

Cambridge IGCSE Biology



Classified Past Papers Paper 6

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Cambridge IGCSE Biology

Paper 6 · Practical Skills by Topic

Model answers · worked · click a skill to jump

1. Recording & tables	41 parts
2. Graphs & plotting	36 parts
3. Calculations & magnification	109 parts
4. Biological drawing	41 parts
5. Planning investigations	36 parts
6. Variables & controls	87 parts
7. Sources of error, anomalies & improvements	30 parts
8. Food tests & identification	50 parts
9. Conclusions & data interpretation	97 parts
10. Observations & comparisons	105 parts

- 1 A student investigated the effect of glucose concentration on the rate of anaerobic respiration in yeast.

Anaerobic respiration in yeast breaks down glucose to form ethanol and carbon dioxide.

Anaerobic respiration in yeast causes the blue dye, methylene blue, to become colourless. The time taken for the blue colour to disappear can be used as a measure of the rate of anaerobic respiration in yeast.

The student used this method:

- Step 1 Label one test-tube **0.0%**, one test-tube **0.5%** and one test-tube **1.0%**.
- Step 2 Put 5.0cm^3 of water into the test-tube labelled **0.0%**.
- Step 3 Put 2.5cm^3 of 1.0% glucose solution and 2.5cm^3 of water into the test-tube labelled **0.5%**.
- Step 4 Put 5.0cm^3 of 1.0% glucose solution into the test-tube labelled **1.0%**.
- Step 5 Stir the contents of the beaker containing the yeast suspension with the glass rod.
- Step 6 Add 5.0cm^3 of the yeast suspension to each of the test-tubes labelled **0.0%**, **0.5%** and **1.0%**.
- Step 7 Put all three test-tubes into a water-bath at 40°C .
- Step 8 Start the stop-clock and wait for three minutes.
- Step 9 After three minutes, remove the test-tubes from the water-bath and place them in a test-tube rack.
- Step 10 Use a pipette to add **one** drop of methylene blue dye to each of the test-tubes. Carefully mix the contents of each test-tube with the glass rod.
- Step 11 Use a second pipette to slowly add a layer of oil to each of the test-tubes.

The layer of oil will float on top of the yeast suspension and methylene blue mixture, as shown in Fig. 1.1.

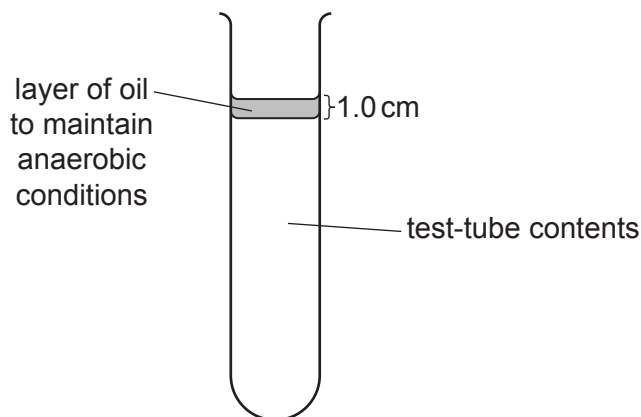


Fig. 1.1



**CLICK FOR
EXPLANATION**



Step 12 Put the test-tubes back into the water-bath and restart the stop-clock.

Step 13 Measure the time taken for the blue colour in each of the test-tubes to disappear.

Record the time taken in seconds for each test-tube.

The student stopped timing if the blue colour had not disappeared after 10 minutes. They recorded this result as >600 in their table.

The stop-clocks from step 13 are shown in Fig. 1.2.



Fig. 1.2



**CLICK FOR
EXPLANATION**

(a) (i) Prepare a table to record the results of the investigation.

