 20 minutes, the raisins were removed from the **cold** beaker.

Step 12 The cold beaker raisins were lined up along the ruler, touching end to end and the total length of the 10 raisins was measured.

Step 13 Step 11 and step 12 were repeated for the hot beaker raisins.

A drawing of the two lines of raisins from step 12 and step 13 is shown in Fig. 1.4.

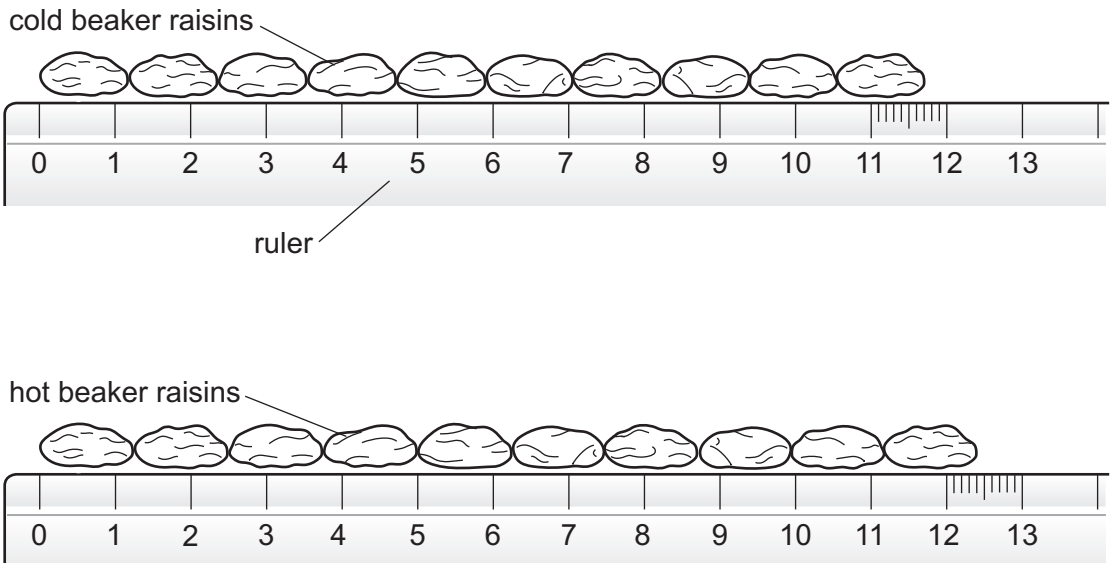

Fig. 1.4

(ii) Prepare a table to record the results.

View solution

Complete the table by:
- recording the measurements shown on the notebook in Fig. 1.2
- measuring and recording the length of the lines of raisins shown in Fig. 1.4.

[4]

(iii) Use the information in your table in **1(a)(ii)** to calculate the change in length for each group of 10 raisins.

View solution

change in length of the cold beaker raisins .....

change in length of the hot beaker raisins .....

[1]

(iv) State a conclusion for these results.

View solution

.....

.....

..... [1]

(b) (i) State **one** variable that was kept constant in this investigation.

..... [1]

View solution

(ii) Suggest why it was better to measure the total length of 10 raisins touching end to end rather than just measuring the length of one raisin.

.....

.....

..... [1]

(c) A student investigated the effect of different concentrations of sodium chloride solution on osmosis in potatoes.

View solution

The student used this method:

- Make four different concentrations of sodium chloride solution in separate test-tubes.
- Cut a piece of potato into five cylinders that are approximately the same length and diameter.
- Measure and record the mass of each potato cylinder.
- Put one potato cylinder into a test-tube containing distilled water.
- Put one potato cylinder into each of the four test-tubes containing the different sodium chloride solutions.
- Leave the potato cylinders in the test-tubes for 30 minutes.
- After 30 minutes, remove the potato cylinders from the test-tubes.
- Dry the potato cylinders with a paper towel.
- Measure and record the mass of each potato cylinder.

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

..... [1]

The student's results are shown in Table 1.1.

Table 1.1

concentration of sodium chloride solution / mol per dm^3	potato cylinder initial mass / g	potato cylinder final mass / g	percentage change in mass
0.0	1.13	1.32	16.8
0.2	1.03	1.08	4.9
0.4	1.19	1.06	–10.9
0.6	1.13	0.86	–23.9
0.8	1.14	0.82	

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(ii) Using the information in Table 1.1, calculate the percentage change in mass for the potato cylinder in the 0.8 mol per dm^3 sodium chloride solution.

