

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education  
June 2003



**SCIENCE: DOUBLE AWARD (MODULAR)**  
**BIOLOGY (MODULAR)**  
**Humans as Organisms (Module 01)**

**346001**

Tuesday 24 June 2003 Morning Session

**In addition to this paper you will require:**

- an HB pencil and a rubber;
- an answer sheet.

You may use a calculator.

Time allowed: 30 minutes

**Instructions**

- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title “Humans as Organisms” printed on it.
- Attempt **one Tier only, either** the Foundation Tier **or** the Higher Tier.
- Answer **all** the questions for the Tier you are attempting.
- Make sure that you use the correct side of the separate answer sheet; the Foundation Tier is printed on one side and the Higher Tier on the other.
- Mark your responses on the separate answer sheet only. Rough work may be done on the question paper.
- Mark the best responses by using a thick pencil stroke to fill in the box. Use an HB pencil. Make sure the pencil stroke does **not** extend beyond the box. Do **not** use ink or ball-point pen. If you wish to change your answer, rub out your first answer completely. See below.

**Examples:**

	1	2	3	4
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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QUESTION XXX				
xxx.1	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
xxx.2	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input checked="" type="checkbox"/> D
xxx.3	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
xxx.4	<input checked="" type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D

**Information**

- The maximum mark for this paper is 36.

**Advice**

- Do **not** choose more responses than you are asked to. You will lose marks if you do.
- Make sure that you hand in both your answer sheet and this question paper at the end of the test.
- If you start to answer on the wrong side of the answer sheet by mistake, make sure that you rub out **completely** the work that is not to be marked.

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You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.  
The Higher Tier starts on page 12 of this booklet.

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**FOUNDATION TIER**

**SECTION A**

Questions **ONE** to **FIVE**.

In these questions match the words in the list with the numbers.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

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**QUESTION ONE**

The diagrams show a white blood cell and a bacterial cell. (They are not drawn to the same scale.)

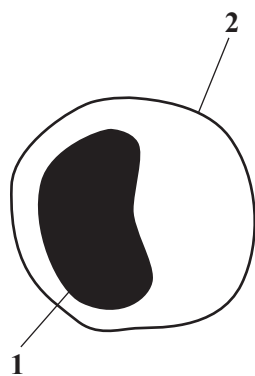
Match words from the list with each of the labels **1–4** on the diagrams.

**cell membrane**

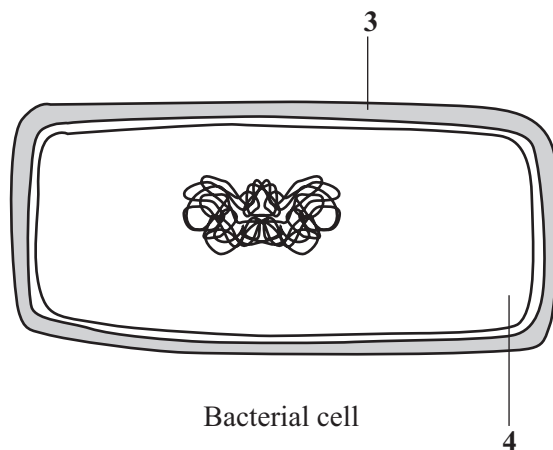
**cell wall**

**cytoplasm**

**nucleus**



White blood cell



Bacterial cell

**QUESTION TWO**

The diagram shows a section through the heart.

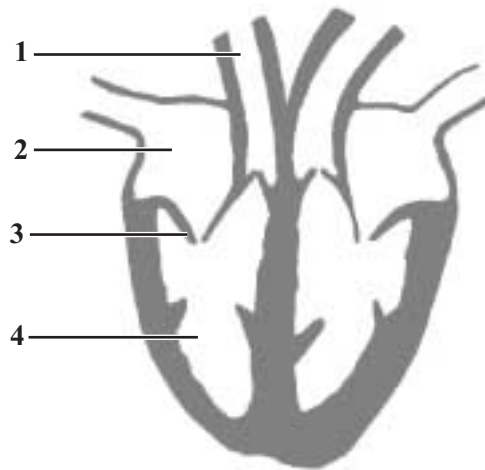
Match words from the list with each of the labels 1–4 on the diagram.