Convert the times on the stop-clocks shown in Fig. 1.2 to seconds and record these times in your table.

percentage concentration of glucose / %	time taken for blue colour to disappear / s
0	600
0.5	362
1	132

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[4]



Cambridge IGCSE Biology 0610 - Solved Past Paper

February/March 2022 · Paper 6 · 0610/62 · 1 (a)(i)

● hard ● medium ● easy

● 1 (a)(i)

Prepare · [4 marks]

Prepare a table to record the results. Convert the times shown in Fig. 1.2 to seconds and record them in your table.

agar block	length of sides / cm	time for block to become completely red / s
A	1.0 x 1.0 x 1.0	416
B	1.0 x 1.0 x 0.5	182
C	1.0 x 0.5 x 0.5	114
D	0.5 x 0.5 x 0.5	84

Model answer - your table should look like this

Model answer

✓ Rule ONE table with at least two columns and a clear ruled line separating the headings from the body of the table (a column for the agar block, and a column for the time). Adding a middle column for the **length** of sides makes the pattern clearer, but is not required. ✓ Head each column with the quantity AND its unit, for example time for block to become completely red / s. Keep the unit in the heading only, never repeat it in the body of the table. ✓ Record all FOUR readings, one for each block A, B, C and D. ✓ Convert every stop-clock time to seconds: A 06:56 = (6 x 60) + 56 = 416 s; B 03:02 = 182 s; C 01:54 = 114 s; D 01:24 = 84 s.

Mark scheme 4 marks

- ✓ table drawn with a minimum of two columns and a header line separating the headings from the body (1)
- ✓ appropriate headings WITH units (e.g. time / s) (1)
- ✓ four readings (for time) recorded, one for each block (1)
- ✓ correct conversion of all the times to seconds (416, 182, 114, 84) (1)

Ignore: units repeated in the body of the table (they belong in the heading only)

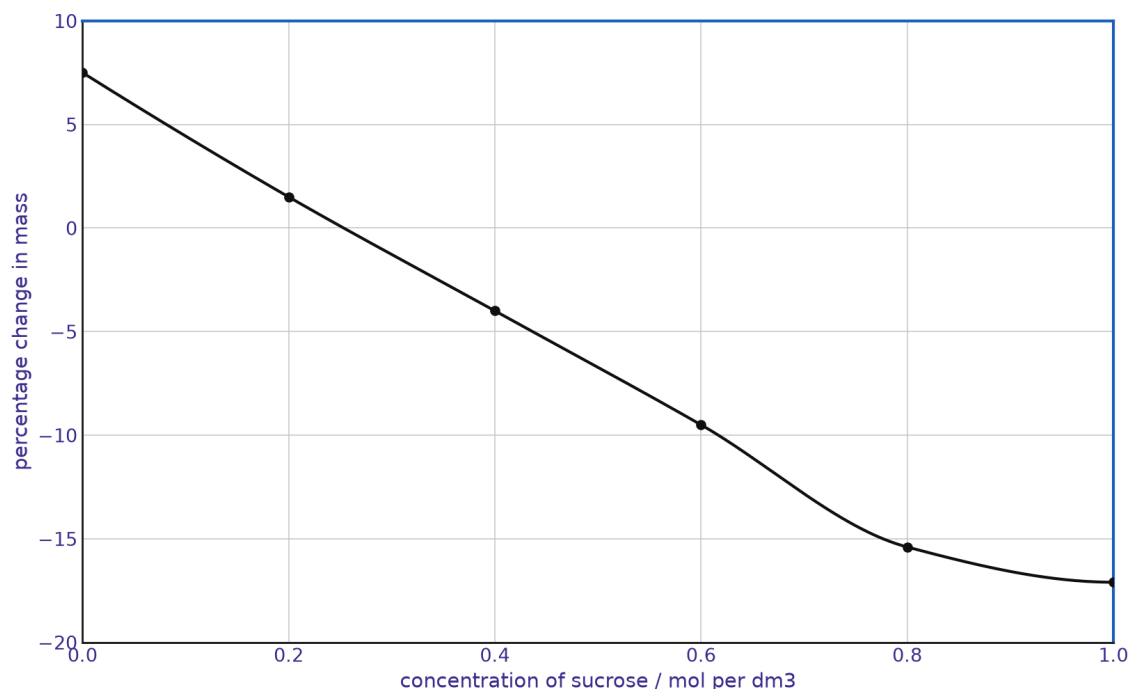
Examiner's insight

Almost all could rule a table with suitable rows, columns and headings, and most converted the times to seconds correctly. The most common slip was putting the units in the body of the table rather than in the heading.

