Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

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General Certificate of Education
June 2004
Advanced Subsidiary Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

BIOLOGY (SPECIFICATION B) BYB1
Unit 1 Core Principles

Tuesday 8 June 2004 Morning Session

In addition to this paper you will require:
- a ruler with millimetre measurements.

You may use a calculator.

Time allowed: 1 hour

Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided. All working must be shown.
- Do all rough work in this book. Cross through any work you do not want marked.

Information
- The maximum mark for this paper is 54.
- Mark allocations are shown in brackets.
- Answers for **Questions 1** to **6** are expected to be short and precise.
- **Question 7** should be answered in continuous prose. Quality of Written Communication will be assessed in the answer. You will be awarded up to 1 mark for your ability to use an appropriate form and style of writing, to organise relevant information clearly and coherently, and to use specialist vocabulary, where appropriate. The legibility of your handwriting and the accuracy of your spelling, punctuation and grammar will also be taken into account.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
3			
4			
5			
6			
7			
QWC			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

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

1 (a) Cells of multicellular organisms may undergo differentiation. What is meant by differentiation?

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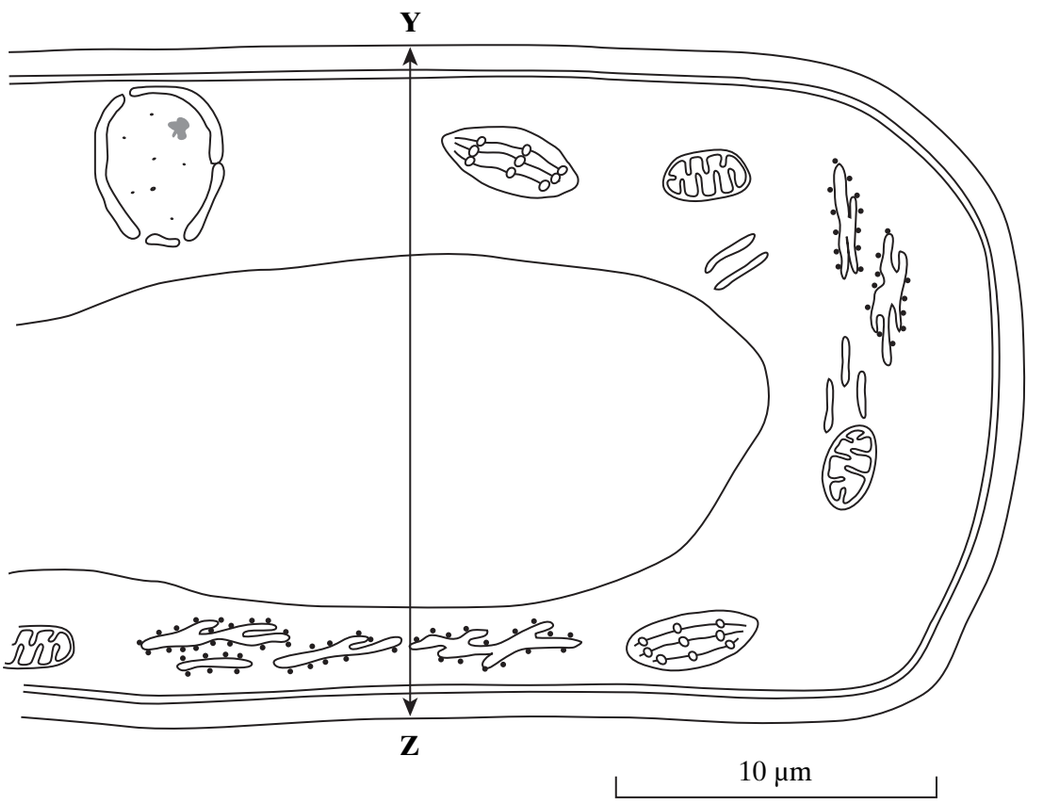
(1 mark)

(b) The drawing shows part of a plant cell as seen with an electron microscope.



(i) Give **two** features shown in the drawing which are evidence that this cell is eukaryotic.

1 .....

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2 .....

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(2 marks)

(ii) Calculate the actual width of the cell from **Y** to **Z**. Give your answer in micrometres (μm) and show your working.

Answer ..... μm

(2 marks)

(iii) Give **one** way in which a typical animal cell differs from the cell shown in the drawing.

