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Cambridge Assessment International Education

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CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

9304406393

BIOLOGY **0610/61**

Paper 6 Alternative to Practical **October/November 2024**

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 **16** pages.

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[Turn over

1 A student investigated the movement of water across a membrane by osmosis.

Dialysis tubing is made from a type of membrane that is partially permeable. Only small molecules such as water can pass through this membrane.

The student used this method:

Step 1 Label two test-tubes **S** and **W**.

Step 2 Put 20 cm^3 of distilled water into each of the labelled test-tubes.

Step 3 Take a piece of dialysis tubing and knot it at one end to form a bag.

Step 4 Put 6 cm^3 of sucrose solution into the open end of the dialysis tubing bag.

Step 5 Rinse the outside of the dialysis tubing bag with distilled water.

Step 6 Use a ruler to measure the distance from the knot at the bottom of the dialysis tubing bag to the bottom of the meniscus in the bag, as shown in Fig. 1.1.

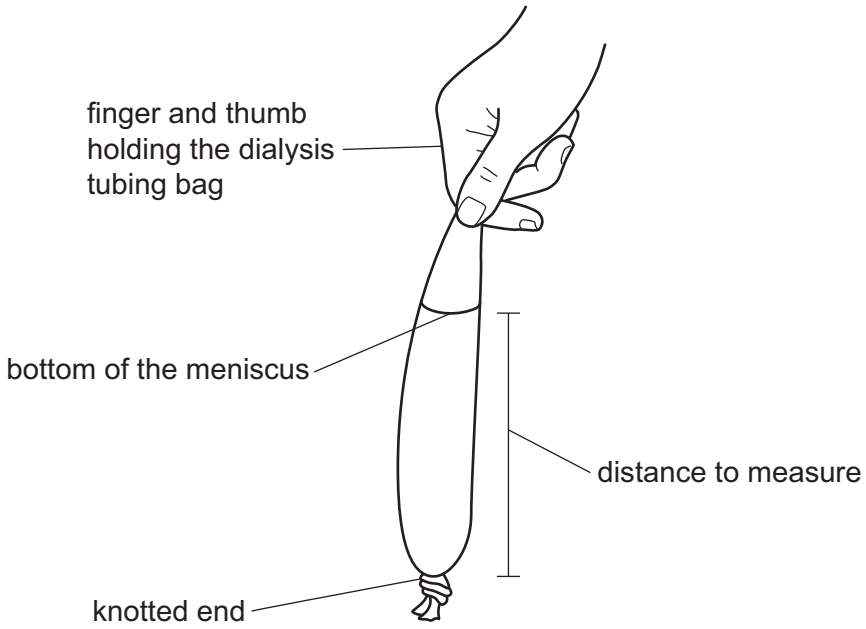


Fig. 1.1

Step 7 Place the dialysis tubing bag into test-tube **S**. Fold the open end of the bag over the top of the test-tube. Use an elastic band to hold the dialysis tubing in place, as shown in Fig. 1.2.

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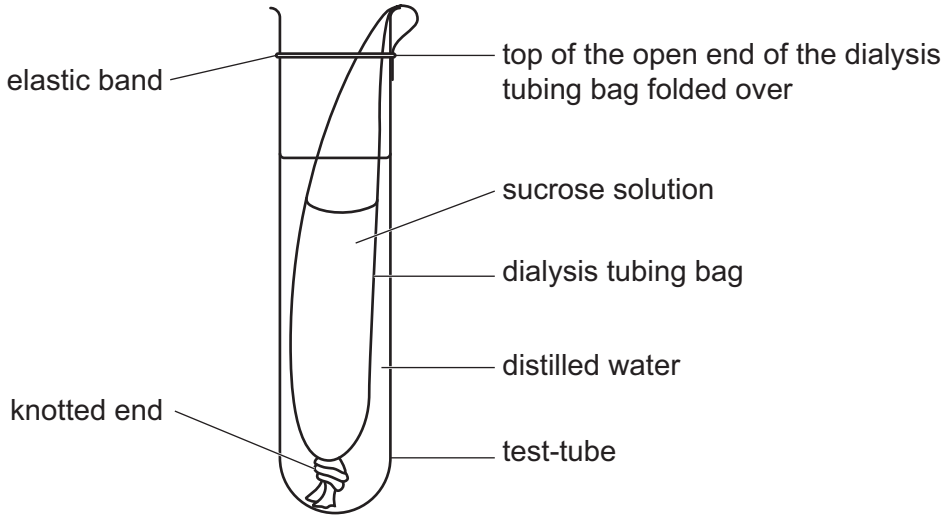


Fig. 1.2

Step 8 Repeat steps 3 to 7 using test-tube **W** and 6 cm^3 of distilled water instead of sucrose solution in step 4.

