Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8861421114

BIOLOGY **5090/61**

Paper 6 Alternative to Practical **October/November 2016**

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.
Write your answers in the spaces provided on the Question Paper.

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.

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

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CAMBRIDGE
International Examinations

Answer **all** questions in the spaces provided.

1 In order to stay alive, cells depend on soluble molecules being able to enter and leave them.

Some blocks of agar, a firm jelly, were used to represent living cells.

A student knew that when agar is coloured with a red indicator and then placed in an acid solution, the agar will change colour from red to yellow as the acid diffuses into it.

The student was provided with three pieces of red agar jelly, **A**, **B** and **C**, as shown in Fig. 1.1.

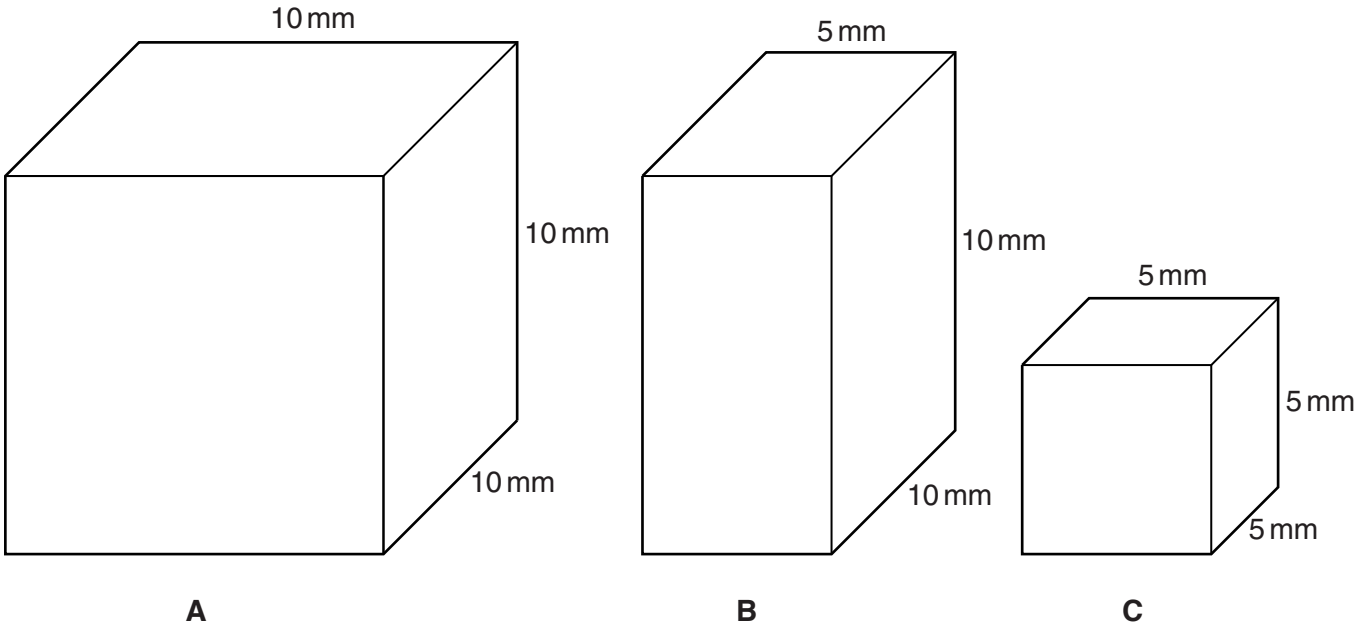


Fig. 1.1

The student placed each piece of jelly in a separate container of the same acid solution at 30 second intervals, and the time was recorded.

The time at which the colour of each piece changed from red to yellow was also recorded.

Table 1.1 shows the results.

Table 1.1

piece	dimensions / mm	time when piece placed in acid solution / s	time at which colour changed / s	time taken for colour change / s
A	10 × 10 × 10	0	480	480
B	10 × 10 × 5	30	150	
C	5 × 5 × 5	60	100	

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(a) (i) Calculate the times taken for pieces **B** and **C** to change colour.
Write your answers in the spaces in Table 1.1.

[2]

(ii) Describe the trend shown by the results in Table 1.1.

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.....[2]

(iii) Use these results to suggest why typical animal cells are rarely larger than 0.1 mm in diameter.

