Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

BIOLOGY **0610/62**

Paper 6 Alternative to Practical **February/March 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.

DC (LK/CGW) 203215/3

1 A student investigated osmosis. They used a model cell made from dialysis tubing. Dialysis tubing is permeable to water but is **not** permeable to larger molecules such as sucrose, which is a type of sugar.

Step 1 One test-tube was labelled **DW** and a second test-tube was labelled **S**.

Step 2 Two dialysis tubing bags were made by knotting lengths of dialysis tubing at one end.

Step 3 A syringe was filled with $10\,cm^3$ of sucrose solution.

Step 4 The $10\,cm^3$ of sucrose solution was transferred from the syringe to a dialysis tubing bag, as shown in Fig. 1.1.

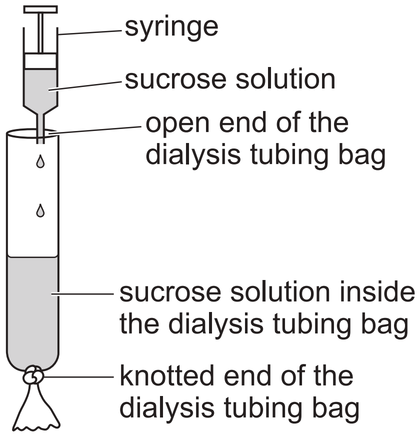


Fig. 1.1

Step 5 A ruler was used to measure the distance from the knot to the meniscus of the sucrose solution in the bag, as shown in Fig. 1.2.

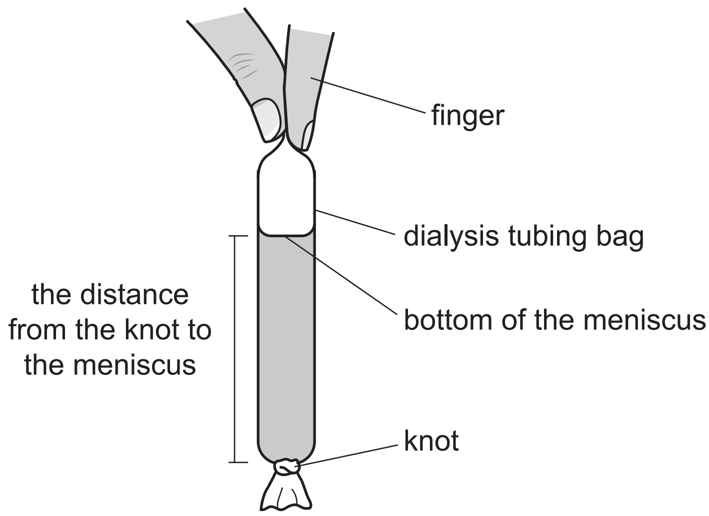


Fig. 1.2

Step 6 The dialysis tubing bag was placed into test-tube **S** and secured with an elastic band.

Step 7 A measuring cylinder was used to pour $30\,cm^3$ of distilled water into test-tube **S**, as shown in Fig. 1.3.

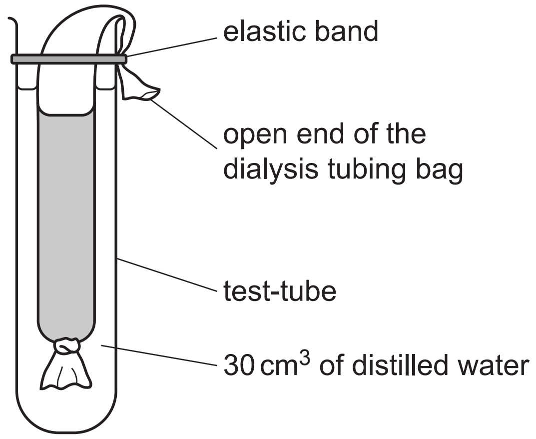


Fig. 1.3

Step 8 The student filled the second dialysis tubing bag with 10 cm^3 of distilled water.

Step 9 The student measured the distance from the top of the knot to the bottom of the meniscus of the distilled water in the dialysis tubing bag.

Step 10 The dialysis tubing bag containing distilled water was then placed into test-tube **DW** and secured with an elastic band. 30 cm^3 of distilled water was poured into test-tube **DW**.

Step 11 Test-tubes **S** and **DW** were left for 15 minutes.

Step 12 At 15 minutes the dialysis tubing bags were removed from test-tubes **S** and **DW**.

(a) Fig. 1.4 shows the dialysis tubing bags at 0 minutes and at 15 minutes.

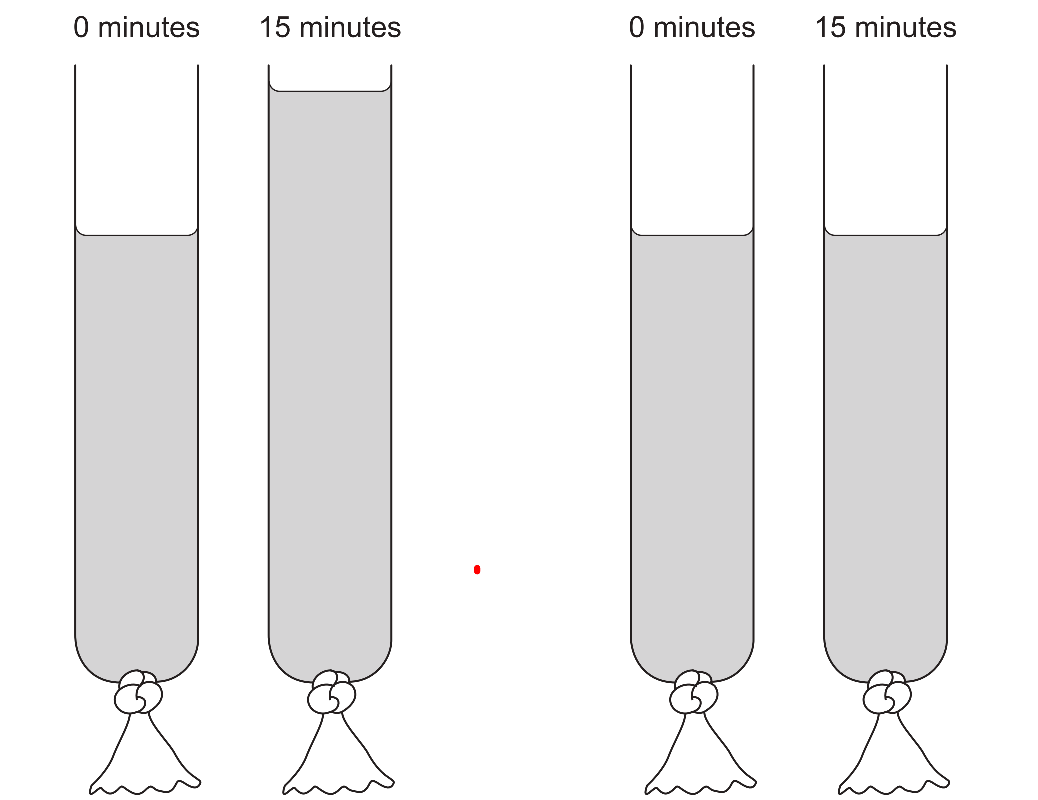


Fig. 1.4

(i) Measure the distance from the top of the knot to the bottom of the meniscus at 0 minutes and 15 minutes for the dialysis tubing bags from test-tubes **S** and **DW**.

Prepare a table and record these measurements in your table.

Test tube	S		DW	
Time in Minutes	0	15	0	15
Height of liquid in mm	55	74	55	55

[3]

(ii) Calculate the change in distance from the knot to the meniscus of the liquids in the dialysis tubing bags in test-tubes **S** and **DW**.

S ....19.......... mm

DW ....0.......... mm
[1]

(iii) Explain why it is important to take the measurements from the same place on the dialysis tubing bags shown in Fig. 1.4.

The measurements should be taken from the same place on the dialysis tubing bags, to calculate the difference accurately.

.... [1]

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

The water entered in the dialysis tubing bag S, and did not enter in the bag DW.

The concentration gradient allows the movement of water.

.... [1]

(v) Identify the variable that the student decided to change (independent variable) in this investigation.

Concentration of sucrose in the dialysis tubing bag .... [1]

(vi) Only one set of results was collected during this investigation.

Explain why it is better to collect several sets of results.

It is better to collect several sets of results to calculate the average.

....

.... [1]

(b) Another student repeated the investigation but their results were not the same. The student only used one syringe during the investigation and did not wash it.

Suggest why the results of their investigation were not as expected.

The results of their investigation were not as expected, because of contamination from the syringe.

.... [1]

(c) Sucrose can be broken down into reducing sugars.

Describe how you would test for the presence of reducing sugars.

Benedict' s solution is a blue alkaline solution used to test the presence of reducing sugars. If the sample is heated with Benedict' s solution, the formation of orange -red solution shows the presence of reducing sugars.

.... [2]

(d) Students investigated the effect of sucrose concentration on the mass of potato cylinders.

- A potato was cut into cylinders.
- The potato cylinders were all cut to 2 cm in length.
- The initial mass of each potato cylinder was measured and recorded.
- Each potato cylinder was put into a different concentration of sucrose solution.
- The potato cylinders were left in the sucrose solutions for one hour.
- The potato cylinders were removed from the sucrose solutions and the final mass of each potato cylinder was measured and recorded.

