

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
Spring 2004



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

346001

Wednesday 3 March 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:

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

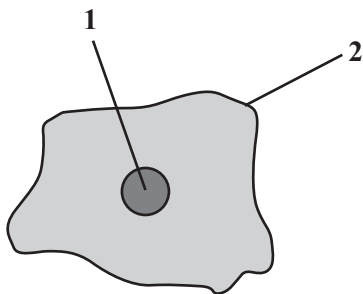
Match words from the list with the labels **1–4** on the diagrams.

cell membrane

cell wall

cytoplasm

nucleus



Human cell



Bacterium

QUESTION TWO

The table is about parts of the breathing system.

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

alveoli

diaphragm

ribcage

windpipe

Part	Description
1	carries air from the throat to the lungs
2	flattens to make air move into the lungs
3	protects the lungs
4	where carbon dioxide leaves the blood

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION THREE

The drawing shows the parts of human blood.

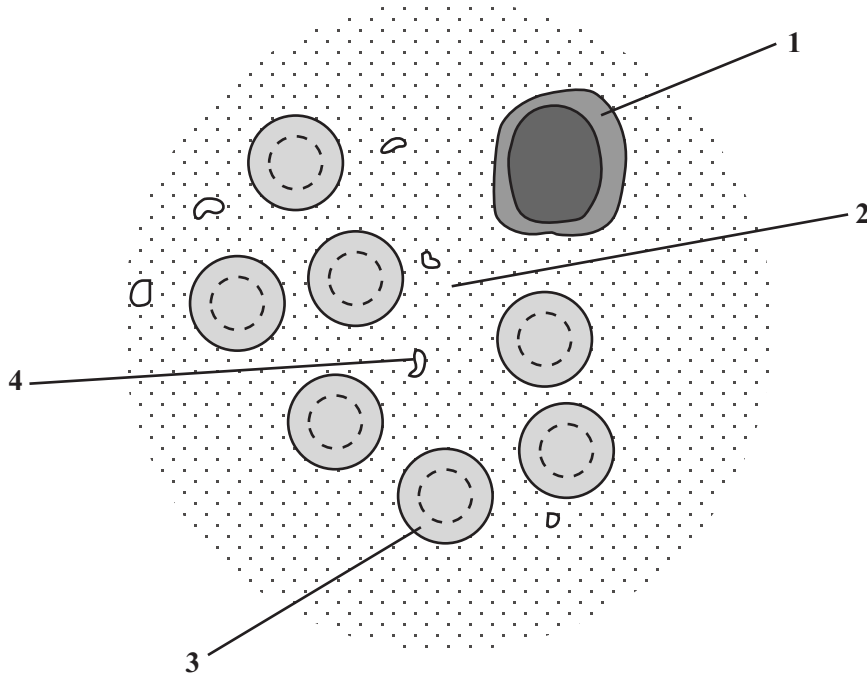
Match words from the list with the parts 1–4 on the drawing.

plasma

platelet

red blood cell

white blood cell



QUESTION FOUR

The body has several ways of defending itself against the entry of bacteria.

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

acid

blood clot

sticky mucus

the skin

Feature	Way of defending the body
1	kills most bacteria taken in with food
2	prevents bacteria entering a cut
3	prevents soil bacteria entering the body when heading a muddy football
4	prevents most bacteria reaching the alveoli

QUESTION FIVE

The table is about substances released into the digestive system.

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

amylase

bile

lipase

protease

Substance	Part played by substance
1	breaks down fat into fatty acids and glycerol
2	breaks down protein into amino acids
3	breaks down starch into sugar
4	neutralises acid

Turn over ►

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 SIX

Viruses are a type of microorganism.

Which **two** of the following are features of viruses?**cell membrane****cell wall****cytoplasm****protein coat****reproduce only in living cells****QUESTION SEVEN**

Plasma is part of the blood.

