

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
June 2006

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

346002



Tuesday 27 June 2006 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

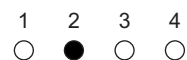
Instructions

- 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

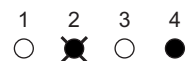
- Use a **black ball-point pen**.

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

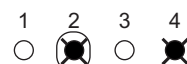


- Do **not** extend beyond the circles.

- 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 in the list with the numbers.

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

Mark your choices on the answer sheet.

QUESTION ONE

The drawing shows an orang-utan. Orang-utans feed on leaves and fruits and live in trees.

The table is about different receptors in the body of the orang-utan.

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

ear

eye

skin

tongue



Part of body	Contains receptors which enable the orang-utan to . . .
1	feel the branches in the trees.
2	keep its balance in the trees.
3	see predators approaching.
4	taste some of the chemicals in the leaves.

QUESTION TWO

The diagram shows a section through a leaf.

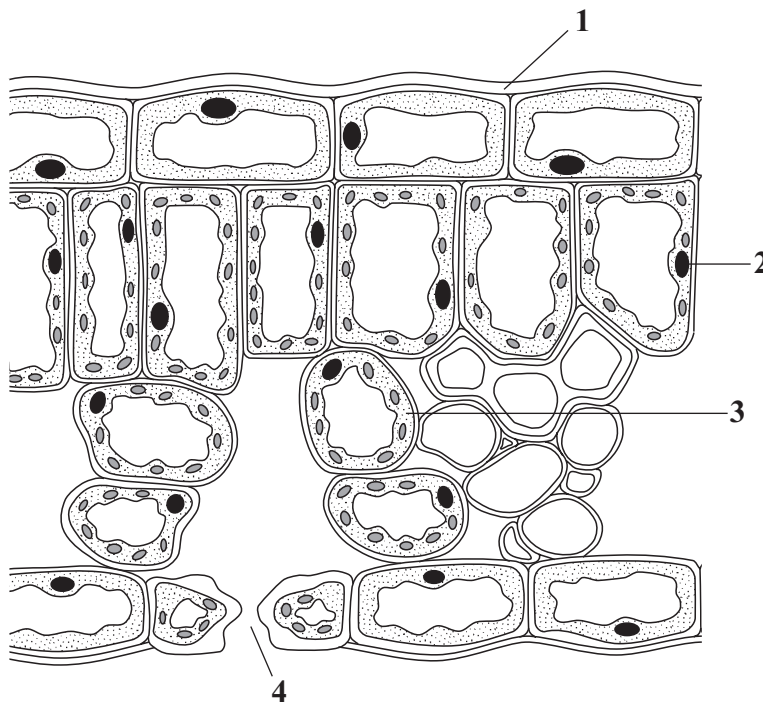
Match words from the list with the numbers 1–4 on the diagram.

cuticle

cytoplasm

nucleus

stoma



Turn over for the next question

Turn over ►

QUESTION THREE

The body produces several waste substances which are removed from the body.

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

carbon dioxide

faeces

ions

urea

Substance	Feature of substance
1	excreted by the lungs
2	excreted in sweat
3	produced by the liver and carried by the blood to the kidney
4	produced in the large intestine

QUESTION FOUR

Parts of plants have different functions and features.

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

phloem

root

shoot

xylem

Part of plant	Function or feature
1	carries nutrients to storage organs
2	carries water up the stem
3	grows against the force of gravity
4	grows towards moisture

QUESTION FIVE

Reflex actions are important in human behaviour.

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

muscle

neurone

receptor

response

If you step on a sharp piece of glass, . . . **1** . . . cells in the skin are stimulated.

Electrical impulses are sent along . . . **2** . . . cells to . . . **3** . . . cells.

The . . . **4** . . . will be the rapid removal of the foot.

Turn over for the next question

Turn over ►

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

Plants absorb and release substances from their leaves.

Which **two** of the following help leaves to absorb substances by increasing the surface area?

flattened shape

internal air spaces

presence of phloem tissue

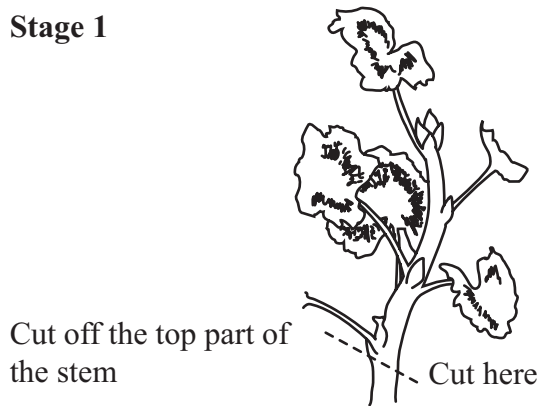
presence of stomata

vacuoles inside the leaf cells

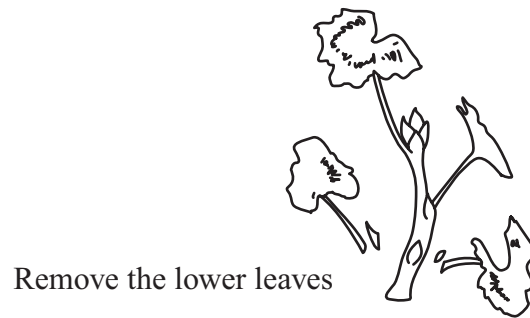
QUESTION SEVEN

The diagram shows how new plants can be produced from cuttings.