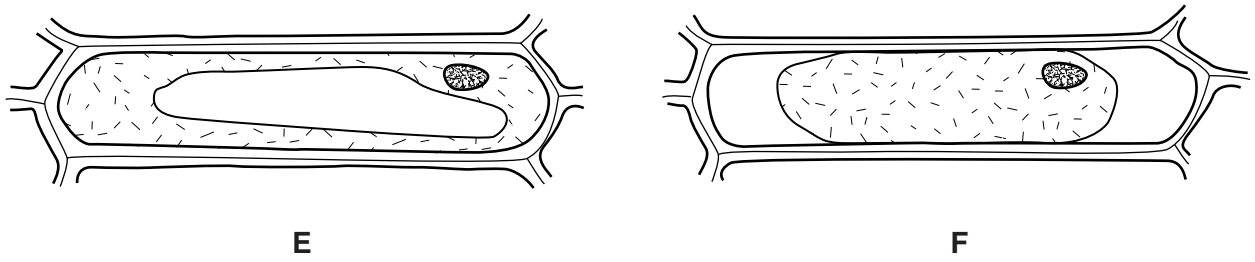
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.....[2]

(b) Fig. 1.2 shows two onion epidermal cells as seen with a microscope. Cell **E** had been placed in water, and cell **F** shows a similar cell that had been placed in a concentrated salt solution for the same length of time.



E **F**

Fig. 1.2

(i) Describe how cell **F** differs in appearance from cell **E**.

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.....[2]

(ii) Suggest an explanation for the appearance of cell **F**.

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.....[4]

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(iii) Describe an investigation you could carry out to determine the concentration of salt solution that would cause fresh onion epidermal cells to become like cell **F**.

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.....[4]

[Total: 16]

2 Vegetarian sources of protein, for example seeds and single cell proteins, are increasingly being used throughout the world.

Fig. 2.1 shows the surface view of half of a peanut seed with the embryo attached.



Fig. 2.1

(a) Make a large drawing of the peanut seed as shown in Fig. 2.1. Label the radicle and plumule.

[4]

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(b) (i) Describe how you could test a peanut seed for the presence of protein.

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.....[3]

(ii) A group of students wanted to compare the protein content of peanut seeds with that of fresh meat.

Suggest **two** variables that would need to be controlled to make a comparison.

1 .....

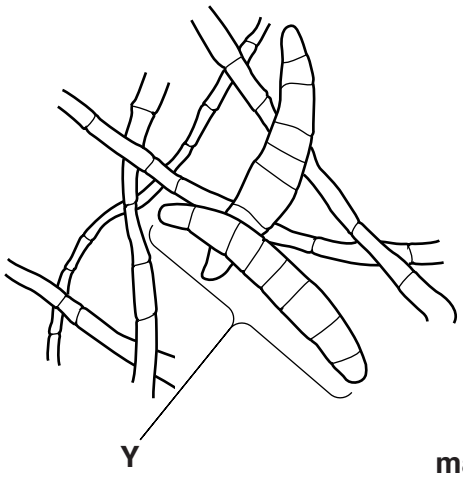
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2 .....

.....[2]

Single cell protein can be produced from a fungus grown in large fermenters.

Fig. 2.2 shows some of a fungal culture as seen with a microscope, with a spore labelled **Y**.



magnification ×4500

Fig. 2.2

(c) (i) Measure and record the length of spore **Y**.

..... mm
[1]

(ii) Calculate the actual length of spore **Y**.

Show your working.

..... mm
[2]