Which **two** of the following are carried by plasma?**bile****hydrochloric acid****lipase****sugar****urea**

NO QUESTIONS APPEAR ON THIS PAGE

TURN OVER FOR THE NEXT QUESTION

Turn over ►

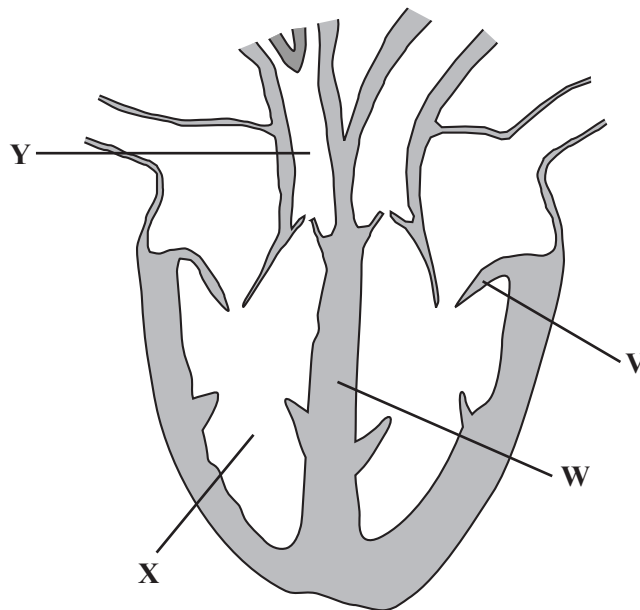
SECTION CQuestions **EIGHT** to **TEN**.

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 a section through the heart.

**8.1** Blood vessel **Y** is an artery because

- A** it branches into two blood vessels.
- B** it carries blood to the heart.
- C** it has a valve.
- D** it leads from a ventricle.

8.2 Part **X** is a ventricle. Ventricles

- A** are always on the right side of the heart.
- B** collect blood from the lungs.
- C** pump blood out of the heart.
- D** pump blood to an atrium.

- 8.3** The function of valve **V** is to
- A** allow the atrium to fill with blood before it contracts.
 - B** keep blood flowing smoothly to the tissues.
 - C** prevent blood from the lungs mixing with blood from the tissues.
 - D** stop blood returning to the atrium when the ventricle contracts.
- 8.4** The function of structure **W** is to
- A** allow pressure in the ventricles to build up gradually.
 - B** keep the pressure in both ventricles the same.
 - C** make blood flow in one direction only.
 - D** prevent oxygenated and deoxygenated blood mixing.

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION NINE

The table shows the volume of blood flowing through various parts of the body at rest and during exercise.

Part of body	Volume of blood flowing in cm ³ per minute		
	At rest	Light exercise	Vigorous exercise
Heart muscle	250	350	1000
Muscles attached to skeleton	1200	4500	22000
Kidneys	1100	900	250
Digestive system	1400	1100	300
Skin	500	1500	600
Brain	750	750	750
Rest of body	600	400	600
TOTAL	5800	9500	X

9.1 Which part of the body has the greatest blood flow at rest?

- A The digestive system
- B The heart muscle
- C The kidneys
- D The muscles attached to the skeleton