1 (d)(iii)

Plot · [4 marks]

Plot a line graph of the concentration of sucrose solution (x-axis) against the percentage change in mass (y-axis). Include a curved line of best fit on your graph.



Model answer - your graph should look like this

Model answer

✓ Label BOTH axes with units: 'concentration of sucrose / mol per dm³' on the x-axis and 'percentage change in mass' on the y-axis. The y-axis must run into NEGATIVE values (for example from +10 down to -20) using ONE even scale for both the positive and the negative part. ✓ Choose a linear (evenly spaced) scale so that the plotted points fill at least half of the grid in both directions. ✓ Plot all the points to within half a small square, using YOUR own calculated -17.1 % for the 1.00 mol per dm³ point, and keep each plotted point small (no larger than a small square). ✓ Draw a single smooth CURVED line of best fit through the points, and do NOT extend (extrapolate) the line beyond the last point.

Mark scheme 4 marks

- ✓ both axes labelled with units (1)
- ✓ linear scale that occupies at least half of the grid (1)
- ✓ first five points plotted accurately, to within half a small square (1)
- ✓ a suitable curved line of best fit drawn (1)

Ignore: a bar chart instead of a line graph; different scales used for the negative and positive percentages

Do not accept: plotted points so large they fill more than a small square; extrapolating beyond the last point

Cambridge IGCSE Biology 0610 - Solved Past Paper

February/March 2026 · Paper 6 · 0610/62 · 1 (a)(ii)

● hard ● medium ● easy

● 1 (a)(ii)

Prepare · [4 marks]

Prepare a table and record the student's results (the height of the foam in each test-tube from Figure 1.4).

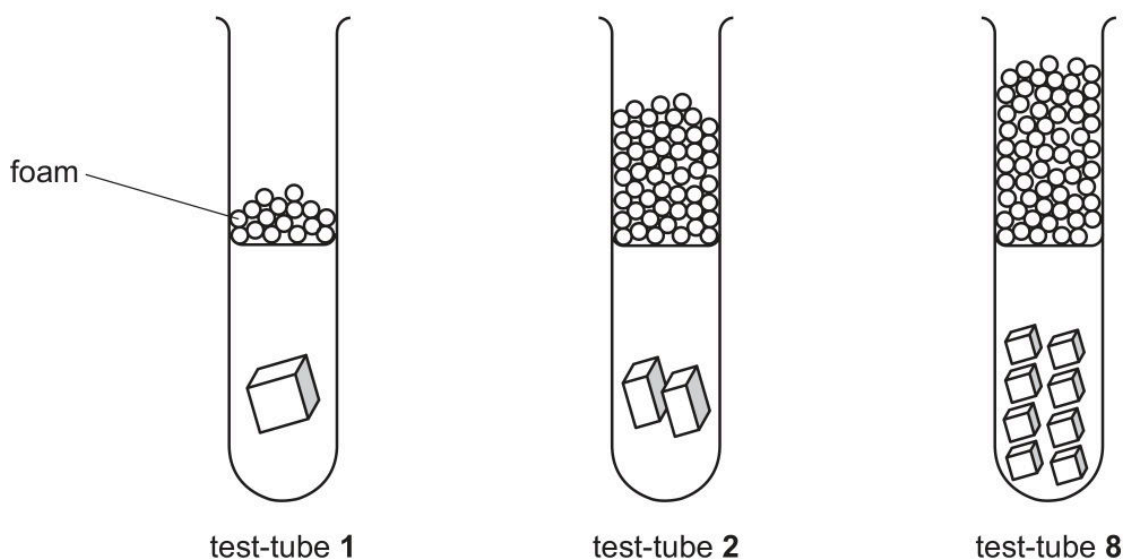


Figure 1.4 - the three test-tubes at the end: read the foam height for tubes 1, 2 and 8

test-tube	total surface area of potato / cm ²	height of foam / mm
1	6	29
2	8	42
8	12	47

