Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/53**

Paper 5 Practical Test **May/June 2022**

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 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.

You are going to investigate the effect of temperature on the rate of osmosis.

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 one empty 100 cm^3 beaker **cold raisins** and one empty 100 cm^3 beaker **hot raisins**.

Step 2 Label one paper towel **cold** and one paper towel **hot**.

Step 3 Take 15 raisins and line the raisins up, touching end to end along a ruler, as shown in Fig. 1.2.

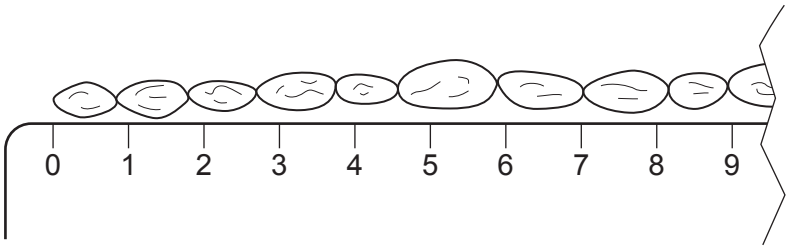

Fig. 1.2

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Step 4 Measure the length of the line of raisins. Record your measurement in your table in **1(a)(ii)**.

Step 5 Place the 15 raisins from step 4 into the empty beaker labelled **hot raisins**.

Step 6 Repeat steps 3 and 4 with a second group of 15 raisins. Place these raisins into the empty beaker labelled **cold raisins**.

Step 7 Raise your hand when you are ready for hot water to be put into the 250 cm^3 beaker labelled **hot water**.

Step 8 Put 50 cm^3 of hot water into the beaker labelled **hot raisins**.

Step 9 Put 50 cm^3 of cold water into the beaker labelled **cold raisins**.

Step 10 Start the stop-clock.

Step 11 Measure the temperatures of the water in the beakers labelled **cold raisins** and **hot raisins** and record your measurements in **1(a)(i)**.

Step 12 Leave the raisins to soak for 20 minutes.

Continue with the rest of the questions while you are waiting.

Step 13 After 20 minutes, measure the final temperatures of the water in the beakers labelled **cold raisins** and **hot raisins** and record your measurements in **1(a)(i)**.

View solution

(a) (i) Record the temperatures of the water in the beakers. Include the unit.

water temperature in the **cold raisins** beaker in step 11 .....

water temperature in the **hot raisins** beaker in step 11 .....

water temperature in the **cold raisins** beaker in step 13 .....

water temperature in the **hot raisins** beaker in step 13 .....

[2]

Step 14 Place the sieve over the **waste** container. Tip the contents of the **cold raisins** beaker into the sieve. Place the raisins from the sieve onto the paper towel labelled **cold**.

Step 15 Line up the 15 raisins so that they are touching end to end along the ruler. Measure the length of the line of raisins. Record your measurement in your table in **1(a)(ii)**.

Step 16 Repeat steps 14 and 15 using the **hot raisins** beaker and the paper towel labelled **hot**.

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(ii) Prepare a table to record your results from steps 4, 6, 15 and 16.

View solution

[4]

(iii) Use the information in your table in **1(a)(ii)** to calculate the change in length for each group of 15 raisins.

View solution

change in length of **cold** raisins .....

change in length of **hot** raisins .....

[1]

(iv) State a conclusion for your results.

View solution

.....

.....

..... [1]

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

View solution

..... [1]

(ii) Suggest why it was better to measure the total length of 15 raisins touching end to end rather than just measuring the length of one raisin.

.....

.....

..... [1]

View solution

(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	

(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.