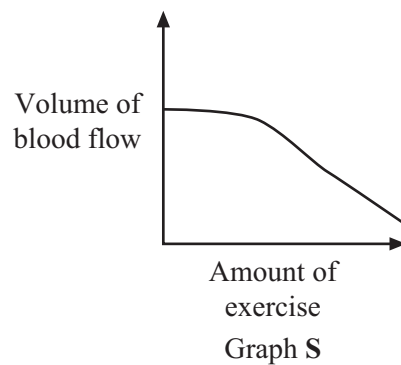
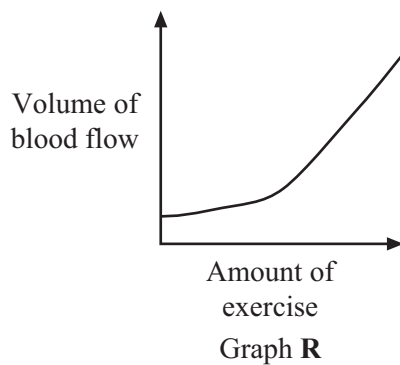
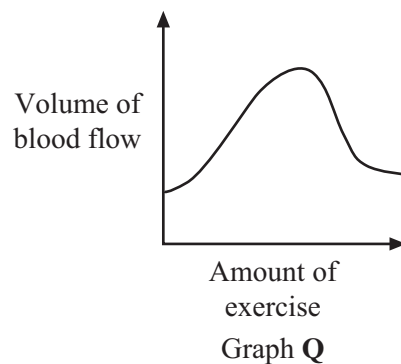
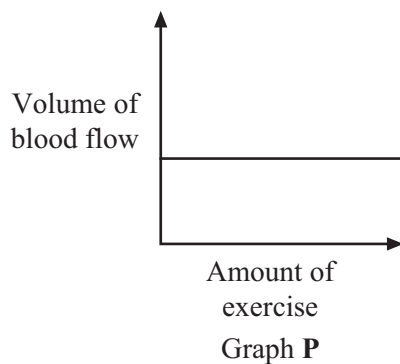
9.2 In which part of the body is blood flow **not** affected by exercise?

- A The brain
- B The heart muscle
- C The kidneys
- D The skin

9.3 The total volume of blood flowing during vigorous exercise (**X**) is

- A 5 700 cm³ per minute
- B 15 300 cm³ per minute
- C 25 500 cm³ per minute
- D 40 800 cm³ per minute

9.4 The graphs, **P**, **Q**, **R** and **S**, show how the blood flow through different organs changes as the exercise increases. (The graphs are not drawn to the same scale.)



Which graph is most likely to show the change in blood flow through the skin as the exercise increases?

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

Turn over ►

QUESTION TEN

The table shows some of the components in human and cow's milk.

Component	Amount per 100 g of milk	
	Human milk	Cow's milk
Protein	1.3 g	3.5 g
Fat	4.1 g	3.8 g
Sugar	7.2 g	4.7 g
Water	87.1 g	87.6 g
Energy	300kJ	274kJ

10.1 The recommended daily intake of energy for a 3 month old baby is 2100 kJ.

What fraction of the daily recommended intake will be provided by 100 g of human milk?

- A $\frac{1}{50}$ (2%)
- B $\frac{1}{8}$ (12.5%)
- C $\frac{1}{7}$ (14.3%)
- D $\frac{1}{2}$ (50%)

10.2 The recommended daily intake of protein for a 3 year old child is 42 grams.

How much cow's milk would provide this protein?

- A 12 g
- B 87.6 g
- C 1200 g
- D 3230 g

10.3 What percentage of the fat in human milk would have to be removed in order to reduce its fat content to that of cow's milk?

- A 0.3%
- B 7.3%
- C 7.9%
- D 92.6%

10.4 When you drink milk, the fat in it is

- A digested by bile released into the small intestine.
- B digested by bile released into the stomach.
- C emulsified by bile released into the small intestine.
- D emulsified by bile released into the stomach.

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 table is about substances released into the digestive system.

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

amylase

bile

lipase

protease

Substance	Part played by substance
1	breaks down fat into fatty acids and glycerol
2	breaks down protein into amino acids
3	breaks down starch into sugar
4	neutralises acid

QUESTION TWO

Red cells are important components of the blood.

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

lungs

muscle

nucleus

pigment

Red blood cells differ from white blood cells because they contain a red **1**

Red blood cells do not have a **2**

Oxyhaemoglobin is formed as blood passes through the **3**

Oxyhaemoglobin is split up into haemoglobin and oxygen in an active **4**

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

Plasma is part of the blood.

Which **two** of the following are carried by plasma?

bile

hydrochloric acid

lipase

sugar

urea

QUESTION FOUR

The diagram shows a cell from the lining of the small intestine.
This cell moves digested materials, such as sugars, into the blood.

Which **two** parts of the cell are directly involved with this process?

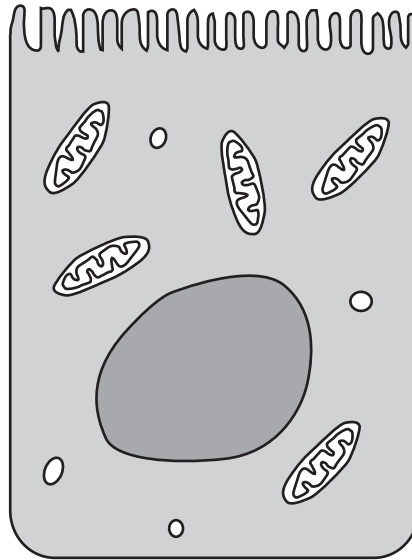
cell membrane

cell wall

genes

mitochondria

protein coat



TURN OVER FOR THE NEXT QUESTION

Turn over ►

SECTION CQuestions **FIVE** to **TEN**.

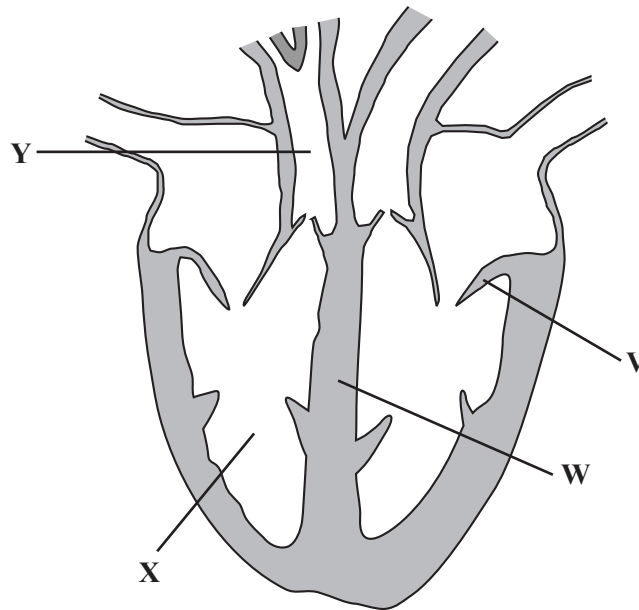
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

QUESTION FIVE

The diagram shows a section through the heart.

**5.1** Blood vessel **Y** is an artery because

- A** it branches into two blood vessels.
- B** it carries blood to the heart.
- C** it has a valve.
- D** it leads from a ventricle.

5.2 Part **X** is a ventricle. Ventricles

- A** are always on the right side of the heart.
- B** collect blood from the lungs.
- C** pump blood out of the heart.
- D** pump blood to an atrium.

- 5.3** The function of valve **V** is to
- A** allow the atrium to fill with blood before it contracts.
 - B** keep blood flowing smoothly to the tissues.
 - C** prevent blood from the lungs mixing with blood from the tissues.
 - D** stop blood returning to the atrium when the ventricle contracts.
- 5.4** The function of structure **W** is to
- A** allow pressure in the ventricles to build up gradually.
 - B** keep the pressure in both ventricles the same.
 - C** make blood flow in one direction only.
 - D** prevent oxygenated and deoxygenated blood mixing.

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION SIX

The table shows the volume of blood flowing through various parts of the body at rest and during exercise.

