Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

5458688021

BIOLOGY **5090/31**

Paper 3 Practical Test **October/November 2014**

1 hour 15 minutes

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	
3	
Total	

This document consists of **11** printed pages and **1** blank page.

CAMBRIDGE International Examinations

In order to plan the best use of your time, read through all the questions on this paper carefully before starting work.

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

$$\text{glucose} \longrightarrow \text{ethanol} + \text{carbon dioxide}$$

You will investigate the effects of water and ethanol on anaerobic respiration of yeast.

You are provided with two beakers labelled **A** and **B**. Each beaker contains a mixture of yeast in glucose solution.

- Pour all of the water in the test-tube labelled **A** into the yeast mixture in beaker **A**.
- Carefully stir the mixture with the glass rod provided.
  Wipe the glass rod clean with a paper towel.
- Pour all of the ethanol in the test-tube labelled **B** into the yeast mixture in beaker **B**.
- Carefully stir the mixture with the glass rod provided.
- Fill the syringe labelled **A**, to the 10 cm^3 mark, with mixture from beaker **A** by pulling the plunger up slowly as shown in Fig. 1.1a.
- Remove the end of the glass tube attached to the syringe from the mixture in beaker **A** and carefully pull up the plunger further until the meniscus in the tube reaches the ink mark as shown in Fig. 1.1b.
- Lay flat the syringe with the tube attached, as shown in Fig. 1.1c, on the piece of black card.