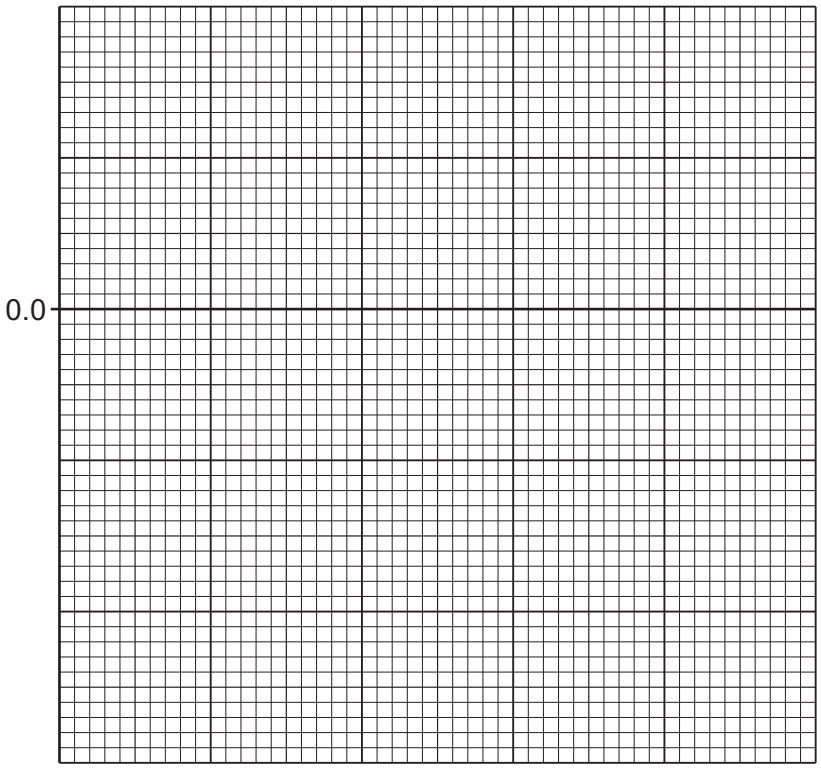
Give your answer to **one** decimal place.

Space for working.

..... %
[3]

(iii) Using the data in Table 1.1 and your answer to **1(c)(ii)**, plot a line graph on the grid of the concentration of sodium chloride solution against the percentage change in mass.

One axis has been started for you.



[4]

(iv) Estimate the concentration of sodium chloride solution at which there would be no percentage change in the mass of the potato cylinder.

Show on your graph how you obtained your estimate.

..... mol per dm^3
[2]

(v) Suggest why the student calculated the percentage change in mass rather than using the difference in the mass of the potato cylinders.

.....

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..... [1]

(vi) Suggest why the student dried the potato cylinders before measuring their mass.

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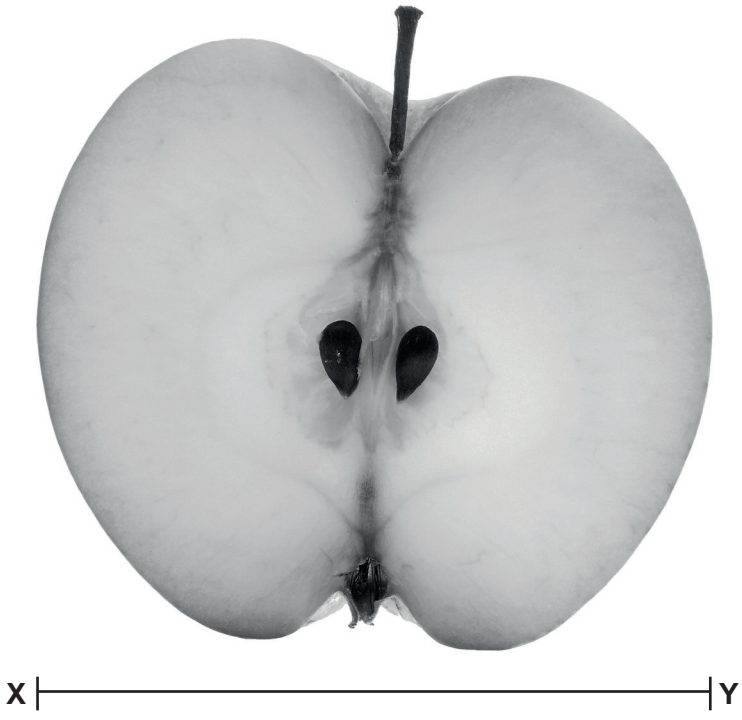
..... [1]

[Total: 22]

2 Fig. 2.1 is a photograph of the cut surface of half an apple.



magnification ×1.2

Fig. 2.1

(a) (i) Make a large drawing of the apple shown in Fig. 2.1.

View solution

[4]

(ii) Measure the length of line **XY** on Fig. 2.1.

View solution

length of line **XY** ..... mm

Calculate the actual width of the apple using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{XY}}{\text{actual width of the apple}}$$

Give your answer to the nearest whole number.

Space for working.

..... mm
[3]

(b) Apples can be used to make juice. The enzyme pectinase can increase the volume of juice that is released from each apple.

A scientist carried out an investigation to find out which concentration of the pectinase solution gave the maximum volume of juice.

View solution

The results from this investigation are shown in Table 2.1.

Table 2.1

percentage concentration of the pectinase solution	volume of apple juice collected in one hour / cm^3			
	trial 1	trial 2	trial 3	average
0.0	7	7	6	6.7
2.5	11	10	2	10.5
5.0	17	14	13	14.7
7.5	24	22	25	23.7
10.0	25	24	21	23.3

(i) Identify the variable that was changed (independent variable) by the scientist in this investigation.

..... [1]

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(ii) The scientist decided not to include the trial 3 result for the 2.5% pectinase solution when they calculated the average.

View solution

Explain why.

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..... [1]

(iii) Describe how to test a sample of apple juice to show the presence of reducing sugars.

View solution

Give the result of a positive test.

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..... [3]

(c) Starch in apple juice makes the juice appear cloudy. The enzyme amylase can be used to remove the starch. This makes the apple juice clear.

View solution

Amylase catalyses the breakdown of starch.

Plan an investigation to determine the optimum (best) temperature for amylase activity in a sample of apple juice.

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..... [6]

[Total: 18]

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