Model answer - your table should look like this

Model answer

✓ Rule ONE table with at least two columns and a clear line separating the headings from the body of the table. ✓ Give each column a detailed heading WITH its unit: e.g. total surface area of potato / cm² (or the test-tube number) and height of foam / mm. Keep the unit in the heading only, never in the data cells. ✓ Record all three foam heights read from Figure 1.4 (measure on the ORIGINAL printed paper, as this reproduced crop is not to scale): about 29 mm for test-tube 1, 42 mm for test-tube 2 and 47 mm for test-tube 8. ✓ Record every height in the SAME unit and precision (all in whole mm), giving one value for each of the three test-tubes.

(ii) State a conclusion for the results of this investigation.

The higher the concentration of glucose
the faster the rate of respiration

[1]

(iii) State the independent variable in this investigation.

concentration of glucose

[1]

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

total volume of solutions/equilibration time / temperature

[1]

(v) Explain why it was important to stir the yeast suspension in step 5.

to distribute the yeast evenly /

to ensure that the yeast concentration is the same all over
the suspension

[1]

(b) One way to improve this investigation would be to use an increased number of different concentrations of glucose.

(i) Suggest **two** other ways to improve this investigation.

1 repeat the investigation at each concentration 5x

2 use a colorimeter to find the end point more accurately

[2]

(ii) Describe how you would make 5.0 cm^3 of 0.25% glucose solution using a 0.50% glucose solution and distilled water.

Dissolve 2.5 cm^3 of the 0.5%
in 2.5 cm^3 of distilled water

[2]



CLICK FOR
EXPLANATION



- (iii) Describe the method you would use to test a solution for the presence of glucose.

Add Benedict's solution

and heat in a water bath at 80 °C

the colour will change into brick red / orange / green

.....

 [2]

- (c) A student investigated the effect of temperature on the rate of respiration in yeast at 25 °C and 35 °C.

In one experiment, the student measured the volume of carbon dioxide produced by the yeast every 5 minutes for a total of 30 minutes.

- (i) Describe suitable apparatus that could be used to collect and measure the volume of carbon dioxide produced.

Use a gas syringe

.....

 [1]

The student did three experiments at each temperature. They used the results to calculate the mean volume of carbon dioxide produced.

Part of the student's results table for the experiments at 35 °C is shown in Table 1.1.

Table 1.1

time / minutes	volume of carbon dioxide produced at 35 °C / cm ³			
	experiment 1	experiment 2	experiment 3	mean
15	1.8	3.2	2.0	1.9

- (ii) The student decided that the result of one of the experiments shown in Table 1.1 was anomalous.

State what is meant by an anomalous result.

