Centre Number						Candidate Number				
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Other Names										
Candidate Signature										

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

General Certificate of Education
Advanced Subsidiary Examination
June 2010

Biology BIOL1

Unit 1 Biology and disease

Tuesday 25 May 2010 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 or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You will be marked on your ability to:
  – use good English
  – organise information clearly
  – use scientific terminology accurately.

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

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

1 (a) Cholera bacteria are prokaryotic cells. Give **three** structures found in prokaryotic cells but not in eukaryotic cells.

1 .....

2 .....

3 .....

(3 marks)

1 (b) Cholera bacteria cause an increase in the secretion of chloride ions into the small intestine. Use your knowledge of water potential to explain how the increased secretion of chloride ions causes diarrhoea.

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(2 marks)

1 (c) People with diarrhoea suffer fluid loss. They can use oral rehydration solutions (ORS) to replace the lost fluid. The mixture used to make an oral rehydration solution is stored as a powder. The powder can be made into a solution with boiled water.

1 (c) (i) Why must boiled water be used to make an ORS?

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(1 mark)

1 (c) (ii) The mixture used to make the ORS contains glucose. Give **one** other substance that must be present in the mixture.

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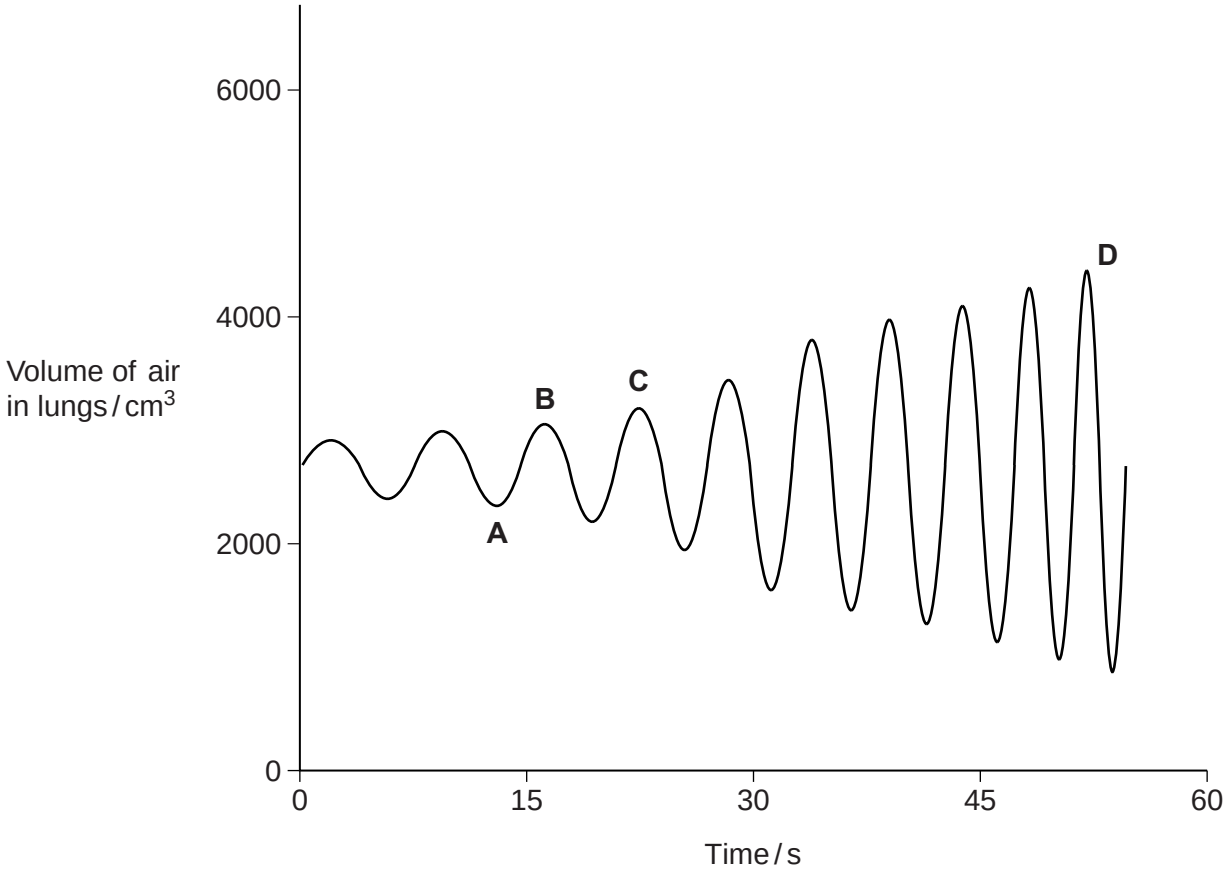
(1 mark)

7

2 The graph shows changes in the volume of air in a person's lungs during breathing.



2 (a) The person was breathing in between times **A** and **B** on the graph.