Part of body	Volume of blood flowing in cm ³ per minute		
	At rest	Light exercise	Vigorous exercise
Heart muscle	250	350	1000
Muscles attached to skeleton	1200	4500	22000
Kidneys	1100	900	250
Digestive system	1400	1100	300
Skin	500	1500	600
Brain	750	750	750
Rest of body	600	400	600
TOTAL	5800	9500	X

6.1 Which part of the body has the greatest blood flow at rest?

- A The digestive system
- B The heart muscle
- C The kidneys
- D The muscles attached to the skeleton

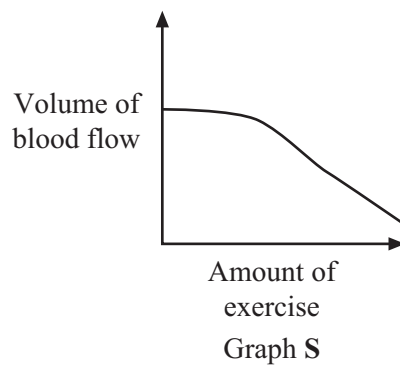
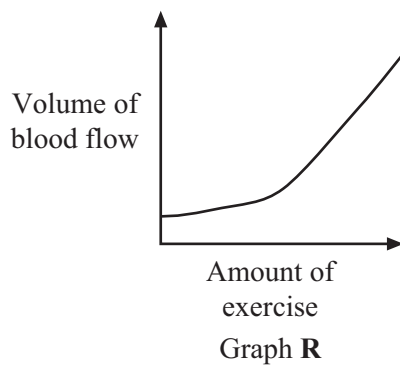
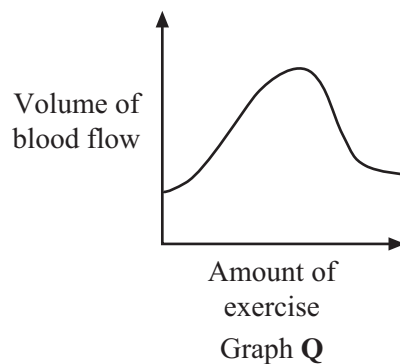
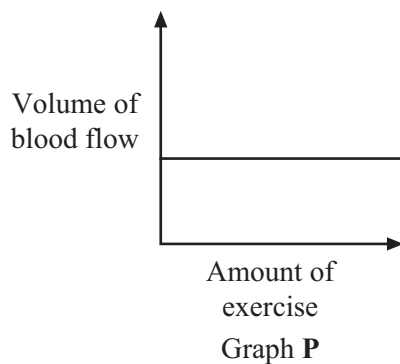
6.2 In which part of the body is blood flow **not** affected by exercise?

- A The brain
- B The heart muscle
- C The kidneys
- D The skin

6.3 The total volume of blood flowing during vigorous exercise (**X**) is

- A 5 700 cm³ per minute
- B 15 300 cm³ per minute
- C 25 500 cm³ per minute
- D 40 800 cm³ per minute

6.4 The graphs, **P**, **Q**, **R** and **S**, show how the blood flow through different organs changes as the exercise increases. (The graphs are not drawn to the same scale.)



Which graph is most likely to show the change in blood flow through the skin as the exercise increases?

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

Turn over ►

QUESTION SEVEN

The table shows some of the components in human and cow's milk.

Component	Amount per 100 g of milk	
	Human milk	Cow's milk
Protein	1.3 g	3.5 g
Fat	4.1 g	3.8 g
Sugar	7.2 g	4.7 g
Water	87.1 g	87.6 g
Energy	300kJ	274kJ

7.1 The recommended daily intake of energy for a 3 month old baby is 2100 kJ.

What fraction of the daily recommended intake will be provided by 100 g of human milk?

- A $\frac{1}{50}$ (2%)
- B $\frac{1}{8}$ (12.5%)
- C $\frac{1}{7}$ (14.3%)
- D $\frac{1}{2}$ (50%)

7.2 The recommended daily intake of protein for a 3 year old child is 42 grams.

How much cow's milk would provide this protein?

