

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
Spring 2004



SCIENCE: DOUBLE AWARD (MODULAR) 346002
BIOLOGY (MODULAR)
Maintenance of Life (Module 02)

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 “Maintenance of Life” 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
○	●	○	○

- 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
○	⊗	○	●

- 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
○	⊗	○	⊗

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 a cell from the leaf of a green plant.

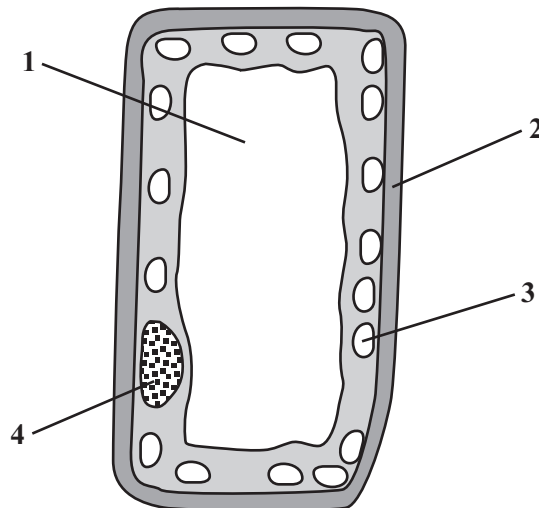
Match words from the list with the labels **1–4** on the diagram.

cell wall

chloroplast

contains cell sap

controls activities of the cell



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 diagram shows a person who has pulled a hand away after touching a sharp object.

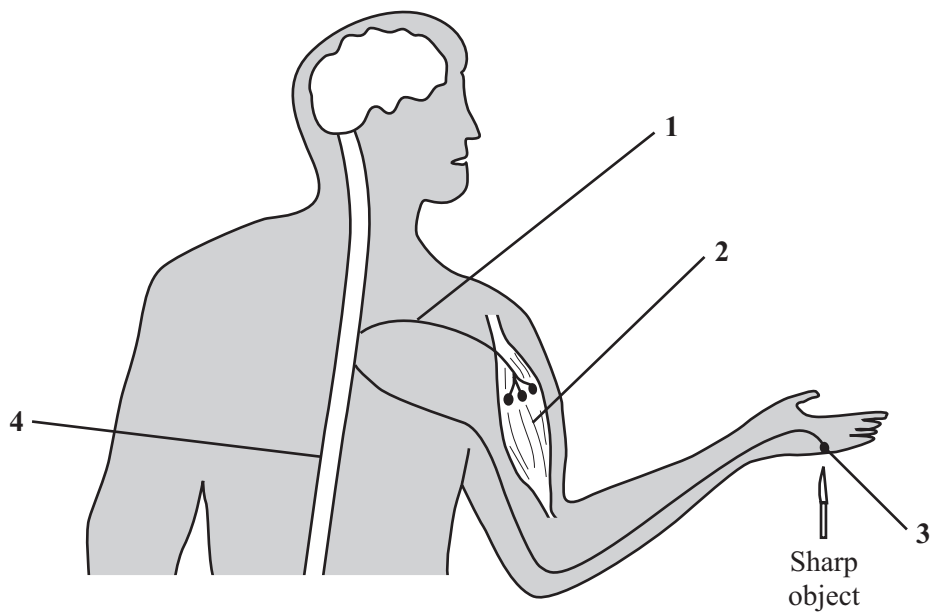
Match words from the list with the labels 1–4 on the diagram.

motor neurone

muscle

receptor

spinal cord



QUESTION FIVE

The diagram shows a section through a plant leaf.

