Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
June 2004

ASSESSMENT and QUALIFICATIONS ALLIANCE

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

Tuesday 29 June 2004 Morning Session

In addition to this paper you will require:
- a black ball-point pen;
- an answer sheet.

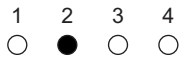
You may use a calculator.

Time allowed: 30 minutes

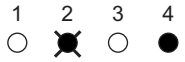
Instructions
- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title "Humans as Organisms" printed on it.
- Attempt **one Tier only**, **either** the Foundation 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

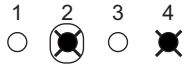
- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:



- 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 the words in the list with the numbers.

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

Mark your choices on the answer sheet.

QUESTION ONE

The drawing shows some of the structures in the thorax.

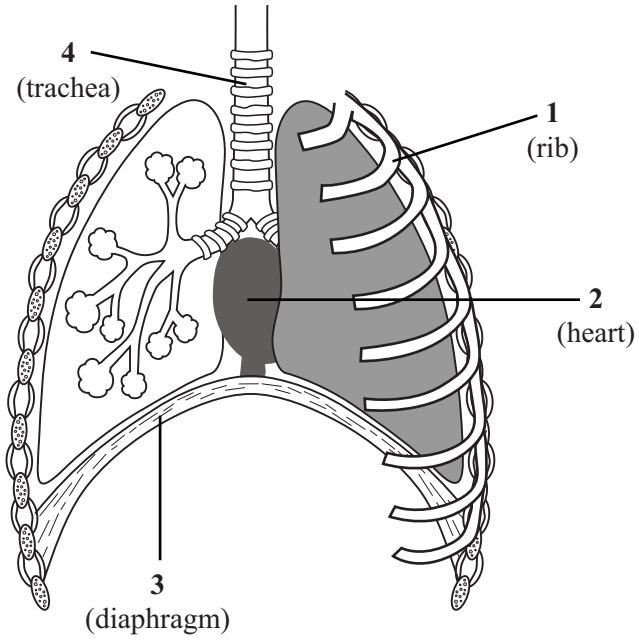
Match words from the list with the labels **1– 4** on the drawing.

carries air in and out of the thorax

protects the lungs

pumps blood around the body

separates the thorax from the abdomen



QUESTION TWO

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

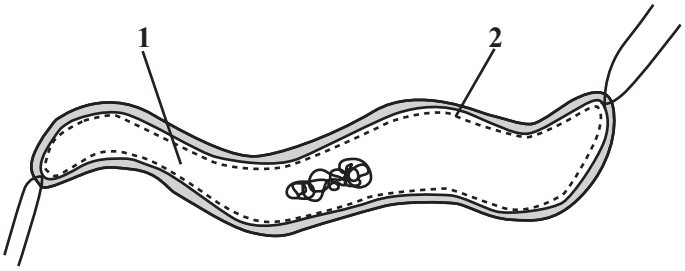
Match words from the list with the labels **1–4** on the diagrams.

controls the entry and exit of substances

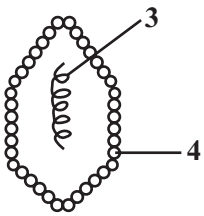
cytoplasm

made of genes

made of protein



Bacterium



Virus

QUESTION THREE

The body can defend itself against microorganisms.

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

hydrochloric acid

mucus

skin

white blood cell

Defence	Activity
1	acts as a barrier
2	produces antitoxins
3	released by the stomach to kill microorganisms in food
4	traps microorganisms in the bronchioles

QUESTION FOUR

The diagram shows a sperm cell. This cell can swim towards an egg.

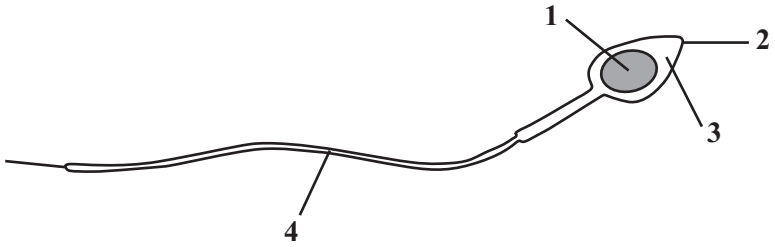
Match words from the list with the labels **1– 4** on the diagram.

cell membrane

controls the activities of the sperm

moves the sperm

where most chemical reactions take place



QUESTION FIVE

The diagram shows part of the digestive system.

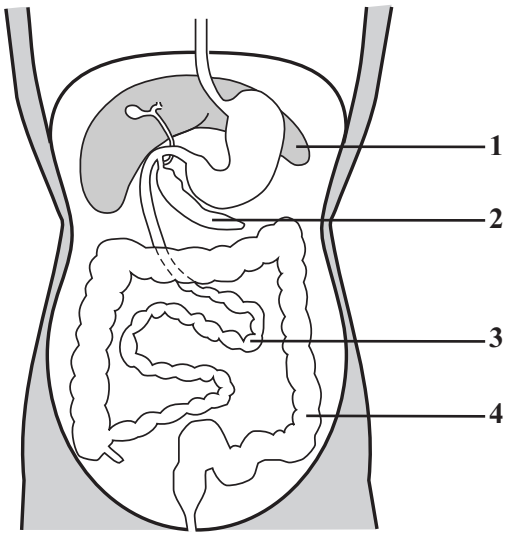
Match words from the list with the labels **1– 4** on the diagram.

produces bile

produces protease but does not absorb food

where digestion of starch takes place

where most water is absorbed



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

Bacteria are microorganisms.

Which **two** of the following are features of bacteria?

cell membrane

cell wall

nucleus

protein coat

reproduce only in living cells

QUESTION SEVEN

Many substances are exchanged at surfaces in the body.

Which **two** of the following provide an increased surface area for absorbing materials?

alveoli

antibodies

bile

ventilation

villi

SECTION C

Questions **EIGHT** to **TEN**.

Each of these questions has four parts.

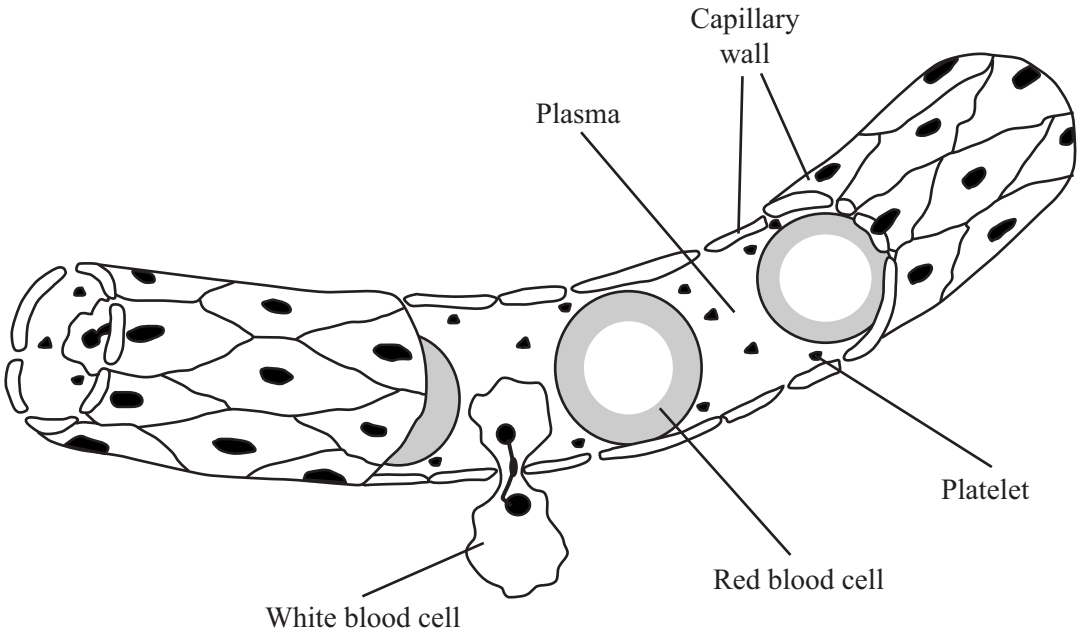
In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION EIGHT

Blood flows through the organs of the body in blood vessels called capillaries.

The drawing shows blood in a capillary.



8.1 Red blood cells transport mainly . . . . .

A antitoxins.

B oxygen.

C sugar.

D urea.

8.2 Plasma transports . . . . .

A most of the carbon dioxide from the lungs to the muscles.

B most of the oxygen from the lungs to the muscles.

C sugars from the small intestine to the muscles.

D urea produced by the kidneys to the liver.

8.3 The white blood cells . . . . .

A ingest microorganisms that have entered the body.

B produce antibodies to counteract the toxins released by microorganisms.

C produce clots that seal cuts.

D transport amino acids to the liver.

8.4 Which of the parts shown in the drawing have a nucleus?

A The cells of the capillary walls only

B The platelets only

C The white blood cells only

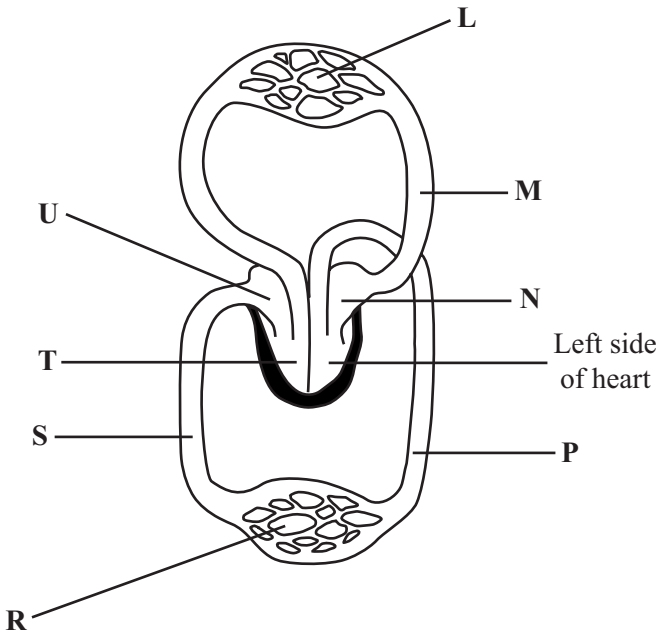
D The white blood cells and capillary wall cells

TURN OVER FOR THE NEXT QUESTION

QUESTION NINE

The circulatory system transports substances round the body.

The diagram shows part of the circulatory system.



9.1 Which of these parts is a ventricle?

A **N**

B **P**

C **R**

D **T**

9.2 Blood vessel **M** is . . . . .

A an artery.

B a bronchus.

C a capillary.

D a vein.

9.3 Carbon dioxide diffuses from the blood into the air at . . . . .

A **L**

B **N**

C **P**

D **R**

9.4 The blood in **S** is . . . . .

A deoxygenated and flowing from **R** to **U**.

B deoxygenated and flowing from **U** to **R**.

C oxygenated and flowing from **R** to **U**.

D oxygenated and flowing from **U** to **R**.

TURN OVER FOR THE NEXT QUESTION

QUESTION TEN

People can be vaccinated against some diseases.

10.1 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.

The table shows the concentration of antibodies in the blood of a person after a first and second injection of vaccine. The first injection was given at the start (0 weeks) and the second injection (booster dose) at a later time during the 12 weeks.
The person was considered to be immune when the antibody concentration exceeded 34 arbitrary units.

Time in weeks	Antibody concentration in arbitrary units
0	0
1	2
2	5
3	15
4	9
5	20
6	50
7	65
8	60
9	58
10	56
11	54
12	52

10.2 It takes a number of weeks after the first injection for the concentration of antibodies to rise above 5 arbitrary units.

This is because . . . . .

A it takes time for the white blood cells to produce the antibodies.

B microorganisms are increasing rapidly in the blood.

C platelets destroy antibodies.

D toxins are being produced to destroy poisons.

10.3 The most likely time when the second injection was given was . . . . .

A during week 2.

B during week 4.

C during week 7.

D during week 12.

10.4 How many weeks after week 12 is it likely to take for the antibody concentration to reach the minimum level for immunity? (Assume the rate of fall of antibody concentration remains constant.)

A 6 weeks after week 12

B 9 weeks after week 12

C 17 weeks after week 12

D 21 weeks after week 12

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 diagram shows part of the digestive system.

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

produces bile

produces protease but does not absorb food

where digestion of starch takes place

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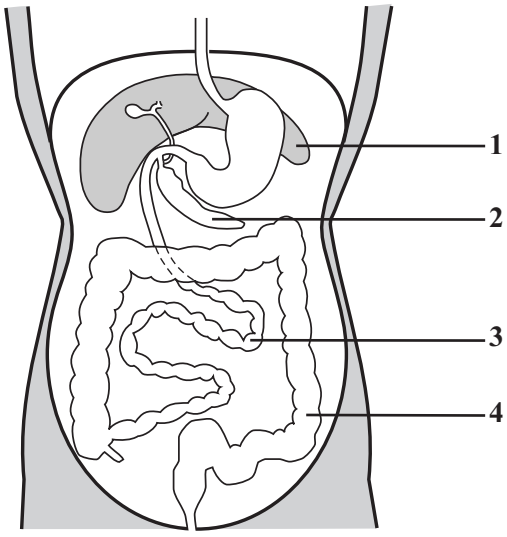


QUESTION TWO

Fat is digested as it passes through the digestive system.

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

gall bladder

liver

small intestine

stomach

Part of digestive system	Activity
1	acidic conditions and lack of lipase prevent fat digestion
2	fatty acids and glycerol produced
3	produces a fluid that emulsifies fat
4	stores an alkaline fluid

TURN OVER FOR THE NEXT QUESTION

NO QUESTIONS APPEAR ON THIS PAGE

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

Many substances are exchanged at surfaces in the body.

Which **two** of the following provide an increased surface area for absorbing materials?

alveoli

antibodies

bile

ventilation

villi

QUESTION FOUR

The breathing system takes air into and out of the body.

Which **two** of the following occur to move air into the breathing system?

the diaphragm moves upwards

the muscles of the diaphragm contract

the pressure in the lungs is lowered

the ribcage moves downwards

the volume of the thorax decreases

SECTION C

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

Each of these questions has four parts.

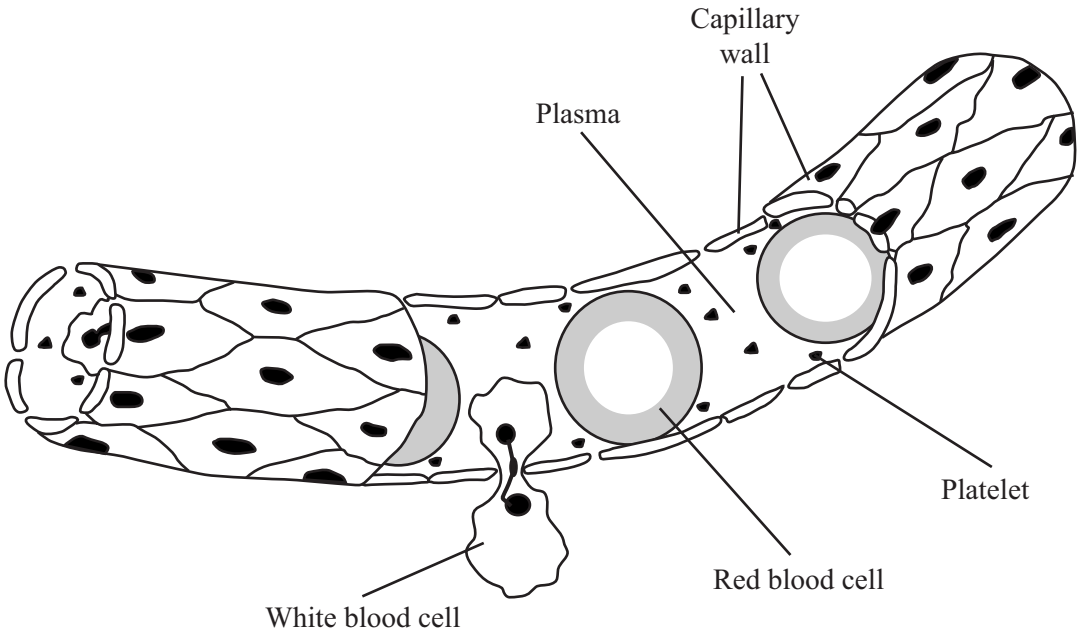
In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION FIVE

Blood flows through the organs of the body in blood vessels called capillaries.

The drawing shows blood in a capillary.



5.1 Red blood cells transport mainly . . . . .

A antitoxins.

B oxygen.

C sugar.

D urea.

5.2 Plasma transports . . . . .

A most of the carbon dioxide from the lungs to the muscles.

B most of the oxygen from the lungs to the muscles.

C sugars from the small intestine to the muscles.

D urea produced by the kidneys to the liver.

5.3 The white blood cells . . . . .

A ingest microorganisms that have entered the body.

B produce antibodies to counteract the toxins released by microorganisms.

C produce clots that seal cuts.

D transport amino acids to the liver.

5.4 Which of the parts shown in the drawing have a nucleus?

A The cells of the capillary walls only

B The platelets only

C The white blood cells only

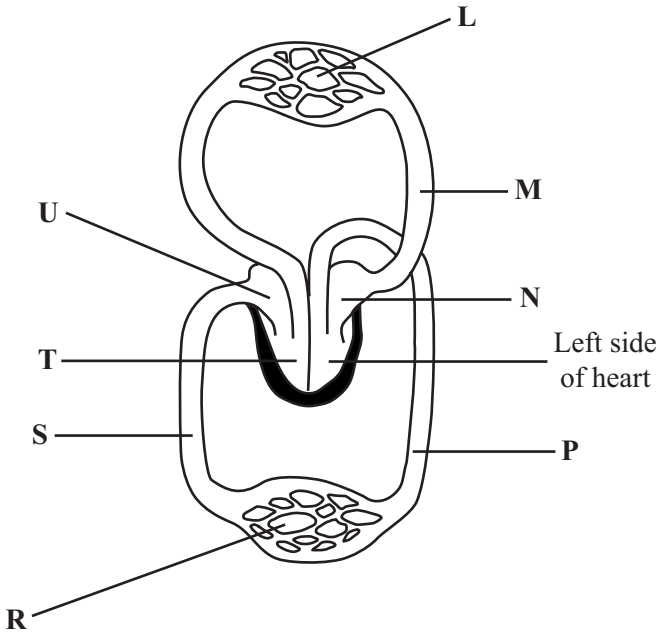
D The white blood cells and capillary wall cells

TURN OVER FOR THE NEXT QUESTION

QUESTION SIX

The circulatory system transports substances round the body.

The diagram shows part of the circulatory system.



6.1 Which of these parts is a ventricle?

A **N**

B **P**

C **R**

D **T**

6.2 Blood vessel **M** is . . . . .

A an artery.

B a bronchus.

C a capillary.

D a vein.

6.3 Carbon dioxide diffuses from the blood into the air at . . . . .

A **L**

B **N**

C **P**

D **R**

6.4 The blood in **S** is . . . . .

A deoxygenated and flowing from **R** to **U**.

B deoxygenated and flowing from **U** to **R**.

C oxygenated and flowing from **R** to **U**.

D oxygenated and flowing from **U** to **R**.

TURN OVER FOR THE NEXT QUESTION

QUESTION SEVEN

People can be vaccinated against some diseases.

7.1 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.

The table shows the concentration of antibodies in the blood of a person after a first and second injection of vaccine. The first injection was given at the start (0 weeks) and the second injection (booster dose) at a later time during the 12 weeks.
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1	2
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7.2 It takes a number of weeks after the first injection for the concentration of antibodies to rise above 5 arbitrary units.

This is because . . . . .

A it takes time for the white blood cells to produce the antibodies.

B microorganisms are increasing rapidly in the blood.

C platelets destroy antibodies.

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7.3 The most likely time when the second injection was given was . . . . .

A during week 2.

B during week 4.

C during week 7.

D during week 12.

7.4 How many weeks after week 12 is it likely to take for the antibody concentration to reach the minimum level for immunity? (Assume the rate of fall of antibody concentration remains constant.)

A 6 weeks after week 12

B 9 weeks after week 12

C 17 weeks after week 12

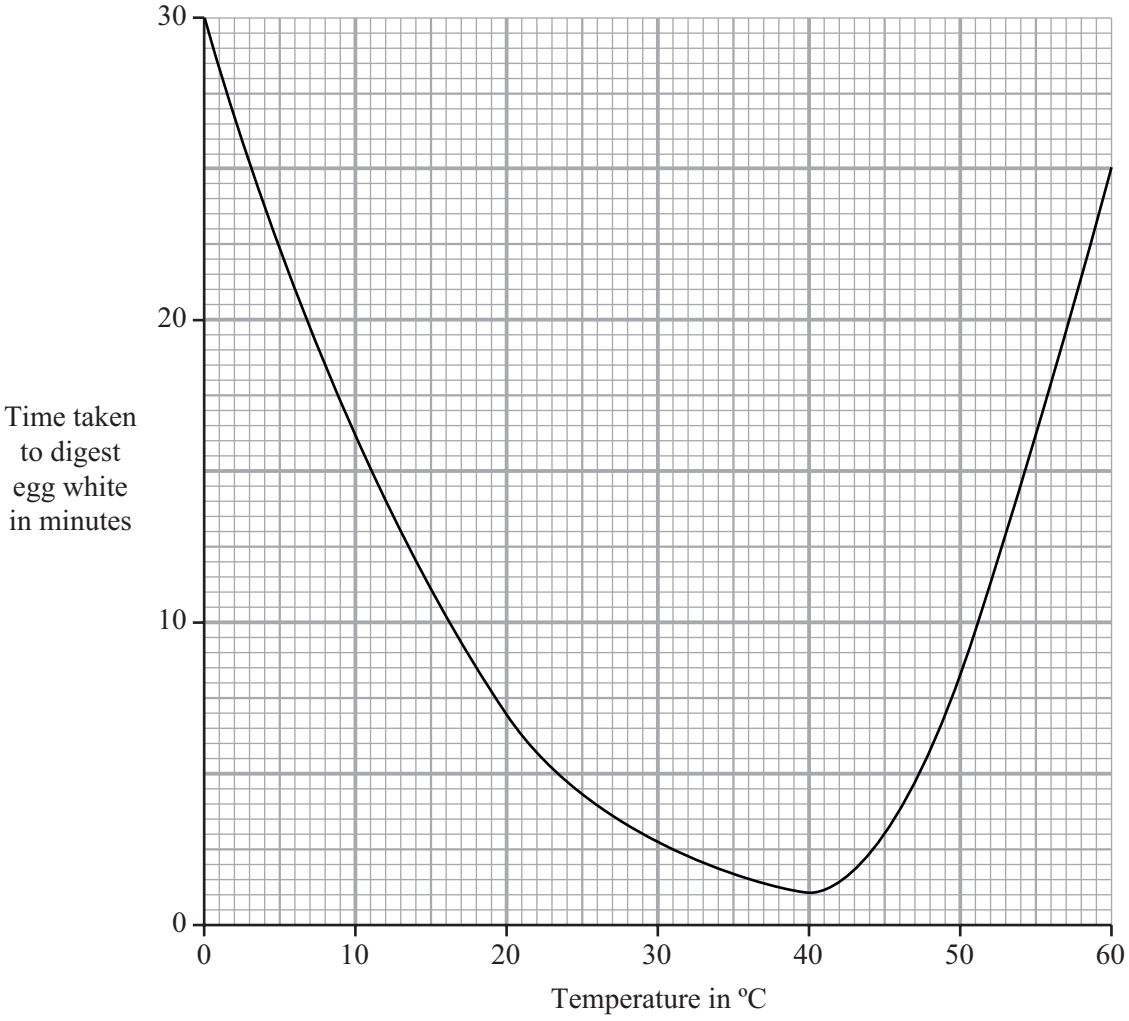
D 21 weeks after week 12

TURN OVER FOR THE NEXT QUESTION

QUESTION EIGHT

Egg white is a protein.
Protease enzymes digest boiled egg white.
In an investigation, equal sized cubes of egg white were placed in tubes containing water.
The tubes were kept at different temperatures ranging from 0 ºC to 60 ºC.
The same volume of protease solution was added to each tube.
The time taken for the egg white to be digested was recorded.

The results are shown in the graph.



8.1 How long would it take for the cube of protein to be digested at 15 ºC?

A 8 minutes

B 10 minutes

C 11 minutes

D 12 minutes

8.2 The cube of protein is digested fastest at . . . . .

A 0 ºC

B 37 ºC

C 40 ºC

D 60 ºC

8.3 Protein is digested by protease enzymes . . . . .

A in acid conditions only.

B in alkaline conditions only.

C in both acid and alkaline conditions.

D in neutral conditions only.

8.4 The cubes of protein had a mass of 1 gram.

What is the rate of digestion of a cube of protein at 20 ºC?

A 0.14 g per minute

B 0.20 g per minute

C 0.35 g per minute

D 14.28 g per minute

QUESTION NINE

The table shows the main gases in both the air breathed in and the air breathed out during a controlled experiment.

Gas	Percentage of gas in air breathed in	Percentage of gas in air breathed out
Nitrogen	79.00	79.00
Oxygen	**X**	14.02
Carbon dioxide	0.04	3.98
Other gases	1.00	3.00
Total	100.00	100.00

9.1 The percentage of oxygen in air breathed in (**X**) is . . . . .

A 19.6%

B 19.96%

C 20.6%

D 21%

9.2 What is the difference between the percentage of carbon dioxide in air breathed in and that in air breathed out?

A 3.58

B 3.94

C 4.02

D 4.38

9.3 Why is the nitrogen content of the air not changed by the body?

A In the alveoli, nitrogen diffuses out of the blood at the same rate as it diffuses into the blood

B Nitrogen cannot diffuse into the blood

C Nitrogen is poisonous to white blood cells

D Nitrogen reacts with haemoglobin in red blood cells

9.4 Energy from respiration is needed . . . . .

A to break down sugars.

B to make enzymes.

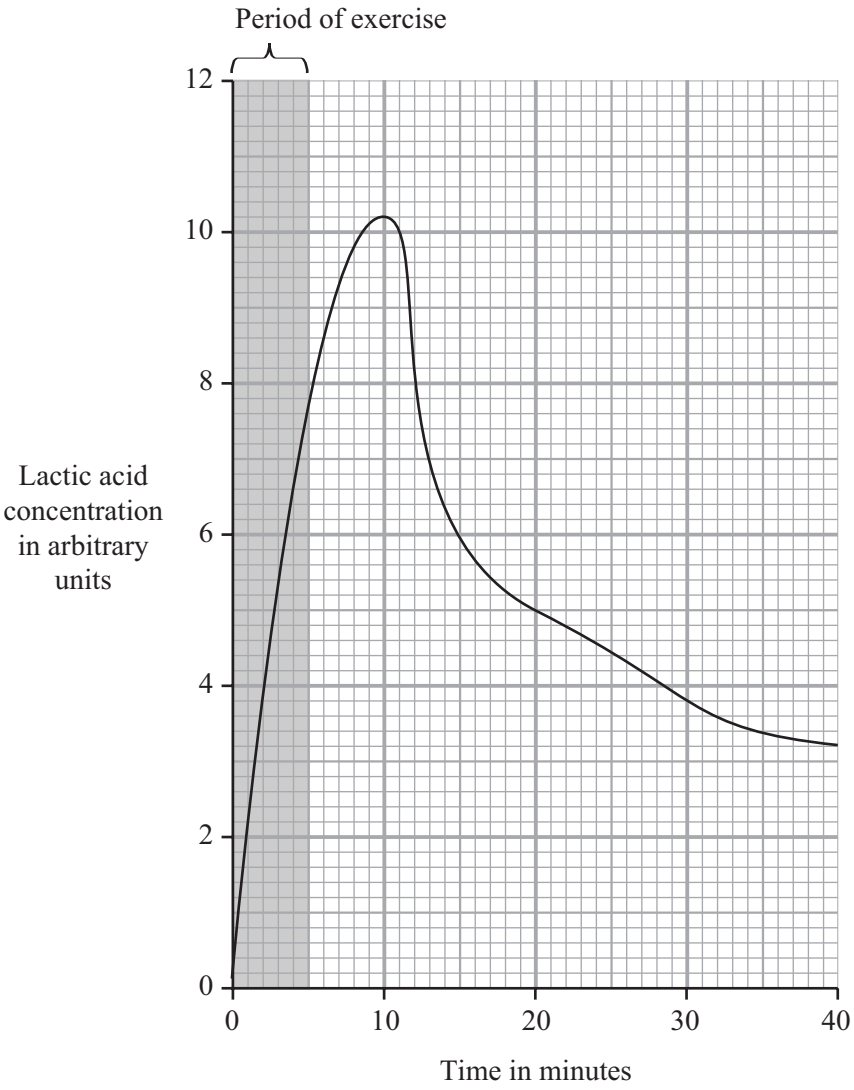
C to make lactic acid.

D to make oxygen diffuse into the blood.

TURN OVER FOR THE NEXT QUESTION

QUESTION TEN

The graph shows the concentration of lactic acid in a person's blood during and after a period of exercise.



10.1 The concentration of lactic acid in the blood rises during exercise.

How much higher does it rise after the period of exercise has ended?

A 2.4 arbitrary units

B 7.0 arbitrary units

C 7.6 arbitrary units

D 10.2 arbitrary units

10.2 The concentration of lactic acid in the blood continues to rise after the period of exercise because . . . . .

A anaerobic respiration continues in the blood.

B a person does not breathe during vigorous exercise.

C blood continues to flow through the muscles.

D the muscles have run out of glucose for aerobic respiration.

10.3 How long, after the period of exercise ended, did it take for the lactic acid concentration to fall to 3.5 arbitrary units?

A 18 minutes

B 23 minutes

C 28 minutes

D 33 minutes

10.4 The concentration of lactic acid in the blood falls because the lactic acid is . . . . .

A carried out of the lungs in the oxygen debt.

B oxidised to carbon dioxide and water.

C stored in the muscles.

D used in anaerobic respiration.

END OF TEST

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE