

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
March 2007



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

346002

Wednesday 7 March 2007 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

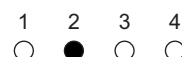
Instructions

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

Instructions for recording answers

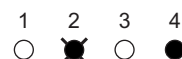
- Use a **black ball-point pen**.

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

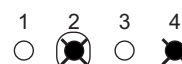


- Do **not** extend beyond the circles.

- 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 14 of this booklet.

FOUNDATION TIER

SECTION A

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

In these questions, match words from the list with the numbers.

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

Mark your choices on the answer sheet.

QUESTION ONE

The diagram shows a plant cell.

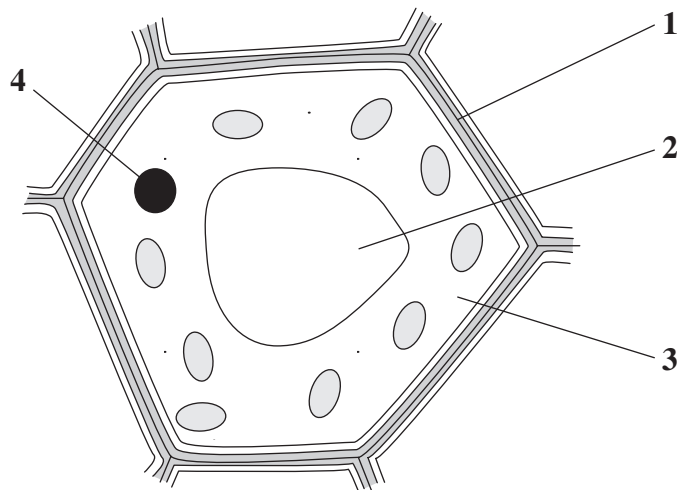
Match words from the list with the labels **1–4** on the diagram.

cell wall

cytoplasm

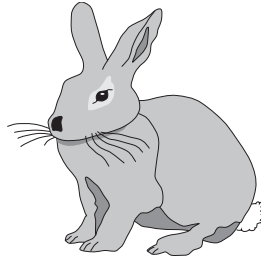
nucleus

permanent vacuole



QUESTION TWO

The drawing shows a rabbit.



The table is about the stimuli that the rabbit detects.

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

ear

eye

nose

skin

Sense organ	Stimulus it detects
1	chemicals given off by cut grass
2	temperature of the air
3	the position of its body when it jumps in the air
4	the shape of a flower

Turn over for the next question

Turn over ►

QUESTION THREE

The diagram shows some of the organs that are involved with waste products.

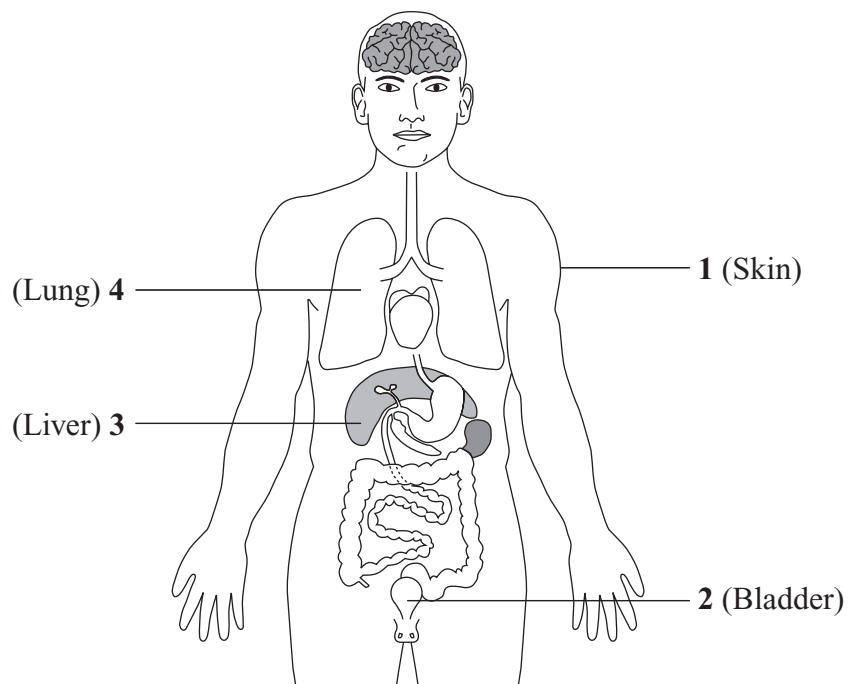
Match words from the list with the labels 1–4 on the diagram.

gets rid of carbon dioxide

produces sweat

where urea is produced

where urine is stored



QUESTION FOUR

Plant growth is affected by a number of factors.

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

hormone

light

nitrate

the force of gravity

Factor	Importance in plant growth
1	a mineral ion absorbed by roots and used for growth
2	roots grow in the direction of it
3	shoots grow towards it
4	stimulates the growth of roots from cuttings

Turn over for the next question

Turn over ►

QUESTION FIVE

The drawing shows a section through part of a plant stem.

