Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

9521801793

BIOLOGY **5090/61**

Paper 6 Alternative to Practical **October/November 2014**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

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.

DC (SJF/SW) 86313/5

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1 Some students investigated the effect of two solutions, ethanol and sucrose, on the respiration of yeast.

Yeast, a type of fungus, can respire anaerobically. This is called fermentation and results in the formation of ethanol (alcohol) and carbon dioxide.

glucose ⟶ ethanol + carbon dioxide

Three beakers, labelled **A**, **B** and **C**, were used. Each beaker contained 10 cm^3 of active yeast mixture (a mixture of yeast in glucose solution). A different solution was then added to each beaker, as shown in Fig. 1.1.

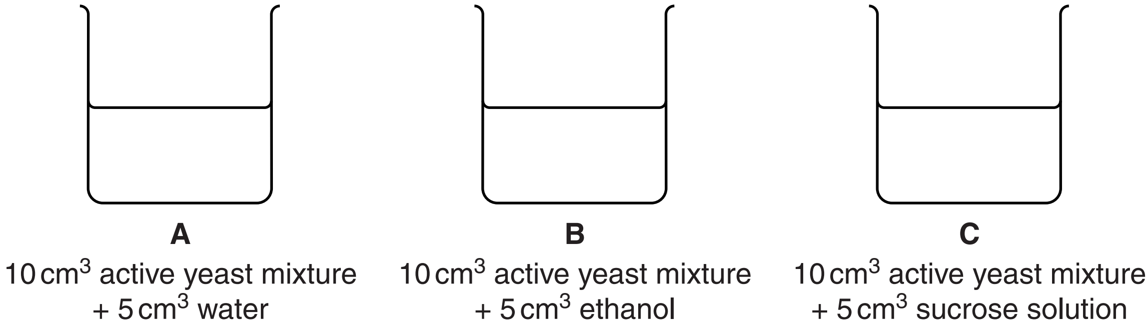

Fig. 1.1

A syringe labelled **A** was filled with 10 cm^3 of mixture from beaker **A**.

A syringe labelled **B** was filled with 10 cm^3 of mixture from beaker **B**.

A syringe labelled **C** was filled with 10 cm^3 of mixture from beaker **C**.

A narrow glass tube, with an ink mark close to one end, was attached to each syringe (using a small piece of flexible tubing) as shown in Fig. 1.2.

The plunger of each syringe, **A**, **B**, and **C**, was pressed to bring the meniscus of the mixture to the level of the ink mark on the narrow tube, as shown in Fig. 1.2.

The time was noted. This was the start time, 0 minutes.

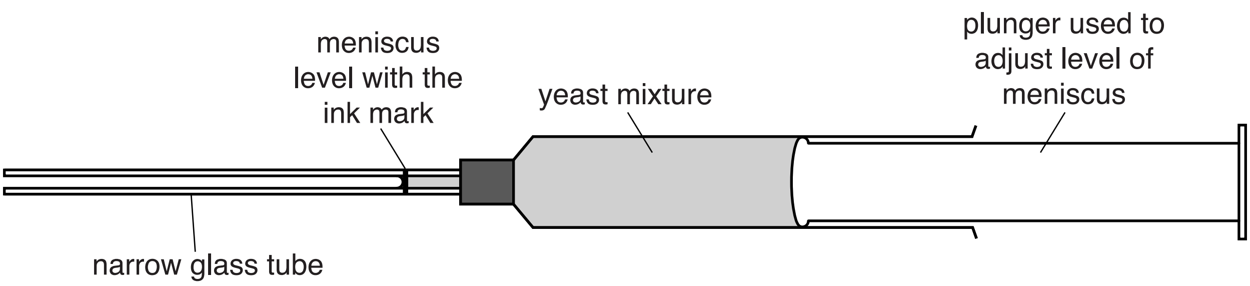

Fig. 1.2

As the actively respiring yeast released carbon dioxide, the volume of the mixture increased and the meniscus moved along the narrow glass tube to the left.

After 10 minutes, 15 minutes and 20 minutes, the distance moved by the meniscus was measured, in mm, and recorded for each tube.

Table 1.1 was drawn to record the results of the investigation.

Table 1.1

	distance meniscus moved / mm		
		B	
0			
10			
15			
20			

(a) Complete the headings of Table 1.1. [2]

The following results were recorded by the students.

In the tube attached to syringe **A**, the meniscus had moved 8 mm after 10 minutes, by a further 2 mm after 15 minutes, and a further 2 mm after 20 minutes.

In the tube attached to syringe **B**, the meniscus had moved 1 mm after 10 minutes, did not move any further between 10 and 15 minutes, and then moved a further 1 mm after 20 minutes.

In the tube attached to syringe **C**, the meniscus had moved 10 mm after 10 minutes, moved to 15 mm after 15 minutes and to 22 mm after 20 minutes.

