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|---------------------|--|------------------|--|
| Surname | | Other Names | |
| Centre Number | | Candidate Number | |
| Candidate Signature | | | |

General Certificate of Secondary Education
Winter 2005



SCIENCE: DOUBLE AWARD A (MODULAR) 346001
BIOLOGY A (MODULAR)
Humans as Organisms (Module 01)

Thursday 24 November 2005 Morning Session

In addition to this paper you will require:

- a black ball-point pen;
- 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.
- 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.
- Answer **all** the questions for the Tier you are attempting.
- Record your answers on the separate answer sheet only. Rough work may be done on the question paper.

Instructions for recording answers

- Use a **black ball-point pen**.

- For each answer **completely fill in the circle** as shown:

| | | | |
|-----------------------|----------------------------------|-----------------------|-----------------------|
| 1 | 2 | 3 | 4 |
| <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |

- Do **not** extend beyond the circles.

- If you want to change your answer, **you must** cross out your original answer, as shown:

| | | | |
|-----------------------|----------------------------------|-----------------------|----------------------------------|
| 1 | 2 | 3 | 4 |
| <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |

- If you change your mind about an answer you have crossed out and now want to choose it, draw a ring around the cross as shown:

| | | | |
|-----------------------|----------------------------------|-----------------------|----------------------------------|
| 1 | 2 | 3 | 4 |
| <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |

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 cross out **completely** the work that is not to be marked.

You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.
The Higher Tier starts on page 14 of this booklet.

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.

QUESTION ONE

The diagram shows some parts of the heart.

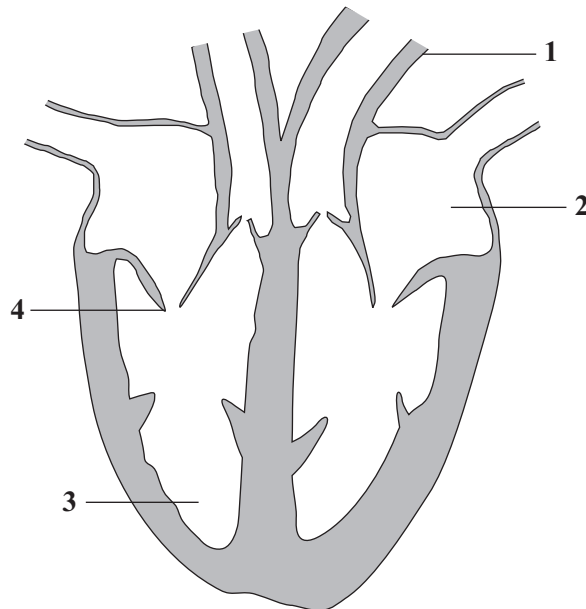
Match words from the list with the labels **1–4** on the diagram.

atrium

blood vessel

valve

ventricle



QUESTION TWO

The diagram shows a nerve cell from the skin.

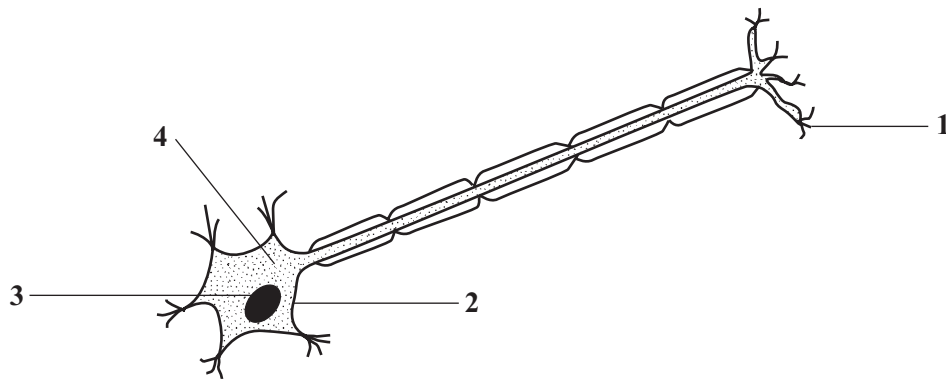
Match words from the list with the labels 1–4 on the diagram.

allows substances into the cell

cytoplasm

nucleus

passes information to other cells



TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION THREE

The diagram shows parts of the digestive system.