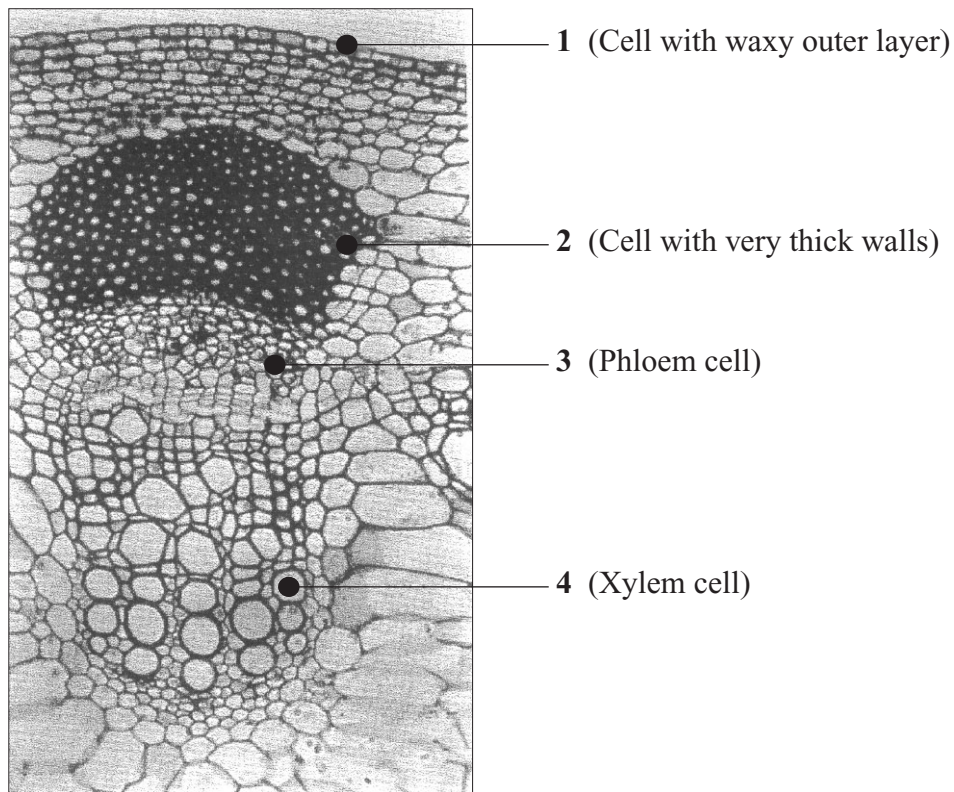
Match words from the list with the labels 1–4 on the drawing.

helps to strengthen the stem

reduces water loss from the stem

transports sugars to the growing regions

transports water up the stem



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

Parts of the eye have different functions.

Which **two** parts of the eye hold the lens in position?**ciliary muscles****cornea****optic nerve****sclera****suspensory ligaments****QUESTION SEVEN**

Drugs may harm the body.

Which **two** conditions may be caused by drinking alcohol?**a raised level of carbon monoxide in the blood****emphysema****heart disease****increased reaction time****lack of self-control****Turn over ►**

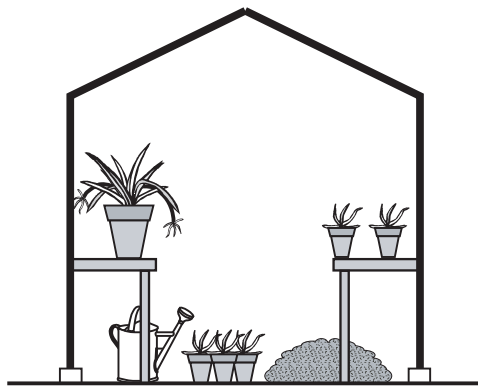
SECTION CQuestions **EIGHT** to **TEN**.

Each of these questions has four parts.

In each part choose only **one** answer.Mark your choices on the answer sheet.

QUESTION EIGHT

The drawing shows plants in a greenhouse.

**8.1** The green chlorophyll in the plant leaves . . .

- A absorbs light energy.
- B produces carbon dioxide.
- C turns glucose into starch.
- D uses up oxygen.

8.2 Greenhouses are often shaded to reduce the temperature.

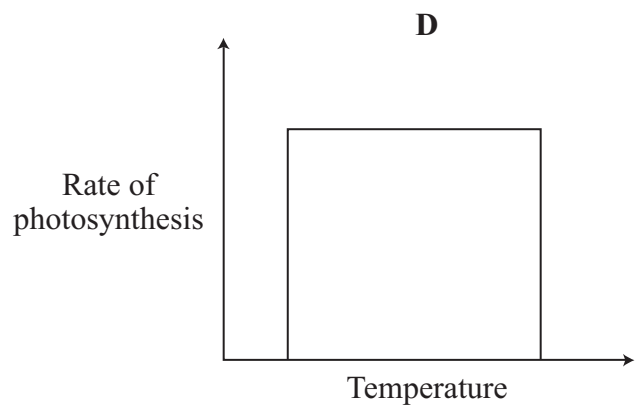
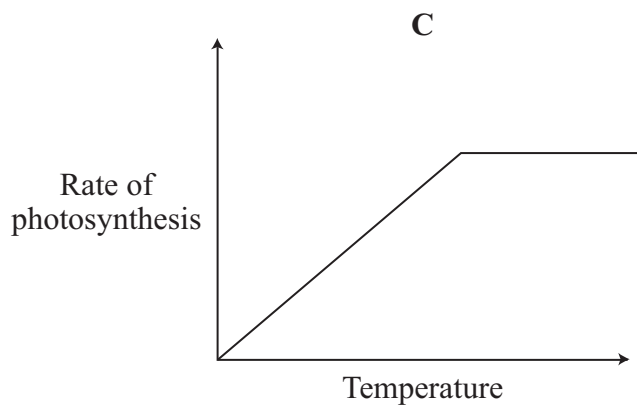
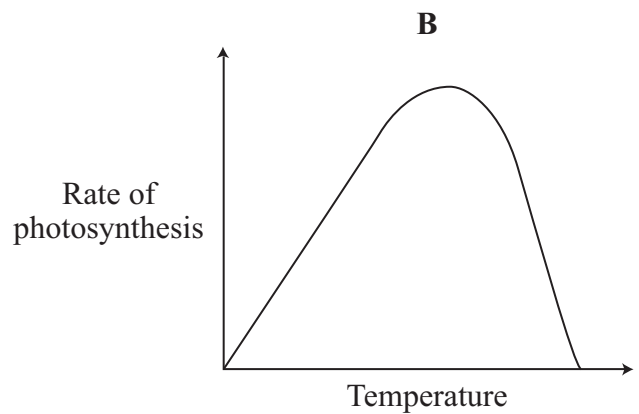
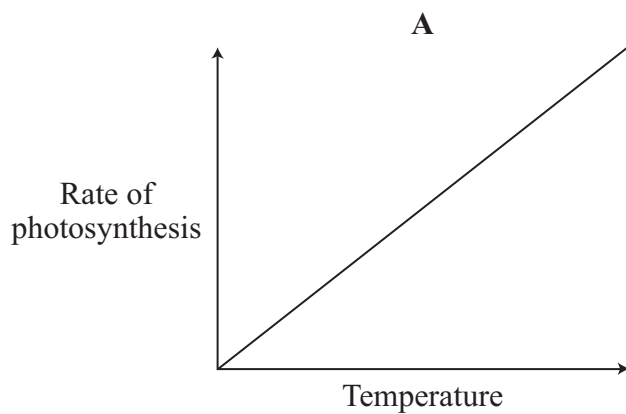
This will reduce the rate of photosynthesis because there is less . . .

- A carbon dioxide.
- B chlorophyll.
- C light.
- D water.

8.3 Some of the glucose produced by the plants . . .

- A** is converted to nitrate.
- B** is converted to starch and stored.
- C** is used in osmosis.
- D** is used in photosynthesis.

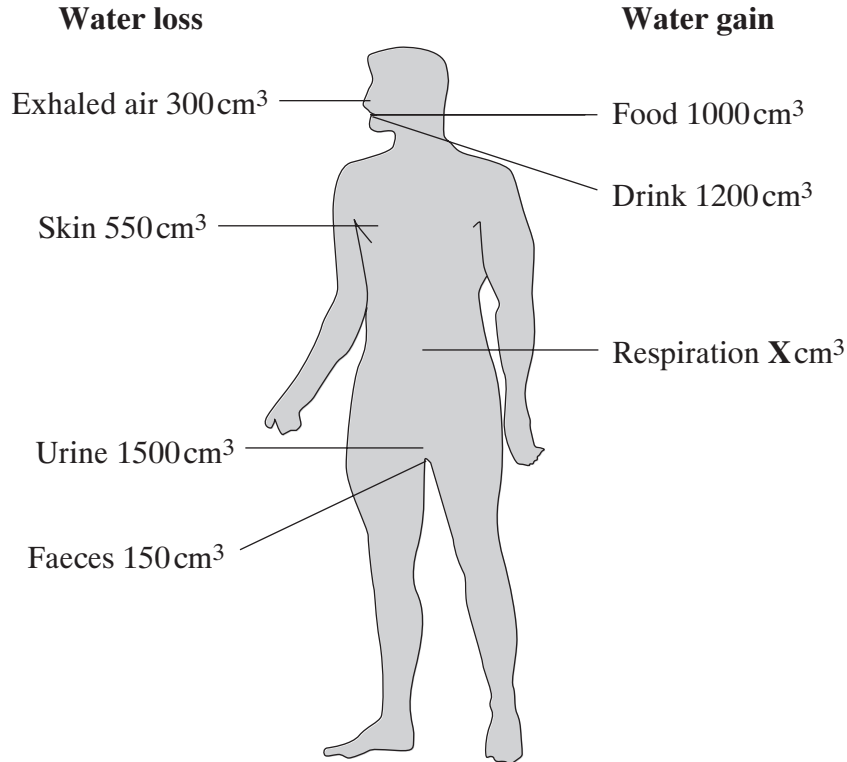
8.4 Which graph shows the effect of temperature on the rate of photosynthesis?



Turn over ►

QUESTION NINE

The drawing shows the daily gain and the daily loss of water for an adult. The total water loss is equal to the total water gain.



9.1 How much water (**X**) did the person gain from respiration?

- A 30 cm³
- B 200 cm³
- C 300 cm³
- D 2500 cm³

9.2 What proportion of the total water loss was in urine?

- A $\frac{1}{10}$ (10%)
- B $\frac{3}{10}$ (30%)
- C $\frac{1}{2}$ (50%)
- D $\frac{3}{5}$ (60%)

9.3 Which organ maintains the correct amount of water in the body?

- A Bladder
- B Kidney
- C Liver
- D Skin

9.4 What is most likely to happen when the air temperature increases?

- A More water will be lost in faeces.
- B The amount of water lost in both sweat and urine will increase.
- C The amount of water lost in sweat will increase and the amount of water gained in respiration will decrease.
- D The amount of water lost in sweat will increase and the amount of water lost in urine will decrease.

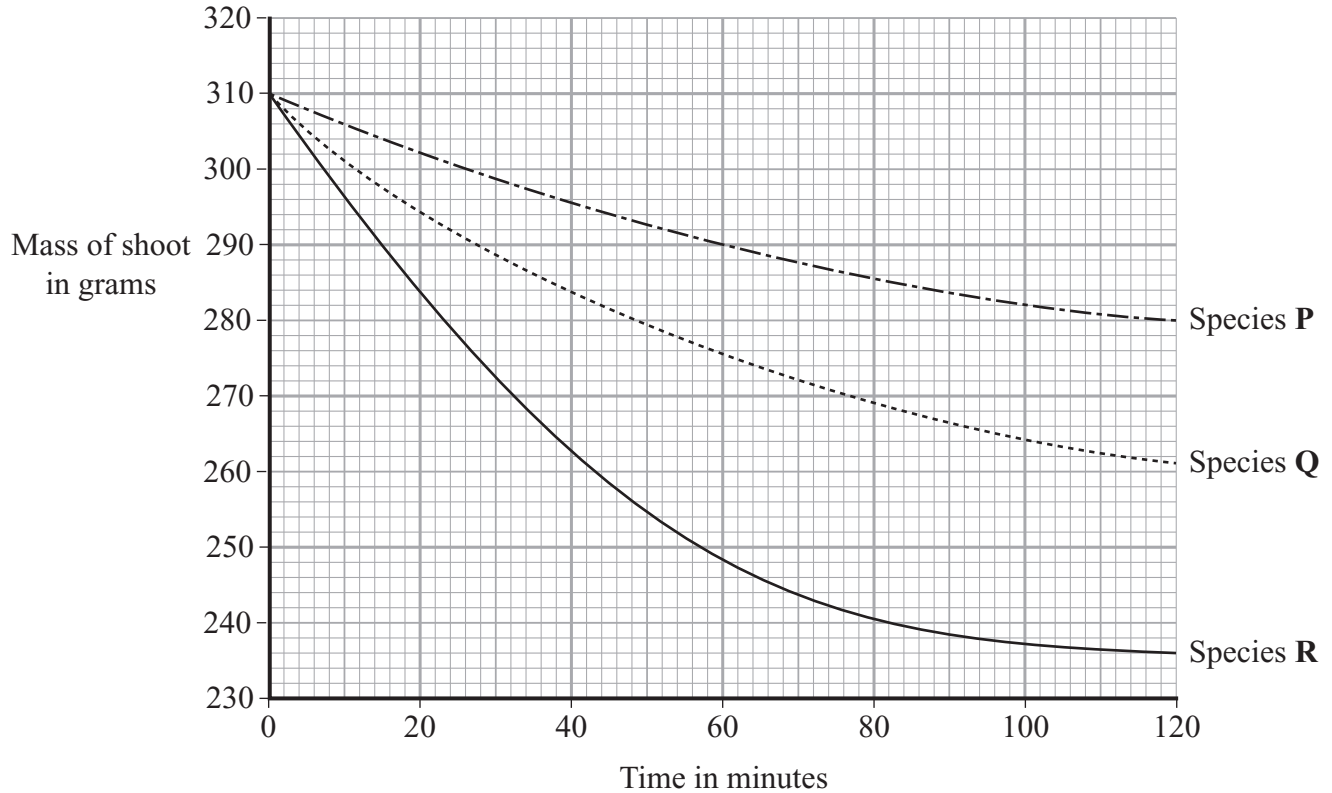
Turn over for the next question

Turn over ►

QUESTION TEN

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

The results are shown in the graph.



10.1 During the first 100 minutes, the mass of species **P** . . .

- A** decreased by 28 grams.
- B** decreased by 38 grams.
- C** increased by 28 grams.
- D** increased by 38 grams.

10.2 The mean rate of loss of mass from species **Q** during the first 40 minutes was . . .

- A** 0.5 grams per minute.
- B** 0.65 grams per minute.
- C** 0.75 grams per minute.
- D** 0.85 grams per minute.

10.3 The water loss from species **R** in the first 60 minutes was . . .

- A 10 grams greater than in the second 60 minutes.
- B 12 grams greater than in the second 60 minutes.
- C 40 grams greater than in the second 60 minutes.
- D 50 grams greater than in the second 60 minutes.

10.4 For all three species, the rate of water loss was lower during the second 60 minutes than during the first 60 minutes.

What is the most likely explanation for this?

- A Some of the stomata on the leaves had closed.
- B The air temperature had increased in the second 60 minutes.
- C The leaf had developed a thicker waxy layer.
- D The level of moisture in the air had decreased.

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 from the list with the numbers.

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

Mark your choices on the answer sheet.

QUESTION ONE

The drawing shows a section through part of a plant stem.

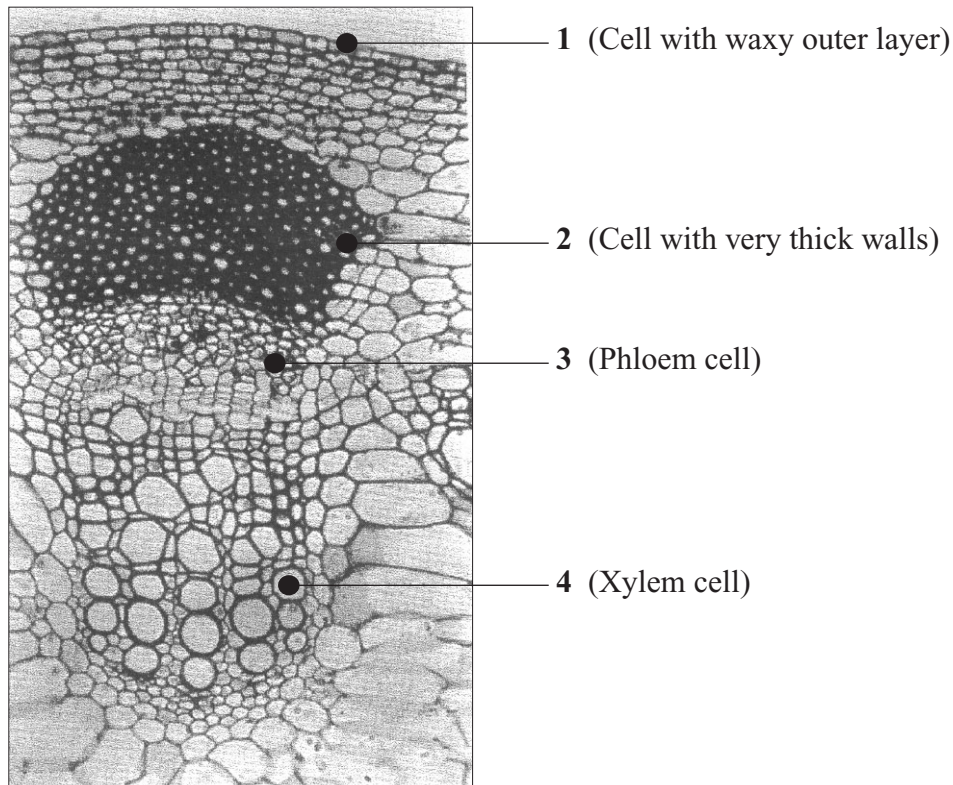
Match words from the list with the labels **1–4** on the drawing.

helps to strengthen the stem

reduces water loss from the stem

transports sugars to the growing regions

transports water up the stem



QUESTION TWO

The table is about conditions that affect plants.

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

soil deficient in nitrate ions

soil deficient in potassium ions

soil has a very high concentration of ions

unequal distribution of hormones in the stem

Condition	Effect on plants
1	bending of stem
2	leaves wilt
3	stunted growth and yellow older leaves
4	yellow leaves with dead spots

Turn over for the next question

Turn over ►

SECTION BQuestions **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

Drugs may harm the body.

Which **two** conditions may be caused by drinking alcohol?**a raised level of carbon monoxide in the blood****emphysema****heart disease****increased reaction time****lack of self-control****QUESTION FOUR**

Plants need nitrate for cell growth. The concentration of nitrate in the soil is usually low.

Which **two** factors enable plants to take in the nitrate they need?**cell sap in the cell vacuole of root hair cells****energy released by respiration****high concentration of nitrate in root hairs****large surface area of root hairs****osmosis**

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Turn over ►

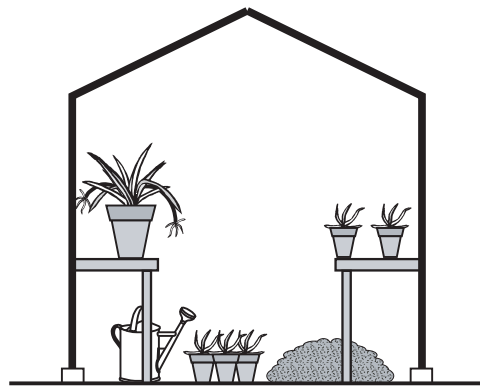
SECTION CQuestions **FIVE** to **TEN**.

Each of these questions has four parts.

In each part choose only **one** answer.Mark your choices on the answer sheet.

QUESTION FIVE

The drawing shows plants in a greenhouse.

**5.1** The green chlorophyll in the plant leaves . . .

- A** absorbs light energy.
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- D** uses up oxygen.

5.2 Greenhouses are often shaded to reduce the temperature.

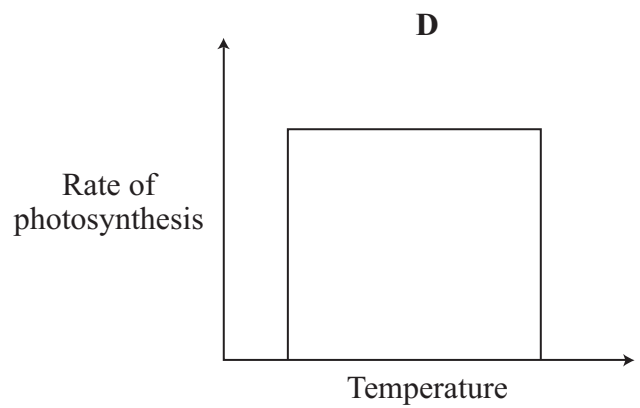
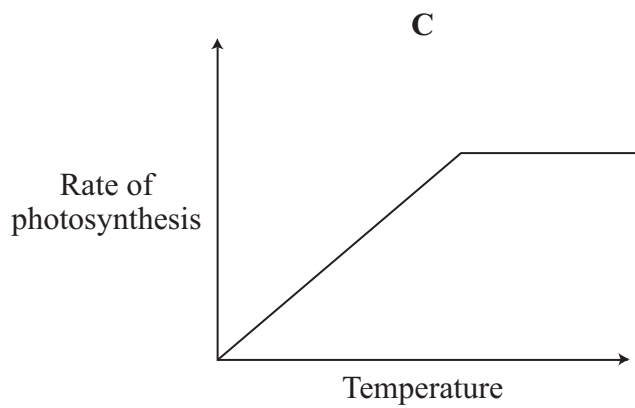
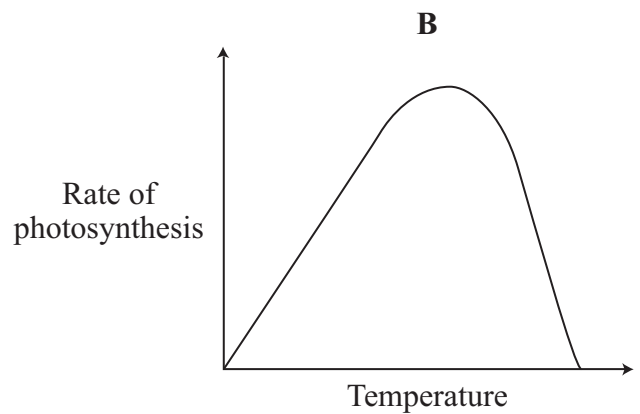
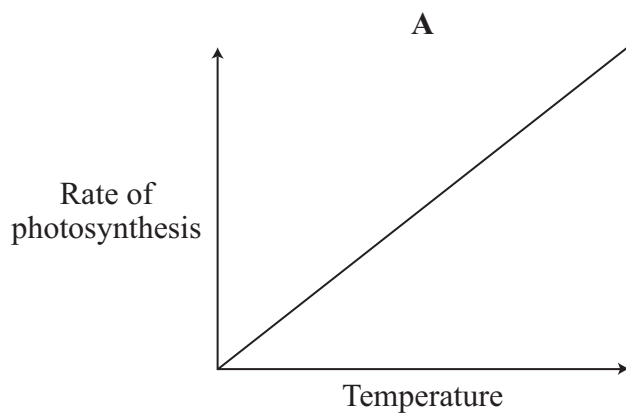
This will reduce the rate of photosynthesis because there is less . . .

- A** carbon dioxide.
- B** chlorophyll.
- C** light.
- D** water.

5.3 Some of the glucose produced by the plants . . .

- A is converted to nitrate.
- B is converted to starch and stored.
- C is used in osmosis.
- D is used in photosynthesis.

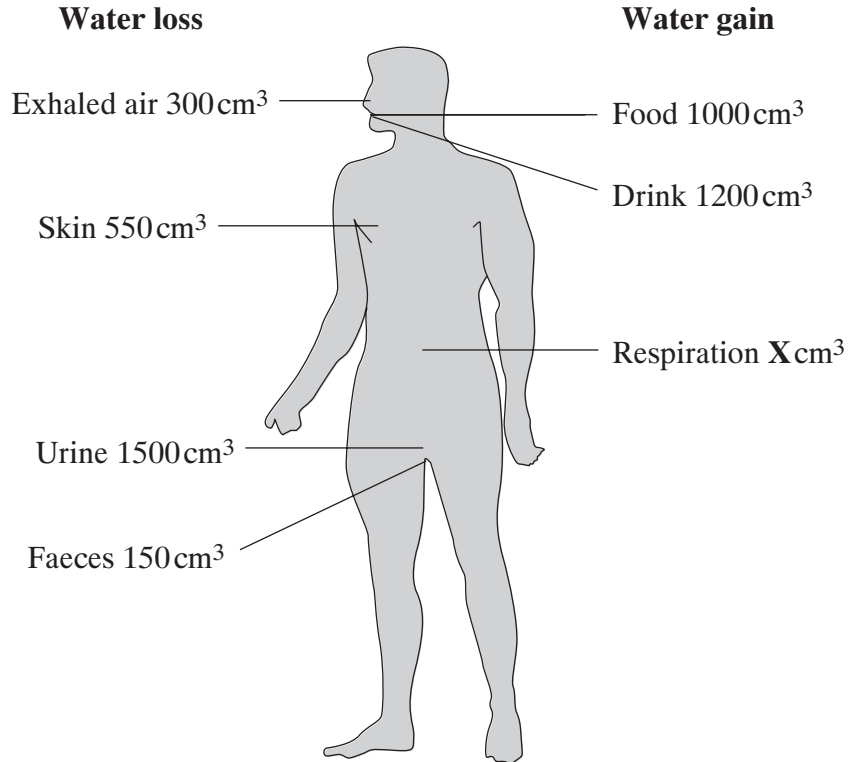
5.4 Which graph shows the effect of temperature on the rate of photosynthesis?



Turn over ►

QUESTION SIX

The drawing shows the daily gain and the daily loss of water for an adult. The total water loss is equal to the total water gain.



6.1 How much water (**X**) did the person gain from respiration?

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- A More water will be lost in faeces.
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- C The amount of water lost in sweat will increase and the amount of water gained in respiration will decrease.
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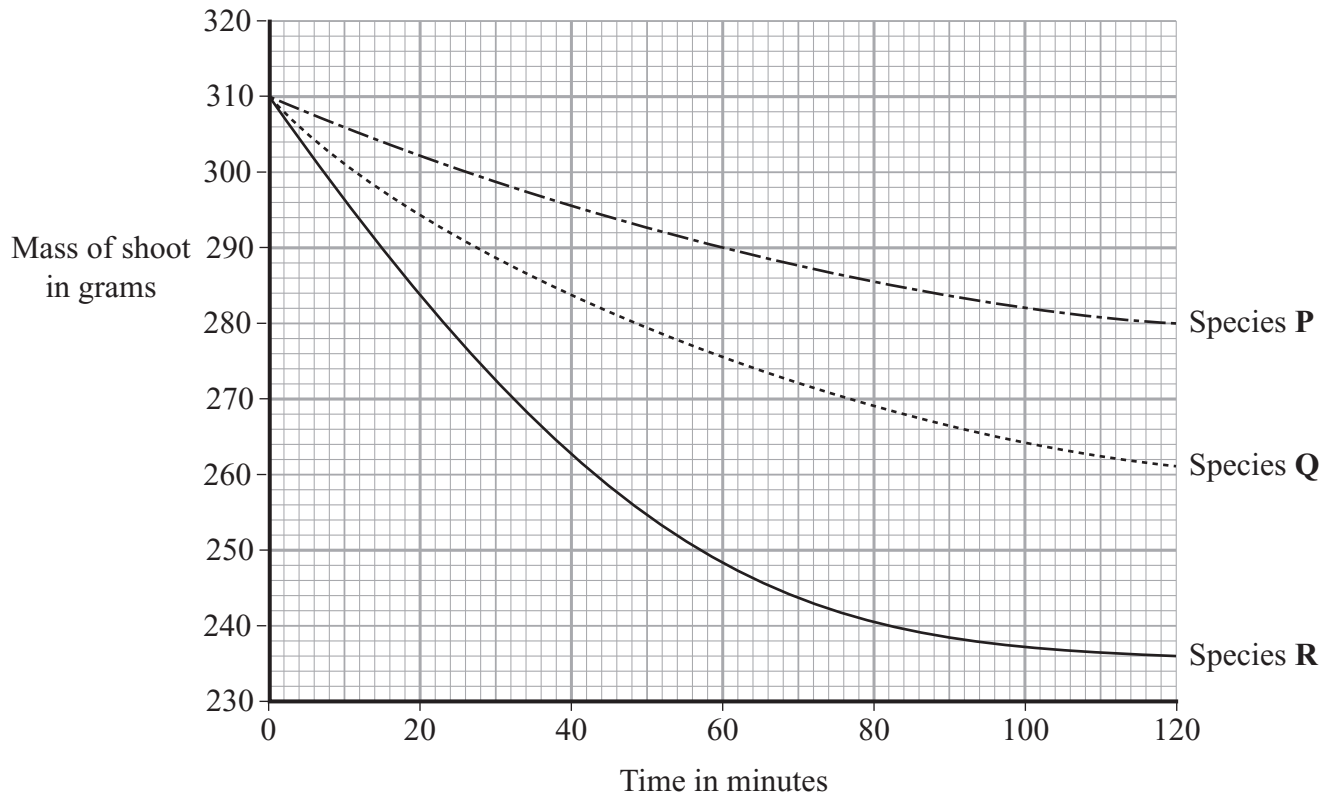
Turn over for the next question

Turn over ►

QUESTION SEVEN

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

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7.1 During the first 100 minutes, the mass of species **P** . . .

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7.2 The mean rate of loss of mass from species **Q** during the first 40 minutes was . . .

- A 0.5 grams per minute.
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- 7.3** The water loss from species **R** in the first 60 minutes was . . .
- A** 10 grams greater than in the second 60 minutes.
 - B** 12 grams greater than in the second 60 minutes.
 - C** 40 grams greater than in the second 60 minutes.
 - D** 50 grams greater than in the second 60 minutes.
- 7.4** For all three species, the rate of water loss was lower during the second 60 minutes than during the first 60 minutes.

What is the most likely explanation for this?

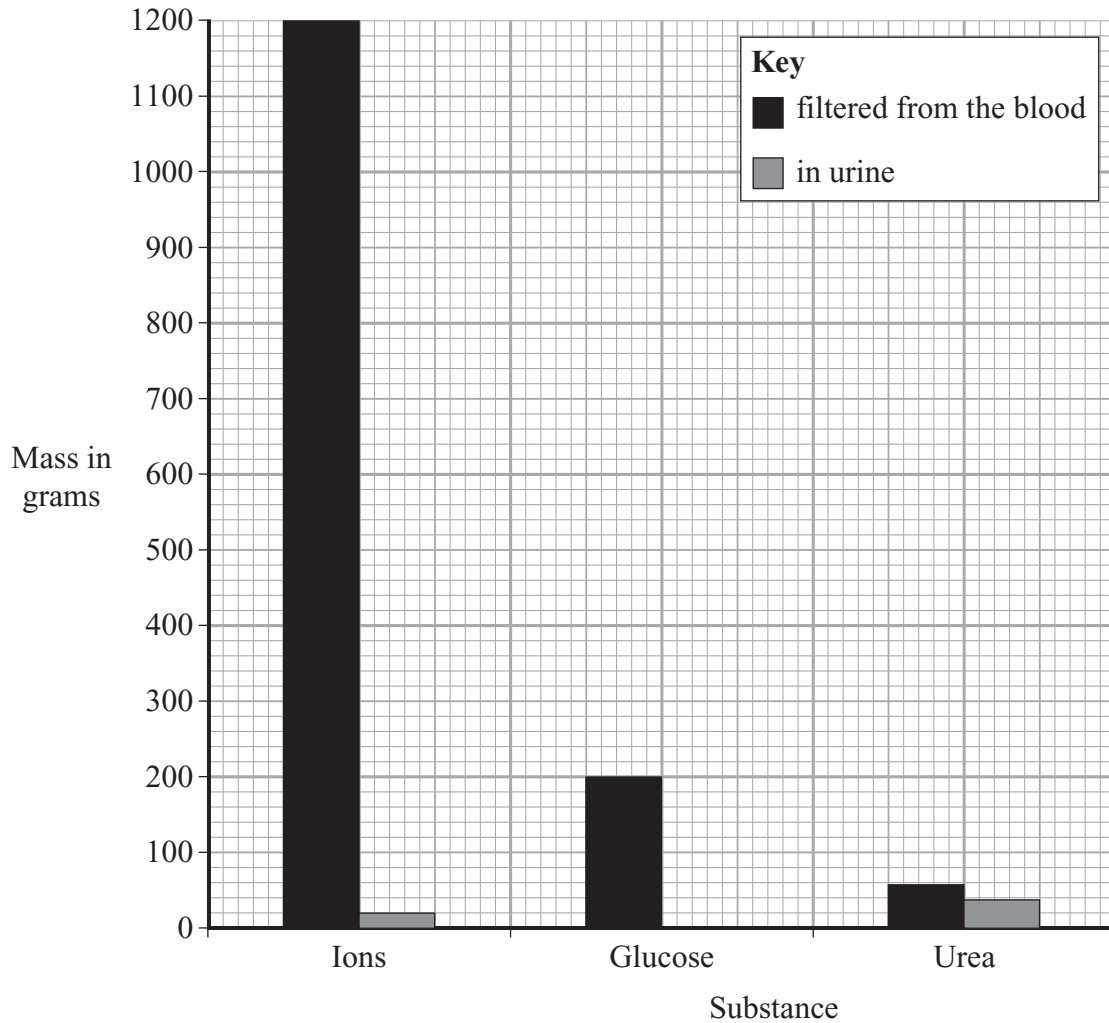
- A** Some of the stomata on the leaves had closed.
- B** The air temperature had increased in the second 60 minutes.
- C** The leaf had developed a thicker waxy layer.
- D** The level of moisture in the air had decreased.

Turn over for the next question

Turn over ►

QUESTION EIGHT

The bar chart shows the mass of substances filtered from the blood by the kidneys and the mass appearing in the urine over a 24-hour period.



8.1 What mass of ions was filtered from the blood by the kidney each hour?

- A 24 g
- B 50 g
- C 120 g
- D 1200 g

8.2 What percentage of the ions was re-absorbed?

- A 1.6 %
- B 20 %
- C 60 %
- D 98.3 %

8.3 Urea is produced . . .

- A in the kidneys from excess amino acids.
- B in the kidneys from excess proteins.
- C in the liver from excess amino acids.
- D in the liver from excess lipids.

8.4 The average volume of water released in urine over a 24-hour period is 1500 cm³.
On a hot day the volume of water released is much less.

What causes this reduction in the volume of urine?

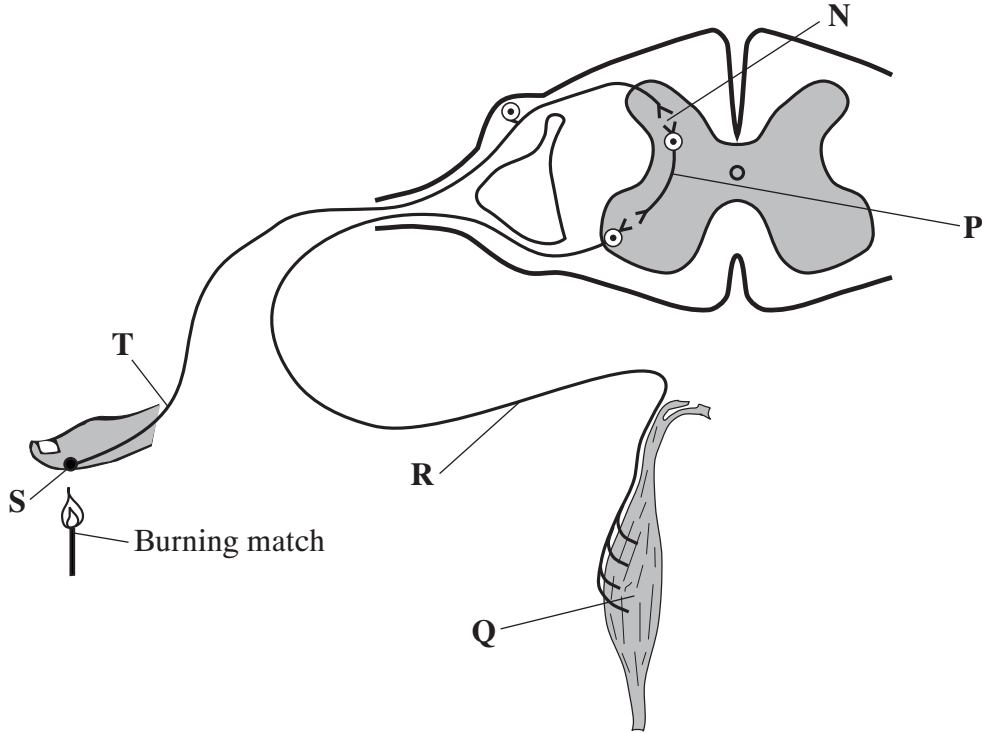
- A The release of ADH from the pancreas causes less water to be re-absorbed into the blood.
- B The release of ADH from the pancreas causes more water to be re-absorbed into the blood.
- C The release of ADH from the pituitary gland causes less water to be re-absorbed into the blood.
- D The release of ADH from the pituitary gland causes more water to be re-absorbed into the blood.

Turn over for the next question

Turn over ►

QUESTION NINE

A person accidentally puts his hand close to a burning match. His hand automatically moves away from the flame. The drawing shows the parts involved in this reflex action.



9.1 Which of the following represents the pathway of the impulses in this reflex action?

- A** P → T → S → R → Q
B Q → R → P → S → T
C S → T → P → R → Q
D S → T → R → P → Q

9.2 There are three neurones involved in this reflex action.

Which line in the table is correct?

	Sensory neurone	Motor neurone	Relay neurone
A	T	R	P
B	R	P	T
C	T	P	R
D	R	T	P

9.3 The synapse is found . . .

- A** at N.
- B** at P.
- C** at S.
- D** between S and T.

9.4 Which of the following is true of reflex actions?

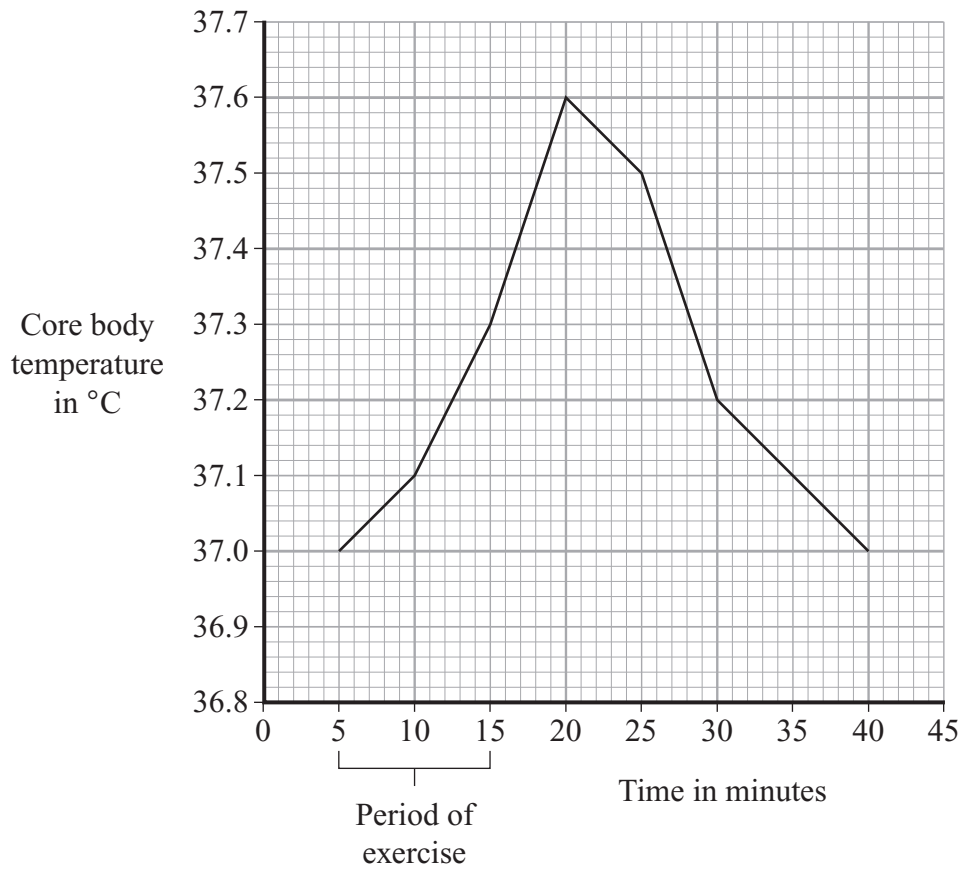
- A** The brain always coordinates the responses.
- B** They all involve muscles.
- C** They all involve the spinal cord.
- D** They are always automatic.

Turn over for the next question

Turn over ►

QUESTION TEN

The graph shows the effect of a 10 minute exercise period on the core body temperature of a person.



10.1 After the end of the period of exercise, the core body temperature rose by . . .

- A** 0.3°C
- B** 0.6°C
- C** 5.0°C
- D** 37.6°C

10.2 An average rate of fall in core body temperature of $0.033\text{ }^{\circ}\text{C}$ per minute occurred between 20 minutes and . . .

- A 25 minutes.
- B 30 minutes.
- C 35 minutes.
- D 40 minutes.

10.3 When the core body temperature increases, the person is likely to . . .

- A release less sweat and the blood vessels supplying the skin capillaries will constrict.
- B release less sweat and the blood vessels supplying the skin capillaries will dilate.
- C release more sweat and the blood vessels supplying the skin capillaries will constrict.
- D release more sweat and the blood vessels supplying the skin capillaries will dilate.

10.4 Why is the core body temperature kept at about $37\text{ }^{\circ}\text{C}$?

- A Enzymes work best at this temperature.
- B Less energy is needed to keep the body warm.
- C The body must be kept as hot as possible.
- D The muscles can contract more powerfully.

END OF TEST

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