

Candidate Name \_\_\_\_\_

Centre Number	Candidate Number

**International General Certificate of Secondary Education**  
**CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
**BIOLOGY**  
**PAPER 3**

**0610/3**

**MAY/JUNE SESSION 2002**  
1 hour 15 minutes

Additional materials:  
Answer paper

**TIME** 1 hour 15 minutes

**INSTRUCTIONS TO CANDIDATES**

Write your name, Centre number and candidate number in the spaces at the top of this page and on all separate answer paper used.

**Section A**

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

**Section B**

Answer any **two** questions.

Write your answers on the separate answer paper provided.

At the end of the examination,

1. fasten all separate answer paper securely to the question paper;
2. enter the numbers of the Section B questions you have answered in the grid below.

**INFORMATION FOR CANDIDATES**

The intended number of marks is given in brackets [ ] at the end of each question or part question.

You are advised to spend no longer than 30 minutes on Section A.

FOR EXAMINER'S USE	
Section A	
Section B	
<b>TOTAL</b>	

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**This question paper consists of 9 printed pages and 3 blank pages.**



**Section A**

Answer **all** the questions.

Write your answers in the spaces provided.

- 1 Pond snails are invertebrates which are often found in ponds amongst the pondweed *Elodea*.

(a) Suggest two reasons why pond snails live amongst *Elodea*.

1. ....  
.....
2. ....  
.....[2]

(b) Six boiling tubes were filled with fresh pond water, to which some hydrogencarbonate indicator solution was added. This indicator is red in water of pH 7, purple when carbon dioxide levels are low and yellow when carbon dioxide levels are high.

The tubes and their contents were set up in daylight, as shown in Table 1.1.

**Table 1.1**

tube	organisms added	conditions
1	one piece of <i>Elodea</i>	uncovered
2	one pond snail	uncovered
3	one piece of <i>Elodea</i> and one pond snail	uncovered
4	one piece of <i>Elodea</i> and several pond snails	uncovered
5	one piece of <i>Elodea</i>	covered with black paper
6	none	uncovered

Table 1.2 shows the results after one hour.

**Table 1.2**

tube	1	2	3	4	5	6
colour of indicator	purple	yellow	red	yellow	yellow	red

(i) Explain the results for tubes 1–5.

*tube 1* .....

.....

*tube 2* .....

.....

*tube 3* .....

.....

*tube 4* .....

.....

*tube 5* .....

.....[10]

(ii) Suggest why tube 6 was used.

.....

.....

.....[2]

[Total : 14]