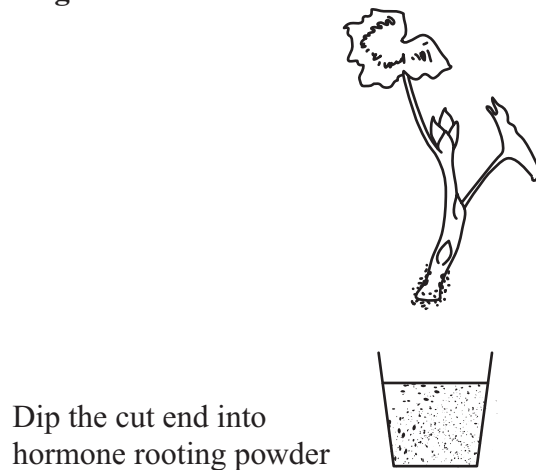
Stage 1



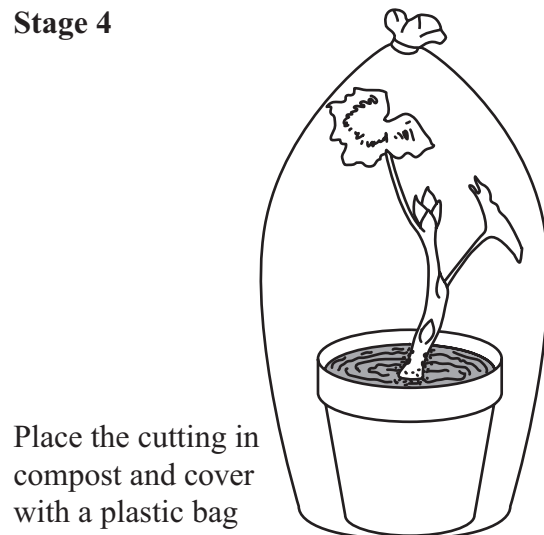
Stage 2



Stage 3



Stage 4



Which **two** of the following are correct?

covering the cutting with a plastic bag decreases transpiration

covering the cutting with a plastic bag stops photosynthesis

the hormones in the rooting powder stimulate the growth of new roots

the hormones in the rooting powder stimulate the growth of new shoots

the hormones in the rooting powder stimulate the leaves to grow rapidly

Turn over ►

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

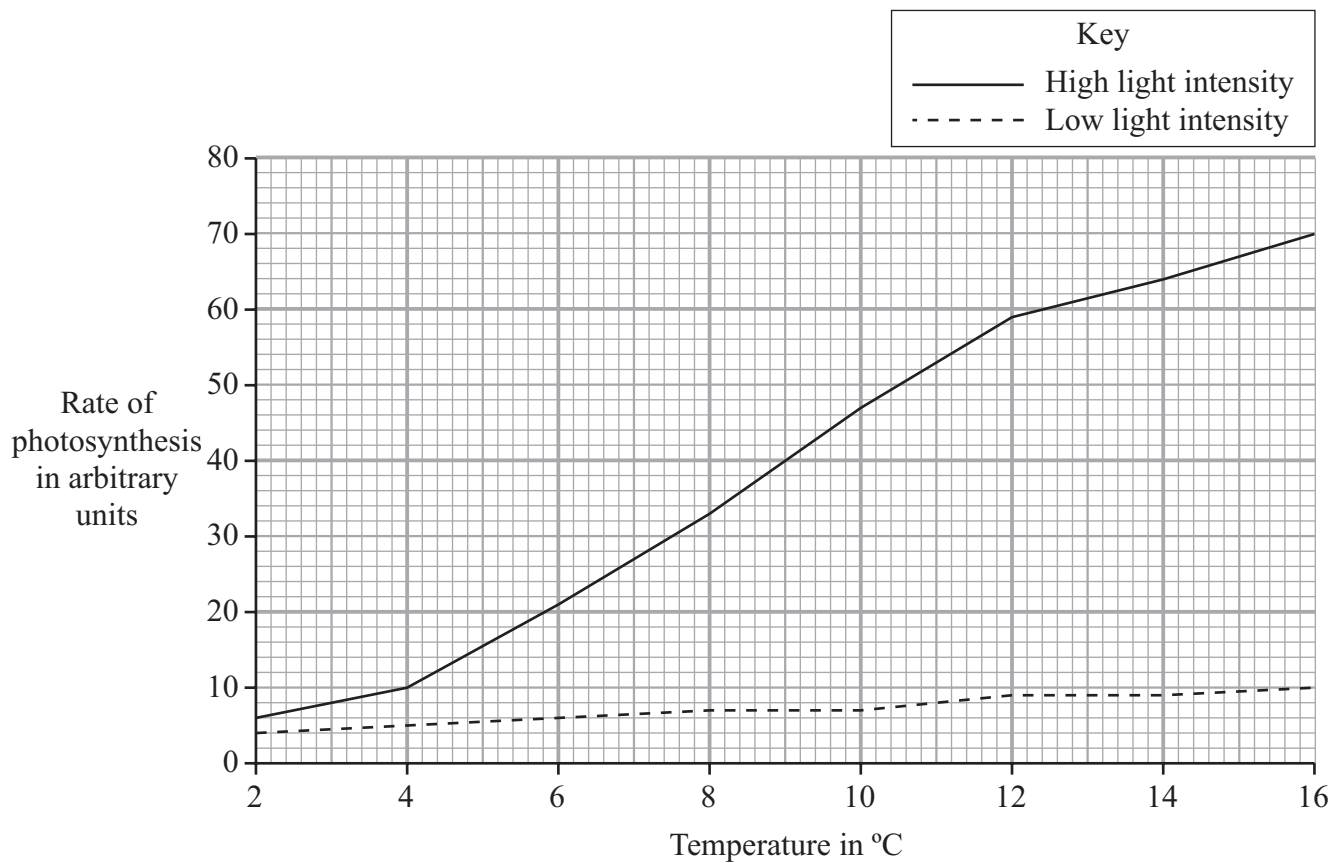
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

QUESTION EIGHT

The graph shows how the temperature affects the rate of photosynthesis in a plant at two different light intensities.



8.1 By how much did the rate of photosynthesis increase between 4°C and 14°C at the high light intensity?

- A 54 arbitrary units
- B 58 arbitrary units
- C 66 arbitrary units
- D 68 arbitrary units

8.2 The graph indicates that the rate of photosynthesis is affected by . . .

- A** light intensity only.
- B** light intensity and temperature.
- C** light intensity, temperature and other factors.
- D** temperature only.

8.3 The rate of photosynthesis can be measured by recording the mass of a gas given off by the plant.

What is the name of this gas given off by the plant?

- A** Carbon dioxide
- B** Nitrogen
- C** Oxygen
- D** Water vapour

8.4 Sugar is produced by photosynthesis.

Which tissue transports the sugar in the plant?

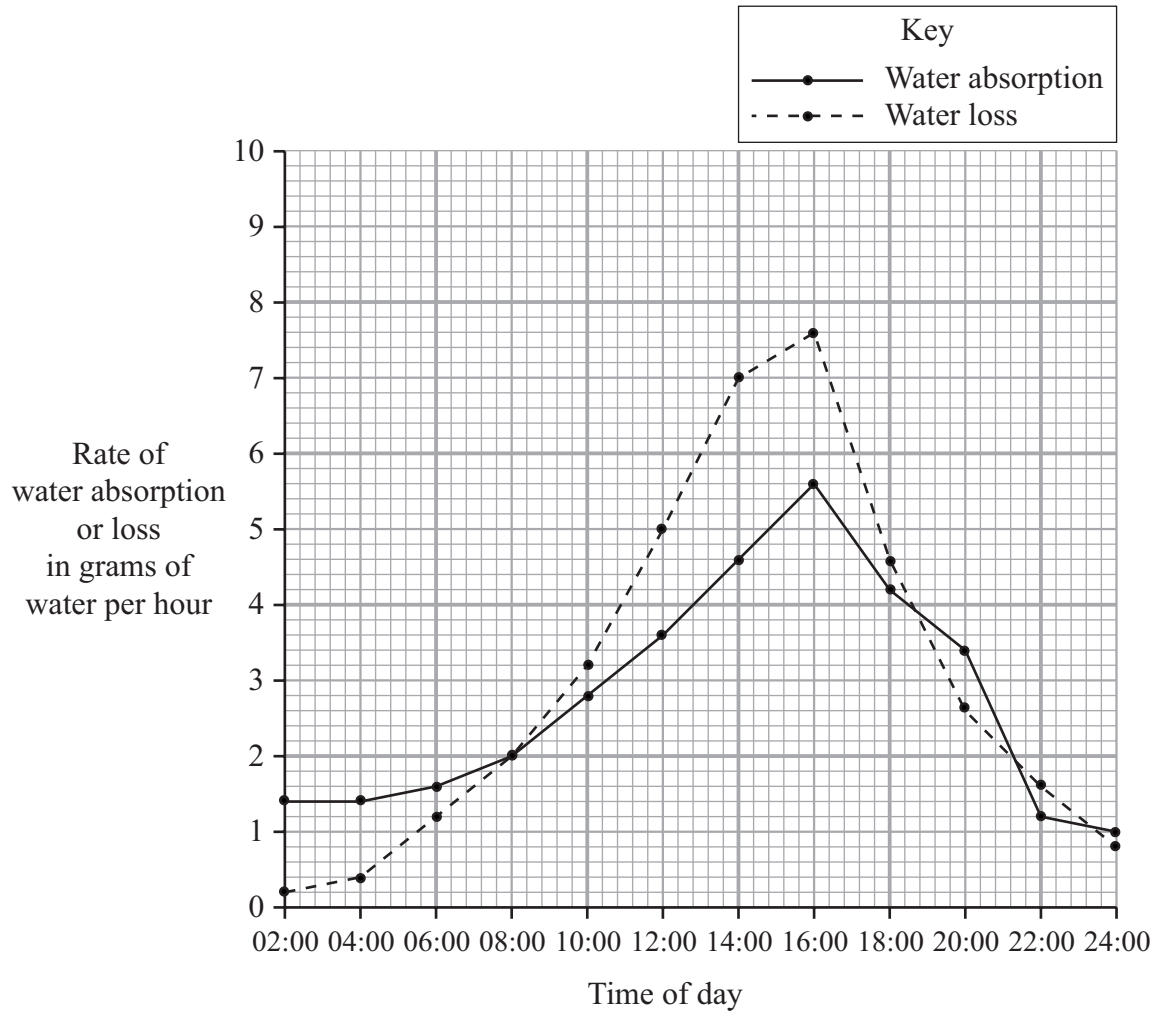
- A** Both phloem and xylem
- B** Internal air spaces in the leaves
- C** Phloem
- D** Xylem

Turn over for the next question

Turn over ►

QUESTION NINE

The graph shows the rate of water absorption by a plant and the rate of water vapour loss by the plant at different times in the day.