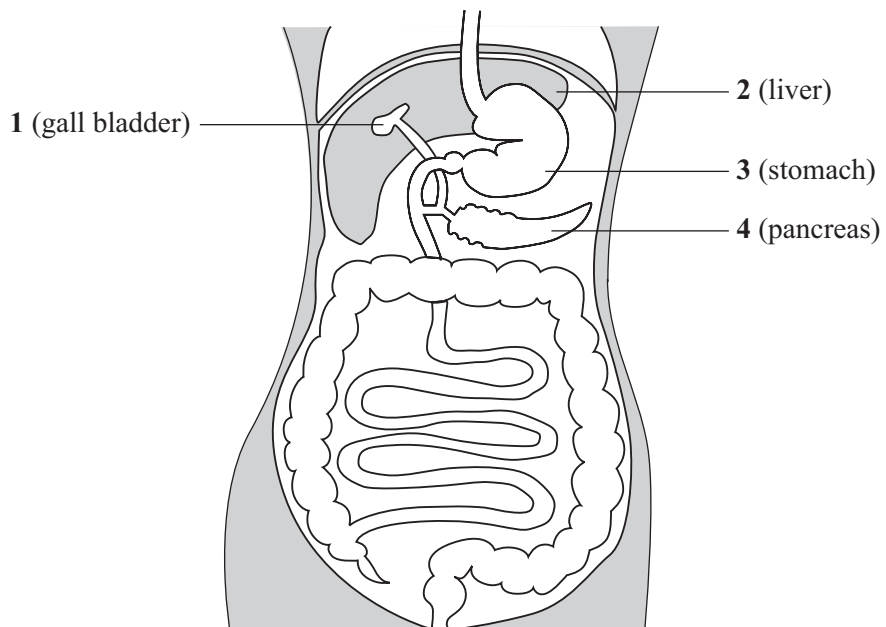
Match words from the list with the labels **1–4** on the diagram.

makes bile

makes lipase

provides acid conditions

stores bile



QUESTION FOUR

The table is about the jobs of structures in the human body.

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

cytoplasm

glandular tissue

muscular tissue

nucleus

| Structure | What the structure does |
|------------------|---|
| 1 | controls the activity of cells |
| 2 | contracts to bring about movement |
| 3 | produces digestive enzymes |
| 4 | where most chemical reactions occur in a cell |

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION FIVE

The diagrams show

- two organisms that cause infections
- two human cells that protect us against infections.

They are **not** drawn to the same scale.

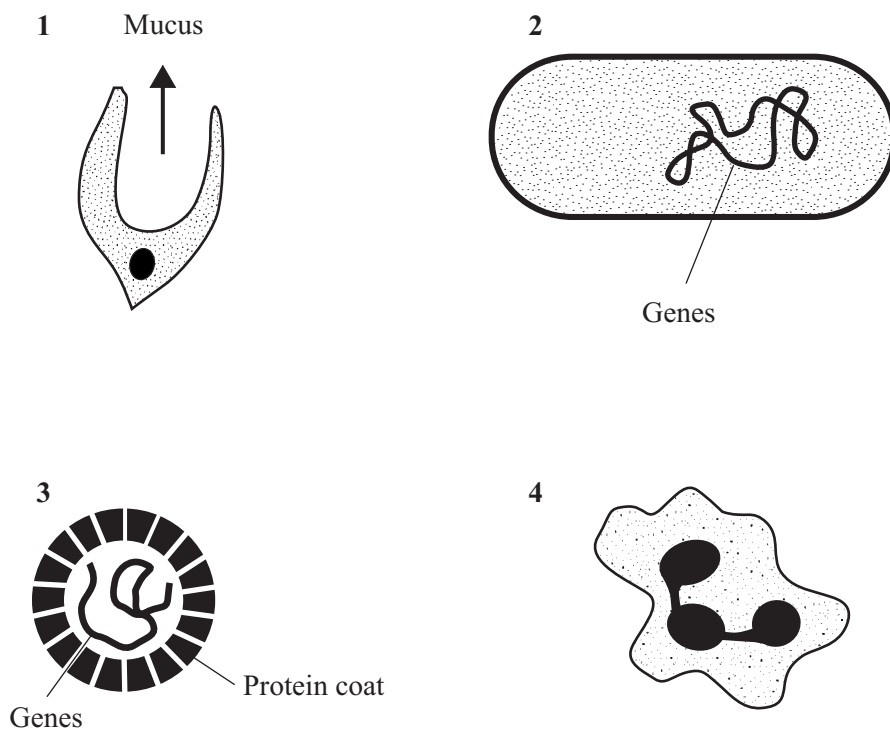
Match words from the list with the diagrams **1–4**.

bacterium

cell from lining of a bronchus

cell that ingests microorganisms

virus



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

QUESTION SIXWhich **two** of the following are features of blood capillaries?**their walls are very thin****their walls contain elastic fibres****their walls contain muscular tissue****they are very narrow****they contain valves****QUESTION SEVEN**

This question is about how the body defends itself against bacteria.

Which **two** of the following stop bacteria from entering the body?**antitoxins****mucus****red blood cells****skin****white blood cells****Turn over ►**

SECTION CQuestions **EIGHT** to **TEN**.