An outlier result that doesn't fit the pattern of the other results

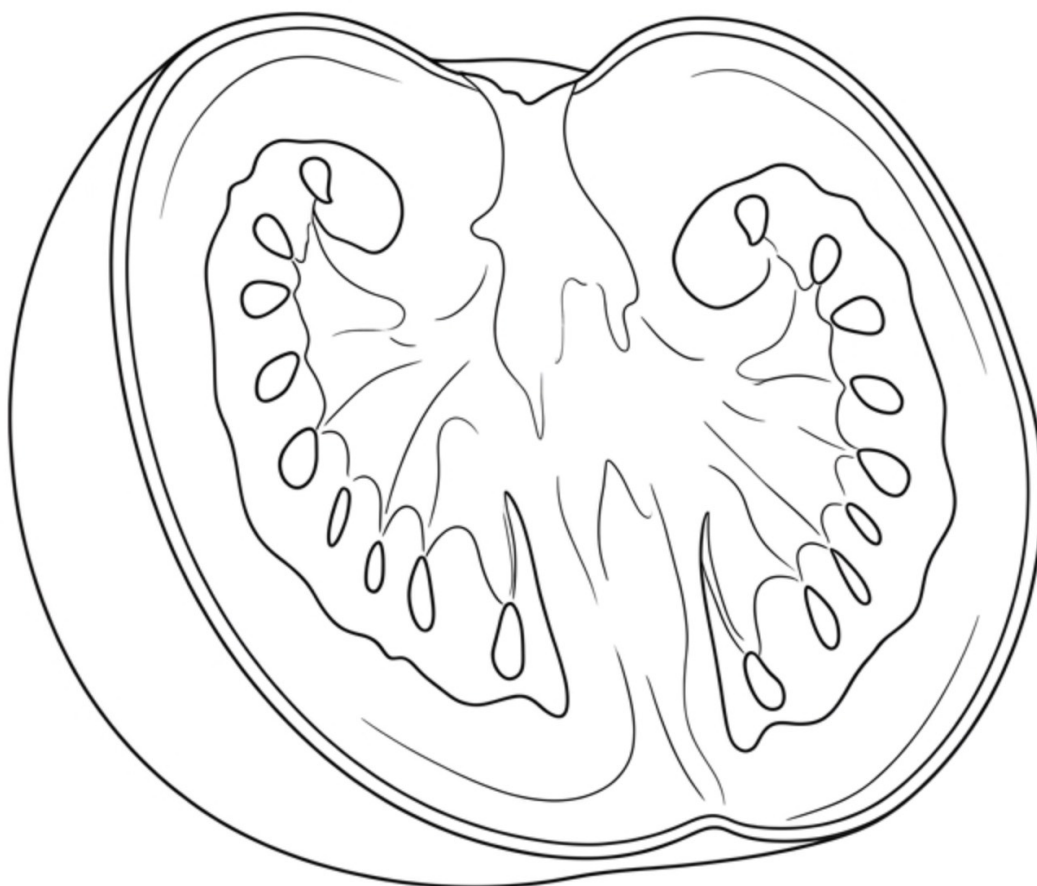
.....

 [1]



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Model answer

✓ Draw the outline of the cut tomato as ONE clear, continuous line, with no shading and no feathery or sketchy lines. ✓ Make the drawing LARGE - it should occupy at least half of the answer space. ✓ Show between 6 and 10 seeds on EACH side, positioned correctly around the two seed chambers as in Fig. 2.1 (not too few or too many). ✓ Show the cut surface and the edge/skin of the fruit so the drawing looks three-dimensional (the flesh, the central column and the two seed chambers).

Mark scheme 4 marks

- ✓ single clear outer line with no shading (1)
- ✓ drawing occupies at least half of the available space (1)
- ✓ 6 to 10 seeds shown on each side, correctly positioned (1)
- ✓ cut surface and edge of the fruit shown (the idea that it is three-dimensional) (1)

Do not accept: a feathery or broken outline; any shading; the wrong number of seeds (5 or 11 are common errors)

Examiner's insight

The drawings were generally very good, many gaining full credit. Outlines should be a single smooth, unbroken line rather than feathery, and pay attention to detail - a few candidates drew the wrong number of seeds (5 and 11 were commonly seen).

2 (a)(ii)

Describe · [3 marks]

Describe how you could show that a tomato fruit contains vitamin C.

Model answer

- (iii) Describe how the student calculated the mean volume of carbon dioxide produced shown in Table 1.1.

The student didn't include the anomalous result in the calculation

[1]

The results of the whole investigation about the effect of temperature on the rate of respiration in yeast at 25°C and 35°C are shown in Table 1.2.

Table 1.2

time / minutes	mean volume of carbon dioxide produced at 25°C / cm ³	mean volume of carbon dioxide produced at 35°C / cm ³
5	0.0	0.1
10	0.0	0.8
15	0.1	1.9
20	0.2	2.7
25	0.5	3.2
30	1.1	3.2



- (iv) Using the data in Table 1.2, compare the mean volumes of carbon dioxide produced at 25°C and 35°C.

The volume of carbon dioxide is always higher at 35 oC

The volume becomes constant at 35 oC but continues to increase at 25 oC

[2]

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- 2 (a) Fig. 2.1 shows epidermal cells from a red onion.