- 9.1** At which of these times was the difference between the rate of water loss and the rate of water absorption least?
- A 04:00
 - B 12:00
 - C 20:00
 - D 22:00

9.2 The increase in the rate of water loss was greatest between . . .

- A** 04:00 and 06:00
- B** 08:00 and 10:00
- C** 12:00 and 14:00
- D** 14:00 and 16:00

9.3 At which time is the plant most likely to show signs of wilting?

- A** 04:00
- B** 12:00
- C** 14:00
- D** 16:00

9.4 Which line of the table, **A**, **B**, **C** or **D**, is true?

	Water is gained through the . . .	Water is lost through the . . .
A	cuticle	roots
B	cuticle	stomata
C	roots	roots
D	roots	stomata

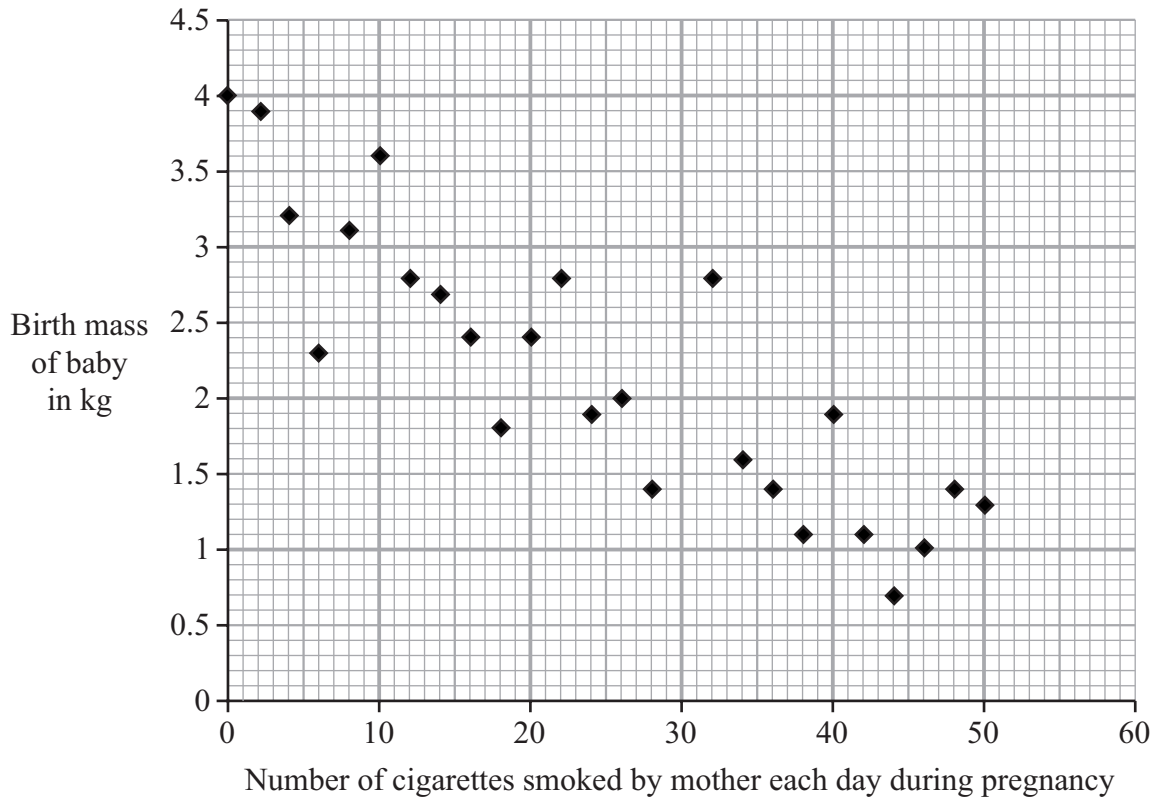
Turn over for the next question

Turn over ►

QUESTION TEN

The graph shows the birth masses of babies born to a group of mothers, compared with the number of cigarettes smoked during pregnancy.

Each \blacklozenge represents one baby.



10.1 Which of the following is true of these data?

- A** Of all the babies weighing 2 or more kilograms, $\frac{1}{4}$ were born to women who smoked fewer than 10 cigarettes a day.
- B** Of the mothers who smoked fewer than 20 cigarettes a day, 12 had babies weighing between 1.5 and 3 kilograms.
- C** Of the mothers who smoked fewer than 30 cigarettes a day, 9 had babies weighing between 1.5 and 3 kilograms.
- D** 9 mothers had babies weighing less than 1.5 kilograms.

10.2 The graph indicates that . . .

- A** cigarette smoke contains nicotine.
- B** smoking cigarettes always reduces the birth mass of babies.
- C** smoking cigarettes during pregnancy is harmful to babies.
- D** smoking cigarettes during pregnancy may lead to a lower birth mass of babies.

10.3 Which chemical in cigarette smoke reduces the ability of the blood to carry oxygen?

- A** Carbon dioxide
- B** Carbon monoxide
- C** Insulin
- D** Tar

10.4 When deprived of certain harmful drugs, a person may suffer from . . .

- A** addiction.
- B** bronchitis.
- C** emphysema.
- D** withdrawal symptoms.

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 in the list with the numbers.

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

Mark your choices on the answer sheet.

QUESTION ONE

Reflex actions are important in human behaviour.

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

muscle

neurone

receptor

response

If you step on a sharp piece of glass, . . . **1** . . . cells in the skin are stimulated.

Electrical impulses are sent along . . . **2** . . . cells to . . . **3** . . . cells.

The . . . **4** . . . will be the rapid removal of the foot.

QUESTION TWO

Plants make a variety of different substances.

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

amino acids

cellulose

lipids (fats and oils)

sugars

Substance	Function in plant
1	formed by photosynthesis
2	stored in seeds
3	used to form cell walls
4	used to make proteins

Turn over for the next question

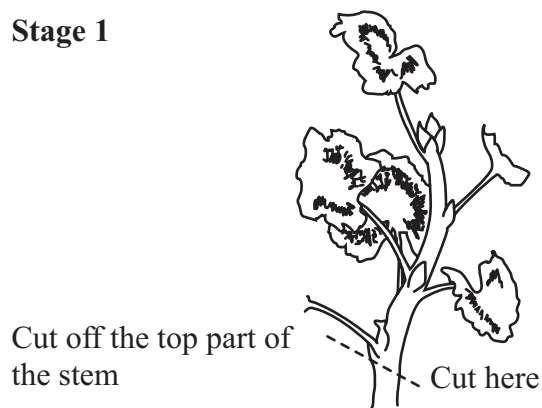
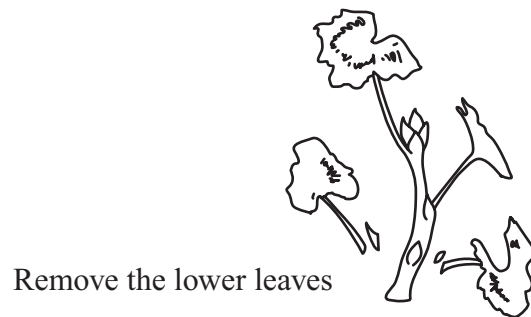
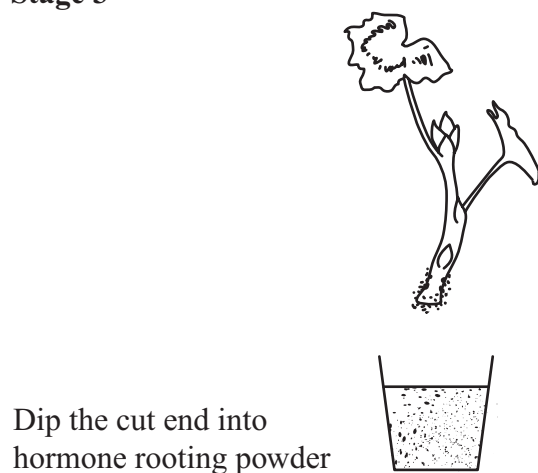
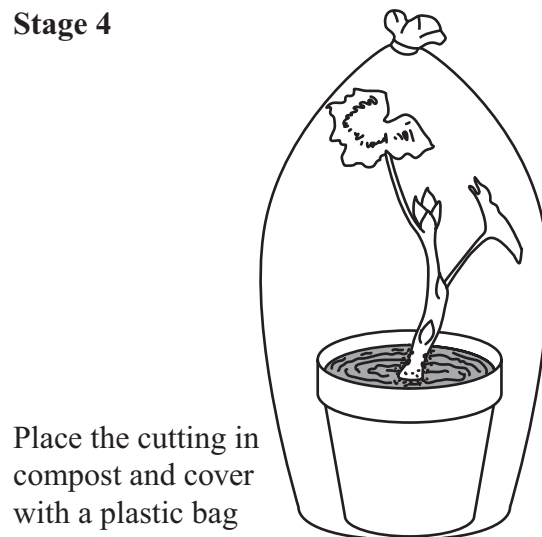
Turn over ►

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

The diagram shows how new plants can be produced from cuttings.

Stage 1**Stage 2****Stage 3****Stage 4**

Which **two** of the following are correct?

covering the cutting with a plastic bag decreases transpiration

covering the cutting with a plastic bag stops photosynthesis

the hormones in the rooting powder stimulate the growth of new roots

the hormones in the rooting powder stimulate the growth of new shoots

the hormones in the rooting powder stimulate the leaves to grow rapidly

QUESTION FOUR

Which **two** of the following are responses to an increase in blood glucose level?

glucagon is released by the liver

glucose is converted to glycogen

glycogen is released into the blood

insulin is released from the pancreas

the liver releases glycogen

Turn over for the next question

Turn over ►

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

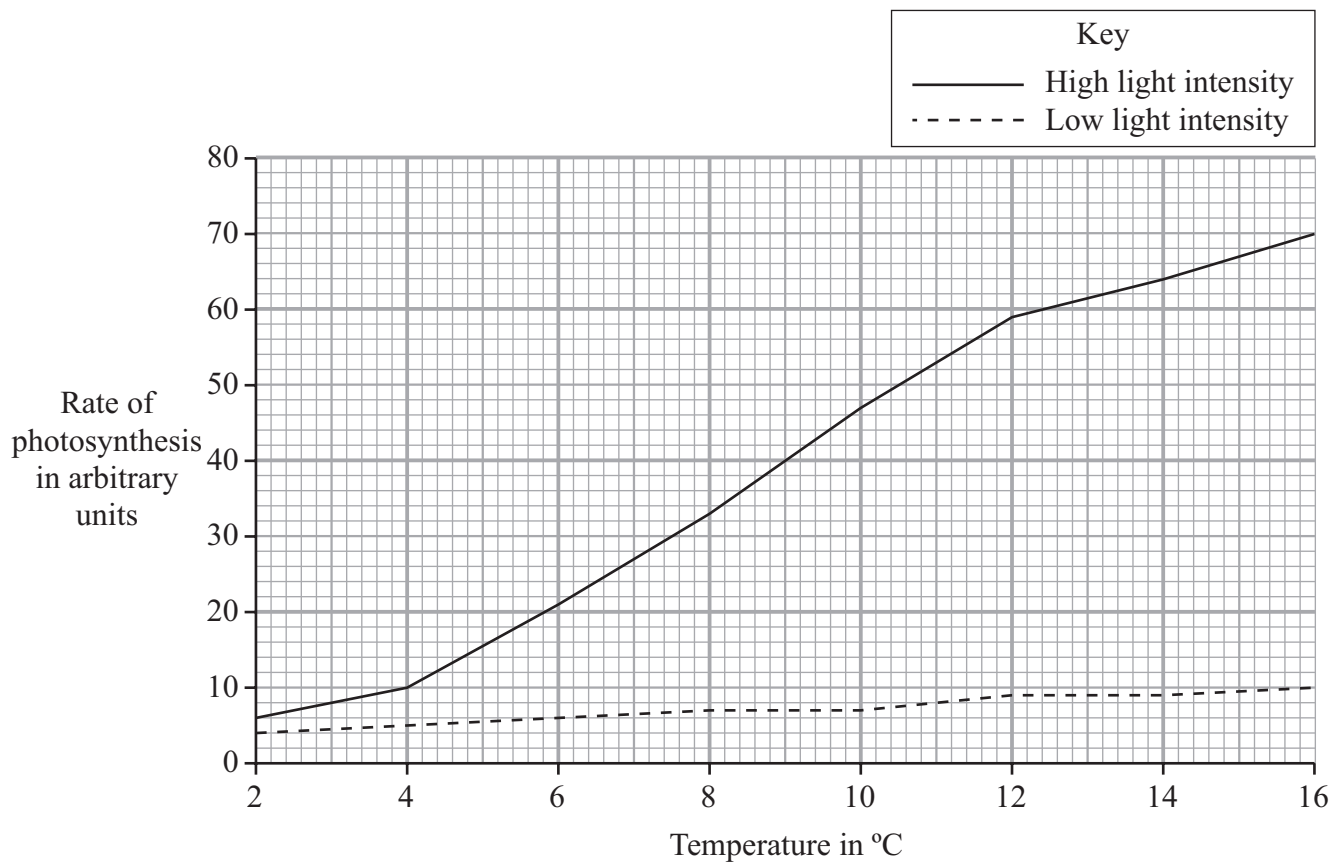
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

QUESTION FIVE

The graph shows how the temperature affects the rate of photosynthesis in a plant at two different light intensities.



- 5.1** By how much did the rate of photosynthesis increase between 4°C and 14°C at the high light intensity?
- A** 54 arbitrary units
 - B** 58 arbitrary units
 - C** 66 arbitrary units
 - D** 68 arbitrary units

5.2 The graph indicates that the rate of photosynthesis is affected by . . .

- A** light intensity only.
- B** light intensity and temperature.
- C** light intensity, temperature and other factors.
- D** temperature only.

5.3 The rate of photosynthesis can be measured by recording the mass of a gas given off by the plant.

What is the name of this gas given off by the plant?

- A** Carbon dioxide
- B** Nitrogen
- C** Oxygen
- D** Water vapour

5.4 Sugar is produced by photosynthesis.

Which tissue transports the sugar in the plant?

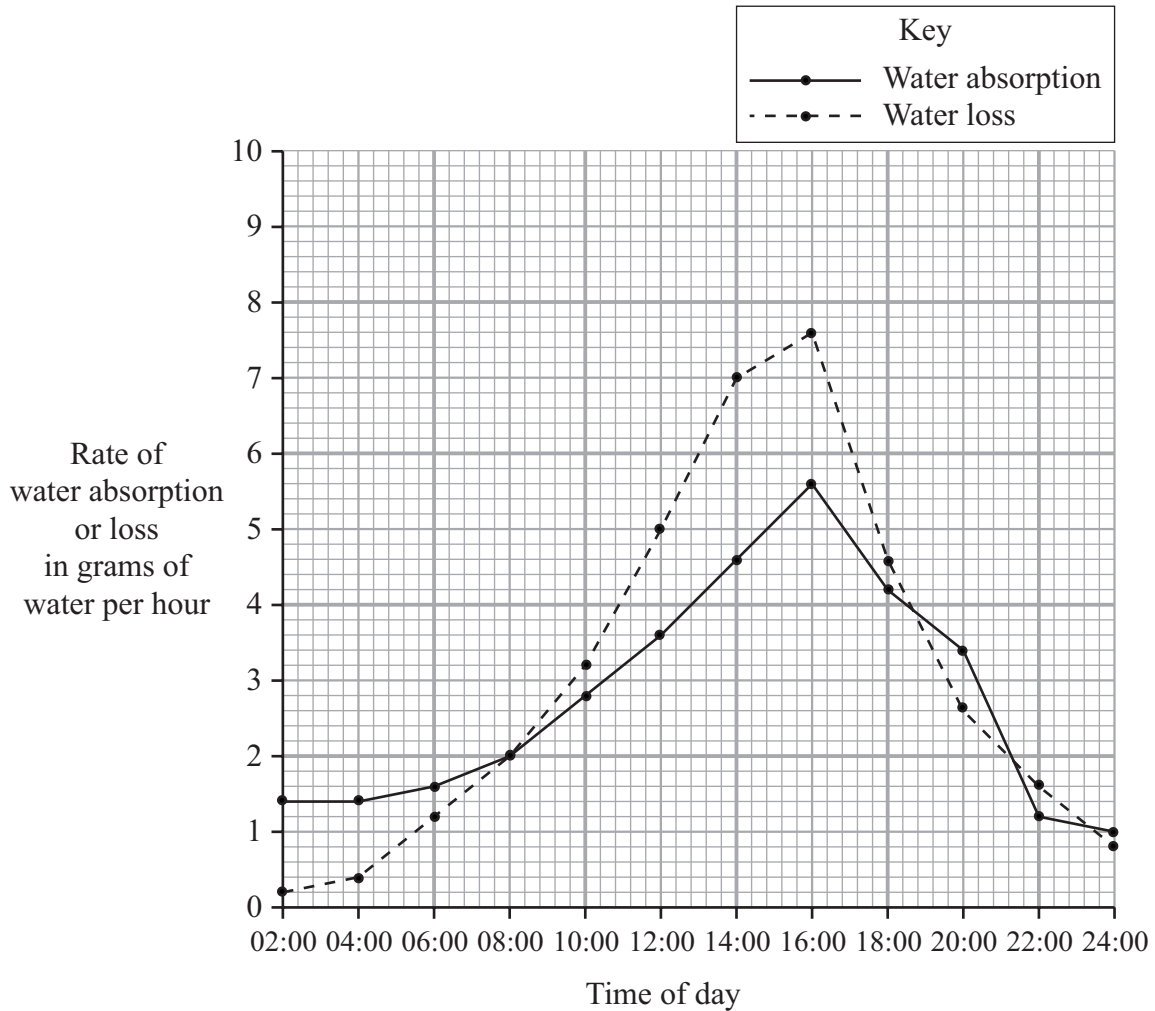
- A** Both phloem and xylem
- B** Internal air spaces in the leaves
- C** Phloem
- D** Xylem

Turn over for the next question

Turn over ►

QUESTION SIX

The graph shows the rate of water absorption by a plant and the rate of water vapour loss by the plant at different times in the day.



- 6.1** At which of these times was the difference between the rate of water loss and the rate of water absorption least?
- A 04:00
 - B 12:00
 - C 20:00
 - D 22:00

6.2 The increase in the rate of water loss was greatest between . . .

- A** 04:00 and 06:00
- B** 08:00 and 10:00
- C** 12:00 and 14:00
- D** 14:00 and 16:00

6.3 At which time is the plant most likely to show signs of wilting?

- A** 04:00
- B** 12:00
- C** 14:00
- D** 16:00

6.4 Which line of the table, **A**, **B**, **C** or **D**, is true?

	Water is gained through the . . .	Water is lost through the . . .
A	cuticle	roots
B	cuticle	stomata
C	roots	roots
D	roots	stomata

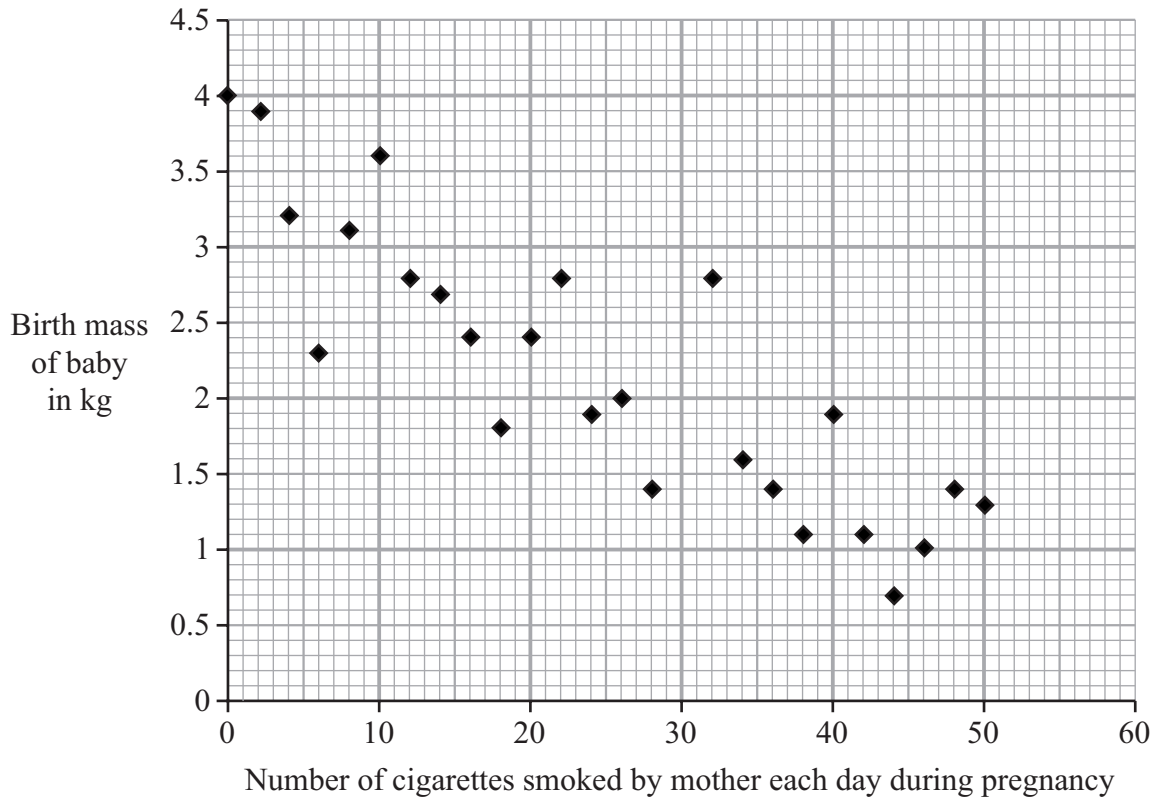
Turn over for the next question

Turn over ►

QUESTION SEVEN

The graph shows the birth masses of babies born to a group of mothers, compared with the number of cigarettes smoked during pregnancy.