(b) Complete Table 1.1 using this information. [3]

(c) (i) Describe the effect of ethanol on the movement of the meniscus in tube **B** and suggest an explanation for this effect.

description ....

....

explanation ....

....

....[2]

(ii) Describe the effect of sucrose solution on the movement of the meniscus in tube **C** and suggest an explanation for this effect.

description ....

....

explanation ....

....

....[2]

(iii) Explain why syringe **A** was included in this investigation.

....

....

....

....[2]

(d) Name **two** variables that were kept constant during this investigation.

1 ....

....

2 ....

....[2]

Carbon dioxide is released during anaerobic respiration.

(e) Describe a test for carbon dioxide.

....

....

....

....[2]

[Total: 15]

Question 2 begins on page 6

2 Fig. 2.1 shows a transverse section of a vascular bundle in the stem of a dicotyledenous plant, as seen under the high power of a light microscope.

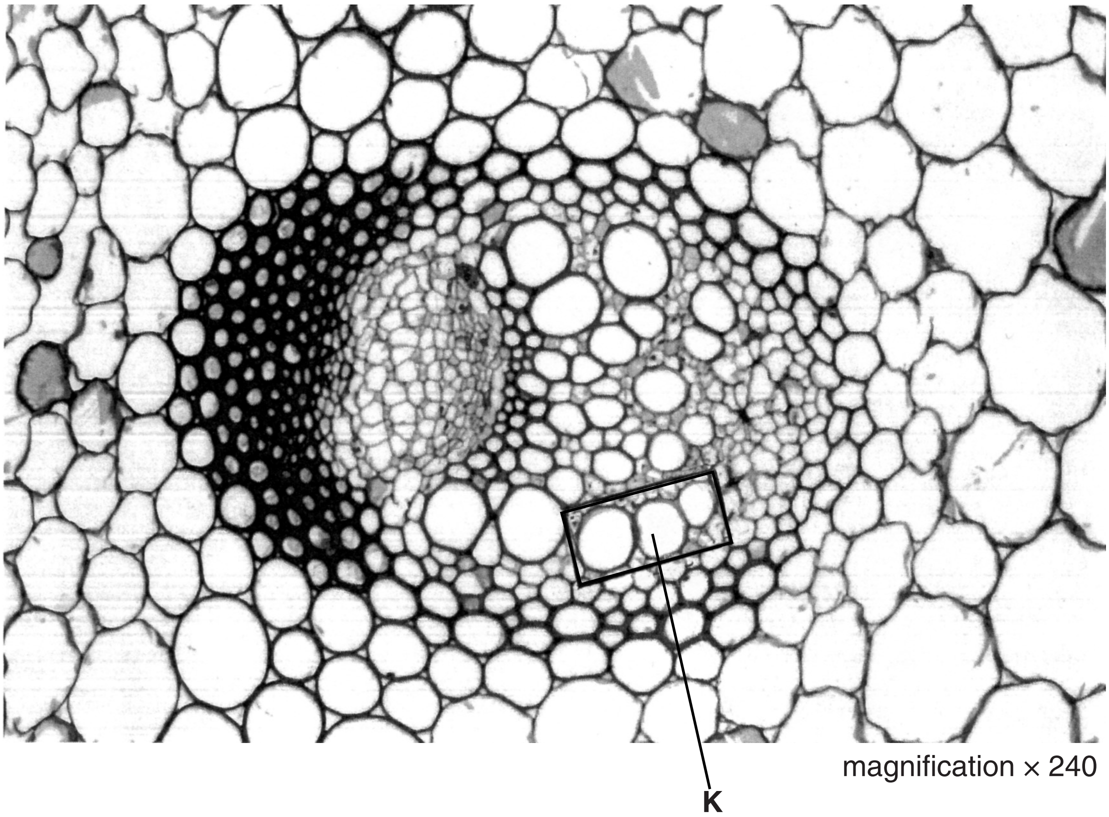

Fig. 2.1

(a) **(i)** On Fig. 2.1, draw a label line and label a phloem cell. [1]

(ii) In the space below, make a large drawing of the three **xylem** vessels enclosed in the box.

[4]

(b) Draw a line on Fig. 2.1 on cell **K** to show the maximum diameter.

Measure this diameter.

.... mm

Draw a line on your drawing to show the maximum diameter of cell **K**.

Measure this diameter.

.... mm

Calculate the magnification of your drawing compared with the actual size of cell **K**.

Show your working.

magnification = ... [4]

(c) Some students wanted to investigate the strength of some plant fibres. These fibres are composed mainly of xylem vessels.

Using the apparatus shown in Fig. 2.2, the students took fibres of the same length and diameter from different plants and attached masses to each until the fibres broke.

