

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
June 2006

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

346001



Tuesday 27 June 2006 Morning Session

For this paper you must have:

- a black ball-point pen
- an objective test answer sheet

You may use a calculator.

Time allowed: 30 minutes

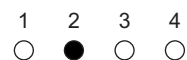
Instructions

- 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.
- Do all rough work in this book, **not** on your answer sheet.

Instructions for recording answers

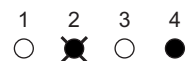
- Use a **black ball-point pen**.

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

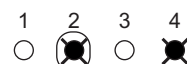


- Do **not** extend beyond the circles.

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



- 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:



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 12 of this booklet.

FOUNDATION TIER

SECTION A

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

In these questions match 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 of the structures in the thorax.

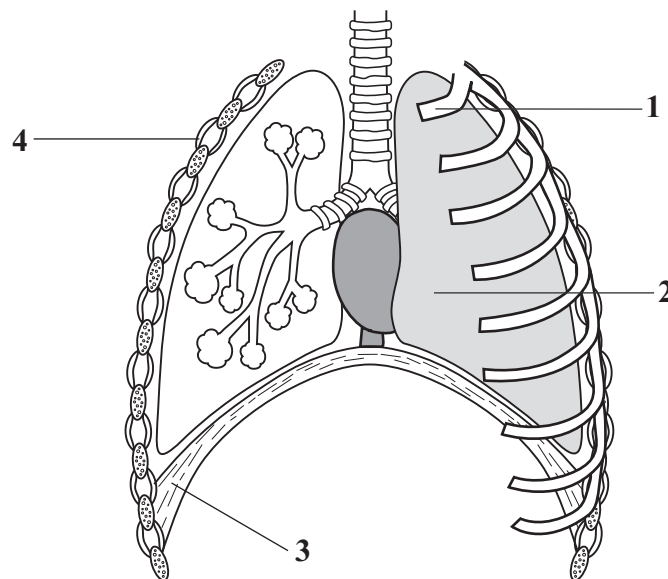
Match words from the list with the labels **1–4** on the diagram.

diaphragm

lung

rib

rib muscle



QUESTION TWO

The diagrams show a human cell and a virus.
(They are **not** drawn to the same scale.)

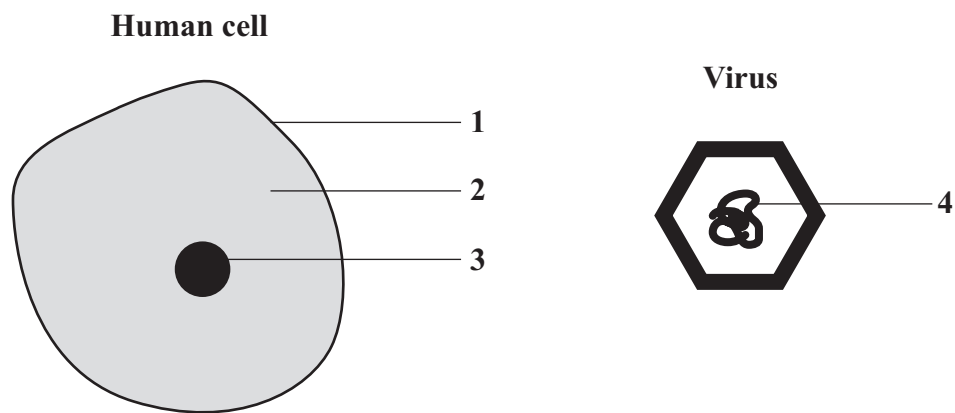
Match words from the list with the labels **1–4** on the diagrams.

cell membrane

cytoplasm

genes

nucleus

**QUESTION THREE**

The table is about the circulatory system.

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

artery

capillary

heart

vein

Part of the body	Feature
1	carries blood away from the organs
2	has thick muscular walls and carries blood to the organs
3	has thin walls to allow diffusion of substances in and out
4	made of muscle to pump blood

Turn over ►

QUESTION FOUR

The table is about some substances in the body.

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

carbon dioxide

hydrochloric acid

mucus

oxygen

Substance	Feature
1	carried in the blood plasma
2	carried in the red blood cells
3	kills bacteria
4	traps microorganisms

QUESTION FIVE

The sentences are about diffusion.

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

faster

higher

lower

zero

Diffusion is the movement of particles from a . . . **1** . . . concentration to a . . . **2** . . . concentration.

The greater the difference in concentration, the . . . **3** . . . the rate of diffusion.

When the concentrations are equal, the rate of diffusion becomes . . . **4**

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.

QUESTION SIX

Which **two** of the following are correct statements about platelets?

- they are fragments of cells**
- they are involved with blood clotting**
- they attack viruses**
- they change shape to trap bacteria**
- they have a nucleus**

QUESTION SEVEN

During digestion, substances are absorbed into the blood.

Which **two** of the following pass from the intestines into the blood?

- fats**
- oxygen**
- proteins**
- sugars**
- water**

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 information is from a box containing breakfast cereal.

	Amount per 100 g
Carbohydrate	83 g
Energy	1800 kJ
Fat	3 g
Protein	6 g

8.1 The recommended daily intake of energy for a young adult male is 12 000 kJ.

A 50 g serving of cereal will provide . . .

- A** 0.075 % of the daily requirement for energy.
- B** 7.5 % of the daily requirement for energy.
- C** 13.3 % of the daily requirement for energy.
- D** 15 % of the daily requirement for energy.

8.2 The amount of protein that a young adult female needs each day is 60 g.

How much cereal would the female have to eat to get this amount of protein?

- A** 10 g
- B** 100 g
- C** 500 g
- D** 1000 g

8.3 During digestion, the starch in the cereal will be broken down into . . .

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

8.4 Starch-digesting enzymes are produced in the . . .

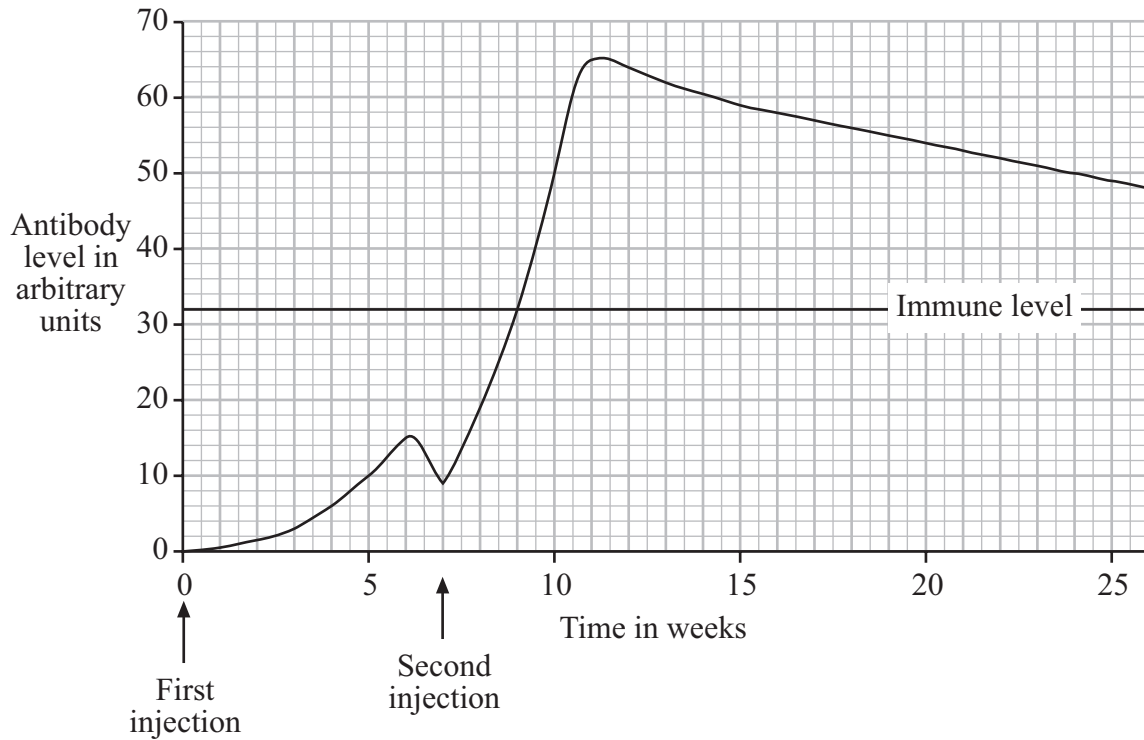
- A pancreas and small intestine.
- B salivary glands only.
- C salivary glands, pancreas and small intestine.
- D small intestine only.

Turn over for the next question

Turn over ►

QUESTION NINE

The graph shows the level of antibodies in a person's blood during the process of immunisation. A first injection was given and then a second injection (booster dose) a few weeks later.



9.1 How long after the second injection did it take to reach the immune level?

- A 1 week
- B 2 weeks
- C 9 weeks
- D 32 weeks

9.2 By how many arbitrary units did the antibody level rise after the second injection?

- A 15
- B 17
- C 56
- D 65

9.3 If the trend in the antibody level continued, what would be the expected level of antibodies in the blood 30 weeks after the first injection?

- A** About 10 arbitrary units
- B** About 15 arbitrary units
- C** About 30 arbitrary units
- D** About 45 arbitrary units

9.4 A long time after the second injection the person is still immune to the bacteria.

This is because . . .

- A** the injections contain live bacteria.
- B** the number of antibodies in the blood stays at a high level.
- C** the white blood cells can rapidly produce antibodies if the bacteria enter the body.
- D** the white blood cells produce antitoxins.

Turn over for the next question

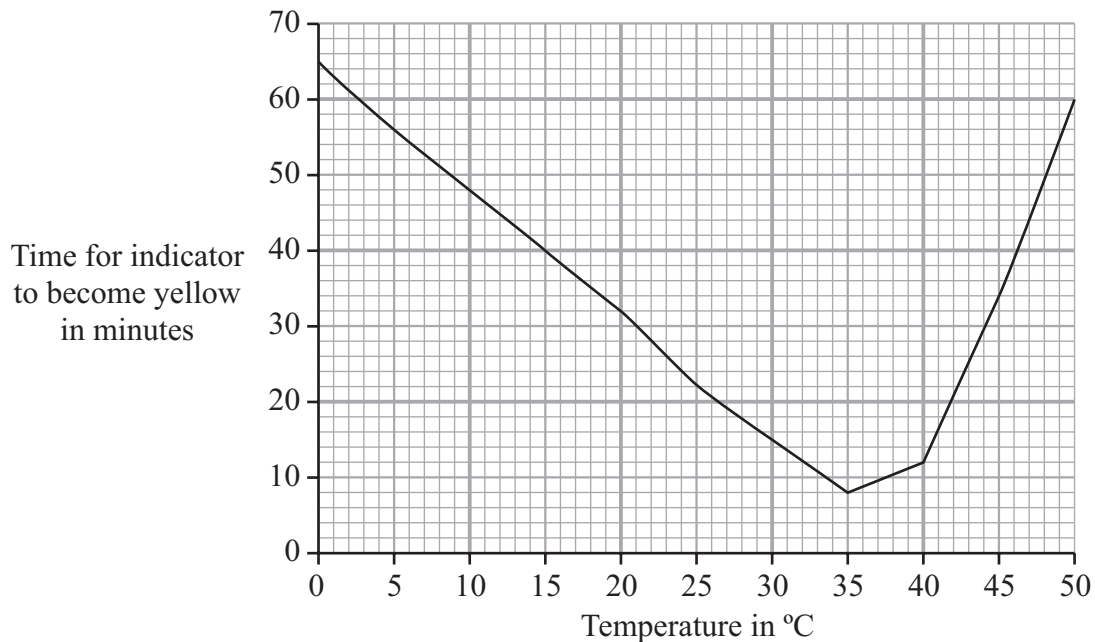
Turn over ►

QUESTION TEN

An investigation was carried out to find out how temperature affects digestion of oils by lipase.

- 5 cm³ of lipase and 2 cm³ of an indicator were put into a test tube.
(The indicator changes colour from red to yellow in acid conditions.)
- 5 cm³ of oil was put into a second test tube.
- Both test tubes were placed in a water bath.
- After 5 minutes the contents of the tubes were mixed and timing was started.
- The test tubes were left in the water bath until the indicator changed to yellow.
(The faster the indicator changes to yellow, the faster the rate of reaction.)
- This was repeated several times at different temperatures.

The graph shows the results.



10.1 At what temperature was the rate of digestion 4 times slower than the rate at 35 °C?

- A 10 °C
- B 15 °C
- C 20 °C
- D 46 °C

10.2 Why does the indicator change colour?

- A Amino acids are produced by the action of lipase on oils.
- B Fatty acids are produced by the action of lipase on oils.
- C The contents of the test tube become alkaline.
- D The oils solidify.

10.3 Lipase enzymes are produced in the . . .

- A mouth and stomach.
- B pancreas and small intestine.
- C stomach and pancreas.
- D stomach and small intestine.

10.4 The digestion of fats and oils occurs more quickly when they have been emulsified.

Emulsifying fats and oils gives them . . .

- A a greater surface area.
- B a high pH.
- C a lower temperature.
- D a smaller mass.

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 words in the list with the numbers.

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QUESTION ONE

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Diffusion is the movement of particles from a . . . **1** . . . concentration to a . . . **2** . . . concentration.

The greater the difference in concentration, the . . . **3** . . . the rate of diffusion.

When the concentrations are equal, the rate of diffusion becomes . . . **4**

QUESTION TWO

A number of substances may be present in the body.

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

bile

protease

protein

toxin

Substance	Feature
1	is a catalyst
2	is an alkaline fluid
3	is an insoluble molecule that can be digested
4	is not normally present in the body

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

During digestion, substances are absorbed into the blood.

Which **two** of the following pass from the intestines into the blood?

fats

oxygen

proteins

sugars

water

QUESTION FOUR

Which **two** of the following are brought about by diffusion?

the movement of blood through the capillaries

the movement of mucus along the trachea

the movement of oxygen from an alveolus into the blood

the movement of sugar from the blood into liver cells

the movement of white blood cells to surround bacteria

Turn over for the next question

Turn over ►

SECTION CQuestions **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 information is from a box containing breakfast cereal.

	Amount per 100 g
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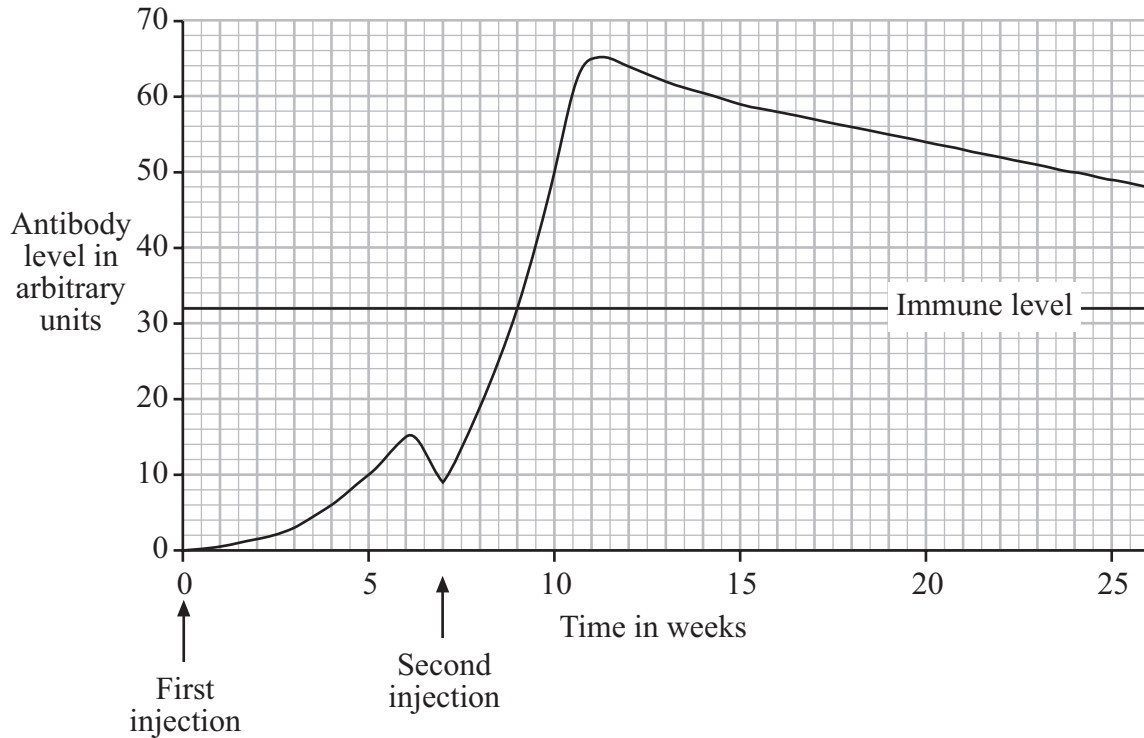
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QUESTION SIX

The graph shows the level of antibodies in a person's blood during the process of immunisation. A first injection was given and then a second injection (booster dose) a few weeks later.



6.1 How long after the second injection did it take to reach the immune level?

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- D** 32 weeks

6.2 By how many arbitrary units did the antibody level rise after the second injection?

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- B** 17
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Turn over for the next question

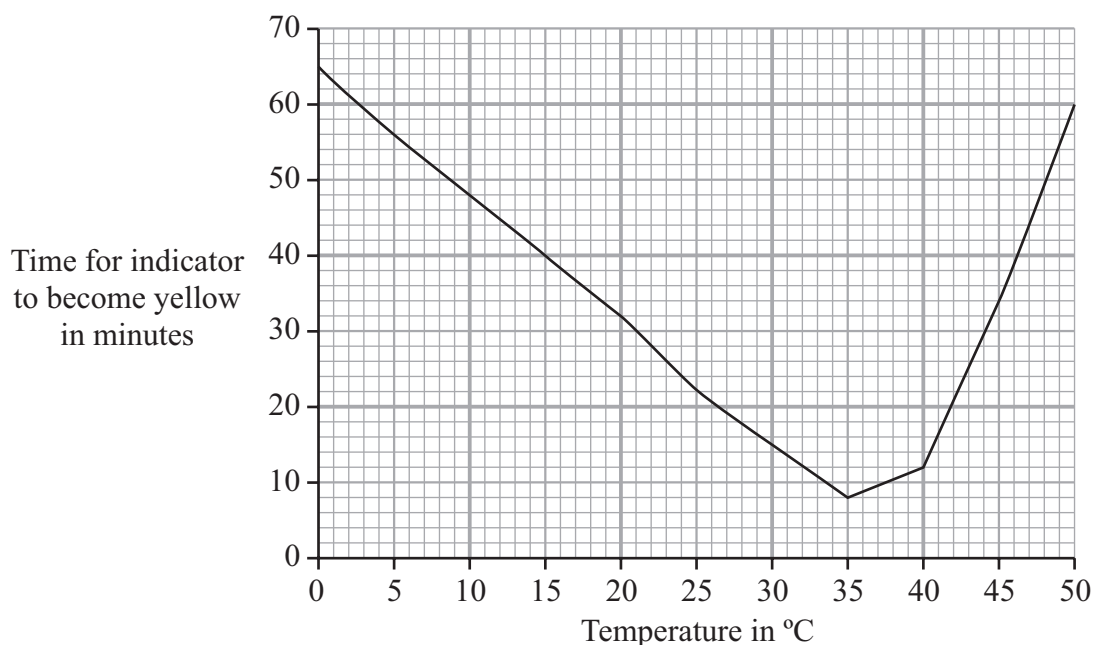
Turn over ►

QUESTION SEVEN

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- D** 46 °C

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Emulsifying fats and oils gives them . . .

- A** a greater surface area.
- B** a high pH.
- C** a lower temperature.
- D** a smaller mass.

Turn over for the next question

Turn over ►

QUESTION EIGHT

Protease enzymes digest boiled egg white.

A student carried out an investigation using two protease enzymes, **P** and **R**.

The results of this investigation are shown in the table.

Enzyme	Time taken for egg white to be digested in minutes		
	in ACID conditions	in NEUTRAL conditions	in ALKALINE conditions
P	20	Egg white not digested after 120 minutes	Egg white not digested after 120 minutes
R	Egg white not digested after 120 minutes	80	40

8.1 Enzyme **R** . . .

- A** works faster in neutral conditions than in alkaline conditions.
- B** works half as fast in alkaline conditions than enzyme **P** does in acid conditions.
- C** works ten times faster in alkaline conditions than enzyme **P** does in acid conditions.
- D** works twice as fast in alkaline conditions than enzyme **P** does in acid conditions.

8.2 Enzymes **P** and **R** are from different regions of the digestive system.

Which of the following are the most likely sites of enzymes **P** and **R**?

- A** Enzyme **P** is produced in the gullet, and enzyme **R** in the large intestine.
- B** Enzyme **P** is produced in the mouth, and enzyme **R** in the stomach.
- C** Enzyme **P** is produced in the stomach, and enzyme **R** in the large intestine.
- D** Enzyme **P** is produced in the stomach, and enzyme **R** in the small intestine.

8.3 The conditions in which enzyme **R** works best are provided by . . .

- A bile.
- B hydrochloric acid.
- C mucus.
- D saliva.

8.4 Absorption of the products from the digestion of the egg white takes place in . . .

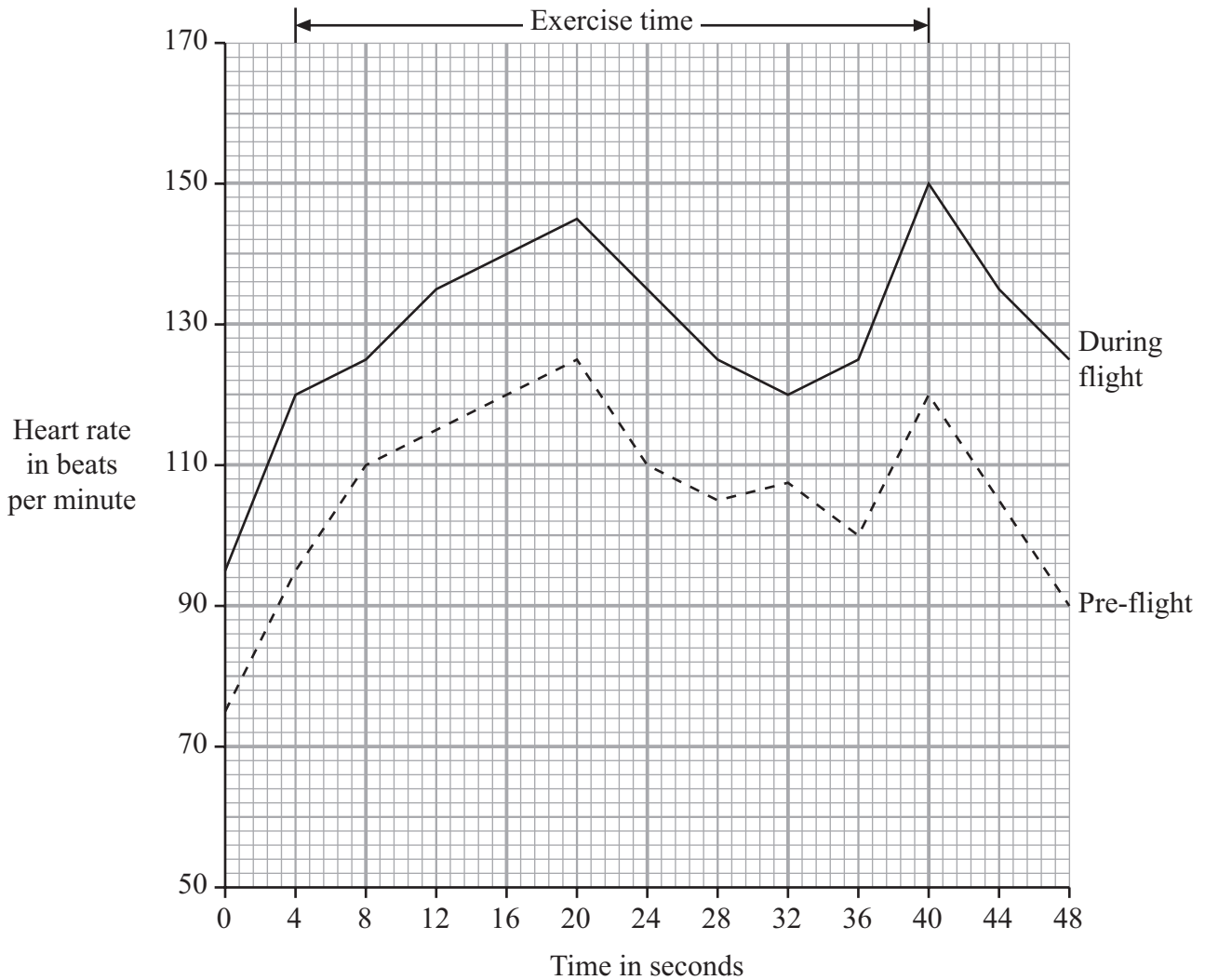
- A the mouth and the stomach.
- B the large intestine.
- C the small intestine.
- D the stomach.

Turn over for the next question

Turn over ►

QUESTION NINE

The heart rate of an astronaut before and during a space flight was recorded. Measurements were taken before, during and after the same amount of exercise. The graph shows the results.



- 9.1** What was the difference between the heart rate pre-flight and the heart rate during the flight, at 36 seconds?
- A** 20 beats per minute
 - B** 25 beats per minute
 - C** 30 beats per minute
 - D** 35 beats per minute

9.2 Which of the following is true of these data?

- A** The heart rate during the flight exercise time peaked at 140 beats per minute.
- B** The heart rate during the pre-flight exercise time peaked at 125 beats per minute.
- C** The heart rate was recorded every minute.
- D** The pre-flight exercise time lasted 40 seconds.

9.3 The increase in heart rate increases the supply of . . .

- A** carbon dioxide to the muscles.
- B** energy to the muscles.
- C** heat to the muscles.
- D** oxygen to the muscles.

9.4 During extended exercise periods, the level of lactic acid in the astronaut's blood rises.

What is the reason for this?

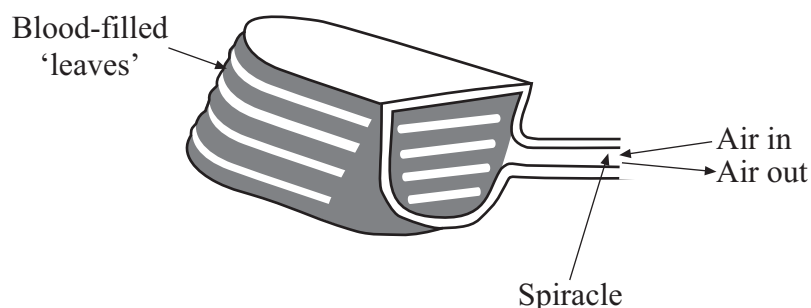
- A** More carbon dioxide is being produced.
- B** The muscle cells are producing carbon dioxide.
- C** The muscle cells are respiring anaerobically.
- D** The muscle cells are using up oxygen rapidly.

Turn over for the next question

Turn over ►

QUESTION TEN

Scorpions have breathing organs called 'book lungs'. These consist of blood-rich tissues arranged like the leaves of a book. Air enters the 'book lungs' through a small opening called a spiracle. Gases can be exchanged between the air and the blood.



10.1 Which of the following will speed up gas exchange between the blood in the 'leaves' and the air around them?

- A Increasing the flow of blood through the 'leaves'
- B Lowering the blood temperature
- C Reducing the number of 'leaves'
- D Reducing the size of the spiracle

10.2 Oxygen passes from the air between the 'leaves' into the blood because . . .

- A carbon dioxide passes into the 'leaves'.
- B the blood is always taking oxygen away from the 'leaves'.
- C the 'leaves' increase the surface area.
- D the spiracles are narrow.

10.3 Oxygen is carried in the blood to the scorpion's muscle cells.

In the muscle cells, the oxygen is used . . .

- A in the cytoplasm to make carbon dioxide.
- B in the cytoplasm to make energy.
- C in the mitochondria to release energy.
- D in the nucleus to make genes.

10.4 Which of the following reactions takes place in the red blood cells, as they pass through the capillaries in the muscles?

A haemoglobin + carbon dioxide \rightarrow oxyhaemoglobin

B haemoglobin + oxygen \rightarrow oxyhaemoglobin

C oxyhaemoglobin \rightarrow haemoglobin + carbon dioxide

D oxyhaemoglobin \rightarrow haemoglobin + oxygen

END OF TEST

There are no questions printed on this page