**artery**

**atrium**

**valve**

**ventricle**

**QUESTION THREE**

The drawing shows a group of cells from the human breathing system. These cells move mucus away from the lungs.

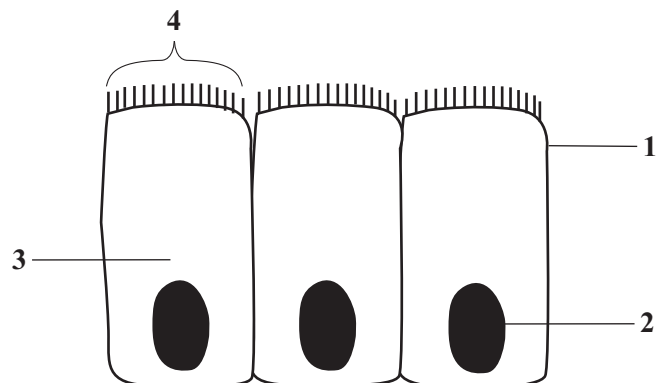
Match words from the list with each of the labels 1–4 in the drawing.

**controls movement of water into the cell**

**controls the activities of the cell**

**moves mucus**

**where most chemical reactions occur**



**Turn over ►**

**QUESTION FOUR**

The table is about parts of the breathing system.

Match words from the list with each of the numbers **1–4** in the table.

**alveolus**

**bronchus**

**diaphragm**

**rib cage**

<b>Part</b>	<b>Feature</b>
<b>1</b>	carries air from the windpipe to the bronchioles
<b>2</b>	moves outwards to make us breathe in
<b>3</b>	where oxygen enters the blood
<b>4</b>	separates the thorax from the abdomen

**QUESTION FIVE**

The table is about substances used in digestion.

Match words from the list with each of the numbers **1–4** in the table.

**bile**

**hydrochloric acid**

**lipase**

**protease**

<b>Substance</b>	<b>Part played in digestion</b>
<b>1</b>	catalyses the breakdown of fat into fatty acids
<b>2</b>	catalyses the breakdown of protein into amino acids
<b>3</b>	creates alkaline conditions in the small intestine
<b>4</b>	creates the correct conditions for digestion in the stomach

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**SECTION B**Questions **SIX** and **SEVEN**.In these questions choose the best **two** answers.Do **not** choose more than two.Mark your choices on the answer sheet.

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**QUESTION SIX**

Platelets are found in the blood.

Which **two** of the following are features of platelets?**absorb oxygen from the lungs****have no nucleus****help blood to clot****produce antitoxins****transport urea to the kidneys****QUESTION SEVEN**

White blood cells defend the body against bacteria.

Which **two** of the following are produced by white blood cells to defend the body against bacteria?**antibodies****antitoxins****mucus****toxins****vaccine****Turn over ►**

**SECTION C**Questions **EIGHT** to **TEN**.

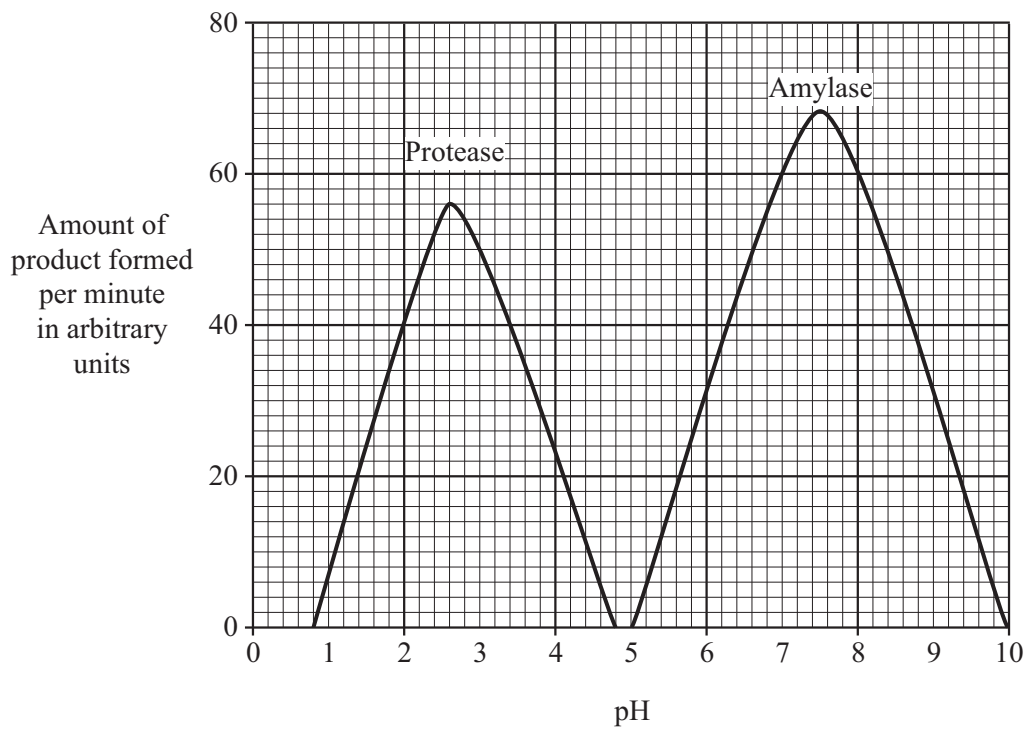
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