(i) State **two** variables that were kept constant in this investigation.

1 Surface area of the cylinders

2 Soaking time

[2]

The results of the investigation are shown in Table 1.1.

Table 1.1

concentration of sucrose / mol per dm^3	initial mass of potato cylinder / g	final mass of potato cylinder / g	change in mass / g	percentage change in mass
0.00	2.13	2.29	0.16	7.5
0.20	2.05	2.08	0.03	1.5
0.40	2.52	2.42	–0.10	–4.0
0.60	1.68	1.52	–0.16	–9.5
0.80	1.56	1.32	–0.24	–15.4
1.00	2.51	2.08	–0.43	- 17.1

(ii) Calculate the **percentage** change in mass of the potato cylinder that was immersed in 1.00 mol per dm^3 sucrose solution.

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

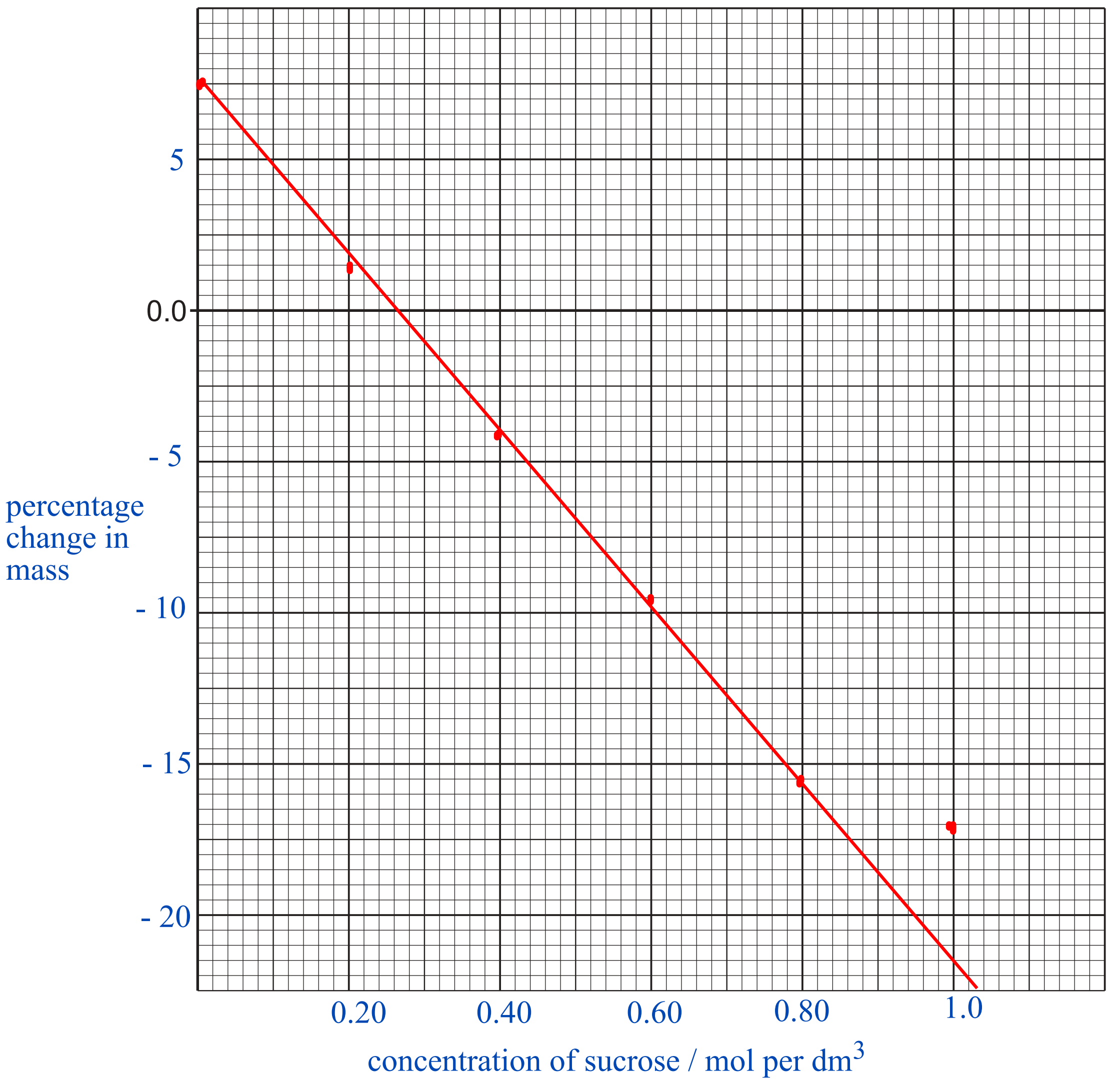
Space for working.