View solution

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

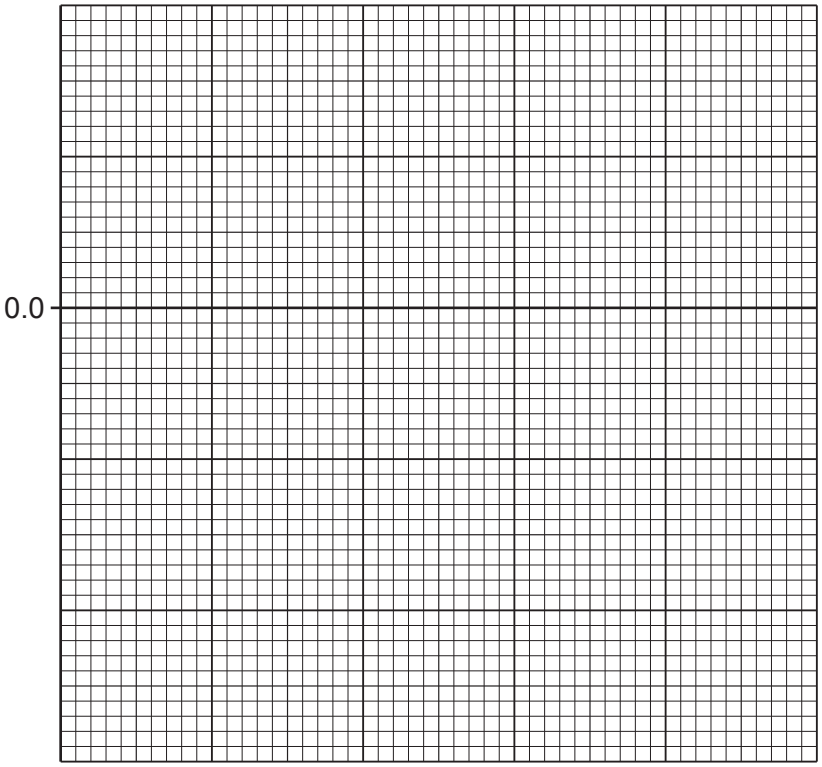
Space for working.

..... %
[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.

View solution

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.

View solution

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]

View solution

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

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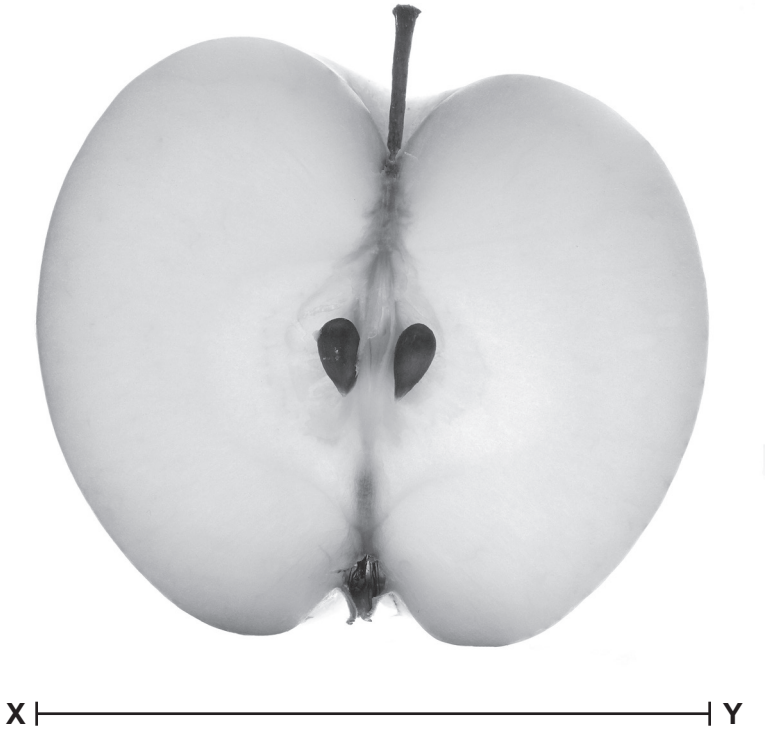
..... [1]

View solution [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]

(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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