Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3322231330 4

BIOLOGY **9700/34**

Paper 3 Advanced Practical Skills 2 **October/November 2018**

2 hours

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
Total	

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Before you proceed, read carefully through the **whole** of Question 1 and Question 2.

Plan the use of the **two hours** to make sure that you finish all the work that you would like to do.

If you have enough time, think about how you can improve the confidence in your results, for example by obtaining and recording one or more additional measurements.

You will **gain marks** for recording your results according to the instructions.

1 Manufacturers of fruit juice need to know the concentration of ascorbic acid (vitamin C) in fruit. The fruit is picked when the juice contains the highest concentration of ascorbic acid.

The concentration of ascorbic acid can be estimated in a fruit extract by carrying out a test using starch solution and iodine solution.

Iodine solution will be added one drop at a time using a syringe.

To practise releasing drops from a syringe:

1. Fill a syringe with 1 cm^3 distilled water.
2. Hold the syringe over an empty test-tube as shown in Fig. 1.1 and push the plunger slowly to release one drop.
3. Repeat this until you can release one drop at a time.

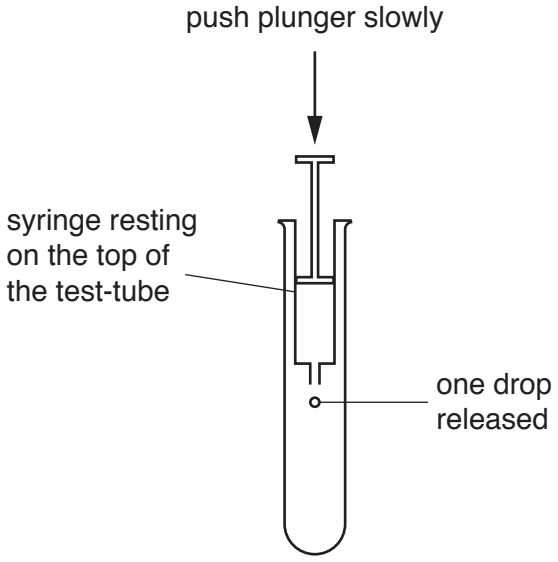

Fig. 1.1

You are provided with the materials shown in Table 1.1.

Table 1.1

labelled	contents	hazard	volume/cm^3
A	0.10% ascorbic acid	none	100
W	distilled water	none	100
iodine	iodine solution	none	20
S	starch solution	none	20

If any solutions come into contact with your skin, wash off immediately under cold water.
It is recommended that you wear suitable eye protection.

You will now carry out a test on **A** and **W** to practise the method **and** to find the volume of iodine solution that needs to be added for the end-point to be reached.

The end-point is when the blue colour remains after 10 seconds.

4. Put 1 cm^3 of **S** into a test-tube.

5. Put 5 cm^3 of **A** into the same test-tube.

6. Shake the test-tube gently to mix the contents.

7. Fill a 1.0 cm^3 syringe with exactly 1.0 cm^3 of **iodine**.

8. Wipe off any **iodine** from the outside of the syringe with a paper towel.

9. Put one drop of **iodine**, as shown in Fig. 1.1, into the mixture of **S** and **A** in the test-tube.

10. Mix gently and observe any colour change.

11. Repeat step 9 and step 10 until a blue colour appears. You may need to refill the syringe with **iodine** as in step 7.

12. When the blue colour appears, shake the test-tube gently for 10 seconds and see if the end-point has been reached.

13. If the blue colour disappears then repeat step 9 to step 12 until the mixture stays blue for at least 10 seconds.

14. Record in **(a)(i)** the **volume** of iodine solution added.

15. Repeat step 4 to step 14 using **W** instead of **A** (in step 5).

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(a) (i) Record the **volume** of iodine solution added to sample **A** and sample **W**.

volume added to **A** ..... cm^3

volume added to **W** ..... cm^3

[1]

You will need to:

- prepare known concentrations of ascorbic acid using simple (proportional) dilution
- carry out a test to find the **volume** of iodine solution added to the test samples.

Make simple (proportional) dilutions of the ascorbic acid, **A** (0.10%), by reducing the concentration by **0.02%** between each successive dilution.

You will need to prepare 20 cm^3 of each concentration.

(ii) Table 1.2 shows how to make up two of the concentrations you will use, 0.10% and 0.00%.

Decide which other concentrations of ascorbic acid to prepare using simple (proportional) dilutions of **A**.

Complete Table 1.2 to show how you will prepare the other concentrations.