**QUESTION EIGHT**

The graph shows the results of an investigation into the effect of pH on the action of a protease and an amylase.



**8.1** How much product was formed per minute by protease at pH3?

- A 20 arbitrary units
- B 30 arbitrary units
- C 40 arbitrary units
- D 50 arbitrary units

**8.2** At which pH value were 60 units of product formed per minute by amylase?

- A** pH 7 only
- B** pH 7.5 only
- C** pH 7 and 8
- D** pH 8 only

**8.3** In which conditions does the amylase work best?

- A** Slightly acid conditions
- B** Slightly alkaline conditions
- C** Exactly neutral conditions
- D** Under any pH conditions

**8.4** Which product is formed by the action of amylase?

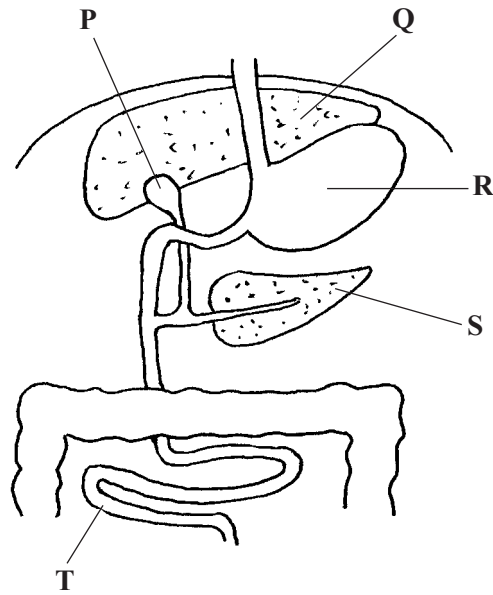
- A** Amino acids
- B** Fatty acids
- C** Glycerol
- D** Sugars

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION NINE**

The diagram shows part of the digestive system.



**9.1** The liquid stored in **P** is . . . . .

- A** bile.
- B** hydrochloric acid.
- C** pancreatic juice.
- D** saliva.

**9.2** In which organs is a starch-digesting enzyme produced?

- A** **P** and **T**
- B** **Q** and **R**
- C** **R** and **S**
- D** **S** and **T**