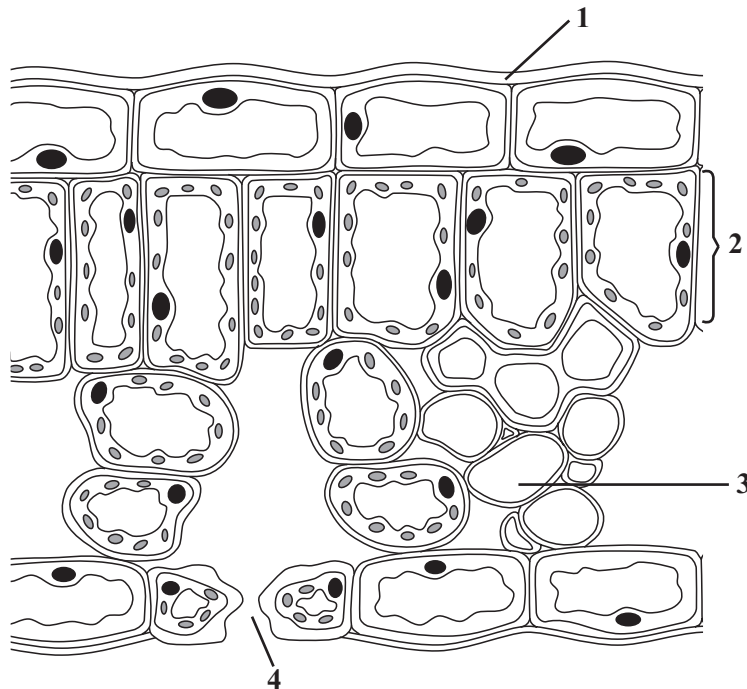
Match words from the list with the labels 1–4 on the diagram.

carries sugar to the roots

made mainly from wax

where photosynthesis takes place

where most water vapour is lost from leaf



TURN OVER FOR THE NEXT QUESTION

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

Plants carry out photosynthesis.

Which **two** of the following are produced by photosynthesis?**carbon dioxide****oxygen****nitrate****sugar****water vapour****QUESTION SEVEN**

Plant hormones affect the growth of plants.

Which **two** of the following are effects of plant hormones?**regulating the ripening of fruits****roots growing towards light****the growth of roots away from water****the growth of roots from cuttings****shoots growing in the direction of the force of gravity**

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

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.