2 (a) (i) Explain how the graph shows that the person was breathing in between times **A** and **B**.

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(1 mark)

2 (a) (ii) Describe and explain what happens to the shape of the diaphragm between times **A** and **B**.

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(2 marks)

2 (b) The person's pulmonary ventilation changed between times **C** and **D**.
Describe how the graph shows that the pulmonary ventilation changed.

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(3 marks)

(Extra space) .....

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3 (a) Name the type of bond that joins amino acids together in a polypeptide.

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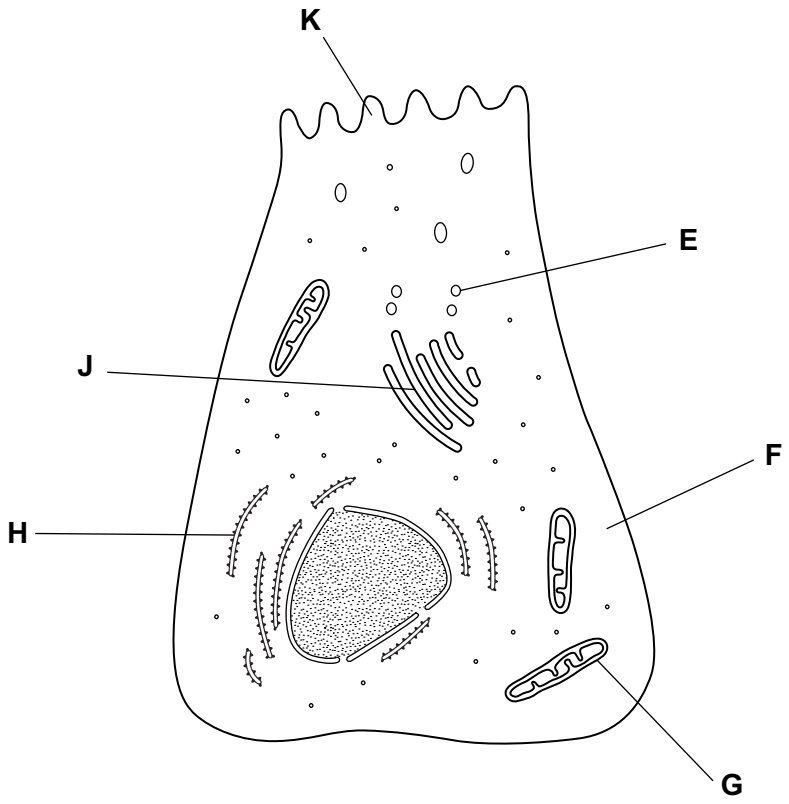
(1 mark)

The diagram shows a cell from the pancreas.



3 (b) The cytoplasm at **F** contains amino acids. These amino acids are used to make proteins which are secreted from the cell.

Place the appropriate letters in the correct order to show the passage of an amino acid from the cytoplasm at **F** until it is secreted from the cell as a protein at **K**.

F				**K**

(2 marks)

3 (c) There are lots of organelle **G** in this cell. Explain why.

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(2 marks)

3 (d) A group of scientists homogenised pancreatic tissue before carrying out cell fractionation to isolate organelle **G**.

Explain why the scientists

3 (d) (i) homogenised the tissue

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(1 mark)

3 (d) (ii) filtered the resulting suspension

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(1 mark)

3 (d) (iii) kept the suspension ice cold during the process

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(1 mark)

3 (d) (iv) used isotonic solution during the process.