**9.3** In which organ is digested fat absorbed?

**A** Q

**B** R

**C** S

**D** T

**9.4** A liquid produced by Q . . . . .

**A** breaks fats into smaller droplets.

**B** contains digestive enzymes.

**C** contains glycerol.

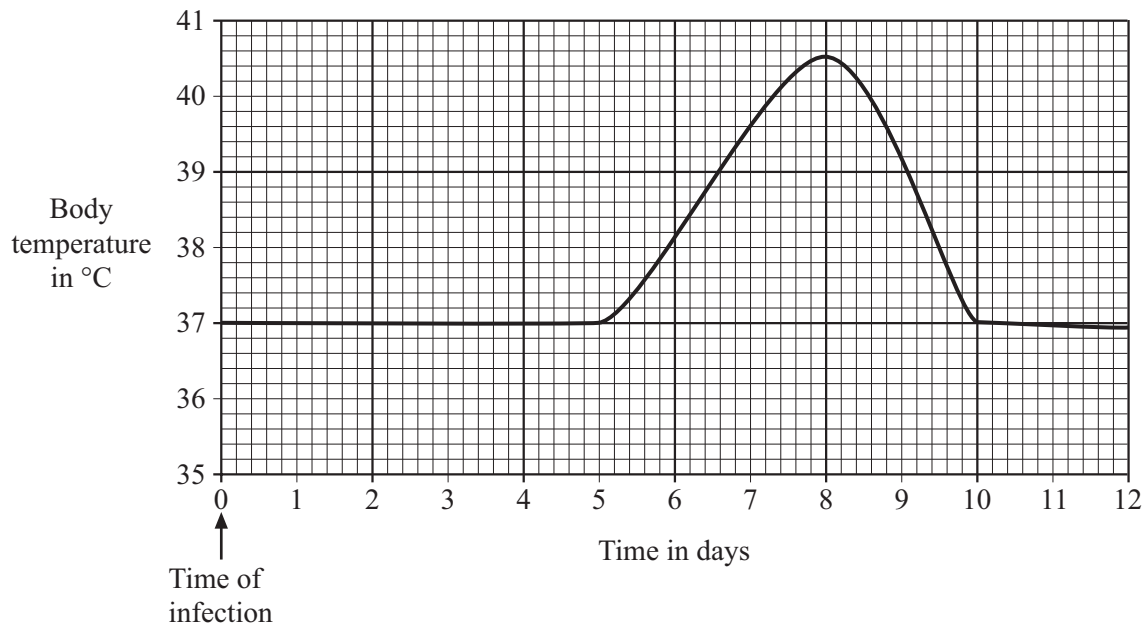
**D** is acidic.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION TEN**

The graph shows the body temperature of a person suffering from a disease.



**10.1** The highest body temperature reached was . . . . .

- A 37.0 °C
- B 38.0 °C
- C 40.5 °C
- D 42.0 °C

**10.2** How long was the body temperature above normal?

- A 2 days
- B 5 days
- C 8 days
- D 10 days

**10.3** When toxins are produced by a bacterial infection, the body temperature rises. Between which times are the greatest number of bacteria likely to be reproducing?

- A** 0 – 4 days
- B** 5 – 8 days
- C** 8 – 10 days
- D** 10 – 12 days

**10.4** When people are vaccinated, they are injected with . . . . .

- A** dead or weakened microbes.
- B** drugs to destroy the microbes.
- C** microbes to destroy toxins.
- D** white blood cells.

**END OF TEST**

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You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.  
The Foundation Tier is earlier in this booklet.

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**HIGHER TIER**

**SECTION A**

Questions **ONE** and **TWO**.

In these questions match the words in the list with the numbers.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

---

**QUESTION ONE**

The table is about substances used in digestion.

Match words from the list with each of the numbers **1–4** in the table.

**bile**

**hydrochloric acid**

**lipase**

**protease**

<b>Substance</b>	<b>Part played in digestion</b>
<b>1</b>	catalyses the breakdown of fat into fatty acids
<b>2</b>	catalyses the breakdown of protein into amino acids
<b>3</b>	creates alkaline conditions in the small intestine
<b>4</b>	creates the correct conditions for digestion in the stomach

**QUESTION TWO**

The diagram shows a section through the heart.

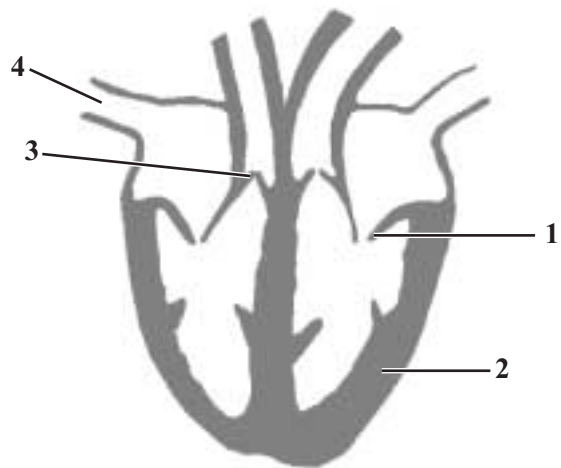
Match words from the list with each of the labels 1–4 on the diagram.

