

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
Spring 2004



**SCIENCE: SINGLE AWARD (MODULAR)
Life and Living Processes (Module 13)**

346013

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 “Life and Living Processes” 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 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 diagrams show a human cell and a bacterium.
(The diagrams are not drawn to the same scale.)

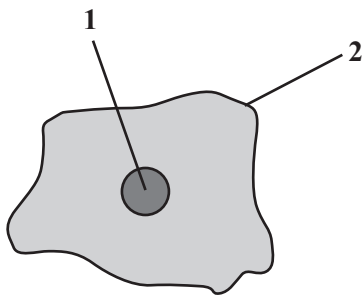
Match words from the list with the labels **1–4** on the diagrams.

cell membrane

cell wall

cytoplasm

nucleus



Human cell



Bacterium

QUESTION TWO

The table is about the receptors we use when we have a meal in a restaurant.

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

eye

nose

skin

tongue

Structure	Contains receptors which allow a human to
1	detect the smell of food
2	feel how warm a plate is
3	read the menu
4	taste food

QUESTION THREE

Waste materials are produced by the body.

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

amino acids

liver

lungs

urine

Waste carbon dioxide is removed from the body through the **1**

Urea is made in the **2**

This urea is made from excess **3**

Urea is removed from the blood in the kidneys and then stored in the bladder as **4**

Turn over ►

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

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**

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

A student visited an optician for an eyesight test.

During the test the optician shone a light into the student's eye and looked inside his eye for any sign of disease.

8.1 Which is the transparent layer that allows light into the eye?

- A Cornea
- B Iris
- C Retina
- D Sclera

8.2 Which is the layer at the back of the eye that the optician was checking for disease?

- A Iris
- B Pupil
- C Retina
- D Sclera

8.3 When the optician shone the light into the student's eye, there was a change in the size of the

- A ciliary muscles and suspensory ligaments.
- B cornea and sclera.
- C iris and pupil.
- D retina and optic nerve.

8.4 The student did not need glasses. The parts that produce the image on the retina were working correctly.

These parts are the

- A** brain and optic nerve.
- B** cornea and lens.
- C** iris and pupil.
- D** sensory neurones and motor neurones.

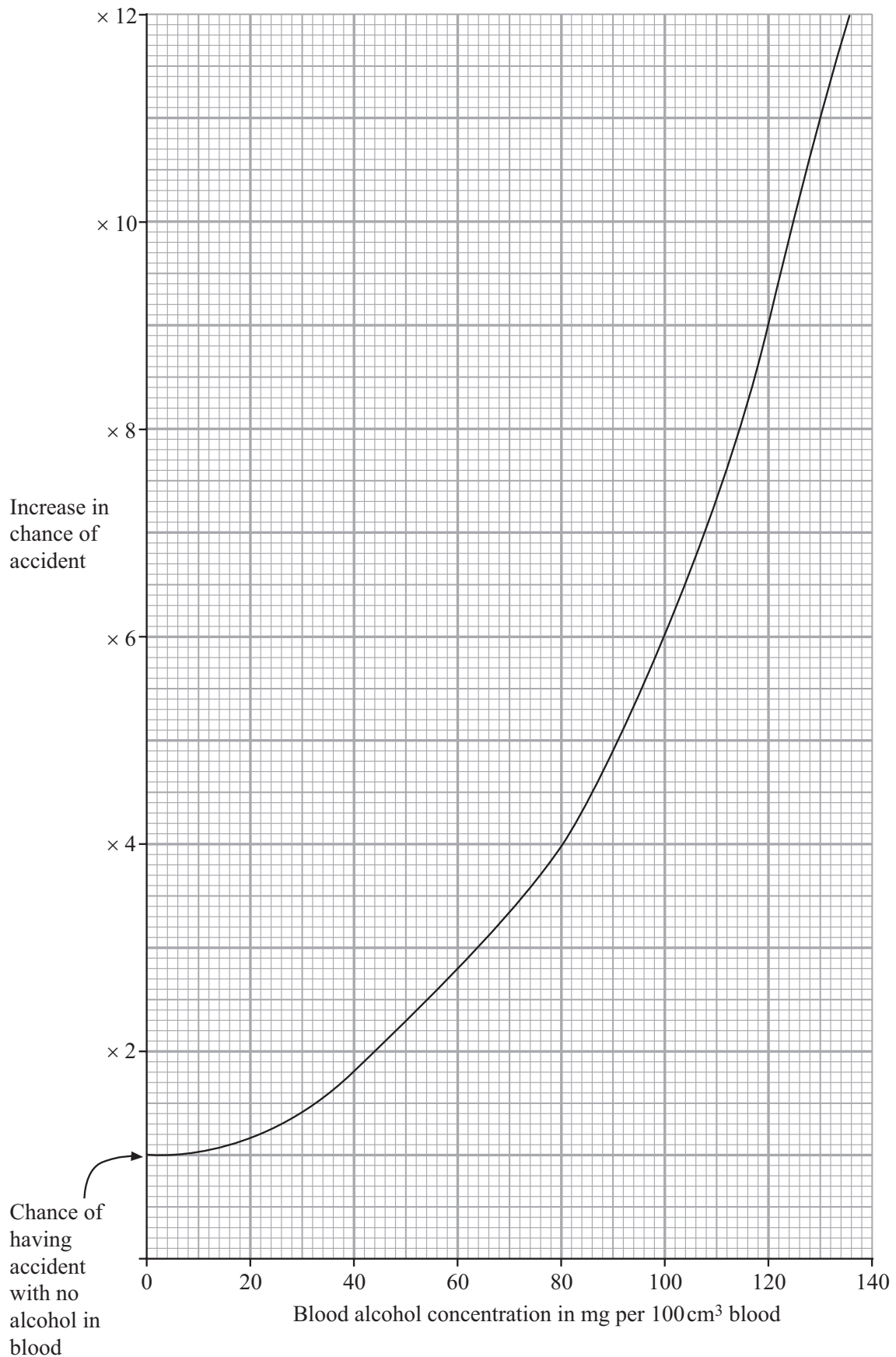
TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION NINE

Alcohol can affect how people drive a car.

The graph shows the effect of blood alcohol on the chance of a person having an accident when driving.



-
- 9.1** What blood alcohol concentration is likely to increase the chance of a car accident by three times?
- A** 32 mg per 100 cm³ of blood
 - B** 52 mg per 100 cm³ of blood
 - C** 64 mg per 100 cm³ of blood
 - D** 74 mg per 100 cm³ of blood
- 9.2** Drinking wine raises the blood alcohol concentration by 20 mg per 100 cm³ of blood for each glass drunk. What is the increase in the chance of an accident if the person drinks five glasses of wine?
- A** 4 times
 - B** 6 times
 - C** 30 times
 - D** 100 times
- 9.3** Why is alcohol in the blood likely to increase the chance of an accident?
- A** Alcohol brings about withdrawal symptoms
 - B** Alcohol is addictive
 - C** Alcohol reduces the amount of oxygen the blood can carry
 - D** Alcohol slows down reactions
- 9.4** Which of the following organs is most likely to be damaged by drinking alcohol?
- A** Heart
 - B** Liver
 - C** Lungs
 - D** Pancreas

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.

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QUESTION ONE

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amylase

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lipase

protease

Substance	Part played by substance
1	breaks down fat into fatty acids and glycerol
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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?

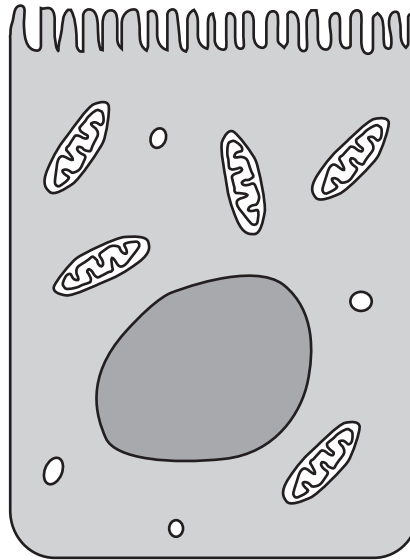
cell membrane

cell wall

genes

mitochondria

protein coat



TURN OVER FOR THE NEXT QUESTION

Turn over ►

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

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QUESTION FIVE

A student visited an optician for an eyesight test.