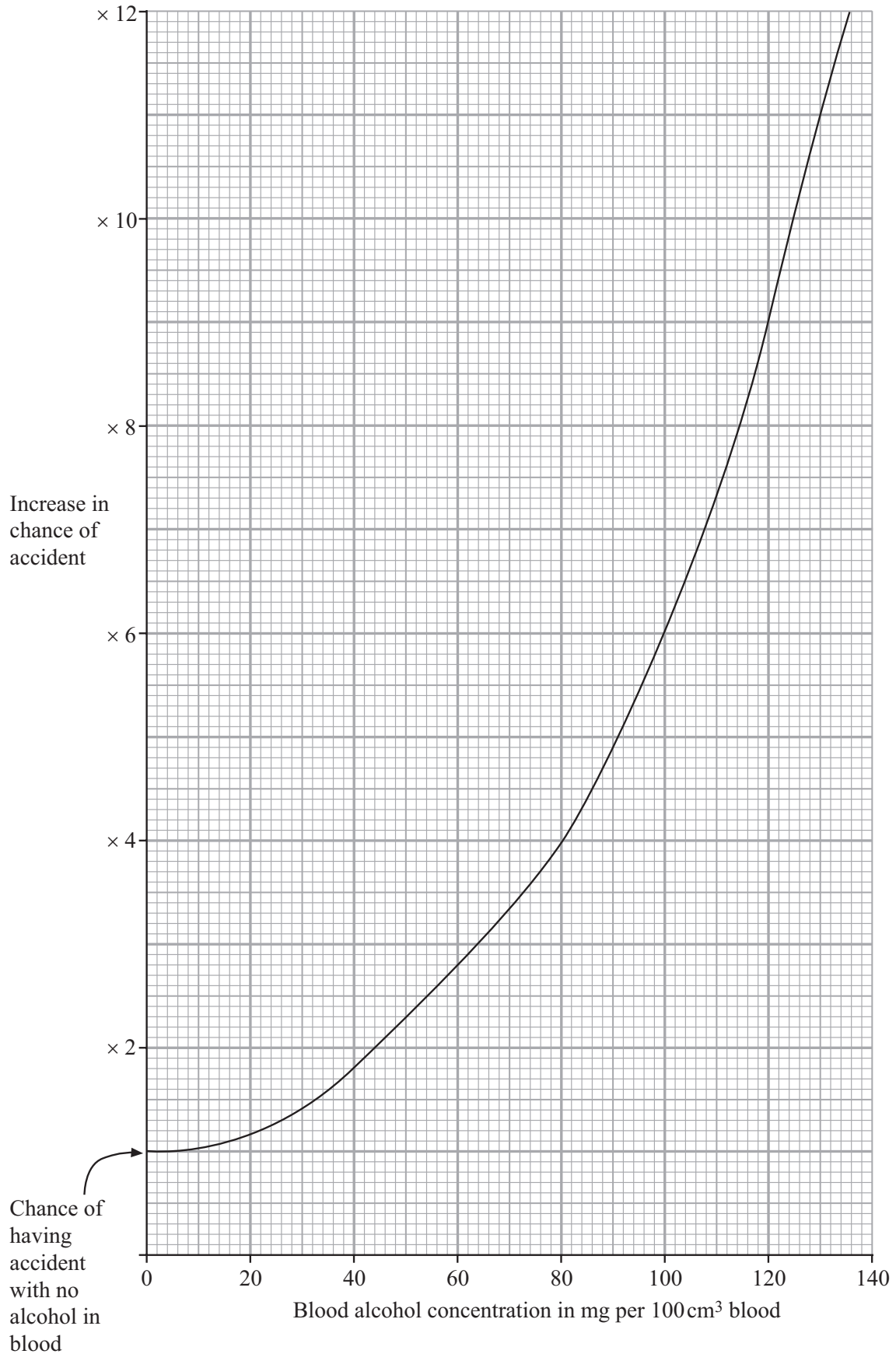
TURN OVER FOR THE NEXT QUESTION

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

In an investigation, the water loss from detached leafy shoots of two different species of plant, **P** and **Q**, was measured.

The results are shown in the table.

Time in minutes	Mass of shoot in grams	
	Species P	Species Q
0	310	310
30	294	302
60	284	296
90	276	290
120	269	285
150	264	282
180	261	279

10.1 During the first 120 minutes of the investigation, species **P** lost

- A 8 grams more mass than species **Q**.
- B 14 grams more mass than species **Q**.
- C 16 grams more mass than species **Q**.
- D 18 grams more mass than species **Q**.

10.2 The mean rate of loss of mass from species **Q** during the 180 minutes of the investigation was

- A 10.3 g per hour.
- B 12.5 g per hour.
- C 14.0 g per hour.
- D 16.3 g per hour.

10.3 The water loss from species **P** in the first 90 minutes of the investigation was

- A 8 grams greater than during the second 90 minutes.
- B 15 grams greater than during the second 90 minutes.
- C 19 grams greater than during the second 90 minutes.
- D 34 grams greater than during the second 90 minutes.

10.4 For species **P**, the rate of water loss is lower during the second 90 minutes than during the first 90 minutes.

What is the most likely explanation for this?

- A Some stomata on the leaves had closed
- B The air temperature had increased after the first 90 minutes
- C The air was drier during the second 90 minutes
- D The leaf had developed a thicker waxy layer

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 a section through a plant leaf.

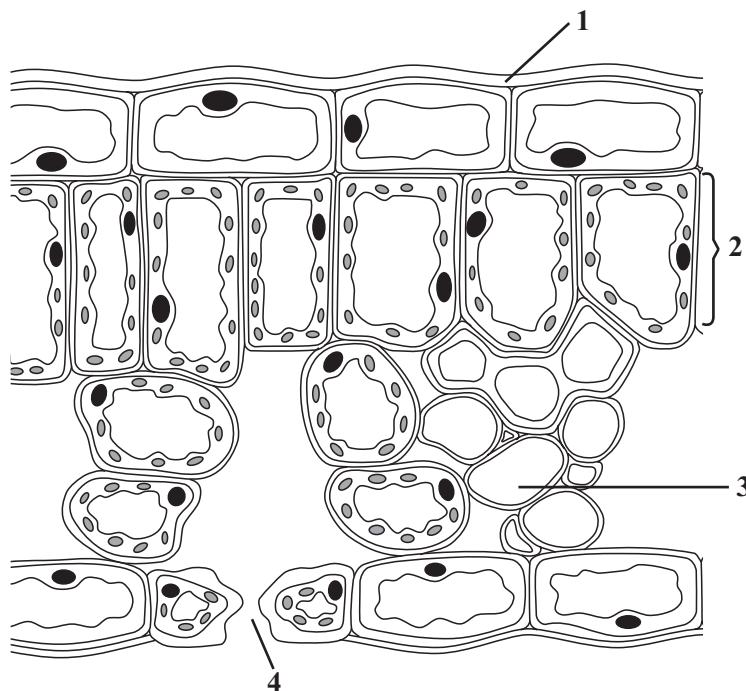
Match words from the list with the labels **1–4** on the diagram.

carries sugar to the roots

made mainly from wax

where photosynthesis takes place

where most water vapour is lost from leaf



QUESTION TWO

The body monitors and controls the blood glucose concentration.

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

glucagon

glucose

glycogen

insulin

If the blood glucose concentration is too low, **1** is secreted into the blood.

This stimulates the liver to convert **2** into **3**

If the blood glucose concentration is too high, **4** is secreted into the blood.

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

Plant hormones affect the growth of plants.

Which **two** of the following are effects of plant hormones?

regulating the ripening of fruits

roots growing towards light

the growth of roots away from water

the growth of roots from cuttings

shoots growing in the direction of the force of gravity

QUESTION FOUR

Mineral ions are needed by plants for healthy growth.

Which **two** of the following are symptoms of nitrate deficiency in plants?

purple younger leaves

stunted growth

wilting

yellow leaves with dead spots

yellow older leaves

NO QUESTIONS APPEAR ON THIS PAGE

TURN OVER FOR THE NEXT QUESTION

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

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QUESTION FIVE

A student visited an optician for an eyesight test.

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- A Cornea
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5.2 Which is the layer at the back of the eye that the optician was checking for disease?

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5.3 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.
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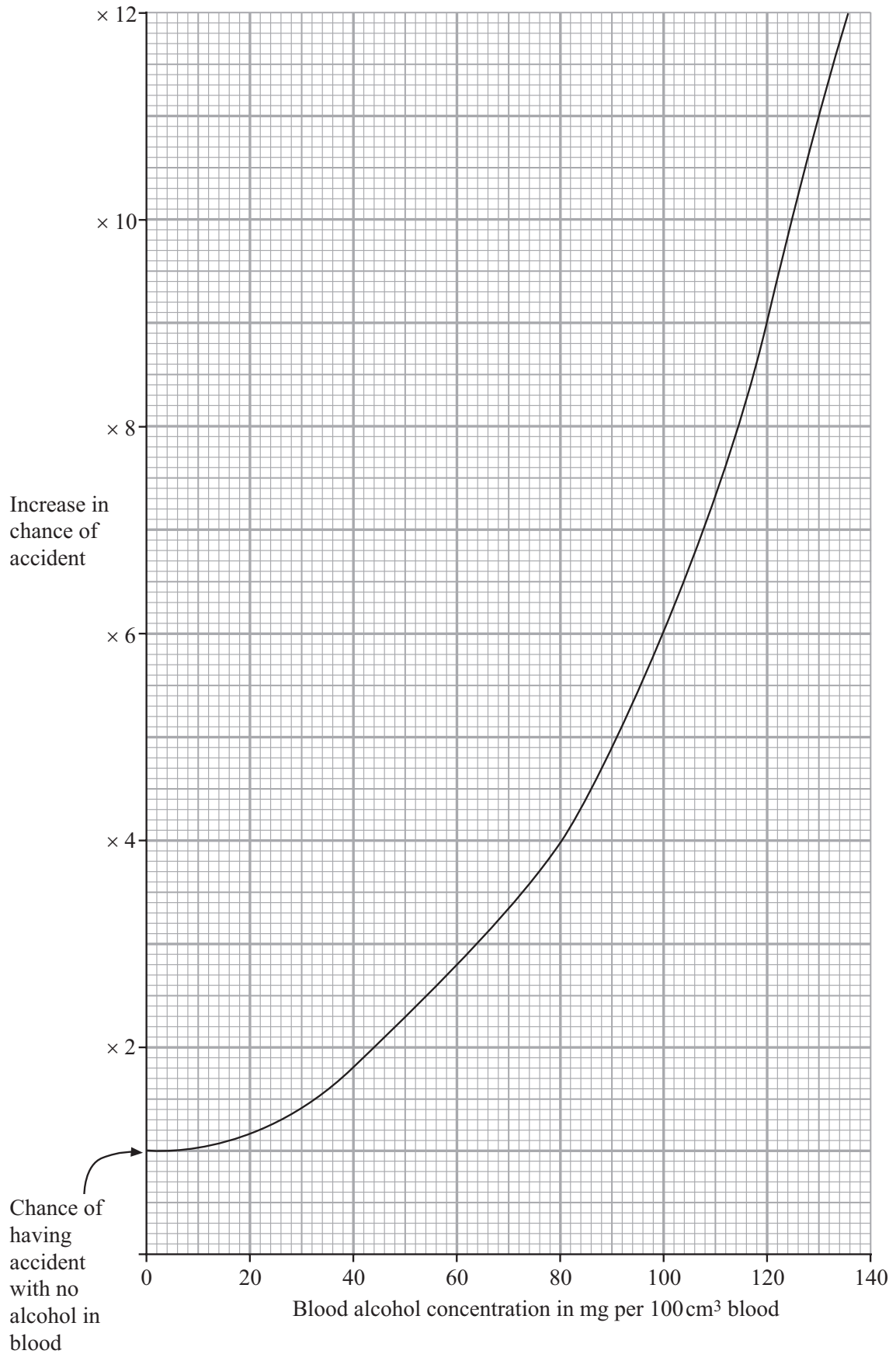
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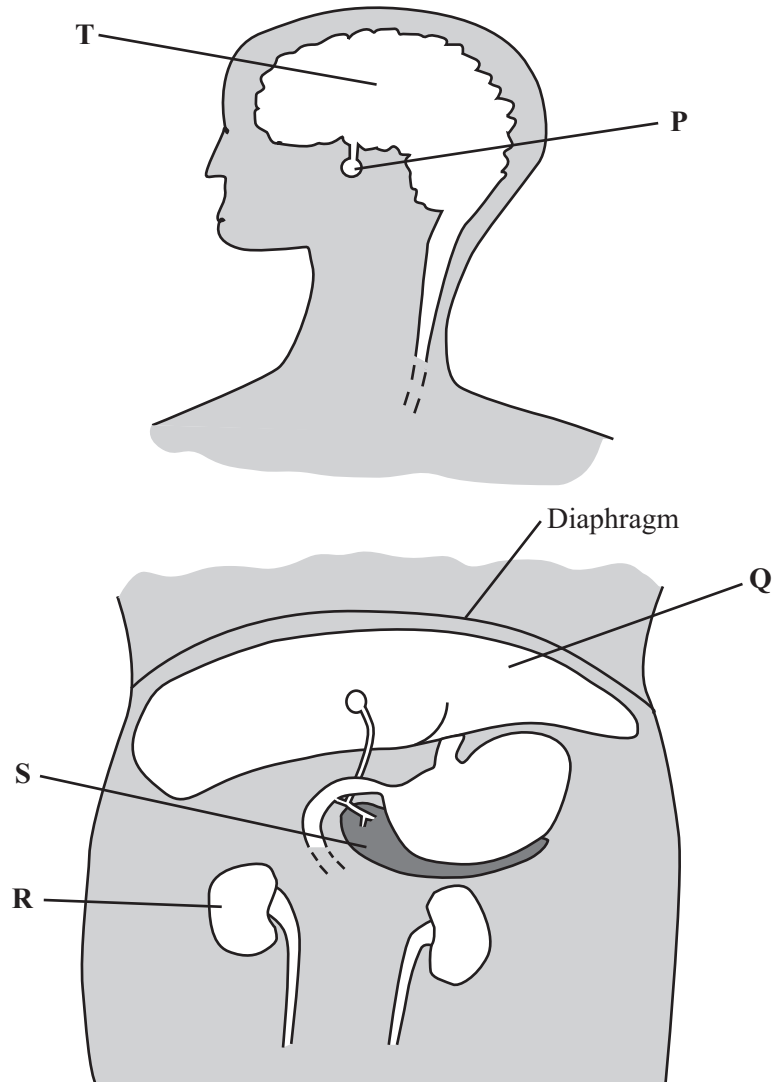
- A** Some stomata on the leaves had closed
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- C** The air was drier during the second 90 minutes
- D** The leaf had developed a thicker waxy layer