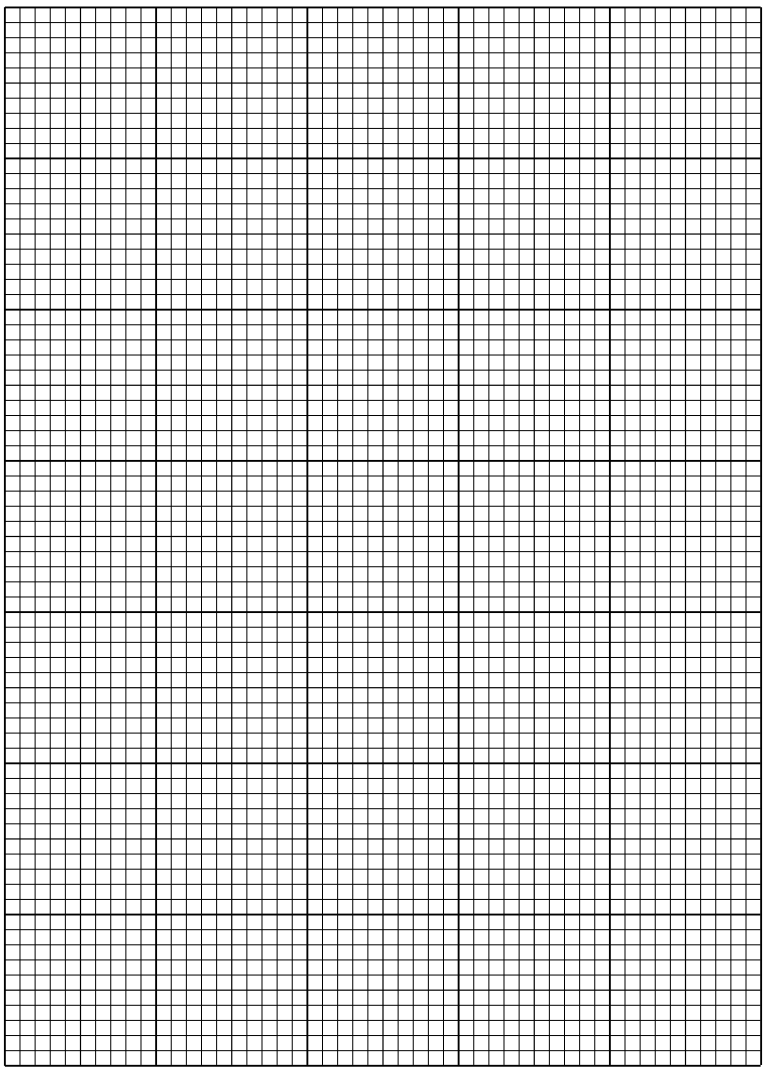
Table 2.1 shows the protein content of some plant crops and single cell protein.

Table 2.1

source of protein	protein content / g per 100 g
peanut	25.0
potato	2.2
rice	7.0
single cell protein	10.0
soya bean	33.7

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



[4]

(ii) The average adult requires approximately 50 g of protein per day to maintain good health. Calculate the mass of single cell protein needed, per day, to provide 50 g of protein.

Show your working.

..... g
[2]

[Total: 18]

3 Fig. 3.1 shows a green leaf damaged by an insect larva. Each square on the grid has an area of $1\,cm^2$.

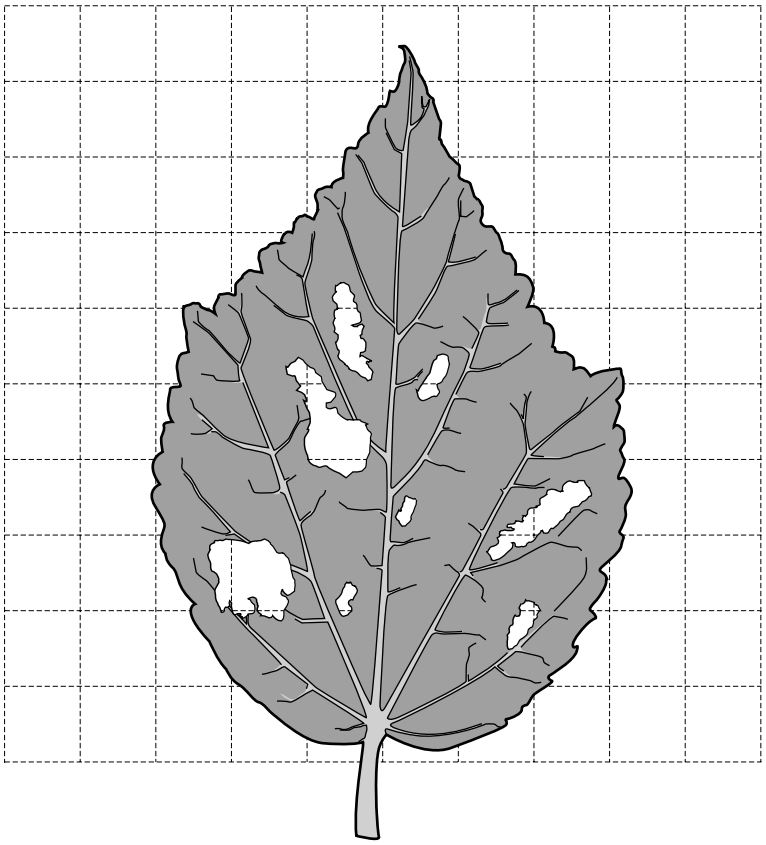


Fig. 3.1

(a) Describe the method you would use to calculate the percentage area of this leaf that has been damaged.

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(b) Suggest and explain how the growth of the plant may be affected if most of its leaves were damaged in this way.

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.....[3]

[Total: 6]

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