Percentage change in mass of the potato cylinder that was immersed in 1.00 mol per dm^3 sucrose solution = (–0.43 / 2.51) * 100 = - 17.1 %

- 17.1 %
[3]

(iii) Plot a line graph on the grid of the concentration of sucrose solution against the percentage change in mass. One axis has been started for you.

Include a curved line of best fit on your graph.



[4]

(iv) Estimate the concentration of sucrose solution at which there was **no** percentage change in the mass of the potato cylinder.

..........0.26.......... mol per dm^3 [1]

(v) Explain why the percentage change in mass is more useful than the change in mass when analysing the results in Table 1.1.

The percentage change in mass is more useful than the change in mass to allow comparison as the initial masses were different.

.... [1]

(e) State the name of the solution that is used to test for the presence of starch and give the result of a positive test.

test solution ...Iodine solution...

positive result...Formation of blue or black colour...

[2]

[Total: 24]

2 Fig. 2.1 is a photograph of a tomato fruit that has been cut in half.

Fig. 2.1

(a) **(i)** Draw a large diagram of the tomato fruit shown in Fig. 2.1.

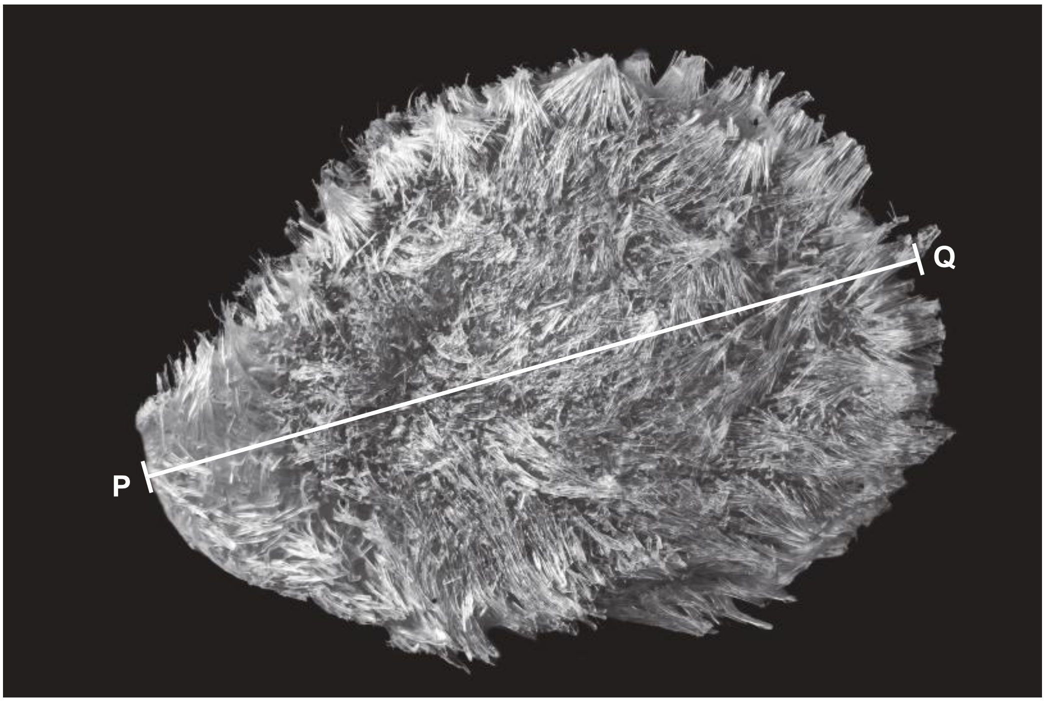
[4]

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

DCPIP (2,6 - Dichlorophenolindophenol) can be used as a indicator for vitamin C.
The juice is extracted from the tomato. To the juice, added DCPIP. If vitamin C is present, it reacts with DCPIP, and changes the colour from blue to colourless.

[3]

(b) Fig. 2.2 is a photomicrograph of a tomato seed.



magnification ×50

Fig. 2.2

Measure the length of line **PQ** on Fig. 2.2.

length of **PQ** ....106........ mm

Calculate the actual size of the tomato seed using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ}}{\text{actual length of the tomato seed}}$$

Include the unit.

Space for working.

Actual length of the tomato seed = 106 / 50 = 2.1 mm

........2.1 mm........

[3]

(c) Plan an investigation to determine the optimum (best) temperature for germination of tomato seeds.

The investigation should be carried out at atleast three different temperatures. The other factors like volume of water used, pH, variety of tomato seed, oxygen concentration, type of soil should be kept constant. Two or more repeats of the entire experiment should be done , to calculate the average. The number of tomato seeds germinated after a particular time should be counted to determine the optimum temperature for germination.

[6]

[Total: 16]