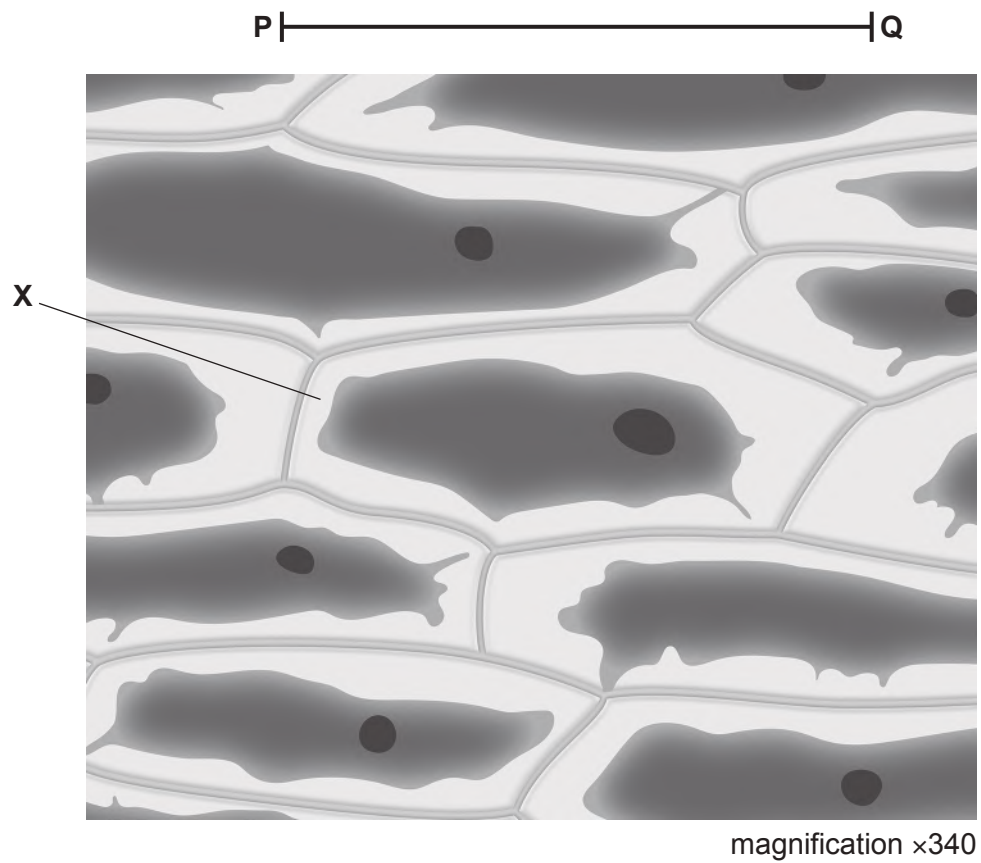


Fig. 2.1

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- (i) Draw a large diagram of the cell labelled **X** in Fig. 2.1.



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[4]

- (ii) Line **PQ** on Fig. 2.1 represents the length of cell **X**.

Measure the length of line **PQ** on Fig. 2.1.

length of **PQ** **70** mm

Calculate the actual length of cell **X** using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line PQ in Fig. 2.1}}{\text{actual length of cell X}}$$

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

Space for working.

$$70 \div 340 = 0.206$$



..... **0.206** mm
[3]

Cambridge IGCSE Biology 0610 - Solved Past Paper

May/June 2024 · Paper 6 · 0610/61 · 2

● hard ● medium ● easy

● 2

Plan · [6 marks]

Plan an investigation to determine the effect of light intensity on photosynthesis in an aquatic plant.

Model answer

- ✓ Independent variable: use at least two (better, five) different light intensities. ✓
- Dependent variable: measure the volume of gas (**oxygen**) given off in a set time, or count the number of bubbles released in a set time. ✓ Method detail: change the light intensity in a controlled way, e.g. move the lamp to different measured distances from the plant (or use a dimmer switch or different bulbs). ✓ Method detail: collect and measure the gas with a gas syringe (or another quantitative displacement method), use a heat shield or LED lamp so the light does not warm the water, and keep the plant submerged. ✓ Keep constant: the same time (or set volume) used for each reading, e.g. the time taken to collect a set volume of **oxygen**. ✓ Keep constant: the carbon dioxide source / hydrogencarbonate concentration, the **temperature**, the colour of light, and the same **species**, size and **age** of plant. ✓ Reliability: take two or more repeats at each light intensity and calculate a mean.
- ✓ Safety: a precaution relevant to THIS investigation, e.g. cut the pond plant away from your body, and do not touch the hot lamp.