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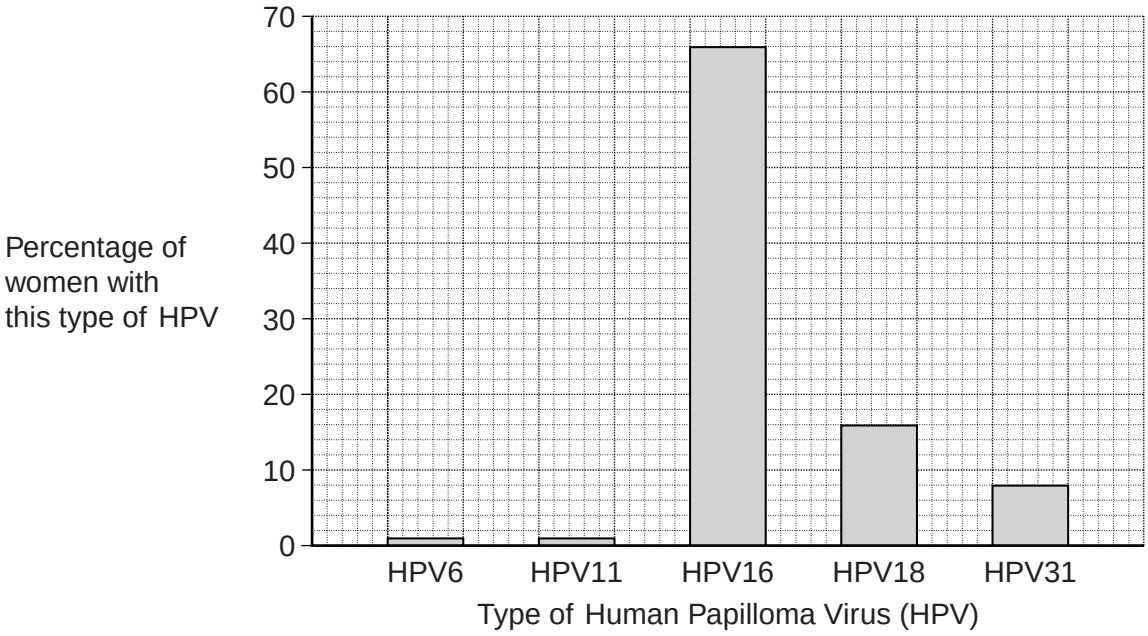
(2 marks)

10

4 Cervical cancer occurs in the neck of the uterus.

Scientists investigated the link between cervical cancer and infection with some types of Human Papilloma Virus (HPV).

The graph shows the frequency of five different types of HPV in women who had cervical cancer.



4 (a) A local newspaper published an article about cervical cancer with the headline 'HPV causes cervical cancer'.

Do the data shown in the graph support this claim? Explain your answer.

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(3 marks)

(Extra space) .....

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4 (b) Scientists have developed vaccines against HPV. One of the vaccines contains HPV antigens.

4 (b) (i) What is an HPV antigen?

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(2 marks)

4 (b) (ii) A vaccine can be used to produce immunity to HPV. Describe how memory cells are important in this process.

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(3 marks)

(Extra space) .....

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4 (c) Some doctors suggested offering the vaccine to young men. Explain the advantage of vaccinating young men as well as young women.

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(2 marks)

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5 Gangliosides are lipids found in the cell surface membranes of nerve cells. Hexosaminidase is an enzyme present in blood that breaks down gangliosides. If gangliosides are not broken down, they damage nerve cells.

5 (a) Hexosaminidase only breaks down gangliosides. It does not break down other lipids. Explain why this enzyme only breaks down gangliosides.

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(3 marks)

(Extra space) .....