Step 9 Place both test-tubes into a hot water-bath for 15 minutes.

Step 10 After 15 minutes, remove test-tubes **S** and **W** from the hot water-bath and put them into a test-tube rack.

Step 11 Remove the dialysis tubing bag from test-tube **S**. Use the ruler to re-measure the distance from the knot at the bottom of the dialysis tubing bag to the bottom of the meniscus in the bag.

Step 12 Repeat step 11 with test-tube **W**.

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(a) Fig. 1.3 shows the student's dialysis tubing bags from test-tubes **S** and **W** at 0 minutes and 15 minutes.

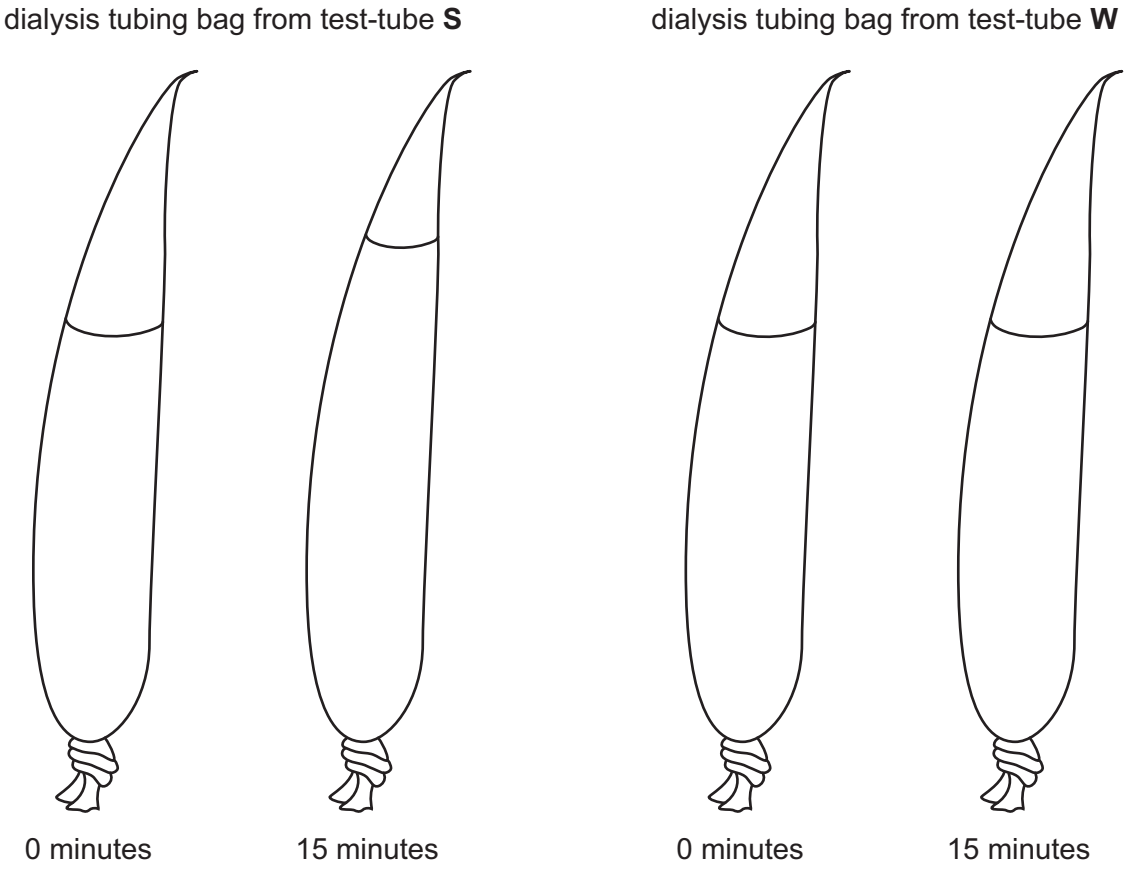


Fig. 1.3

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(i) Measure the distance from the knot at the bottom of the dialysis tubing bag to the bottom of the meniscus in the bag for all **four** dialysis tubing bags shown in Fig. 1.3.

(Fig. 1.1. shows where the measurements should be taken on the dialysis tubing bags.)

Prepare a table and record your measurements from **Fig. 1.3** in your table.