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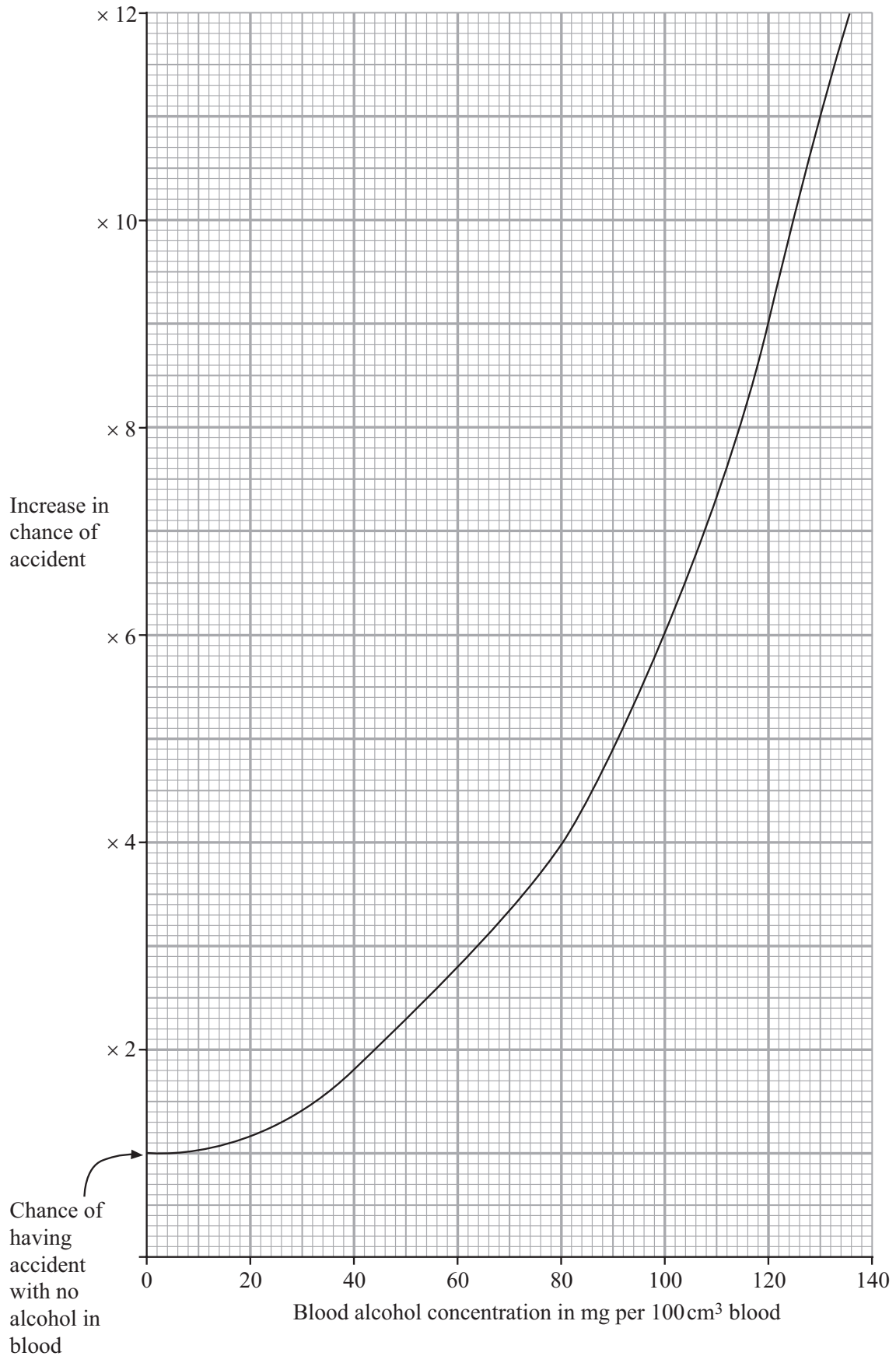
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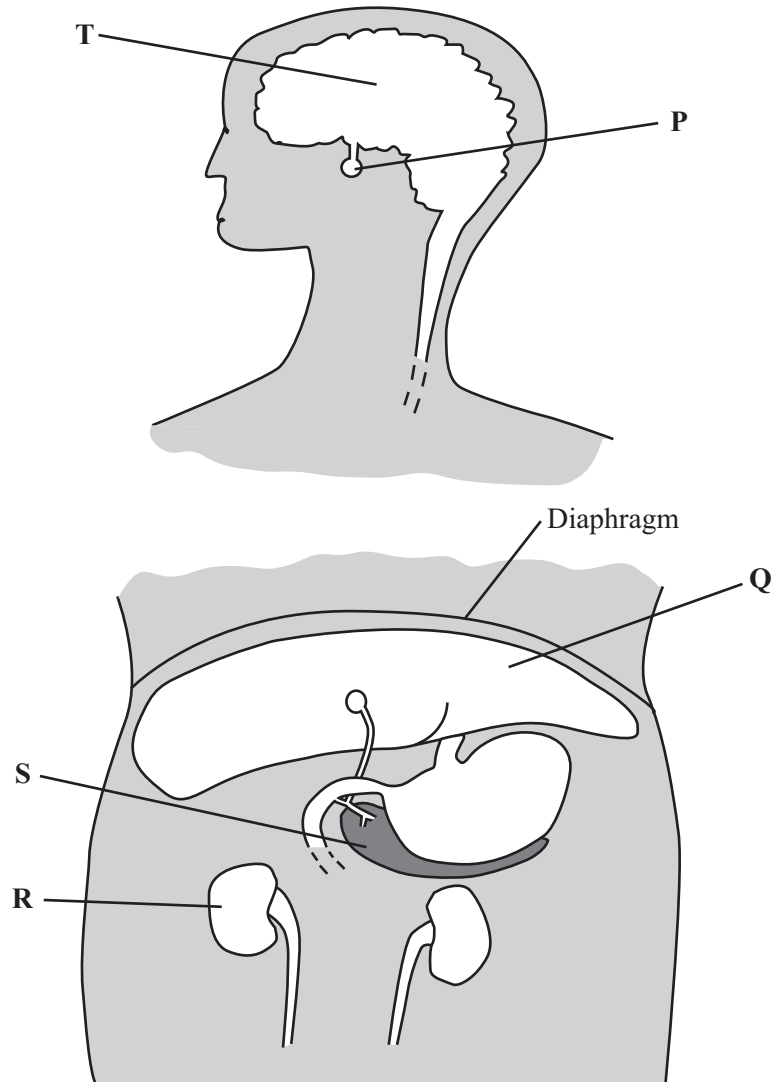
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TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION EIGHT