**contains deoxygenated blood from the head**

**opens to allow deoxygenated blood to pass**

**prevents backflow of oxygenated blood**

**raises the pressure of blood**



**TURN OVER FOR THE NEXT QUESTION**

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**SECTION B**Questions **THREE** and **FOUR**.In these questions choose the best **two** answers.Do **not** choose more than two.Mark your choices on the answer sheet.

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**QUESTION THREE**

White blood cells defend the body against bacteria.

Which **two** of the following are produced by white blood cells to defend the body against bacteria?**antibodies****antitoxins****mucus****toxins****vaccine****QUESTION FOUR**

Human cells contain mitochondria.

Which **two** of the following are true of mitochondria?**they are found in the cytoplasm****they contain haemoglobin****they control the activity of the cell****they control the passage of chemicals in and out of the cell****they release energy during respiration**

**SECTION C**Questions **FIVE** to **TEN**.

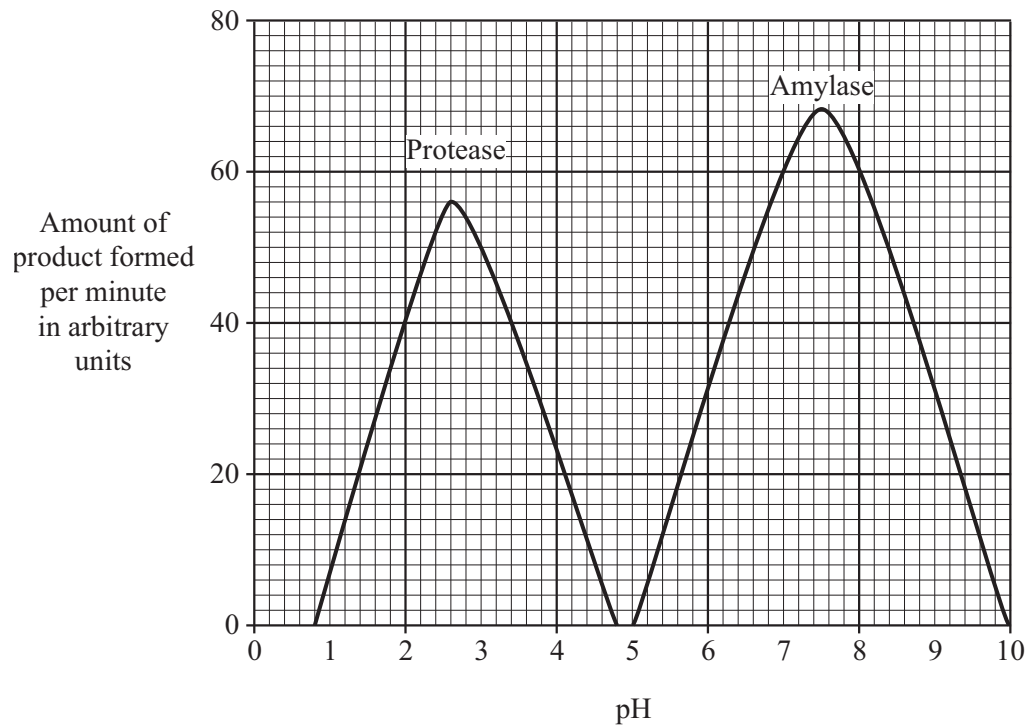
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

**QUESTION FIVE**

The graph shows the results of an investigation into the effect of pH on the action of a protease and an amylase.