Mark scheme 6 marks · eight marking points, total capped at 6

- ✓ independent variable: at least two / different light intensities (1)
- ✓ dependent variable: volume of gas / oxygen produced OR number of bubbles counted (1)
- ✓ method detail (max two): how the light intensity is changed, e.g. different lamp distances / dimmer switch / different bulbs (1)
- ✓ method detail (max two): collecting or measuring the gas (gas syringe / displacement); heat shield or LED to avoid heating; keep the plant submerged; time to acclimatise (1)
- ✓ constant variable (max two): the time or volume used for each reading (1)
- ✓ constant variable (max two): CO₂ source / hydrogencarbonate concentration; colour or wavelength of light; temperature; same type / species / age of plant (1)
- ✓ two or more repeats (1)
- ✓ a relevant safety precaution (1)

Do not accept: stating the plants release carbon dioxide (this loses the dependent-variable mark)

Ignore: 'wear goggles and gloves' with no link to this particular investigation

(b) Water moves into and out of cells by osmosis.

Plan an investigation to determine the effect of the concentration of sodium chloride solution on osmosis in plant tissue.

Prepare five different solutions of sodium chloride, all of the same volume.

Cut cylinders of the same size from the same onion.

Measure the initial mass of these cylinders.

Soak the cylinders in each solution for 48 hours.

Then, calculate percentage change in mass

Repeat at each concentration and find the average

Wear gloves for safety.

[6]

[Total: 13]



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2. Graphs & plotting

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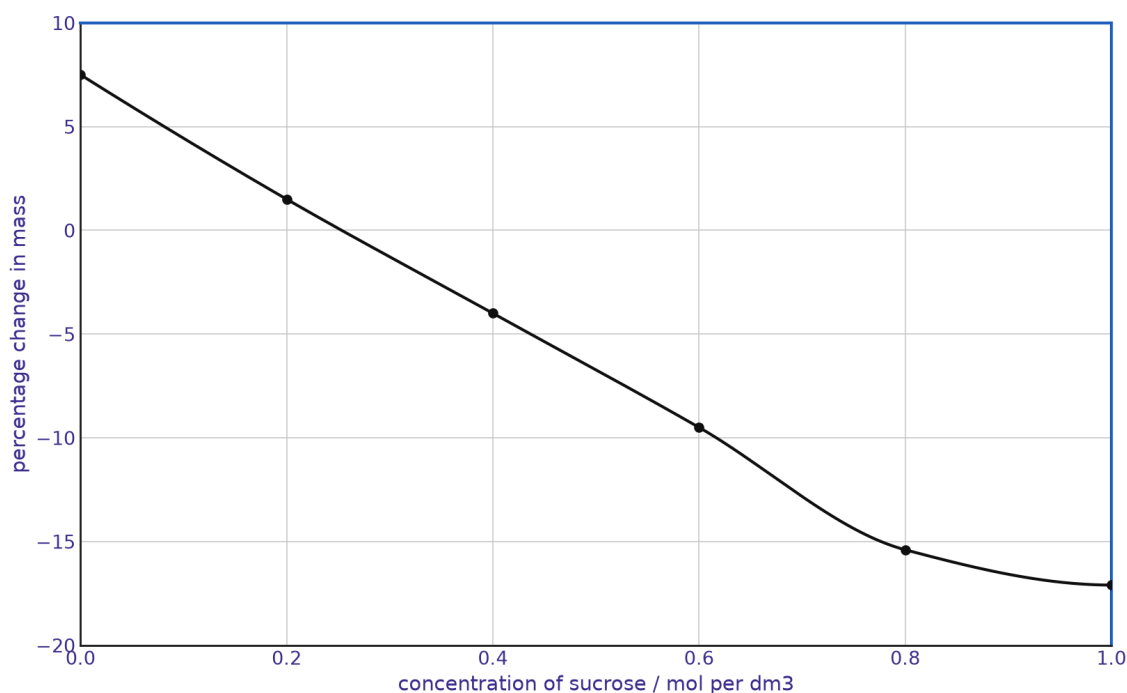
February/March 2021 · Paper 6 · 0610/62 · 1 (d)(iii)

● hard ● medium ● easy

● 1 (d)(iii)

Plot · [4 marks]

Plot a line graph of the concentration of sucrose solution (x-axis) against the percentage change in mass (y-axis). Include a curved line of best fit on your graph.



Model answer - your graph should look like this

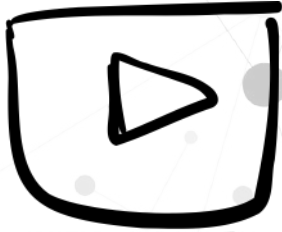
Model answer

✓ Label BOTH axes with units: 'concentration of sucrose / mol per dm³' on the x-axis and 'percentage change in mass' on the y-axis. The y-axis must run into NEGATIVE values (for example from +10 down to -20) using ONE even scale for both the positive and the negative part. ✓ Choose a linear (evenly spaced) scale so that the plotted points fill at least half of the grid in both directions. ✓ Plot all the points to within half a small square, using YOUR own calculated -17.1 % for the 1.00 mol per dm³ point, and keep each plotted point small (no larger than a small square). ✓ Draw a single smooth CURVED line of best fit through the points, and do NOT extend (extrapolate) the line beyond the last point.

Mark scheme 4 marks

- ✓ both axes labelled with units (1)
- ✓ linear scale that occupies at least half of the grid (1)
- ✓ first five points plotted accurately, to within half a small square (1)

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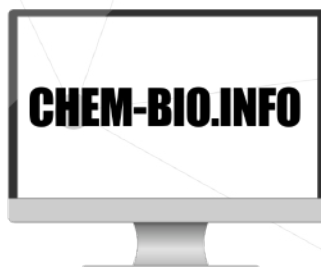
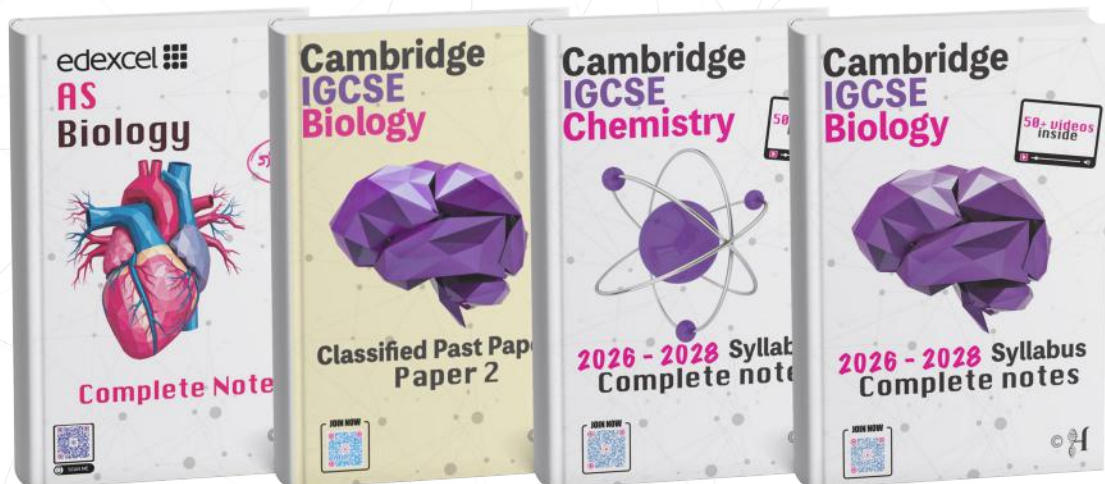


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