Table 1.2

percentage concentration of ascorbic acid	volume of **A** /cm^3	volume of **W** /cm^3
0.10	20.00	0.00
0.00	0.00	20.00

[2]

16. Prepare the concentrations of ascorbic acid as shown in Table 1.2.

17. Repeat step 4 to step 13 using one of the concentrations in Table 1.2 instead of **A** (in step 5).

18. Record your result in **(a)(iii)**.

19. Repeat step 17 and step 18 for each of the other concentrations as shown in Table 1.2.

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(iii) Record your results in an appropriate table for the known concentrations of ascorbic acid.

[4]

You will need to estimate the concentration of ascorbic acid in **X** and **Y**.

You are provided with the materials shown in Table 1.3.

Table 1.3

labelled	contents	hazard	volume/cm^3
X	fruit extract with unknown concentration of ascorbic acid	none	20
Y	fruit extract with unknown concentration of ascorbic acid	none	20

20. Repeat step 4 to step 13 using **X** instead of **A** (in step 5).

21. Record your result in **(a)(iv)**.

22. Repeat step 20 and step 21 using **Y**.

(iv) Record the volume of iodine solution added to **X** and **Y**.

volume added to **X** .....

volume added to **Y** .....

[1]

(v) Complete Fig. 1.2 to show the position on the line of each of the percentage concentrations of ascorbic acid shown in Table 1.2.

Using your results in **(a)(iv)**, put the labels **X** and **Y** on Fig. 1.2 to show an estimate of the concentrations of ascorbic acid in **X** and **Y**.

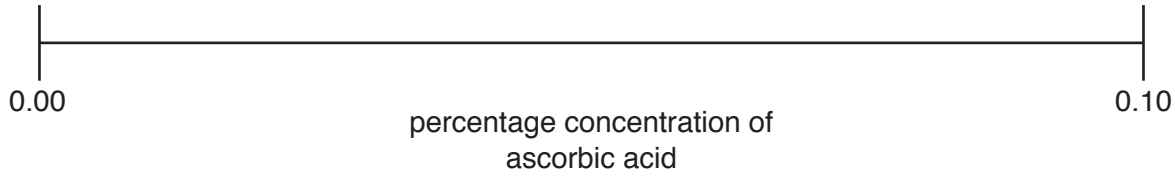

Fig. 1.2

[1]

(vi) Identify **one** significant source of error in this investigation.

.....

.....

..... [1]

(vii) Suggest how you would make **three** improvements to this investigation in order to obtain a more accurate estimate of the concentration of ascorbic acid in **X** and **Y**.

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..... [3]

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(b) A student carried out further investigations on ascorbic acid to test its effect on the reaction of amylase on starch. Maltose is a product of the hydrolysis of starch.

Different concentrations of ascorbic acid were added to standard mixtures of amylase and starch. The student measured the mass of maltose produced.

The results are shown in Table 1.4.

Table 1.4

percentage concentration of ascorbic acid	mass of maltose produced/mg
0.000	97
0.002	52
0.004	42
0.006	33
0.008	25
0.010	19

(i) Plot a graph of the data in Table 1.4 on the grid in Fig. 1.3.

Use a sharp pencil for drawing graphs.