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

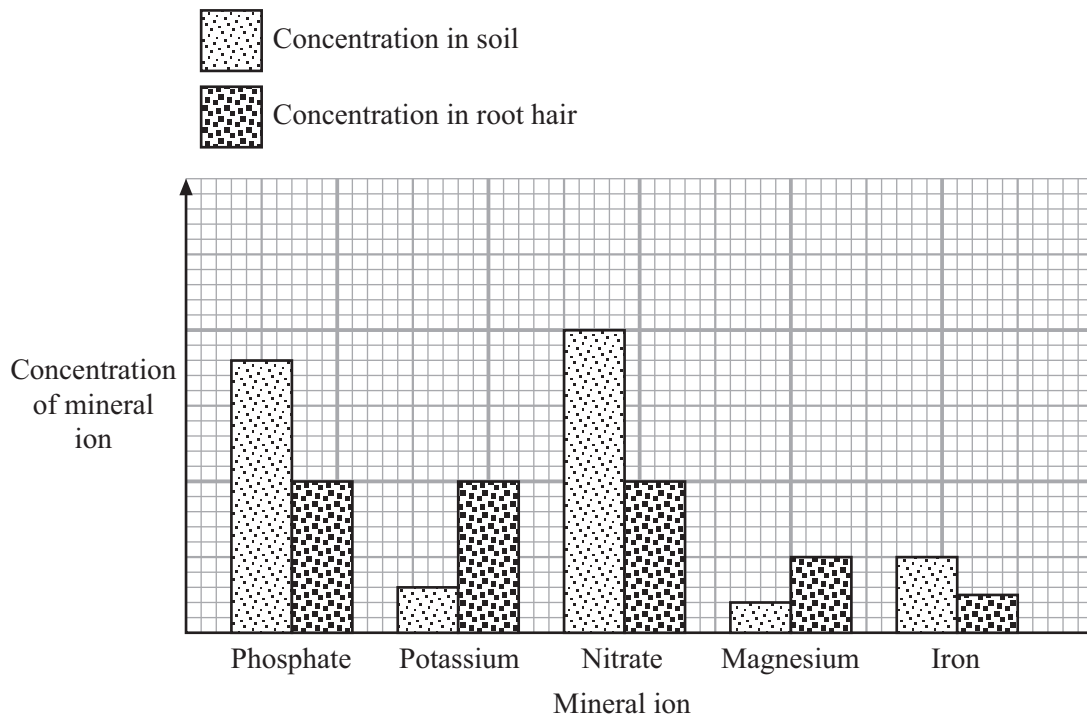
Turn over ►

QUESTION NINE

Plants absorb mineral ions from the soil through their roots.

The root hairs of a plant, and the soil water around them, were analysed.

The bar chart shows the concentrations of mineral ions in the soil water and in the cytoplasm of the root hair cells.



9.1 Which mineral ions are most likely to be absorbed by active transport into the root hairs?

- A Iron, nitrate and phosphate
- B Magnesium and iron
- C Magnesium and potassium
- D Nitrate, phosphate and potassium

9.2 Which ion is likely to enter the root hairs most rapidly by diffusion?

- A Magnesium
- B Nitrate
- C Phosphate
- D Potassium

- 9.3** To absorb mineral ions by active transport a plant must use
- A** carbon dioxide from respiration.
 - B** energy from photosynthesis.
 - C** energy from respiration.
 - D** oxygen from photosynthesis.
- 9.4** A plant growing in conditions where potassium ions are deficient would be likely to develop
- A** purple younger leaves and stunted growth.
 - B** yellow leaves with dead spots.
 - C** yellow older leaves and purple younger leaves.
 - D** yellow older leaves and stunted growth.

TURN OVER FOR THE NEXT QUESTION

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