- A 12 g
- B 87.6 g
- C 1200 g
- D 3230 g

- 7.3** What percentage of the fat in human milk would have to be removed in order to reduce its fat content to that of cow's milk?
- A** 0.3%
 - B** 7.3%
 - C** 7.9%
 - D** 92.6%
- 7.4** When you drink milk, the fat in it is
- A** digested by bile released into the small intestine.
 - B** digested by bile released into the stomach.
 - C** emulsified by bile released into the small intestine.
 - D** emulsified by bile released into the stomach.

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION EIGHT

Many chemical reactions occur in the human body.

- 8.1** Where in a cell does aerobic respiration take place?
- A Cell membrane
 - B Cytoplasm
 - C Mitochondria
 - D Nucleus
- 8.2** Which activity does **not** require energy from respiration?
- A Active transport of glucose into a cell
 - B Building proteins from amino acids
 - C Diffusion of carbon dioxide out of a cell
 - D Replacing heat lost to colder surroundings
- 8.3** Anaerobic respiration in cells
- A occurs only in alveoli.
 - B occurs when the concentration of oxygen in muscle cells is high.
 - C produces carbon dioxide.
 - D releases less energy than aerobic respiration.
- 8.4** Which of the statements about chemical reactions in the body is **not** true?
- A Some are controlled by enzymes
 - B Some occur in the cytoplasm
 - C They may need acid conditions
 - D They only occur inside cells

QUESTION NINE

Measles is an infectious disease caused by a virus.

Vaccination has reduced the number of children who catch measles.

9.1 Measles vaccine contains

- A** antibodies.
- B** antitoxins.
- C** dead bacteria.
- D** weakened virus.

9.2 In the body the vaccine stimulates

- A** blood cells to form clots around the vaccine.
- B** red blood cells to carry more oxygen to the tissues.
- C** white blood cells to ingest the vaccine.
- D** white blood cells to make new antibodies.

9.3 If a child catches measles and then recovers, that child will not catch measles again because

- A** the child can be vaccinated.
- B** the virus can no longer enter the body.
- C** white cells will quickly produce the same antibodies again.
- D** white cells will surround the virus.

9.4 Measles virus is different from a bacterium because

- A** it cannot reproduce outside an organism.
- B** it has a nucleus.
- C** it has a thick cell wall.
- D** it has no genes.

