Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

General Certificate of Education
Advanced Subsidiary Examination
June 2012

Biology BIOL1

Unit 1 Biology and disease

Monday 14 May 2012 9.00 am to 10.15 am

For this paper you must have:
- a ruler with millimetre measurements.
- a calculator.

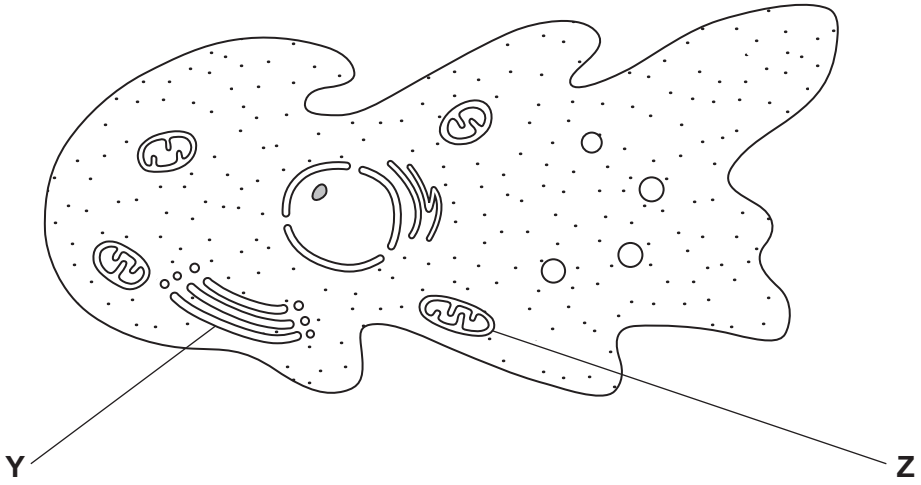
Time allowed
- 1 hour 15 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided.
- Do not write outside the box around each page in margins or on blank pages.
- You may ask for extra paper. Extra paper must be secured to this booklet.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The maximum mark for this paper is 60.
- You are expected to use a calculator, where appropriate.
- The marks for questions are shown in brackets.
- Quality of Written Communication will be assessed in all answers.
- You will be marked on your ability to:
  - use good English
  - organise information clearly
  - use scientific vocabulary accurately.

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

1 An amoeba is a single-celled, eukaryotic organism. Scientists used a transmission electron microscope to study an amoeba. The diagram shows its structure.



1 (a) (i) Name organelle **Y**.

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(1 mark)

1 (a) (ii) Name **two** other structures in the diagram which show that the amoeba is a eukaryotic cell.

1 .....

2 .....

(2 marks)

1 (b) What is the function of organelle **Z**?

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(1 mark)

1 (c) The scientists used a transmission electron microscope to study the structure of the amoeba. Explain why.

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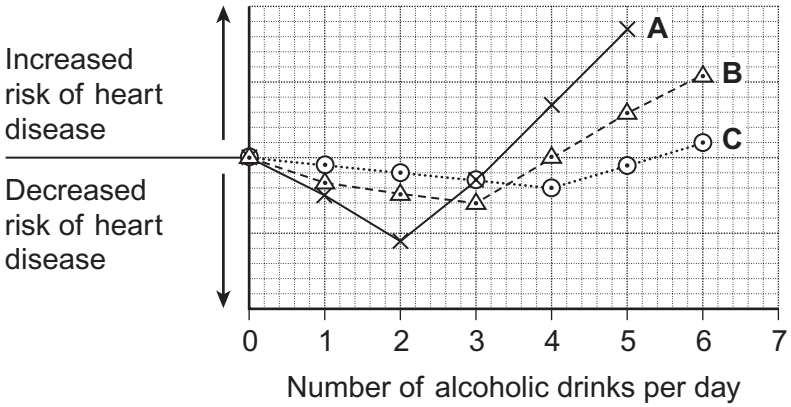
(2 marks)

6

Turn over for the next question

2 Scientists compared the results of three investigations, **A**, **B** and **C**. These investigations were into the effect of drinking different amounts of alcohol on the risk of developing heart disease.

The graph shows the results of these investigations.



2 (a) Describe the relationship between increasing the number of alcoholic drinks per day and the risk of heart disease in investigation **A**.

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(2 marks)

2 (b) All the volunteers who took part in investigation **C** were aged between 40 and 50 years old. Explain how choosing volunteers of a similar age improved this investigation.

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(1 mark)

2 (c) A newspaper headline used the information in the graph to claim 'Alcohol is good for you.' Evaluate this claim.

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(3 marks)

(Extra space) .....

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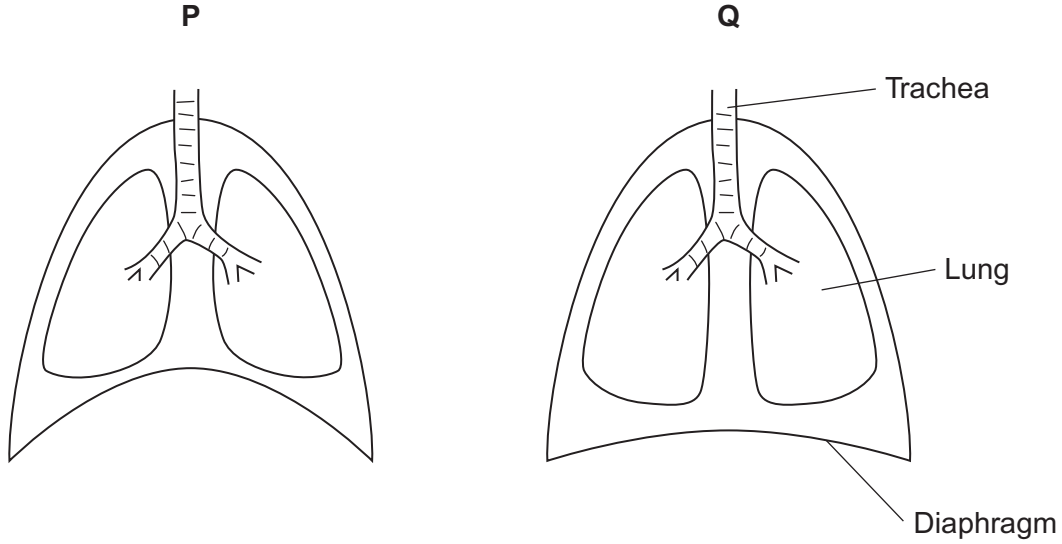
Turn over for the next question

3 The diagram shows the position of the diaphragm at times **P** and **Q**.



3 (a) Describe what happens to the diaphragm between times **P** and **Q** to bring about the change in its shape.

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(2 marks)

3 (b) Air moves into the lungs between times **P** and **Q**. Explain how the diaphragm causes this.

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(3 marks)

(Extra space) .....

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3 (c) Describe how oxygen in air in the alveoli enters the blood in capillaries.

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(2 marks)

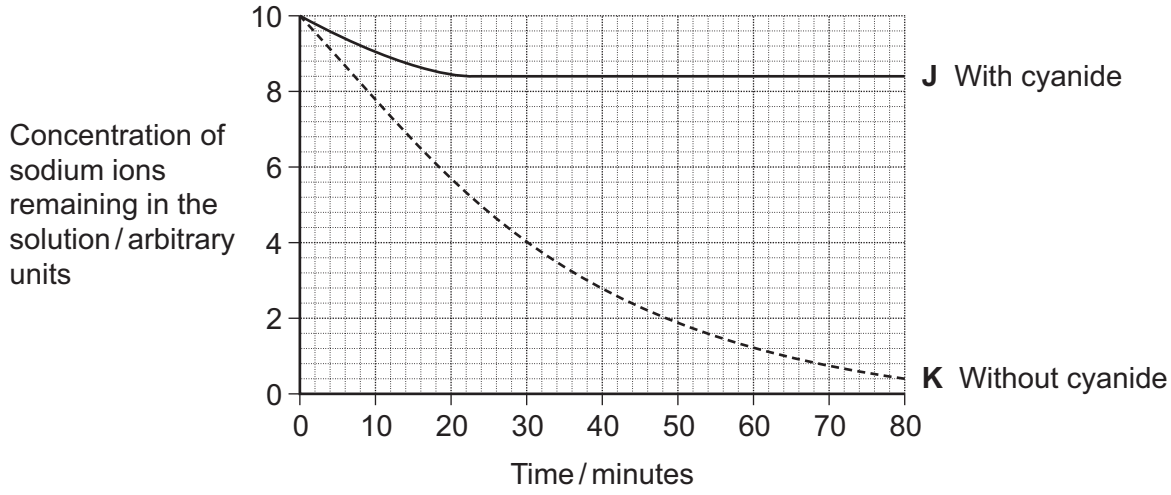
7

Turn over for the next question

4 A scientist investigated the effect of cyanide on the uptake of sodium ions by animal tissue. He set up two beakers, **J** and **K**.
He put equal volumes of a solution containing sodium ions and equal masses of an animal tissue in each beaker.

- He added cyanide to beaker **J**.
- He did not add cyanide to beaker **K**.

He measured the concentration of sodium ions remaining in the solution in each beaker, for 80 minutes. The graph shows his results.



4 (a) Calculate the rate of uptake of sodium ions by the tissue in beaker **K** for the first 30 minutes. Show your working.

Answer …… arbitrary units per minute
(2 marks)

4 (b) Adding cyanide affects the uptake of sodium ions by the tissue. Use the graph to describe how.

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(2 marks)

4 (c) Cyanide is a substance which affects respiration.
Use information in the question to explain the effect of cyanide on the uptake of sodium ions by the tissue.

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(3 marks)

(Extra space) .....

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7

Turn over for the next question

5 (a) What is a pathogen?

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(1 mark)

5 (b) When a pathogen enters the body it may be destroyed by phagocytosis. Describe how.

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(4 marks)

(Extra space) .....

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5 (c) When a pathogen causes an infection, plasma cells secrete antibodies which destroy this pathogen.

Explain why these antibodies are only effective against a specific pathogen.

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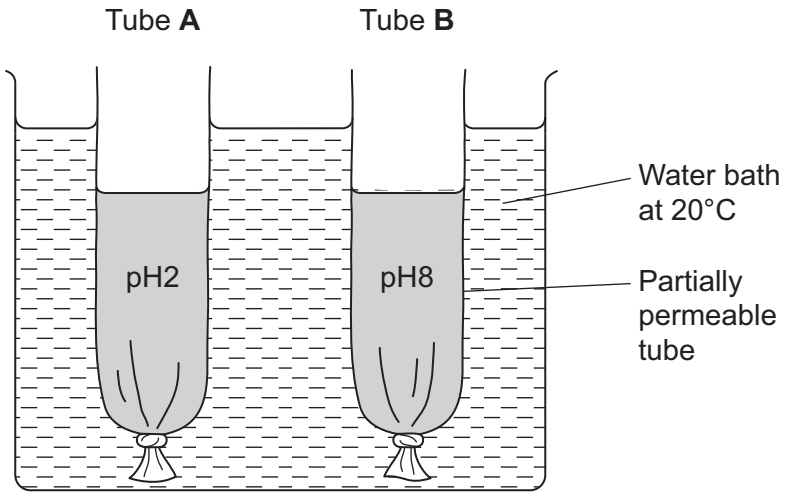
(2 marks)

7

Turn over for the next question

6 A student investigated the effect of pH on the activity of the enzyme amylase. She set up the apparatus shown in the diagram.



The tubes were made from Visking tubing. Visking tubing is partially permeable. She added an equal volume of amylase solution and starch to each tube.

- She added a buffer solution at pH2 to tube **A**.
- She added an equal volume of buffer solution at pH8 to tube **B**.

After 30 minutes, she measured the height of the solutions in both tubes. She then tested the solutions in tubes **A** and **B** for the presence of reducing sugars.

6 (a) Describe how the student would show that reducing sugars were present in a solution.

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(3 marks)

(Extra space) .....

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6 (b) After 30 minutes, the solution in tube **B** was higher than the solution in tube **A**.

6 (b) (i) Explain why the solution in tube **B** was higher.

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(3 marks)

(Extra space) .....

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6 (b) (ii) The student concluded from her investigation that the optimum pH of amylase was pH8. Is this conclusion valid? Explain your answer

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(1 mark)

7

Turn over for the next question

7 Read the following passage.

Gluten is a protein found in wheat. When gluten is digested in the small intestine, the products include peptides. Peptides are short chains of amino acids. These peptides cannot be absorbed by facilitated diffusion and leave the gut in faeces.

Some people have coeliac disease. The epithelial cells of people with coeliac disease do not absorb the products of digestion very well. In these people, some of the peptides from gluten can pass between the epithelial cells lining the small intestine and enter the intestine wall. Here, the peptides cause an immune response that leads to the destruction of microvilli on the epithelial cells.

Scientists have identified a drug which might help people with coeliac disease. It reduces the movement of peptides between epithelial cells. They have carried out trials of the drug with patients with coeliac disease.

Use the information in the passage and your own knowledge to answer the following questions.

7 (a) Name the type of chemical reaction which produces amino acids from proteins.

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(1 mark)

7 (b) The peptides released when gluten is digested cannot be absorbed by facilitated diffusion (lines 2 – 3). Suggest why.

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(3 marks)

(Extra space) .....

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7 (c) The epithelial cells of people with coeliac disease do not absorb the products of digestion very well (lines 4 – 5). Explain why.

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(3 marks)

(Extra space) .....

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7 (d) Explain why the peptides cause an immune response (lines 7 – 8).

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(1 mark)

7 (e) Scientists have carried out trials of a drug to treat coeliac disease (lines 10 – 11). Suggest **two** factors that should be considered before the drug can be used on patients with the disease.

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2 .....

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(2 marks)

10

Turn over for the next question

8 (a) The heart controls and coordinates the regular contraction of the atria and ventricles. Describe how.

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(Extra space) .....

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8 (b) The diet of a person can increase the risk of coronary heart disease. Explain how.

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(5 marks)

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END OF QUESTIONS

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