[3]

(ii) Calculate the change in distance from the knot to the meniscus of the solution in the dialysis tubing bag in test-tubes **S** and **W**.

S ..... mm

W ..... mm
[1]

(iii) State a conclusion for this investigation.

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..... [1]

(b) (i) Suggest a suitable piece of equipment that could be used to measure the distilled water in step 2.

..... [1]

(ii) Suggest why the dialysis tubing bag was rinsed in step 5.

.....

.....

..... [1]

(iii) Explain why water was used instead of sucrose solution in the dialysis tubing bag in test-tube **W**.

.....

.....

..... [1]

(iv) Identify **two** variables that were kept constant in this investigation.

1 .....

2 .....
[2]

(v) This investigation was only done once.

Explain why it is better to repeat an investigation.

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(vi) Suggest an alternative method of measuring the movement of water in dialysis tubing bags.

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(c) Sucrose is made from glucose and fructose.

Glucose and fructose are reducing sugars.

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

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[Total: 14]

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2 In plants, water moves up the stem in xylem vessels as a column of water molecules as a result of transpiration.

A celery stalk that still has its leaves attached can be used to investigate the movement of water in a plant, as shown in Fig. 2.1.

Fig. 2.2 shows dye in the xylem vessels of a celery stalk.



Fig. 2.1



not to scale

Fig. 2.2

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Plan an investigation to determine the effect of temperature on the rate of movement of a coloured dye through celery stalks.

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3 **(a)** Fig. 3.1 is a photograph of a banana borer insect which is a pest of banana plants.



Fig. 3.1

Line **AB** represents the length of the banana borer.

Measure the length of line **AB** in Fig. 3.1.

length of line **AB** ..... mm

Calculate the actual length of the banana borer using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{AB} \text{ in Fig. 3.1}}{\text{actual length of the banana borer}}$$

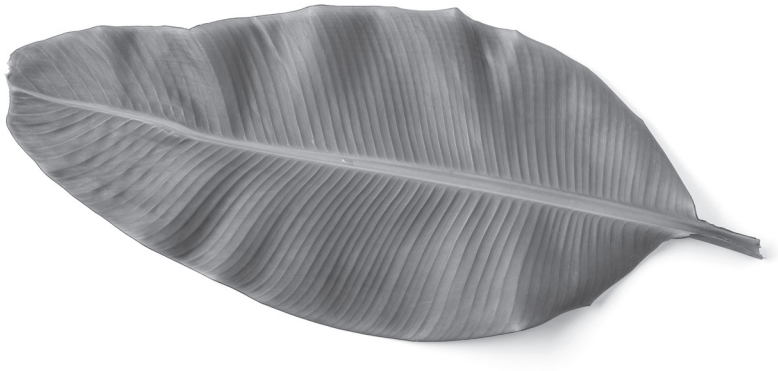
Give your answer to **two** significant figures.

Space for working.

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(b) Fig. 3.2 is a photograph of one leaf from a banana plant.



magnification ×0.04

Fig. 3.2

Fig. 3.3 is a photograph of one leaf from a strawberry plant.



magnification ×1.3

Fig. 3.3

(i) Identify **three** ways the strawberry plant leaf in Fig. 3.3 differs from the banana plant leaf in Fig. 3.2.

difference 1 .....

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difference 2 .....

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difference 3 .....

.....

[3]

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(ii) Leaves release carbon dioxide gas during respiration.

State the name of an indicator that is used to test for the presence of carbon dioxide gas.

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(c) Fig. 3.4 shows a banana flower.

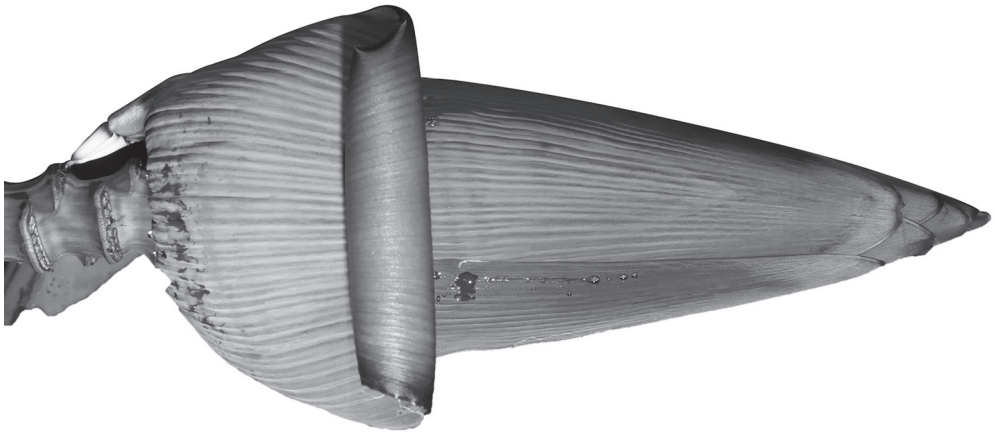


Fig. 3.4

Draw a large diagram of the banana flower shown in Fig. 3.4.