2 Fig. 2.1 shows a human sperm cell.

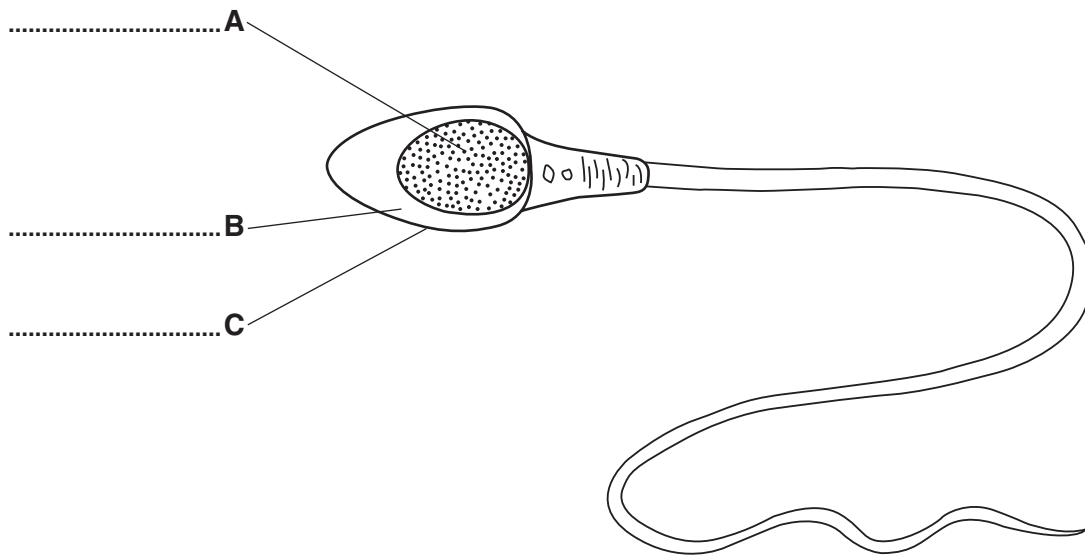


Fig. 2.1

(a) On Fig. 2.1, label the cell parts **A**, **B** and **C**. [3]

(b) Sperm cells contain only half the number of chromosomes present in other body cells.

(i) State the term used to describe this reduced number of chromosomes.

.....[1]

(ii) Define the term *chromosome*.

.....  
.....[2]

- (c) Using the symbols **X** and **Y**, draw a genetic cross to show how sex is inherited in humans and state the ratio of males to females produced.

[4]

[Total : 10]

- 3 A student cut pieces of potato to the same length and placed them in boiling tubes containing a range of sugar solutions. Two pieces were placed into each boiling tube.

Each piece was remeasured after 24 hours. Table 3.1 shows the results of the experiment.

**Table 3.1**

concentration of sugar solution (mol)	length of potato at start (mm)	length of potato after 24 hours (mm)		mean length (mm)	mean change in length (mm)	% change in length
		piece 1	piece 2			
0	60	60	64	62.0	+2.0	+3.3
0.2	60	58	59	58.5	-1.5	-2.5
0.4	60	55	55	55.0	-5.0	-8.3
0.6	60	54	54	54.0	-6.0	-10.0
0.8	60	53	54			
1.0	60	52	53	52.5	-7.5	-12.5

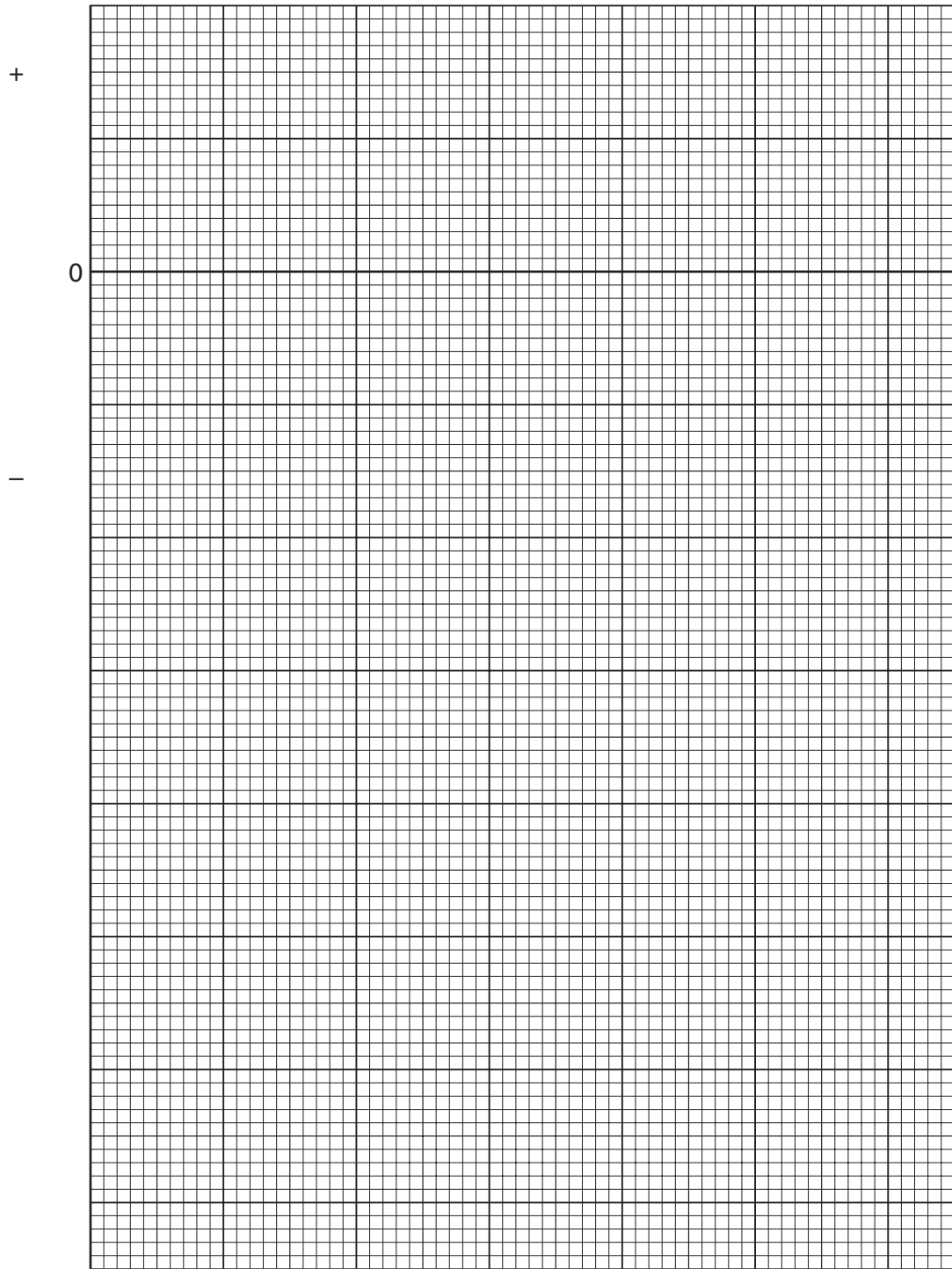
Space for rough work.