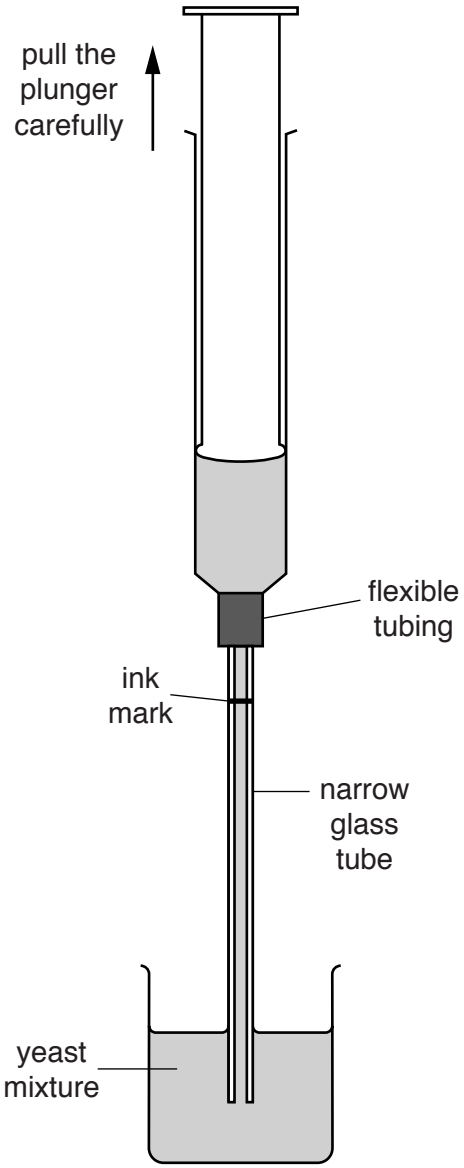

Fig. 1.1a

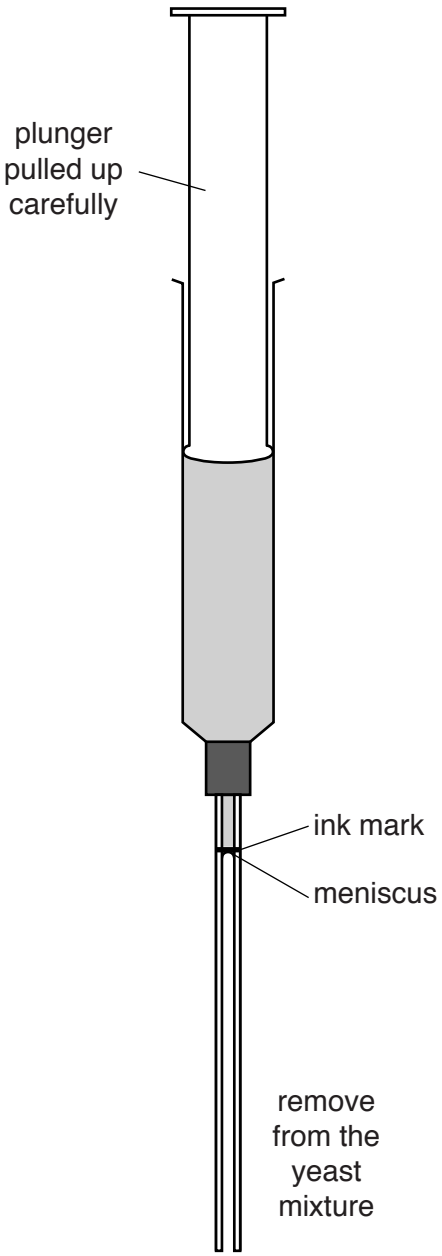

Fig. 1.1b

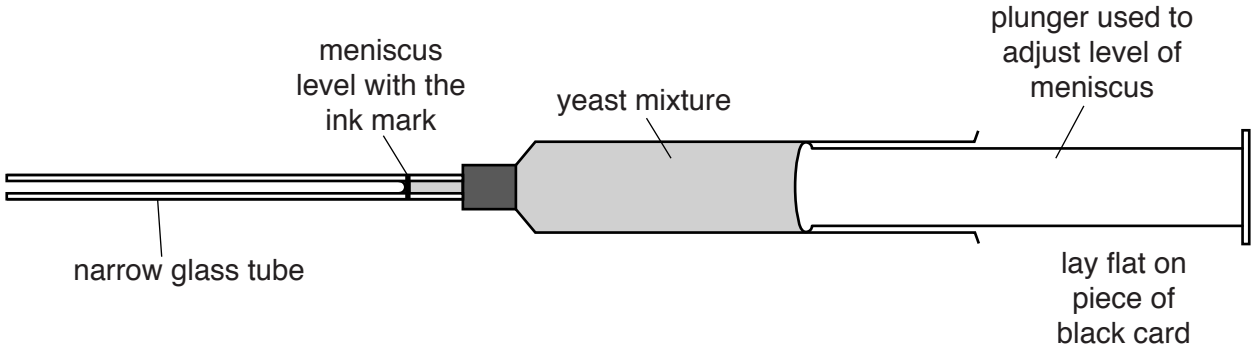

Fig. 1.1c

[Turn over

- Check the meniscus is still level with the ink mark. If not, carefully press or pull the plunger to re-align the meniscus with the ink mark as shown in Fig. 1.1c.

Record the time **now** as the start time for 0 minutes .....

Use a ruler to measure the distance, in mm, between the ink mark and the meniscus on the glass tube. Readings should be made after 10 minutes, 15 minutes and 20 minutes.

- Continue with setting up syringe **B** whilst taking readings for **A**.

(a) (i) Record your results in Table 1.1.

Table 1.1

time/min	distance meniscus moved/mm	
	A	**B**
0	0	0
10		
15		
20		

[3]

- Fill the syringe labelled **B**, to the 10 cm^3 mark, with mixture from beaker **B** by pulling the plunger up slowly as shown in Fig. 1.1a.

- Remove the end of the glass tube attached to the syringe from the mixture in beaker **B** and carefully pull up the plunger further until the meniscus in the tube reaches the ink mark as shown in Fig. 1.1b.

- Lay flat the syringe with the tube attached, as shown in Fig. 1.1c, on the piece of black card.

  Check the meniscus is still level with the ink mark. If not, carefully press or pull the plunger to re-align the meniscus with the ink mark as shown in Fig. 1.1c.

Record the time **now** as the start time for 0 minutes .....

Use a ruler to measure the distance, in mm, between the ink mark and the meniscus on the glass tube. Readings should be made after 10 minutes, 15 minutes and 20 minutes.

(ii) Record your results in Table 1.1. [3]

Continue with Question 2 while waiting to record measurements.

(b) (i) Describe your results and suggest an explanation as to why the meniscus of the yeast mixture **A** moved along the tube attached to syringe **A**.

description .....

.....

.....

explanation .....

.....

..... [3]

(ii) Describe and explain your results for mixture **B**.

description .....

.....

explanation .....

..... [2]

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

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.....

.....

..... [2]

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

1 .....

.....

2 .....

..... [2]

[Total: 15]

2 **(a)** 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.

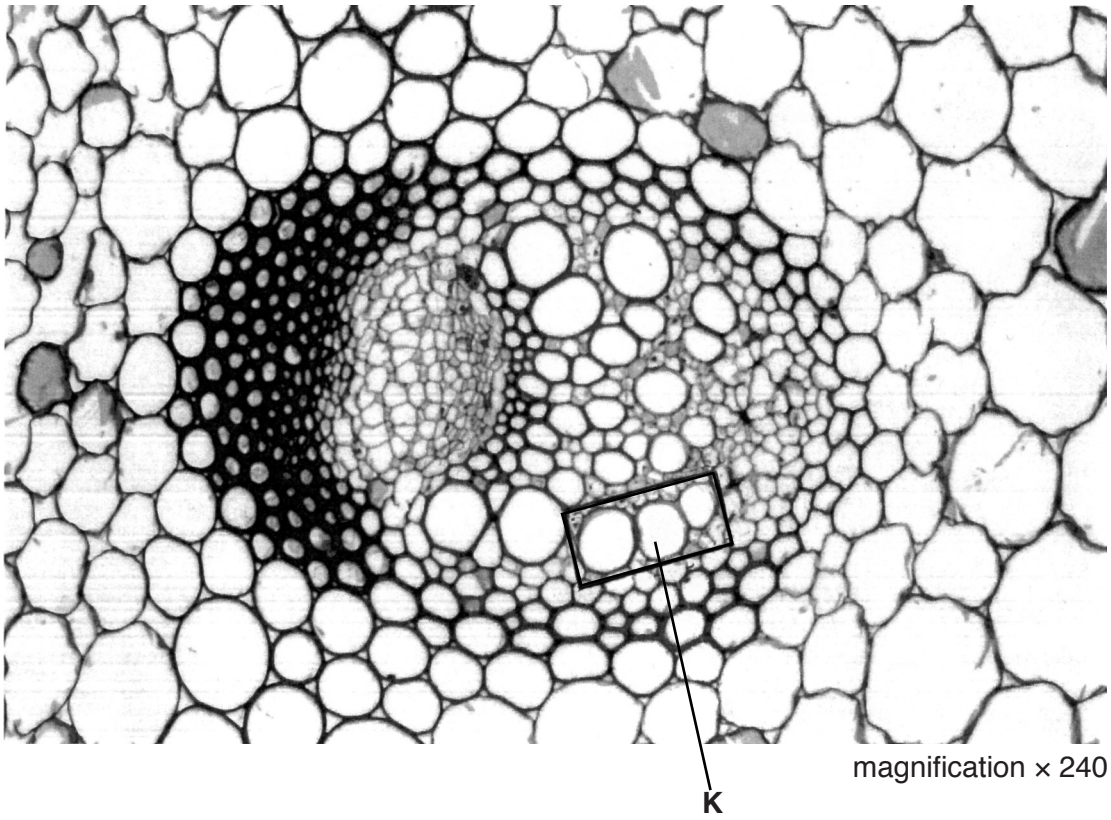


Fig. 2.1

(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.