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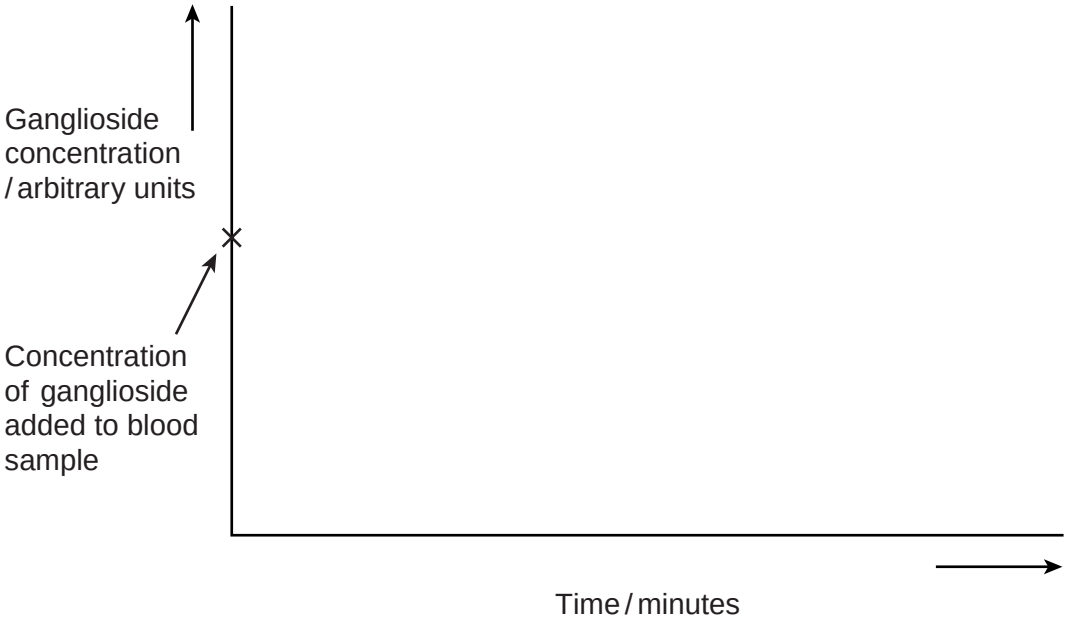
5 (b) Hexosaminidase is found in the blood of healthy people. People with Tay Sachs disease do not have this enzyme in their blood.

Doctors confirm Tay Sachs disease by using a blood test. The technician carrying out the test adds a solution containing a high concentration of gangliosides to a sample of blood from the person being tested. The technician then measures the concentration of gangliosides in the person's blood at regular intervals.

5 (b) (i) Complete the graph below by sketching a curve to show the results you would expect for a person with Tay Sachs disease. Label this curve **T**.

(1 mark)



5 (b) (ii) Sketch a curve on the same graph to show the results you would expect for a healthy person who does **not** have Tay Sachs disease. Label this curve **H**.

(1 mark)

5 (c) Scientists are trying to find a way to give the missing enzyme to people with Tay Sachs disease. Suggest why they cannot give the enzyme as a tablet that is swallowed.

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(2 marks)

7

Turn over ▶

6 Read the following passage.

Some foods contain substances called flavenoids. Flavenoids lower blood cholesterol concentration and reduce the risk of developing coronary heart disease.

Some types of dark chocolate have a high concentration of flavenoids. One group of scientists investigated the effect of eating dark chocolate on the risk of developing coronary heart disease.

The scientists randomly divided healthy volunteers into two groups. Every day one group was given dark chocolate containing flavenoids to eat. The other group acted as a control.

The scientists measured the diameter of the lumen of the main artery in the arms of the volunteers every week. At the end of a month, the diameter of the lumen of the main artery in the arm of the volunteers who had eaten dark chocolate containing flavenoids had increased.

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

6 (a) High blood cholesterol concentration is a risk factor associated with coronary heart disease.

Give **two** other risk factors associated with coronary heart disease.

1 .....

2 .....

(2 marks)

6 (b) (i) The scientists used healthy volunteers in this investigation (line 7). Why was it important that the volunteers were healthy?

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(1 mark)

6 (b) (ii) The scientists randomly divided the volunteers into two groups (line 7). Explain why they divided them randomly.

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(1 mark)

6 (c) (i) Describe how the control group should have been treated.

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(2 marks)

6 (c) (ii) Why was it important to have a control group in this investigation?

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(1 mark)

6 (d) Suggest why an increase in the diameter of the lumen of the main artery in the arm (lines 11-12) is associated with a reduced risk of coronary heart disease.

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(3 marks)

(Extra space) .....

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7 (a) Many different substances enter and leave a cell by crossing its cell surface membrane. Describe how substances can cross a cell surface membrane.

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(5 marks)

(Extra space) .....

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7 (b) Describe and explain how the lungs are adapted to allow rapid exchange of oxygen between air in the alveoli and blood in the capillaries around them.

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(5 marks)

(Extra space) .....

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END OF QUESTIONS

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