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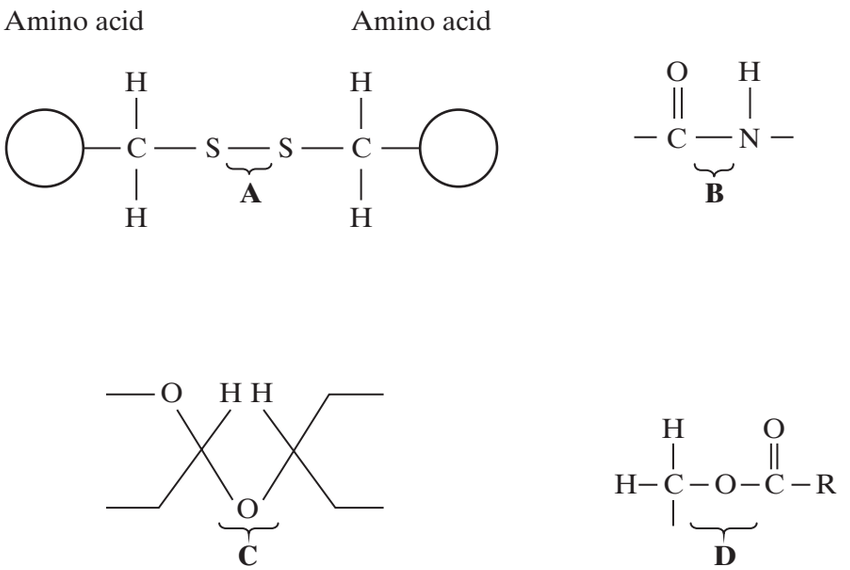
(1 mark)

6

2 The diagrams show four types of linkage, **A** to **D**, which occur in biological molecules.



(a) Name the chemical process involved in the formation of linkage **B**.

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(1 mark)

(b) Give the letter of the linkage which

(i) occurs in a triglyceride molecule;

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(1 mark)

(ii) might be broken down by the enzyme amylase;

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(1 mark)

(iii) may occur in the tertiary, but not the primary structure of protein.

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(1 mark)

(c) Describe how a saturated fatty acid differs in molecular structure from an unsaturated fatty acid.

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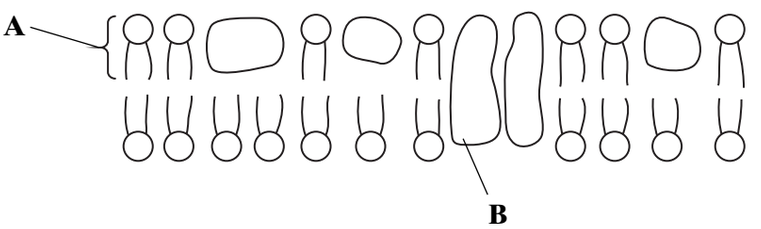
(2 marks)

6

TURN OVER FOR THE NEXT QUESTION

3 (a) The diagram shows the fluid-mosaic model of a cell surface membrane.



(i) Name the molecules labelled **A** and **B**.

A .....

B .....

(1 mark)

(ii) How does the bilayer formed by substance **A** affect entry and exit of substances into and out of a cell?

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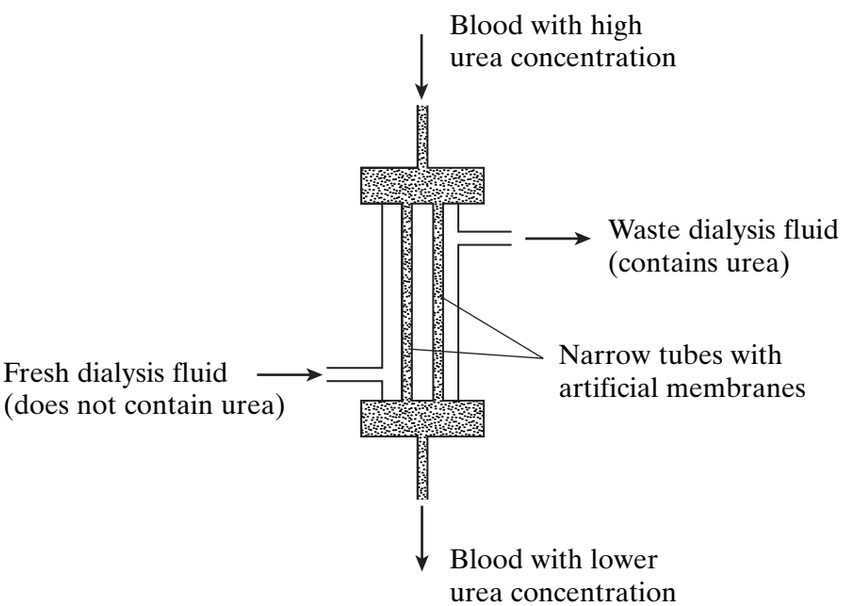
(2 marks)