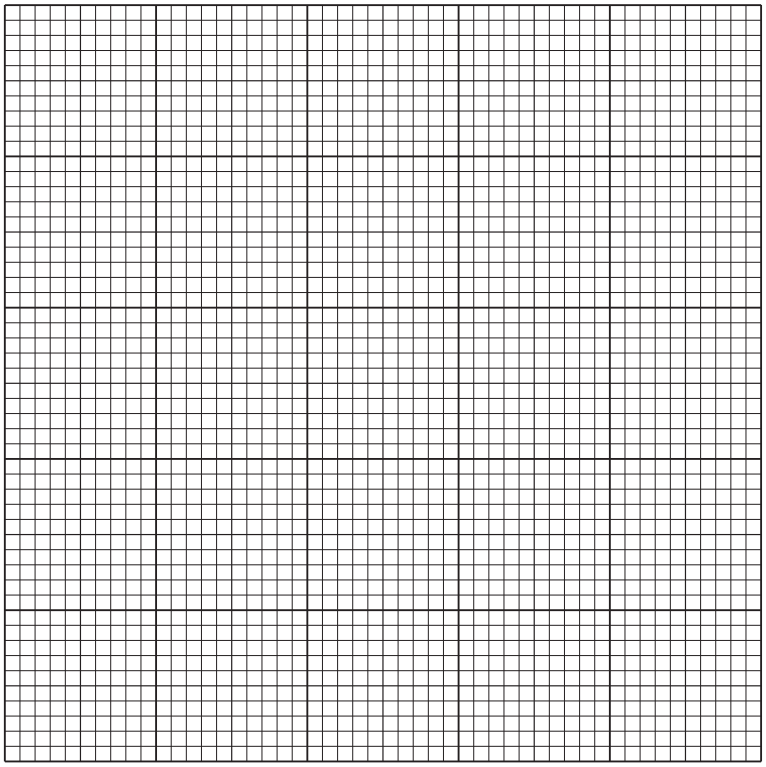

Fig. 1.3

[4]

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(ii) Use your graph to find the mass of maltose produced when 0.005% of ascorbic acid was used.
Show **on the graph** how you determined your answer.

mass of maltose = ... [2]

(iii) Suggest **one** explanation for the results between 0.000% and 0.010%.

.....

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 22]

2 **M1** is a slide of a stained transverse section through a plant root.

You are not expected to be familiar with this specimen.

Use a sharp pencil for drawing.

(a) **(i)** Draw a large plan diagram of the transverse section through the root.

Use **one** ruled label line and label to identify the cortex.

You are expected to draw the correct shape and proportions of the different tissues.

[4]

(ii) Observe the cells in the epidermis and the cells directly beneath the epidermis.

Select a group of **four** touching cells. These four cells must include:

- **two** epidermal cells that are touching each other
- **two** cells directly beneath the epidermis that are touching each other **and** are also touching at least one of the epidermal cells.

Make a large drawing of this group of **four** touching cells.

Use **one** ruled label line and label to identify the cell wall of **one** cell.

You are expected to draw the correct shape and proportions of the different cells.

[5]

(b) Fig. 2.1 is a photomicrograph of a stained transverse section through a root of a different type of plant.

You are not expected to be familiar with this specimen.

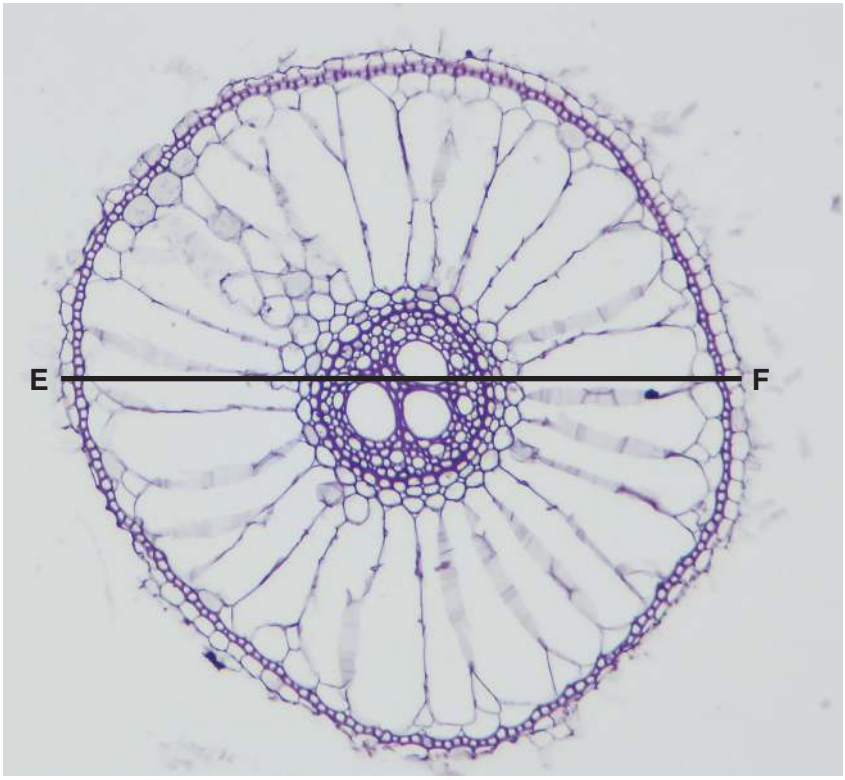

Fig. 2.1

Use the line **E–F** to determine the simplest whole number ratio of the total diameter of the root to the diameter of the central vascular tissue.

Show your working.

ratio ..... [5]

(c) Prepare an appropriate table so that it is suitable for you to record observable differences between the root on **M1** and the root in Fig. 2.1.

Record your observations in the table you have prepared.

[4]

[Total: 18]

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