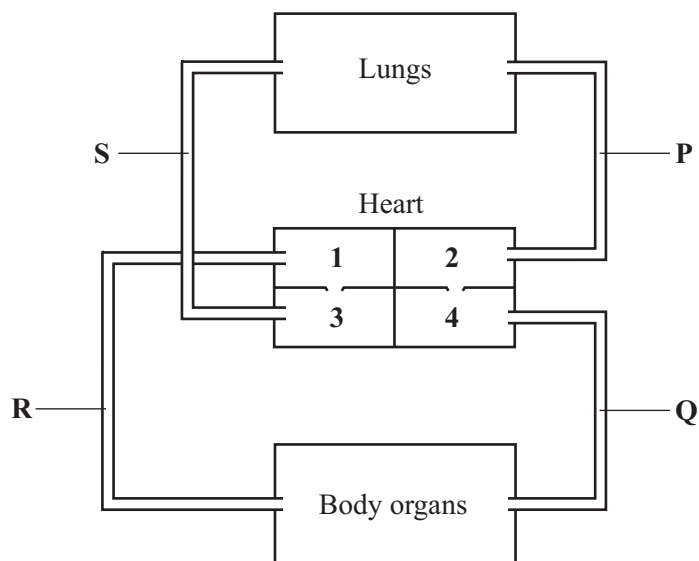
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

QUESTION EIGHT

The diagram shows part of the circulatory system.

The chambers of the heart are numbered **1** to **4**.**8.1** Blood is pumped by the heart to the lungs and back to the heart.

Which sequence shows the path of the blood through the chambers of the heart, as it passes from the heart to the lungs and back to the heart?

A 1 → 2 → lungs → 3 → 4**B** 1 → 3 → lungs → 2 → 4**C** 2 → 1 → lungs → 3 → 4**D** 2 → 4 → lungs → 1 → 3

- 8.2** Which blood vessels carry blood containing very little oxygen?
- A** P and Q
 - B** P and R
 - C** Q and S
 - D** R and S
- 8.3** Which parts ensure that blood flows in the correct direction through the heart?
- A** Arteries
 - B** Elastic fibres
 - C** Valves
 - D** Veins
- 8.4** Blood is forced out of the heart by the contraction of the
- A** arteries.
 - B** atria.
 - C** diaphragm.
 - D** ventricles.

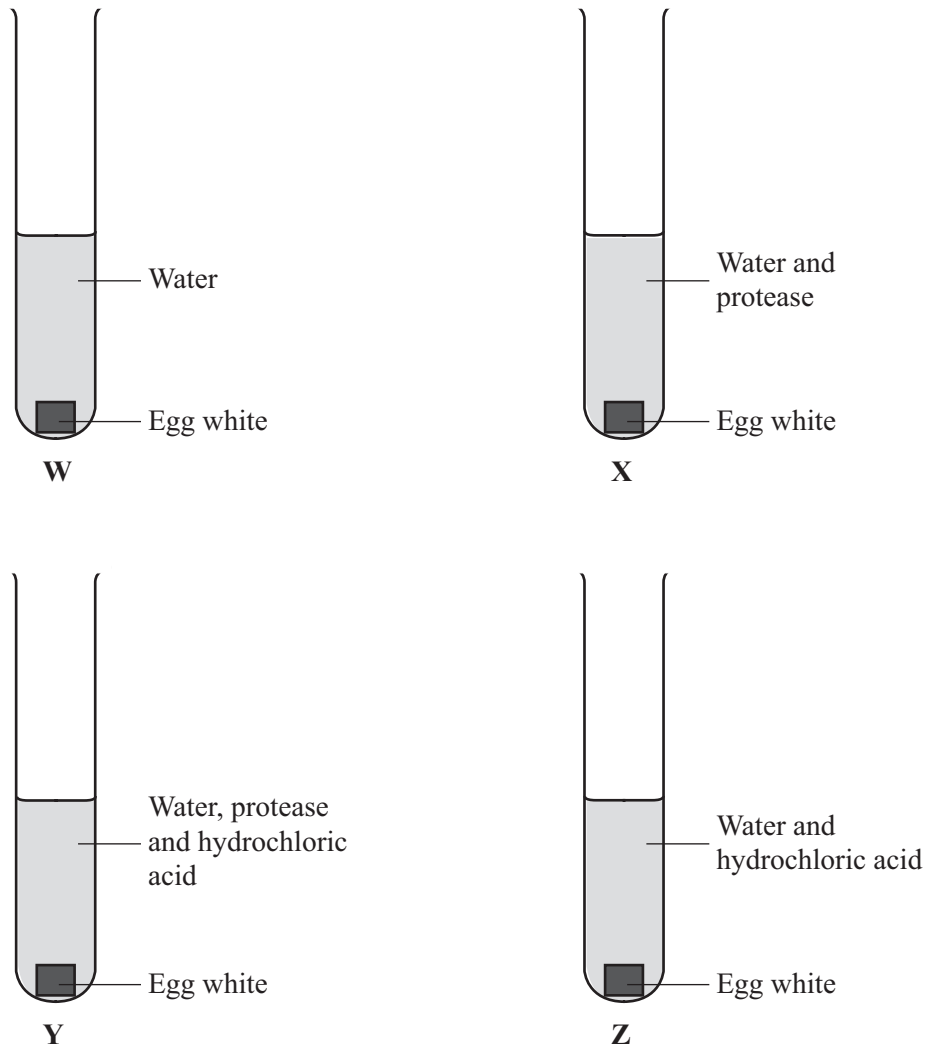
TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION NINE

The test tubes below were set up in an investigation into the rate of protein digestion by protease from the stomach. The protein used was 2.00 grams of hard boiled egg white in each test tube.

All the test tubes were kept at 37 °C for 30 minutes.



9.1 In which test tube would most protein be digested?

- A** W
- B** X
- C** Y
- D** Z

9.2 The protein is digested into

- A amino acids.
- B fatty acids.
- C glycerol.
- D sugar.

9.3 After 30 minutes, 1.76 grams of egg white remained in one test tube.

How much egg white had been digested?

- A 0.24 grams
- B 0.25 grams
- C 0.34 grams
- D 0.76 grams

9.4 Which other organ produces protease?

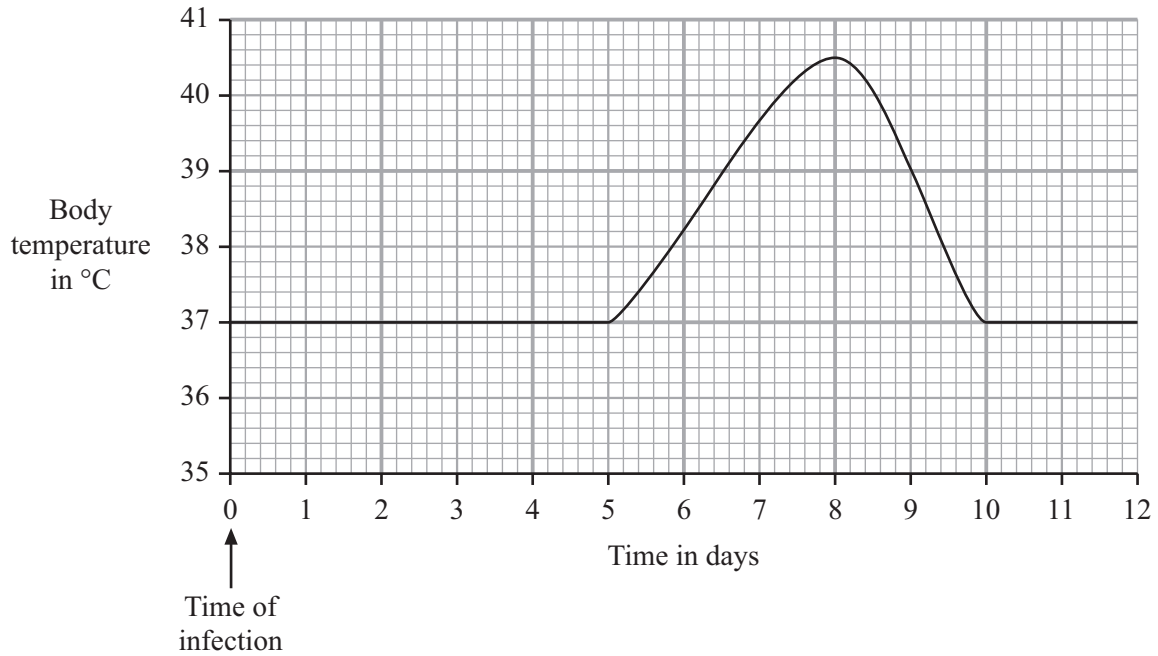
- A Gullet
- B Liver
- C Salivary glands
- D Small intestine

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 40.7 °C

10.2 For 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 microorganisms.
- B** drugs to destroy the microorganisms.
- C** microorganisms to destroy toxins.
- D** white blood cells.

END OF TEST

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

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 diagrams show

- two organisms that cause infections
- two human cells that protect us against infections.

They are **not** drawn to the same scale.

Match words from the list with the diagrams **1–4**.

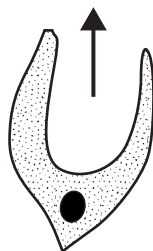
bacterium

cell from lining of a bronchus

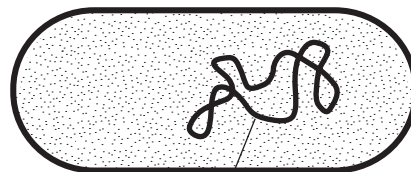
cell that ingests microorganisms

virus

1 Mucus



2



Genes

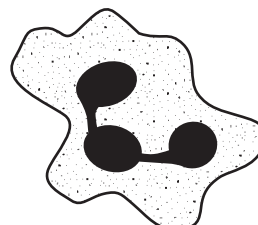
3



Genes

Protein coat

4



QUESTION TWO

Anaerobic respiration can occur in muscle cells.

Match words from the list with the numbers **1–4** in the sentences.

glucose

lactic acid

molecules

oxygen

When muscle cells have insufficient **1** , they carry out anaerobic respiration.

This uses **2** and produces **3**

The energy from respiration allows cells to build larger **4** from smaller ones.

TURN OVER FOR THE NEXT QUESTION

Turn over ►

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.

QUESTION THREE

This question is about how the body defends itself against bacteria.

Which **two** of the following stop bacteria from entering the body?

antitoxins

mucus

red blood cells

skin

white blood cells

QUESTION FOUR

This question is about parts of the digestive system.

Which **two** of these parts do **not** produce digestive enzymes?

large intestine

liver

pancreas

salivary glands

small intestine

NO QUESTIONS APPEAR ON THIS PAGE

TURN OVER FOR THE NEXT QUESTION

Turn over ►

SECTION C

Questions **FIVE** to **TEN**.

Each of these questions has four parts.

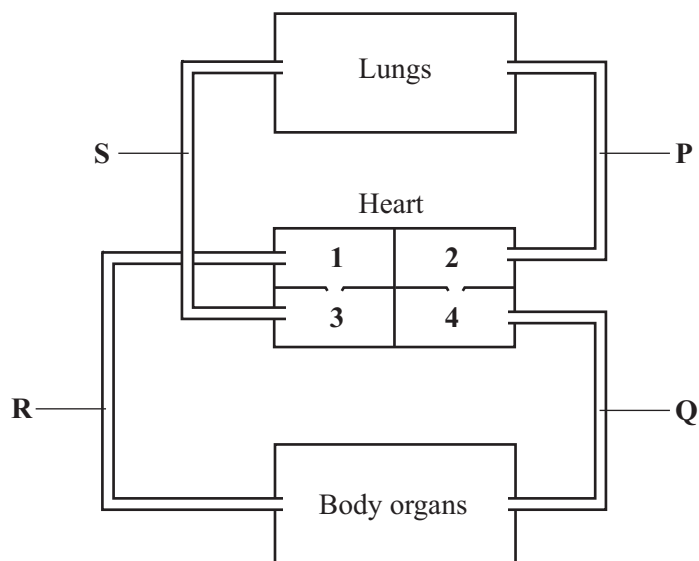
In each part choose only **one** answer.

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QUESTION FIVE

The diagram shows part of the circulatory system.

The chambers of the heart are numbered **1** to **4**.



5.1 Blood is pumped by the heart to the lungs and back to the heart.

Which sequence shows the path of the blood through the chambers of the heart, as it passes from the heart to the lungs and back to the heart?

A 1 → 2 → lungs → 3 → 4

B 1 → 3 → lungs → 2 → 4

C 2 → 1 → lungs → 3 → 4

D 2 → 4 → lungs → 1 → 3

- 5.2** Which blood vessels carry blood containing very little oxygen?
- A** P and Q
 - B** P and R
 - C** Q and S
 - D** R and S
- 5.3** Which parts ensure that blood flows in the correct direction through the heart?
- A** Arteries
 - B** Elastic fibres
 - C** Valves
 - D** Veins
- 5.4** Blood is forced out of the heart by the contraction of the
- A** arteries.
 - B** atria.
 - C** diaphragm.
 - D** ventricles.

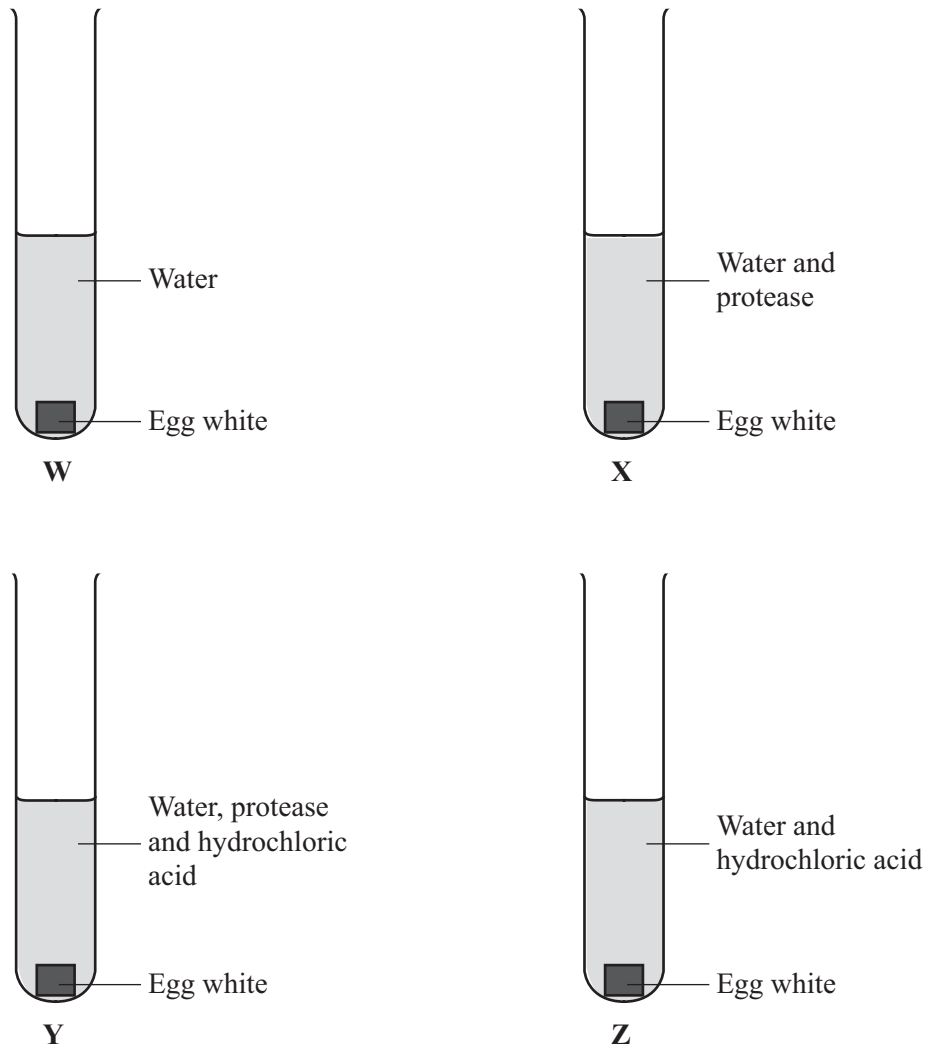
TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION SIX

The test tubes below were set up in an investigation into the rate of protein digestion by protease from the stomach. The protein used was 2.00 grams of hard boiled egg white in each test tube.

All the test tubes were kept at 37 °C for 30 minutes.



6.1 In which test tube would most protein be digested?

- A** W
- B** X
- C** Y
- D** Z

6.2 The protein is digested into

- A amino acids.
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6.3 After 30 minutes, 1.76 grams of egg white remained in one test tube.

How much egg white had been digested?

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6.4 Which other organ produces protease?

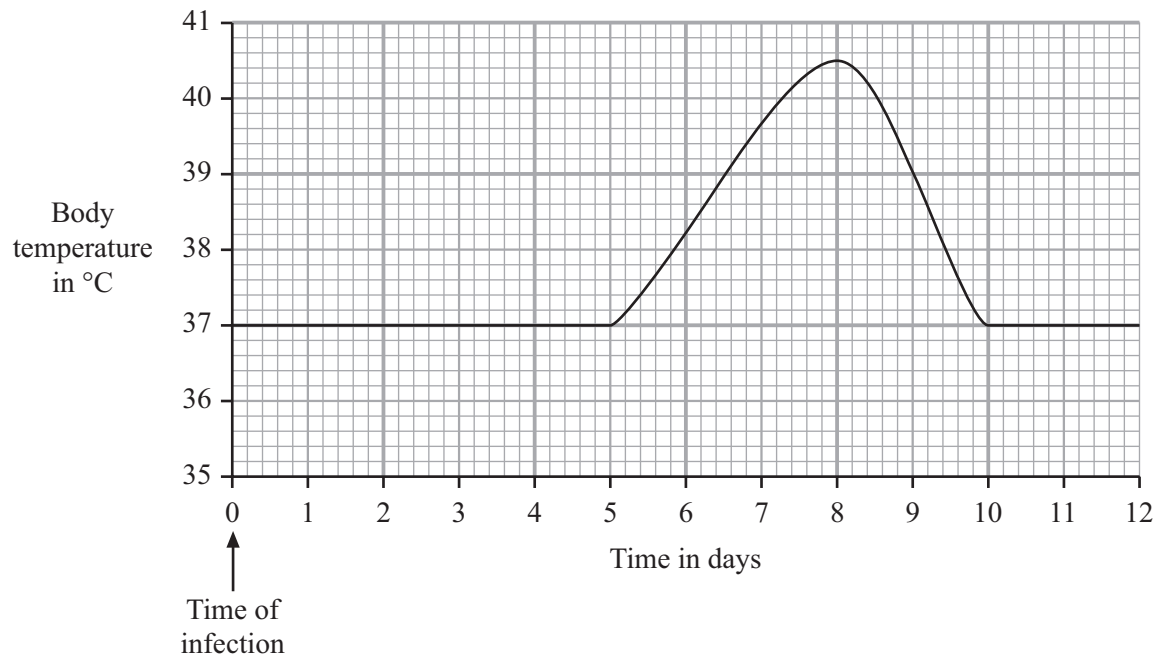
- A Gullet
- B Liver
- C Salivary glands
- D Small intestine

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** 40.7 °C
- 7.2** For 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 microorganisms.
- B** drugs to destroy the microorganisms.
- C** microorganisms 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.

| Part of blood | Number per mm ³ in a healthy person |
|-------------------|--|
| White blood cells | 4000 to 11 000 |
| Red blood cells | 4.5 million to 6.5 million |
| Platelets | 150 000 to 350 000 |

Table 1

Table 2 shows the blood test results for four people.

| Test | James | John | Michael | Paul |
|-------------------|-------------|-------------|-------------|-------------|
| 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?

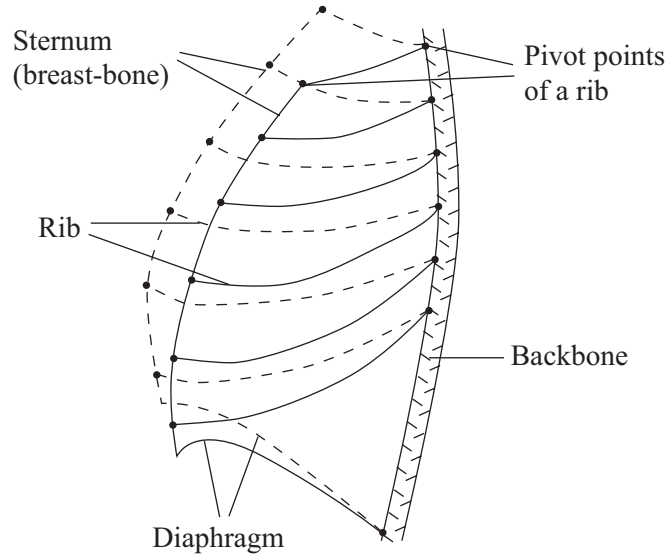
- A James
- B John
- C Michael
- D Paul

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION NINE

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



| Key | |
|-------|----------------------------------|
| ----- | 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 What are the effects of movements of the diaphragm and ribs when breathing in?

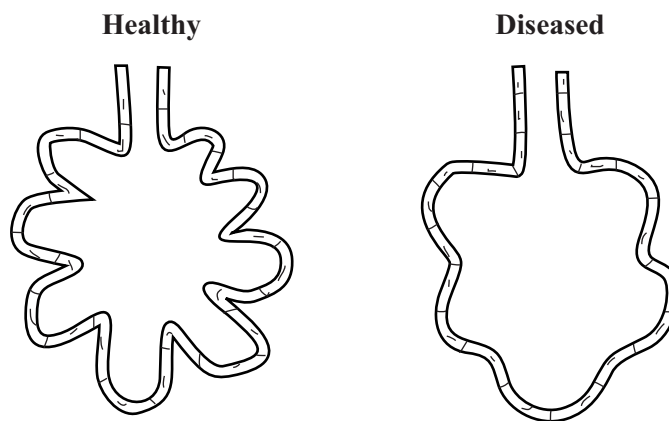
| | Effect on volume of thorax | Effect on pressure inside thorax |
|---|----------------------------|----------------------------------|
| A | decreases | decreases |
| B | decreases | increases |
| C | increases | decreases |
| D | increases | increases |

9.3 In one type of lung disease, the alveoli become lined with mucus.

Why does this reduce the rate at which oxygen enters the blood?

- A** It decreases the surface area of the alveoli
- B** It increases the distance between air and blood
- C** The alveoli hold less oxygen
- D** The blood capillaries in the lung become narrower

9.4 Healthy alveoli have many folds. In another type of lung disease, the alveoli lose their folds, as shown in the diagrams.



Why does this reduce the rate at which oxygen enters the blood?

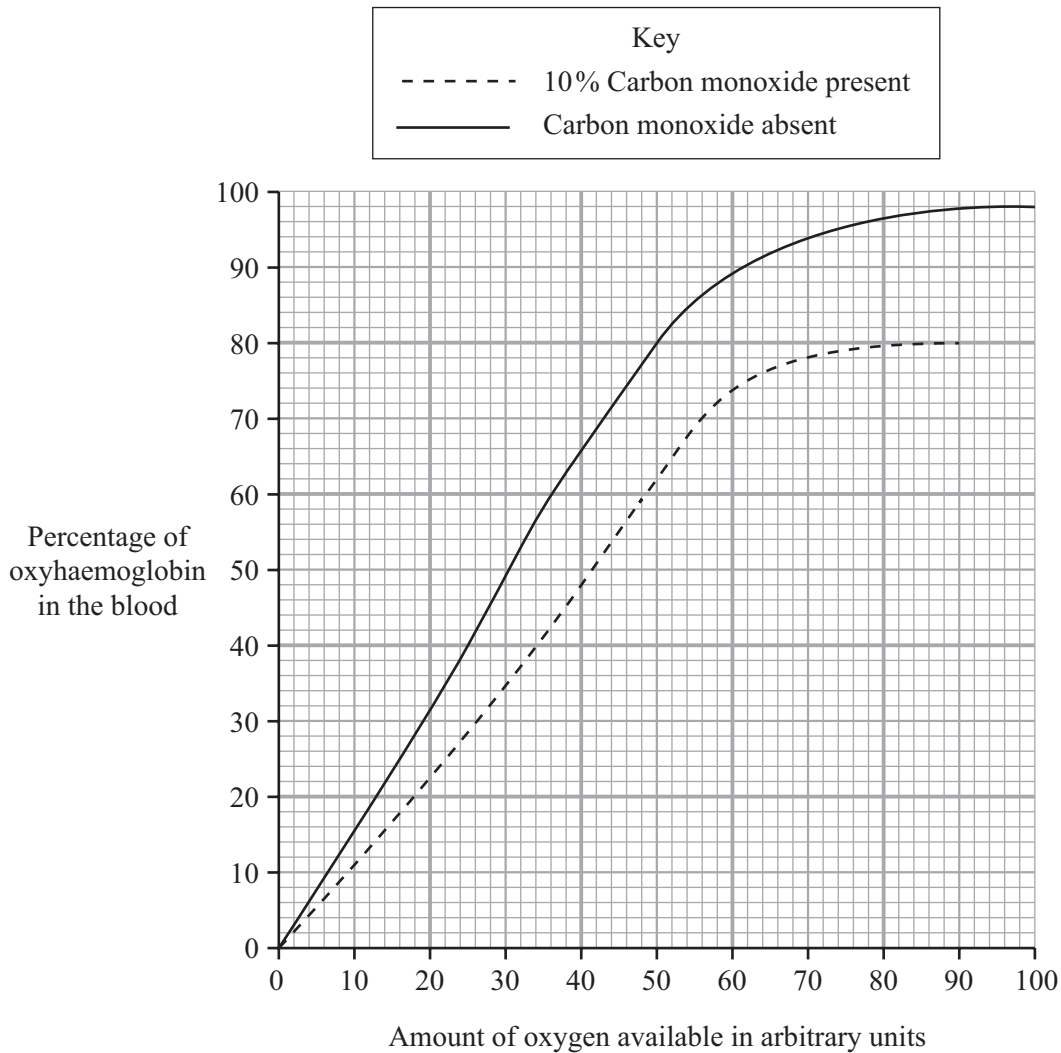
- A** It decreases the surface area of the alveoli
- B** It increases the distance between air and blood
- C** The alveoli hold less oxygen
- D** The blood capillaries in the lung become narrower

Turn over ►

QUESTION TEN

Haemoglobin combines with oxygen in the blood to form oxyhaemoglobin. The amount of oxyhaemoglobin formed is affected by the amount of oxygen available. It is also affected by the presence of other gases such as carbon monoxide.

The graph shows the percentage of oxyhaemoglobin in the blood when different amounts of oxygen are available. The two lines show the percentages of oxyhaemoglobin in the blood when 10% carbon monoxide is present and when carbon monoxide is absent.



10.1 What is the percentage of oxyhaemoglobin in the blood when 10% carbon monoxide is present and 40 arbitrary units of oxygen are available?

- A** 26%
- B** 34%
- C** 48%
- D** 66%

10.2 What happens to the amount of oxyhaemoglobin in the blood when 50 arbitrary units of oxygen are available and 10% carbon monoxide is present in the blood?

- A It falls by 8 units
- B It falls from 80% to 62%
- C It rises from 62 units to 80 units
- D It rises from 50% to 80%

10.3 Oxyhaemoglobin is formed in the

- A digestive system.
- B kidneys.
- C liver.
- D lungs.

10.4 Carbon monoxide combined with haemoglobin forms carboxyhaemoglobin. This does not break down easily.

What is the likely effect on the body of the formation of carboxyhaemoglobin?

- A Less oxygen passes from the blood into the cells
- B Platelets are unable to help clot blood
- C The nuclei in white blood cells are destroyed
- D The plasma would carry more carbon dioxide

END OF TEST

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