The percentage change in length was calculated using the equation shown below.

$$\% \text{ change in length} = \frac{\text{mean change in length}}{\text{original length}} \times 100$$

- (a) Complete the table by calculating the mean length, the mean change in length and the percentage change in length for the potato pieces in 0.8 mol sugar solution. Use the space under the table for rough work. [3]

(b) Plot a line graph of percentage change in length against concentration on the grid provided.



[6]

(c) (i) Use your graph to predict in which sugar concentration there would be no change in length.

.....[1]

(ii) Explain why there would be no change in length at this concentration.

.....  
.....  
.....[2]

(d) The student thought that not all the measurements recorded in Table 3.1 were correct.

(i) Which measurement is most likely to be incorrect?

.....[1]

(ii) State the effect of this inaccuracy on the calculations for the concentration concerned.

.....  
.....[1]

(e) Changes in length of the pieces of potato were due to osmosis.

State two ways in which osmosis is beneficial to plants.

1. ....  
.....  
2. ....  
.....[2]

[Total : 16]



**Section B**

Answer any **two** questions.

Write your answers on the separate answer paper provided.

- 4 (a) (i) Define the term *transpiration*. [3]
- (ii) Describe how you would carry out an experiment to compare the rate of transpiration from a small plant **or** a leafy shoot in cool and in hot conditions. Predict the results you would expect to obtain. [8]

(b) Explain how wilting occurs. [4]

[Total : 15]

- 5 (a) (i) Describe how nitrogen in the air can become part of a protein molecule in the muscle of a herbivorous mammal. [9]
- (ii) Outline the functions of proteins in mammals, other than for muscle formation. [3]

(b) Explain how a deficiency of magnesium ions can result in poor plant growth. [3]

[Total : 15]

- 6 (a) Name and describe **one** example of each of the following methods of birth control:

(i) natural; [3]

(ii) chemical; [3]

(iii) mechanical; [3]

(iv) surgical. [3]

(b) Describe the process of reproduction in bacteria. [3]

[Total : 15]

- 7 (a) Construct a table to distinguish between arteries and veins. [5]

(b) Describe how capillaries enable the transfer of **named** materials between blood and tissue fluid. [4]

(c) (i) Outline the pathway taken when blood flows through the double circulatory system. [4]

(ii) Suggest the advantages of a double circulatory system. [2]

[Total : 15]