**5.1** How much product was formed per minute by protease at pH3?

- A** 20 arbitrary units
- B** 30 arbitrary units
- C** 40 arbitrary units
- D** 50 arbitrary units

**5.2** At which pH value were 60 units of product formed per minute by amylase?

- A** pH 7 only
- B** pH 7.5 only
- C** pH 7 and 8
- D** pH 8 only

**5.3** In which conditions does the amylase work best?

- A** Slightly acid conditions
- B** Slightly alkaline conditions
- C** Exactly neutral conditions
- D** Under any pH conditions

**5.4** Which product is formed by the action of amylase?

- A** Amino acids
- B** Fatty acids
- C** Glycerol
- D** Sugars

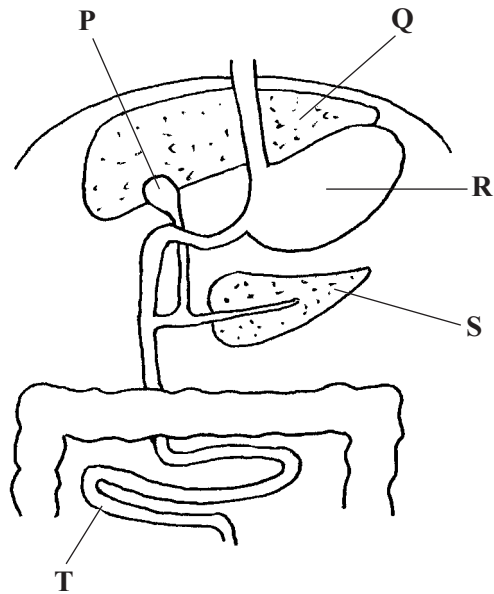
**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**



**QUESTION SIX**

The diagram shows part of the digestive system.



- 6.1** The liquid stored in **P** is . . . . .
- A** bile.
  - B** hydrochloric acid.
  - C** pancreatic juice.
  - D** saliva.
- 6.2** In which organs is a starch-digesting enzyme produced?
- A** **P** and **T**
  - B** **Q** and **R**
  - C** **R** and **S**
  - D** **S** and **T**

**6.3** In which organ is digested fat absorbed?

**A** Q

**B** R

**C** S

**D** T

**6.4** A liquid produced by Q . . . . .

**A** breaks fats into smaller droplets.

**B** contains digestive enzymes.

**C** contains glycerol.

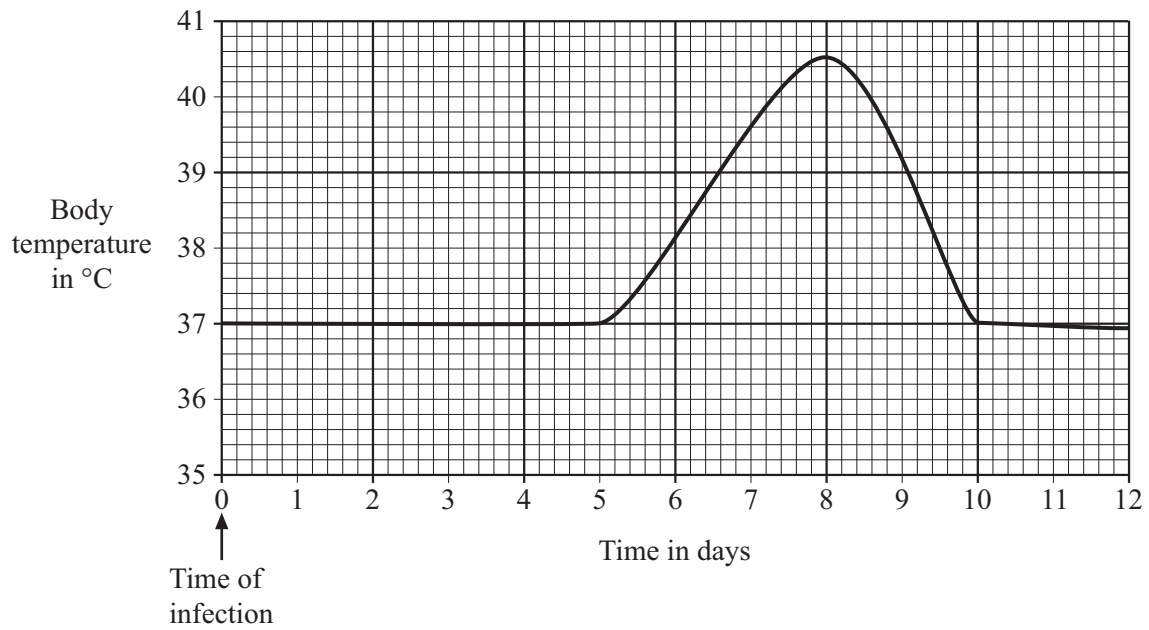
**D** is acidic.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION SEVEN**

The graph shows the body temperature of a person suffering from a disease.