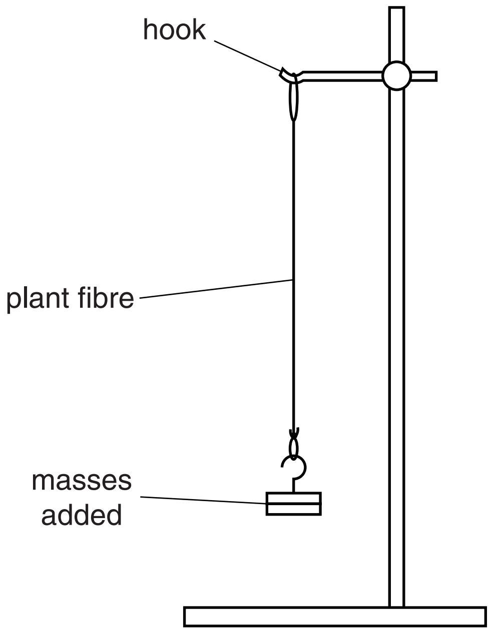

Fig. 2.2

Table 2.1 shows the plant fibres that were tested and the masses needed to break each one.

Table 2.1

plant fibre	mass needed to break one fibre / g
banana	980
celery	450
jute	2900
nettle	600
Phormium	830

(i) Construct a bar chart of the data in Table 2.1.

[4]

(ii) Calculate by how many times the jute fibre is stronger than the nettle fibre.

Express your answer to one decimal place.

Show your working.

....[2]

(iii) Suggest a feature of plant fibres that could affect their strength.

....

....[1]

[Total: 16]

3 Fig. 3.1 shows two germinating cress seedlings on the same scale. One seedling was grown in the light; the other seedling was grown in the dark.

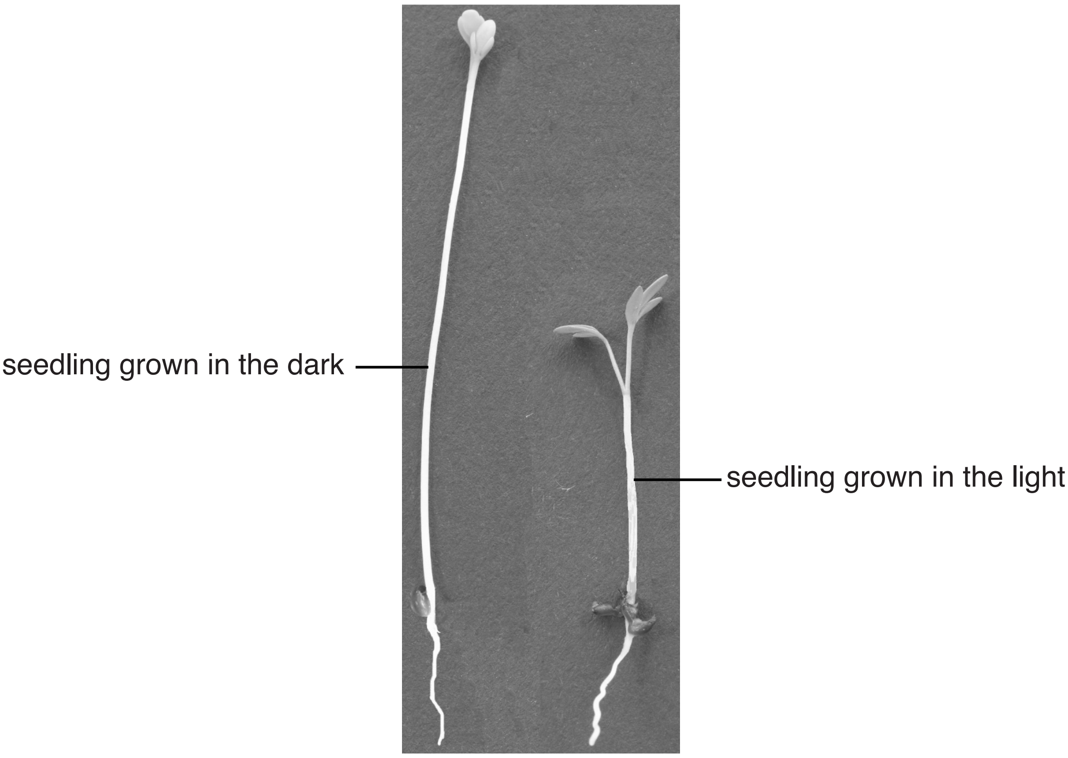

Fig. 3.1

(a) Complete Table 3.1 to compare the features of these seedlings.

Table 3.1

feature	**seedling grown**	
	in the dark	**in the light**
leaf		
stem		
root		

[3]

(b) Design an investigation to show how temperature affects the germination of cress seeds.

Explain how you will control variables to ensure that this investigation is valid.

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....[6]

[Total: 9]

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