(b) A dialysis machine contains artificial membranes which enable urea to be removed from the blood of a person with kidney failure. The diagram shows a dialysis machine.



(i) By what process does urea pass from the blood into the dialysis fluid?

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(1 mark)

(ii) Suggest **two** reasons for keeping the fluid in the dialysis machine at 40 °C rather than room temperature.

1 .....

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2 .....

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(2 marks)

(iii) The blood and the dialysis fluid flow in opposite directions in the dialysis machine. Explain the advantage of this.

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(2 marks)

(iv) Blood flows through the dialysis machine at a rate of 200 cm^3 per minute. Calculate the total volume which passes through the machine in 5 hours. Give your answer in dm^3 and show your working.

Answer ..... dm^3

(2 marks)

10

Turn over ▶

4 (a) When first hatched, the young of some species of fish are less than 2 mm long. Explain how these young fish get enough oxygen to their cells without having gills.

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(2 marks)

(b) Mackerel are fast swimming fish whereas toadfish only swim slowly. The table shows some features of the gills of these fish.

	Thickness of lamellae / µm	**Number of lamellae per mm of gill length**
Mackerel	5	32
Toadfish	35	8

Use evidence from the table to explain how mackerel are able to swim faster than toadfish.

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(3 marks)

5

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5 (a) Explain how the shape of an enzyme molecule is related to its function.

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(3 marks)

(b) Bacteria produce enzymes which cause food to decay. Explain how vinegar, which is acidic, can prevent the action of bacterial enzymes in some preserved foods.

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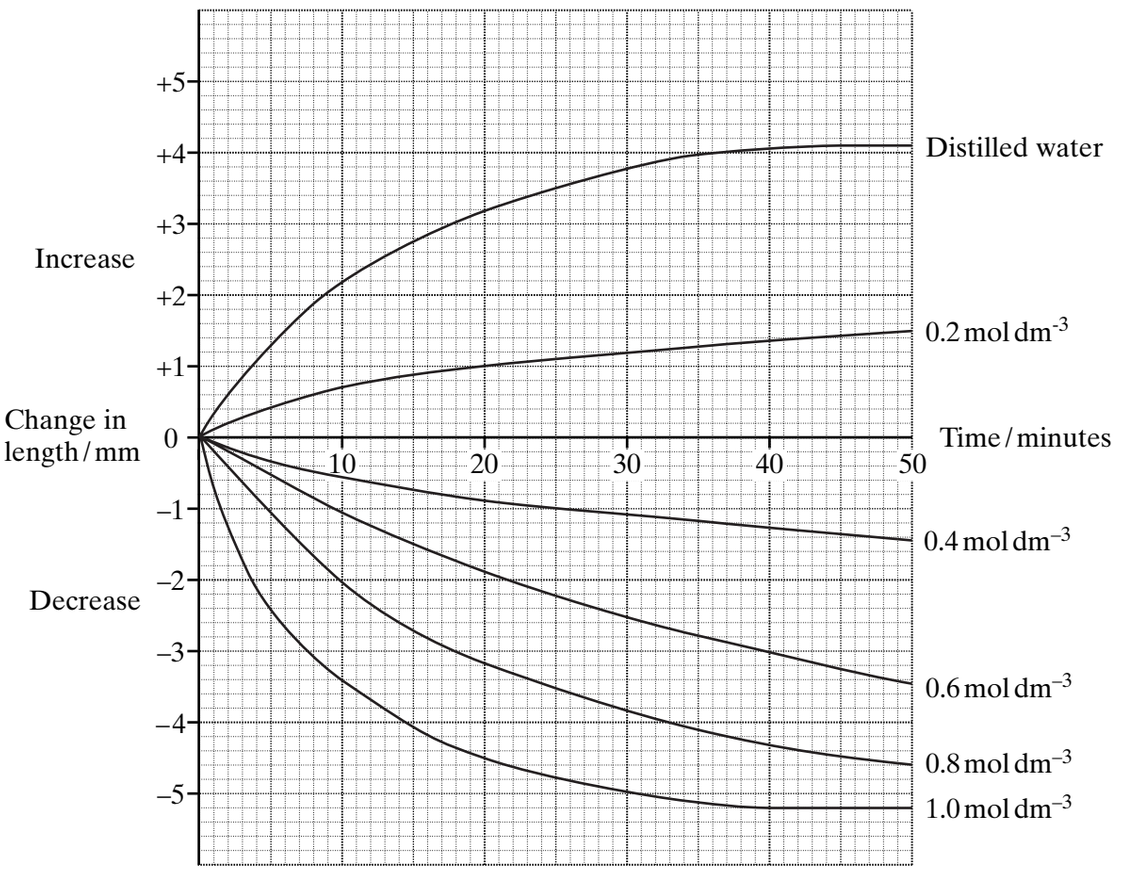
(3 marks)

6

TURN OVER FOR THE NEXT QUESTION

6 Six cylinders of a standard size were cut from a single large potato. One cylinder was placed in distilled water and the others were placed in sucrose solutions of different concentrations. The length of each cylinder was measured every 5 minutes for the next 50 minutes. The graph shows the changes in length at each sucrose concentration.



(a) Explain why

(i) the potato cylinder in distilled water increased in length;

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(2 marks)

(ii) the potato cylinder in the 1.0 mol dm^{-3} sucrose solution showed no further decrease in length after 40 minutes.

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(2 marks)

(b) (i) Describe the difference in the rate of decrease in length during the first 10 minutes between the cylinder in the 0.4 mol dm^{-3} and the cylinder in the 0.8 mol dm^{-3} solution.

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(1 mark)

(ii) Use your knowledge of water potential to explain this difference.

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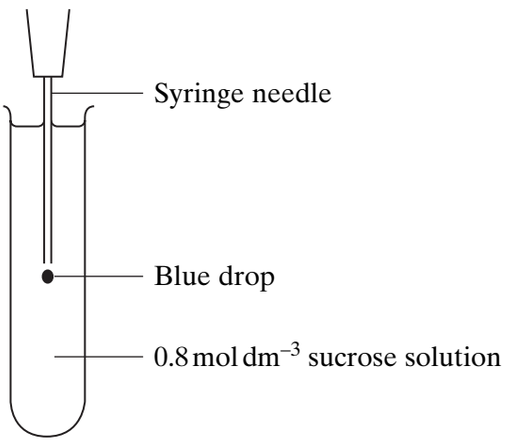
(1 mark)

QUESTION 6 CONTINUES ON THE NEXT PAGE

(c) After 45 minutes the potato cylinder in the 0.8 mol dm^{-3} solution was removed and blue dye added to this solution. Some of this blue-stained solution was drawn into a syringe. A drop was then released, slowly, halfway down a test tube of fresh 0.8 mol dm^{-3} sucrose solution as shown in the diagram. The blue drop quickly moved to the surface of the liquid in the test tube.



(i) The density of a solution depends on its concentration. The more concentrated the solution the greater its density. Explain why the blue drop had a lower density and therefore moved up.

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(2 marks)

(ii) A sucrose solution of concentration 0.3 mol dm^{-3} has a water potential which is equivalent to that of the potato cells. Describe and explain what would happen to the blue drop from this solution.

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(2 marks)

10

Question 7 should be answered in continuous prose.
Quality of Written Communication will be assessed in these answers.

7 (a) Milk is an important source of protein in the diet of many people. Describe how the protein in milk is digested in the human gut.

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(6 marks)

QUESTION 7 CONTINUES ON THE NEXT PAGE

(b) The table compares the mass of protein and fat found in whole and skimmed milk.

Nutrient	Mass / g per 100 g	
	Whole milk	Skimmed milk
Protein	3.4	3.5
Fat	3.9	0.1

Using information in the table, explain why a person with a damaged liver might be recommended to drink skimmed milk rather than whole milk.

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(4 marks)

10

END OF QUESTIONS

QWC

1

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