**7.1** The highest body temperature reached was . . . . .

- A** 37.0 °C
- B** 38.0 °C
- C** 40.5 °C
- D** 42.0 °C

**7.2** How long was the body temperature above normal?

- A** 2 days
- B** 5 days
- C** 8 days
- D** 10 days

**7.3** When toxins are produced by a bacterial infection, the body temperature rises. Between which times are the greatest number of bacteria likely to be reproducing?

- A** 0 – 4 days
- B** 5 – 8 days
- C** 8 – 10 days
- D** 10 – 12 days

**7.4** When people are vaccinated, they are injected with . . . . .

- A** dead or weakened microbes.
- B** drugs to destroy the microbes.
- C** microbes to destroy toxins.
- D** white blood cells.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION EIGHT**

The parts of blood have different functions.

**Table 1** shows the number of these parts in a healthy person.

<b>Part of blood</b>	<b>Number per mm<sup>3</sup> in healthy person</b>
White blood cells	4000 to 11 000
Red blood cells	4.5 to 6.5 million
Platelets	150 000 to 350 000

**Table 1**

**Table 2** shows the blood test results for four people.

<b>Test</b>	<b>James</b>	<b>John</b>	<b>Michael</b>	<b>Paul</b>
White blood cells	6500	1000	4100	30 000
Red blood cells	5.3 million	5.2 million	3.0 million	5.5 million
Platelets	70 000	210 000	200 000	180 000

**Table 2**

**8.1** Which person is most likely to become tired quickly when exercising?

- A** James
- B** John
- C** Michael
- D** Paul

**8.2** Which person's blood is most likely to clot slowly?

- A** James
- B** John
- C** Michael
- D** Paul

**8.3** Which person is most likely to recover slowly from an infection?

- A** James
- B** John
- C** Michael
- D** Paul

**8.4** One of the symptoms of leukaemia is a large increase in the number of white blood cells. Which person is most likely to be suffering from leukaemia?

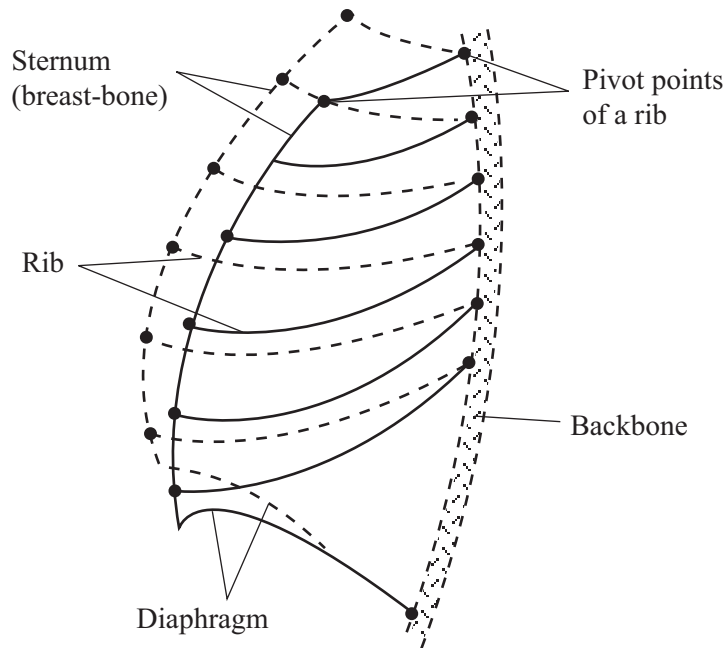
- A** James
- B** John
- C** Michael
- D** Paul

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

### QUESTION NINE

The diagram shows a side view of the thorax during breathing movements.