[4]

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(d) Bananas contain protein.

A student investigated the protein content in different types of fruit.

Table 3.1 shows the student's results.

Table 3.1

type of fruit	protein content / g per 100 g of fruit
apple	0.3
apricot	1.4
avocado	2.0
banana	1.1
guava	2.6
passion fruit	2.2
pineapple	0.9

(i) Calculate the mass of guava that a person would need to eat to gain 14.5 g of protein.

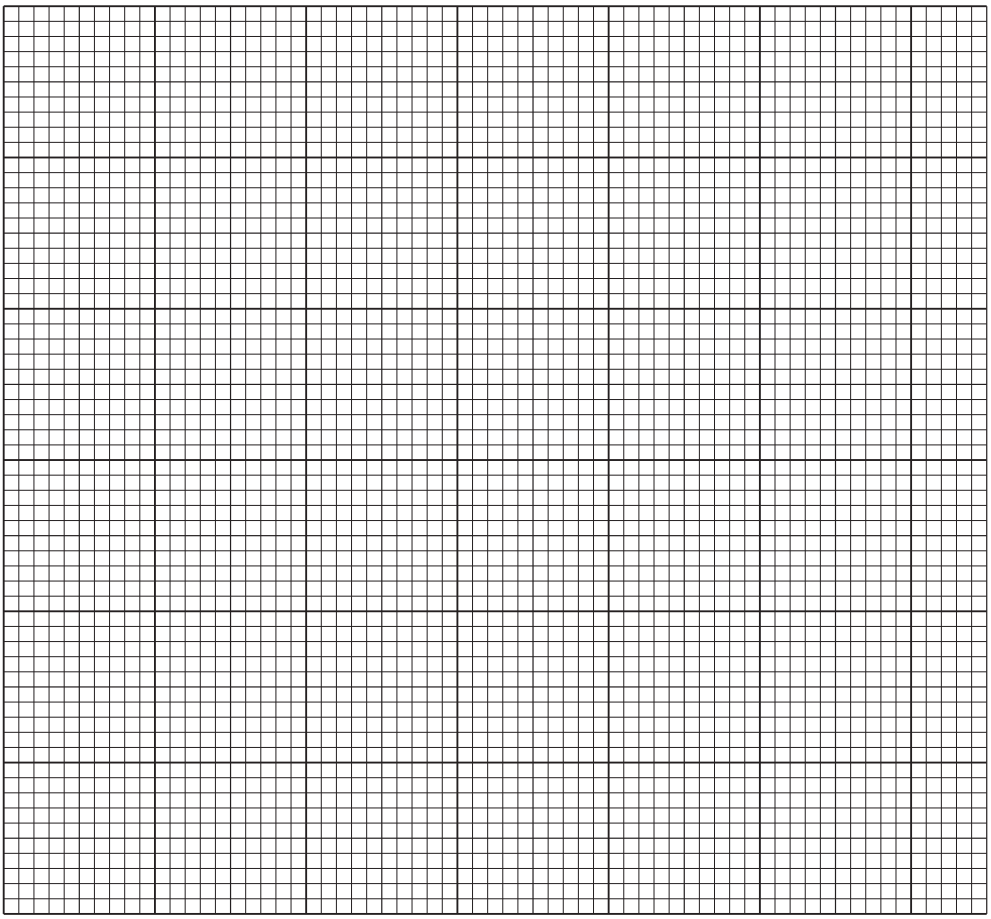
Give your answer to the nearest whole number.

Space for working.

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(ii) Plot a bar chart on the grid of the data in Table 3.1.



[4]

(iii) State the dependent variable in the investigation described in **3(d)**.

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(e) Samples of three different types of food were labelled **X**, **Y** and **Z**. The samples were tested for protein and starch.

The food tests showed that:

- Food **X** contained both protein and starch.
- Food **Y** contained starch only.
- Food **Z** contained protein only.

Complete Table 3.2 to show the expected final colours of these food tests.

Table 3.2

type of food	protein test final colour	starch test final colour
X		
Y		
Z		

[2]

[Total: 20]

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