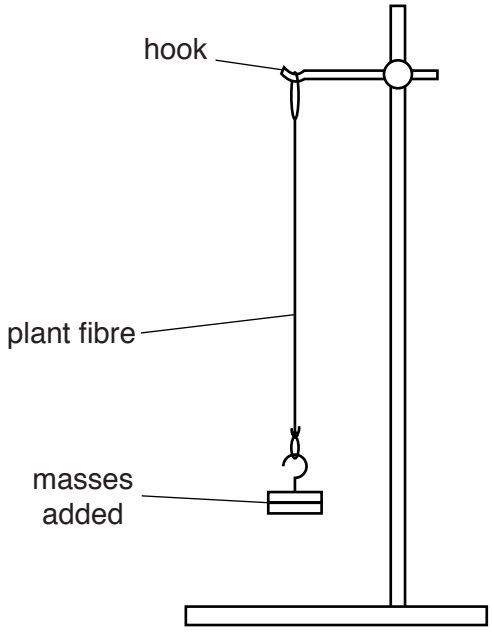


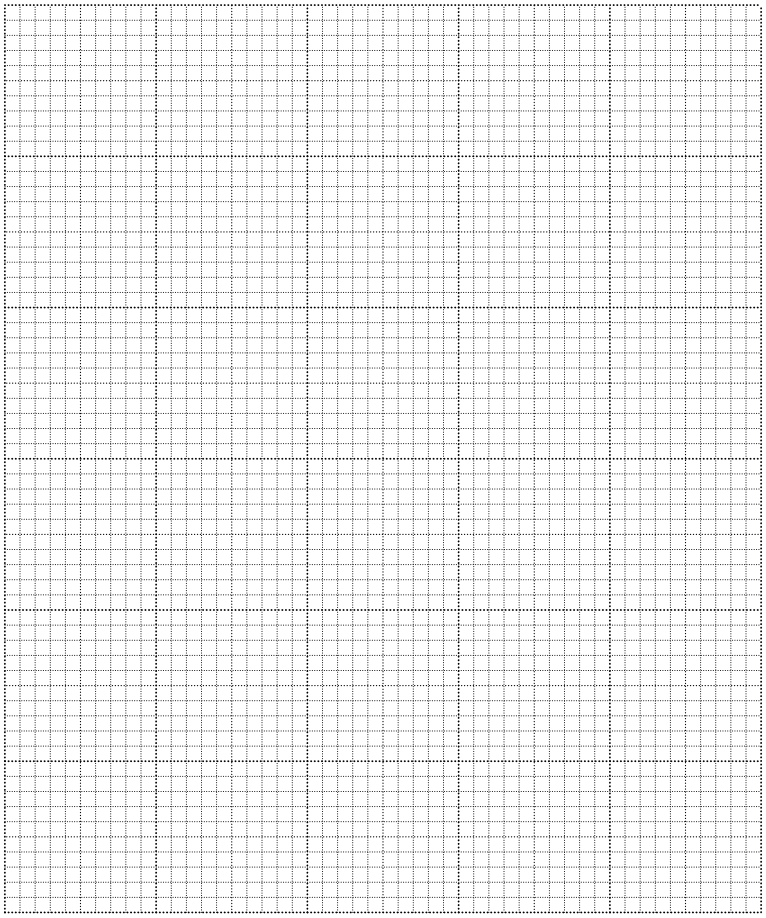
Fig. 2.2

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.

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..... [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.

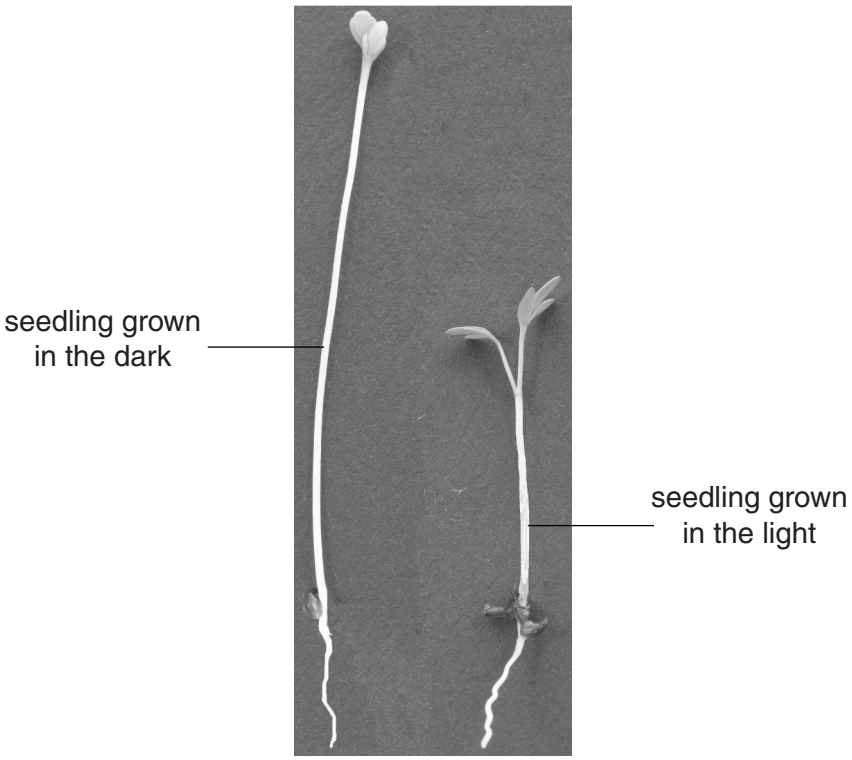

Fig. 3.1

(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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