----- = position at end of breathing in  
 \_\_\_\_\_ = position at end of breathing out

**9.1** What causes the change in position of the sternum during breathing in?

- A** Contraction of the diaphragm muscles
- B** Contraction of the muscles attached to the backbone
- C** Contraction of the muscles between the ribs
- D** Inflation of the lungs

**9.2** When breathing in, the movements of the diaphragm and ribs cause . . . . .

- A** the volume of the thorax to increase and the pressure inside it to decrease.
- B** the volume of the thorax to decrease and the pressure inside it to increase.
- C** the volume of the thorax and the pressure inside it both to decrease.
- D** the volume of the thorax and the pressure inside it both to increase.

- 9.3** Oxygen is carried away from the lungs in the blood . . . . .
- A** as oxyhaemoglobin in the blood plasma.
  - B** attached to the nucleus of red blood cells.
  - C** combined with haemoglobin in the cytoplasm of red blood cells.
  - D** joined to molecules of oxyhaemoglobin in red blood cells.
- 9.4** What happens if not enough oxygen reaches the leg muscles of a person during a long period of vigorous exercise?
- A** The muscles begin to obtain energy from aerobic respiration and produce lactic acid
  - B** The muscles begin to obtain energy from aerobic respiration and produce more carbon dioxide
  - C** The muscles begin to obtain energy from anaerobic respiration and produce lactic acid
  - D** The muscles begin to obtain energy from anaerobic respiration and produce more carbon dioxide

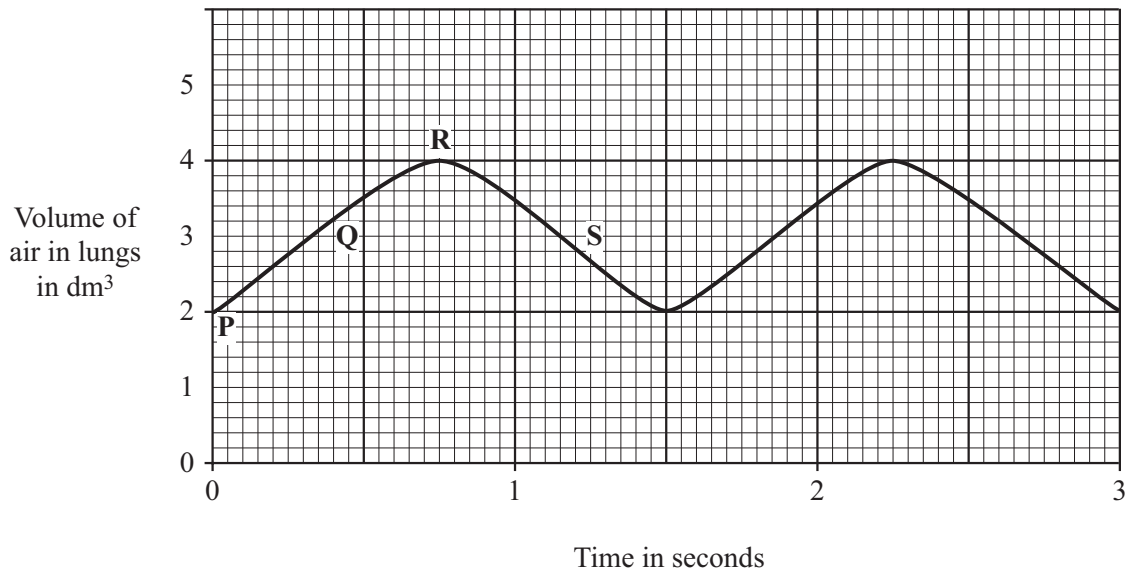
**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**



## QUESTION TEN

The graph shows the changes in the volume of air in the lungs of a person during exercise.



10.1 A part of the graph which represents the person exhaling is . . . . .

- A P → Q
- B Q → R
- C P → R
- D R → S

10.2 How many breaths per minute is the person taking?

- A 20
- B 30
- C 40
- D 50

10.3 What is the change in the volume of air in the lungs when the person inhales once?

- A  $1.0 \text{ dm}^3$
- B  $1.5 \text{ dm}^3$
- C  $2.0 \text{ dm}^3$
- D  $4.0 \text{ dm}^3$

**10.4** Carbon dioxide is transferred from the blood to the air in the lungs by . . . . .

- A** active transport.
- B** catalysis.
- C** diffusion.
- D** respiration.

**END OF TEST**