Each \blacklozenge represents one baby.



7.1 Which of the following is true of these data?

- A Of all the babies weighing 2 or more kilograms, $\frac{1}{4}$ were born to women who smoked fewer than 10 cigarettes a day.
- B Of the mothers who smoked fewer than 20 cigarettes a day, 12 had babies weighing between 1.5 and 3 kilograms.
- C Of the mothers who smoked fewer than 30 cigarettes a day, 9 had babies weighing between 1.5 and 3 kilograms.
- D 9 mothers had babies weighing less than 1.5 kilograms.

- 7.2** The graph indicates that . . .
- A** cigarette smoke contains nicotine.
 - B** smoking cigarettes always reduces the birth mass of babies.
 - C** smoking cigarettes during pregnancy is harmful to babies.
 - D** smoking cigarettes during pregnancy may lead to a lower birth mass of babies.
- 7.3** Which chemical in cigarette smoke reduces the ability of the blood to carry oxygen?
- A** Carbon dioxide
 - B** Carbon monoxide
 - C** Insulin
 - D** Tar
- 7.4** When deprived of certain harmful drugs, a person may suffer from . . .
- A** addiction.
 - B** bronchitis.
 - C** emphysema.
 - D** withdrawal symptoms.

Turn over for the next question

Turn over ►

QUESTION EIGHT

The table shows the concentration of various ions in the soil and in the cytoplasm of a root hair cell. The concentration factor shows how many times more concentrated each ion is in the root hair than in the soil.

Ion	Concentration in root hair in parts per million	Concentration in soil in parts per million	Concentration factor
Calcium	10 000	14 000	0.7
Copper	6	20	0.3
Iron	100	10 000	0.01
Magnesium	2 000	5 000	0.4
Nitrate	20 000	1 000	20
Phosphate	2 100	700	3
Potassium	10 000	14 000	0.7
Sulphate	1 200	800	1.5
Zinc	20	50	0.4

8.1 For how many ions is the concentration factor less than 1.0?

- A 2
- B 3
- C 6
- D 7

8.2 Two of the ions which are absorbed into the plant by active transport are . . .

- A nitrate and magnesium ions.
- B nitrate and potassium ions.
- C nitrate and sulphate ions.
- D phosphate and potassium ions.

8.3 Poor root growth and purple younger leaves are symptoms of a deficiency of . . .

- A** nitrate ions.
- B** phosphate ions.
- C** potassium ions.
- D** sulphur.

8.4 Root hair cells are adapted for the absorption of ions by . . .

- A** having a thick layer of cytoplasm.
- B** providing a large surface area.
- C** the lack of a cell wall.
- D** the lack of chloroplasts.

Turn over for the next question

Turn over ►

QUESTION NINE

A girl went for a swim in a lake.

There was a breeze blowing.

A few minutes after the girl came out of the water she felt cold.

She soon began to shiver and noticed that the skin of her hands looked pale.

9.1 The girl felt cold because . . .

- A** her muscles had become fatigued during her swim and could not shiver yet.
- B** more blood was flowing to the thermoregulatory centre in her brain.
- C** the breeze had caused sweating to increase.
- D** the water on her skin was evaporating quickly in the breeze.

9.2 The advantage to the girl of shivering is that . . .

- A** blood is pushed more quickly to the blood vessels of her skin.
- B** excess water is shaken from her skin.
- C** the rate of respiration in her muscles is increased.
- D** the sweat glands are stimulated to release sweat.

9.3 The skin of her hands looked pale because . . .

- A** the blood vessels had constricted to reduce the flow of blood to the skin.
- B** the blood vessels had moved deeper into her skin.
- C** the sweat glands had dilated and become lighter in colour.
- D** the sweat glands had released more salt on to the skin.

9.4 Some substances work best at body temperature.

The activity of which substances is most affected by a failure to maintain body temperature within narrow limits?

- A** Acids
- B** Enzymes
- C** Fats
- D** Starches

QUESTION TEN

The kidneys help to maintain the internal environment of the body.

10.1 The first stage in producing urine is . . .

- A diluting the urine.
- B filtering the blood.
- C reabsorbing substances useful to the body.
- D the kidney releasing urea into the blood.

10.2 The kidneys reabsorb . . .

- A all the blood cells.
- B all the glucose.
- C all the ions.
- D all the urea.

10.3 How does the kidney respond when the water content of the blood increases above normal?

- A The excretion of ions is reduced.
- B The excretion of water remains constant but less urea is excreted.
- C The reabsorption of glucose and ions is reduced.
- D The reabsorption of water is reduced.

10.4 A kidney produces $180\,000\text{ cm}^3$ of filtrate per day. Of this, 98 % is reabsorbed.

What is the average rate of urine production?

- A 1.5 cm^3 per hour
- B 144 cm^3 per hour
- C 150 cm^3 per hour
- D $144\,000\text{ cm}^3$ per hour

END OF TEST

There are no questions printed on this page