The diagrams show the positions of some organs that help to keep the conditions in the body fairly constant.



- 8.1** Organ S secretes the hormones that control blood sugar level. These hormones are most likely to be
- A** released into the intestine along with enzymes from organ S.
 - B** transmitted along motor neurones to their target organ.
 - C** transported in the blood plasma to their target organ.
 - D** used to neutralise the acidic stomach contents entering the small intestine.

- 8.2** One function of organ **Q** is to
- A** break down excess amino acids.
 - B** produce urine.
 - C** reabsorb dissolved ions into the blood.
 - D** release excess heat from the blood.
- 8.3** Organ **R**
- A** helps to cool the body by releasing water.
 - B** produces dilute urine when a person is sweating.
 - C** reabsorbs useful ions from the liquid filtered from the blood.
 - D** reabsorbs urine if it becomes too dilute.
- 8.4** If the concentration of water in the blood is too high
- A** less ADH is released by organ **P**, resulting in a more dilute urine.
 - B** less ADH is released by organ **S**, resulting in a more dilute urine.
 - C** more ADH is released by organ **P**, resulting in a more concentrated urine.
 - D** more ADH is released by organ **T**, resulting in a more dilute urine.

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION NINE

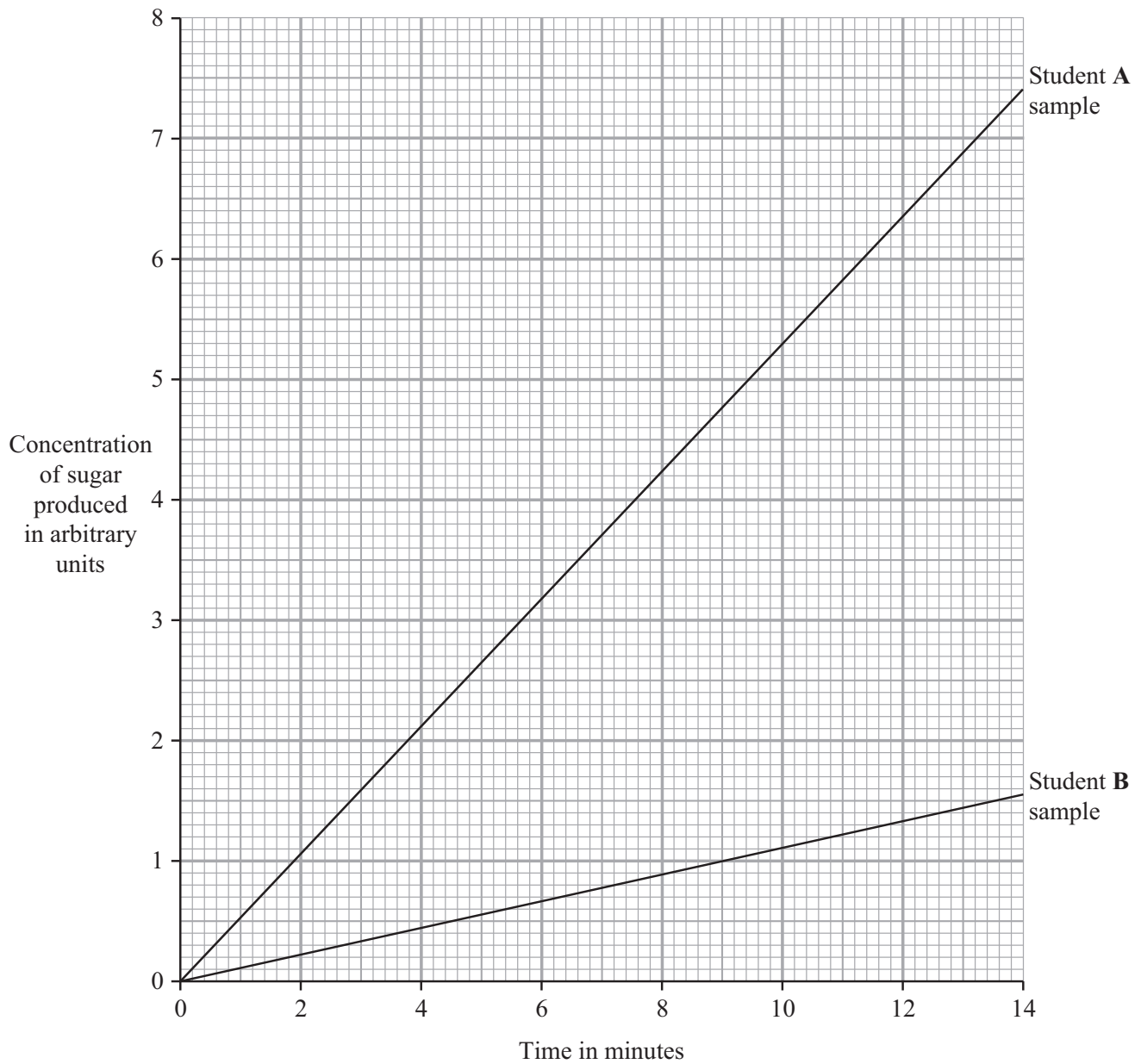
An investigation was carried out to compare the effectiveness of samples of saliva on the breakdown of starch. Saliva samples, of equal volume, were collected from Student **A** and Student **B**.

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.



-
- 9.1** 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.
- 9.2** 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.
- 9.3** 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
- 9.4** 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

Turn over ►

QUESTION TEN

A constant core body temperature is important to allow the human body to function efficiently.

- 10.1** The receptors involved in detecting the temperature in the body are found in
- A the liver and the pancreas.
 - B the liver and the thermoregulatory centre.
 - C the pancreas and the skin.
 - D the thermoregulatory centre and the skin.
- 10.2** Which organ monitors changes in core body temperature?
- A Brain
 - B Kidney
 - C Liver
 - D Skin
- 10.3** Which action plays a major role in returning core body temperature to normal after exercise?
- A Constriction of the blood vessels supplying the skin capillaries
 - B Increasing muscle contraction
 - C Increasing the rate of respiration
 - D Sweating
- 10.4** Which of the following is most likely to occur if the core body temperature falls?
- A ADH production will increase
 - B Reactions involving enzymes will slow down
 - C The blood flow to the skin will increase
 - D The rate of sweating will increase

END OF TEST

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