Turn over ►

QUESTION TEN

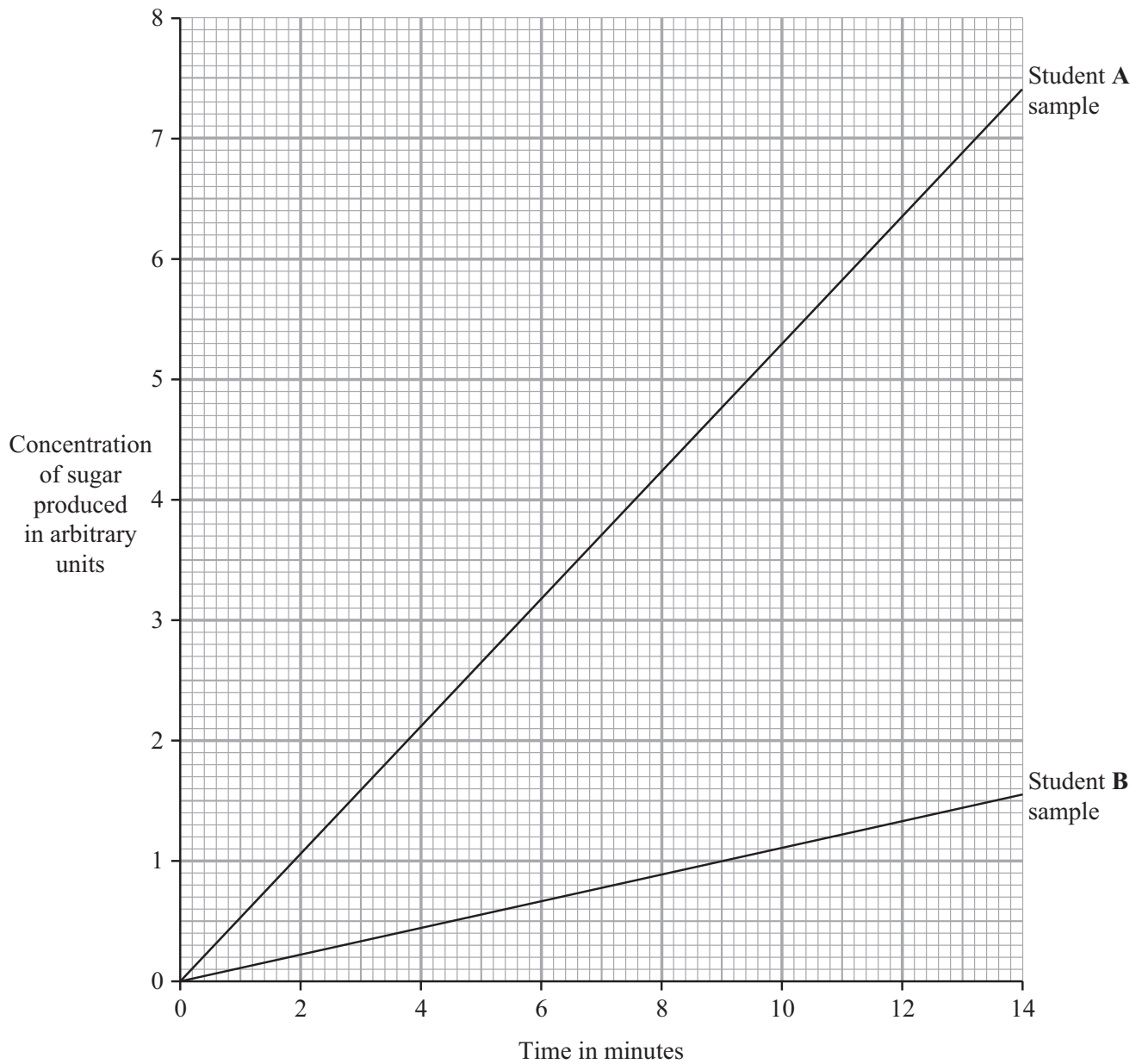
An investigation was carried out to compare the effectiveness of samples of saliva on the breakdown of starch. Saliva samples, of equal volume, were collected from Student **A** and Student **B**.

The saliva samples and two tubes containing 10 cm³ of starch solution were kept in a water bath at 40°C for 20 minutes.

Each saliva sample was then added to a tube containing starch solution and the mixtures were kept in the water bath.

The concentration of sugar produced was measured every two minutes for 14 minutes.

The results are shown in the graph.



- 10.1** After 10 minutes the difference in the concentration of sugar between the two samples was
- A 4.2 arbitrary units.
 - B 5.3 arbitrary units.
 - C 5.9 arbitrary units.
 - D 6.4 arbitrary units.
- 10.2** The rate of production of sugar by the saliva from student **B** was
- A 0.11 arbitrary units per minute.
 - B 0.53 arbitrary units per minute.
 - C 1.89 arbitrary units per minute.
 - D 52.8 arbitrary units per minute.
- 10.3** What is the most likely reason for the difference in the rate of sugar production in the two samples?
- A Student **A**'s saliva contains a higher concentration of amylase than student **B**'s saliva
 - B Student **A**'s sample had been kept at a warmer temperature
 - C Student **B**'s saliva used up the starch more rapidly
 - D The temperature of the water bath was too low for amylase to work effectively
- 10.4** What conditions should be used to break down starch in an experiment like this if enzymes from the pancreas were used instead of saliva?
- A Bile should be added
 - B The mixture should be made more acidic
 - C The mixture should be made more alkaline
 - D No change in conditions should be made

END OF TEST

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE