

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education  
Spring 2005



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

Wednesday 2 March 2005 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
<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**.

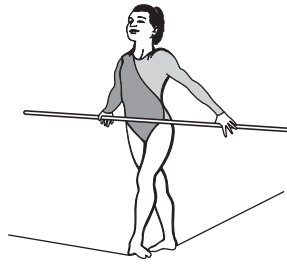
In these questions match the words in the list with the numbers.

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

Mark your choices on the answer sheet.

#### QUESTION ONE

The table is about different receptors in the body of a circus tightrope walker.



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

ears

eyes

nose

skin

Part of body	Contains receptors which allow the tightrope walker to
1	balance on the rope
2	feel the rope with her feet
3	see the pole in her hands
4	smell the sawdust in the circus ring

**QUESTION TWO**

The diagram shows the positions of four organs that help to keep conditions inside the body constant.

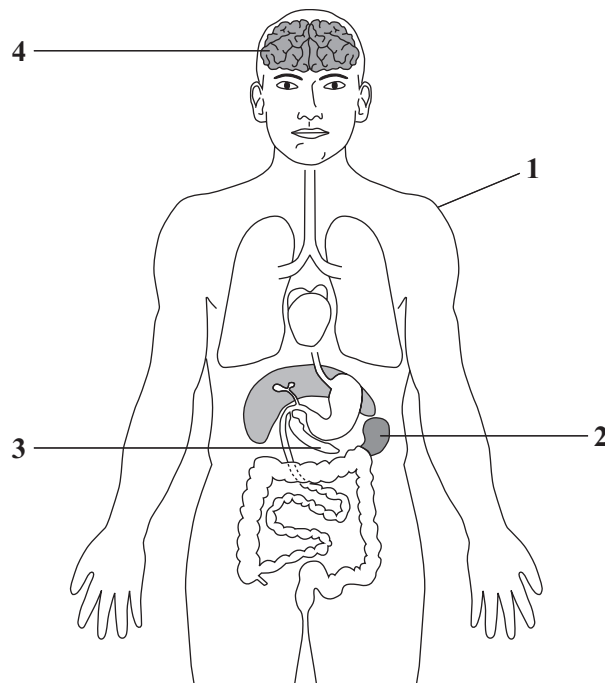
Match words from the list with the labels 1–4 on the diagram.

**produces insulin**

**produces sweat**

**produces urine**

**receives impulses from the eye**



**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION THREE**

The table is about some of the functions of different parts of a plant.

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

**cuticle**

**phloem**

**root hair**

**xylem**

Part of plant	What it does
1	absorbs water from the soil
2	carries water up the stem
3	prevents too much water being lost from the leaves
4	transports sugars within the plant

**QUESTION FOUR**

The diagram shows the pathway of impulses in a reflex action.

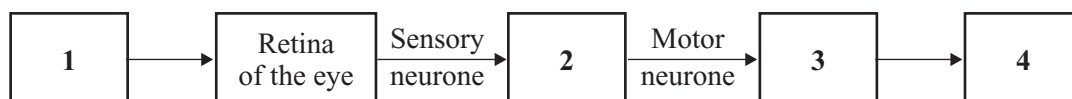
Match words from the list with the labels 1–4 in the diagram.

**brain**

**muscles**

**response**

**stimulus**



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**QUESTION FIVE**

Plants are sensitive to their surroundings.

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

**against the force of gravity**

**in the direction of the force of gravity**

**towards light**

**towards moisture**

Shoots from seeds move upwards towards the surface of the soil by growing . . . . . **1** . . . . .

When the shoots are above the soil, they grow . . . . . **2** . . . . . to get energy to make food.

To collect water, roots may move sideways in the soil by growing . . . . . **3** . . . . .

Roots from seeds move down into the soil by growing . . . . . **4** . . . . .

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

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**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.

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**QUESTION SIX**

Plant cells are different from animal cells.

Which **two** of the following parts are **not** found in animal cells?

cell membrane

cell wall

chloroplast

cytoplasm

nucleus

**QUESTION SEVEN**Which **two** of the following are treatments for patients with diabetes?

a high carbohydrate intake

careful control of diet

drugs to reduce glucagon concentration

drugs to reduce loss of ions in urine

insulin injections

Turn over ►

**SECTION C**Questions **EIGHT** to **TEN**.

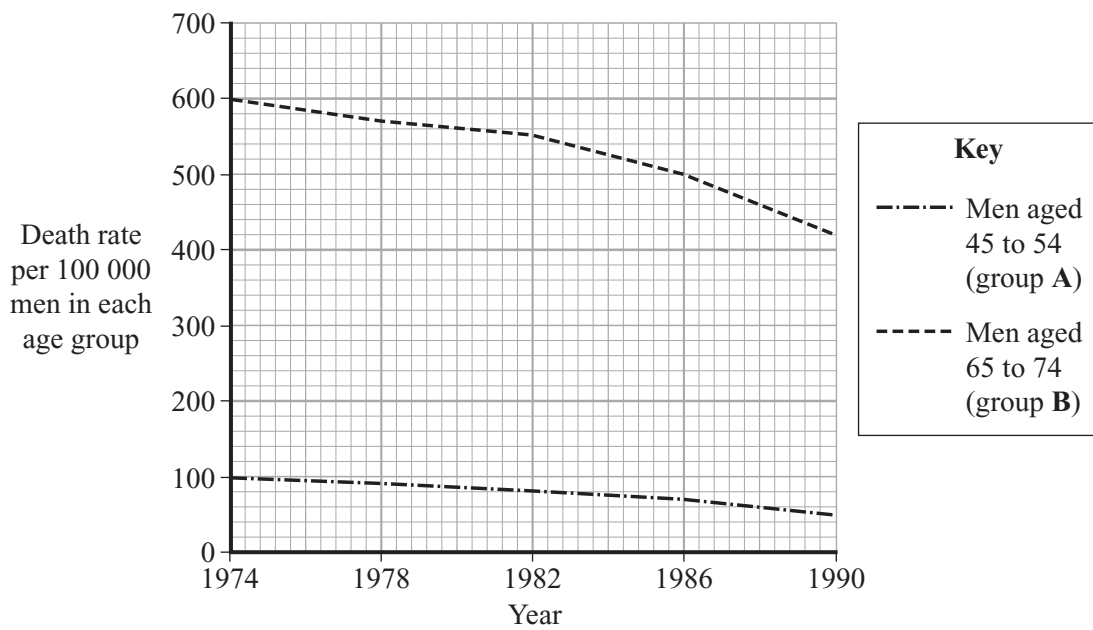
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

**QUESTION EIGHT**

The graph shows the death rate from lung cancer among men in two different age groups.



**8.1** In a population of one million men aged 65 to 74, how many would have died from lung cancer in 1974?

- A 100
- B 600
- C 4500
- D 6000



- 
- 8.2** In any particular year, the death rate from lung cancer for men between 55 and 64 years of age is likely to be . . . . .
- A** between the death rates for age groups **A** and **B**.
  - B** higher than the death rate for age group **B**.
  - C** lower than the death rate for age group **A**.
  - D** the same as the death rate for age group **B**.
- 8.3** The best interpretation of the graph is that . . . . .
- A** death from lung cancer is more likely in younger men.
  - B** medical care improved from 1974 to 1990.
  - C** more older men die from lung cancer than younger men.
  - D** older men have smoked more cigarettes than younger men.
- 8.4** Lung cancer can be caused by . . . . .
- A** alcohol.
  - B** drug abuse.
  - C** solvent abuse.
  - D** substances in tobacco smoke.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION NINE**

Wheat plants make their own food by photosynthesis.

**9.1** The tiny holes which allow gases to move in and out of plant leaves are called . . . . .

- A guard cells.
- B root hair cells.
- C stomata.
- D xylem.

**9.2** The waste gas given off by wheat plants during photosynthesis is . . . . .

- A carbon dioxide.
- B nitrogen.
- C oxygen.
- D water vapour.

**9.3** On a winter's day it is dull but not freezing.

The rate of photosynthesis of wheat plants is most likely to be limited by . . . . .

- A a shortage of chlorophyll.
- B a shortage of light.
- C a shortage of oxygen.
- D a shortage of water.

**9.4** During photosynthesis, plants . . . . .

- A produce glucose which may be used in respiration.
- B produce starch which may be used in respiration.
- C turn glucose into starch.
- D turn starch into glucose.

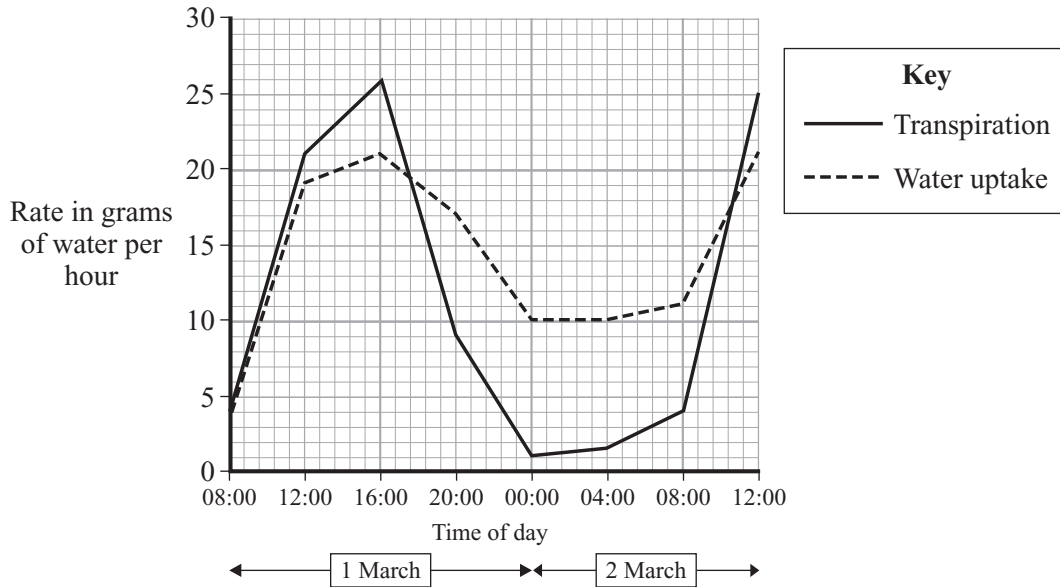
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**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

### QUESTION TEN

The graph shows the rate of transpiration and the rate of water uptake for a small bush.



**10.1** Which statement does the graph show is true for this bush?

- A Most water is taken up when it is dark
- B The rate of transpiration is always greater than the rate of water uptake
- C The rate of transpiration varies throughout the day
- D The rate of water uptake is always greater than the rate of transpiration

**10.2** The rate of transpiration is greatest at . . . . .

- A 12:00 hours on 1 March.
- B 16:00 hours on 1 March.
- C 04:00 hours on 2 March.
- D 12:00 hours on 2 March.

**10.3** The difference between the rate of transpiration and the rate of water uptake on 1 March at 16:00 hours is . . . . .

- A 5 g per hour
- B 6 g per hour
- C 26 g per hour
- D 47 g per hour

**10.4** Transpiration is . . . . .

- A the diffusion of water from cell to cell in the leaf.
- B the loss of water through the leaves of a plant.
- C the movement of water from the stem to the leaf.
- D the movement of water through cell membranes.

**END OF TEST**

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You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.  
The Foundation Tier is earlier in this booklet.

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**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.

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**QUESTION ONE**

Plants are sensitive to their surroundings.

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

**against the force of gravity**

**in the direction of the force of gravity**

**towards light**

**towards moisture**

Shoots from seeds move upwards towards the surface of the soil by growing . . . . . **1** . . . . .

When the shoots are above the soil, they grow . . . . . **2** . . . . . to get energy to make food.

To collect water, roots may move sideways in the soil by growing . . . . . **3** . . . . .

Roots from seeds move down into the soil by growing . . . . . **4** . . . . .

**QUESTION TWO**

The table is about molecules and ions that are important in plants.

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

**cellulose molecules**

**nitrate ions**

**phosphate ions**

**starch molecules**

<b>Molecule or ion</b>	<b>Use in plant</b>
<b>1</b>	act as an insoluble storage substance
<b>2</b>	make up the cell wall
<b>3</b>	play an important role in respiration
<b>4</b>	used to form proteins

**TURN OVER FOR THE NEXT QUESTION**

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**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.

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**QUESTION THREE**Which **two** of the following are treatments for patients with diabetes?

- a high carbohydrate intake**
- careful control of diet**
- drugs to reduce glucagon concentration**
- drugs to reduce loss of ions in urine**
- insulin injections**

**QUESTION FOUR**In which **two** of the following ways are hormones used to control growth or reproduction in plants?

- as a weed killer by disrupting the growth patterns of weeds**
- controlling fruit ripening during transport of fruits**
- helping plants to grow in very dry conditions**
- increasing the uptake of carbon dioxide by plants**
- increasing the uptake of ions from the soil by plants**

Turn over ►

**SECTION C**Questions **FIVE** to **TEN**.

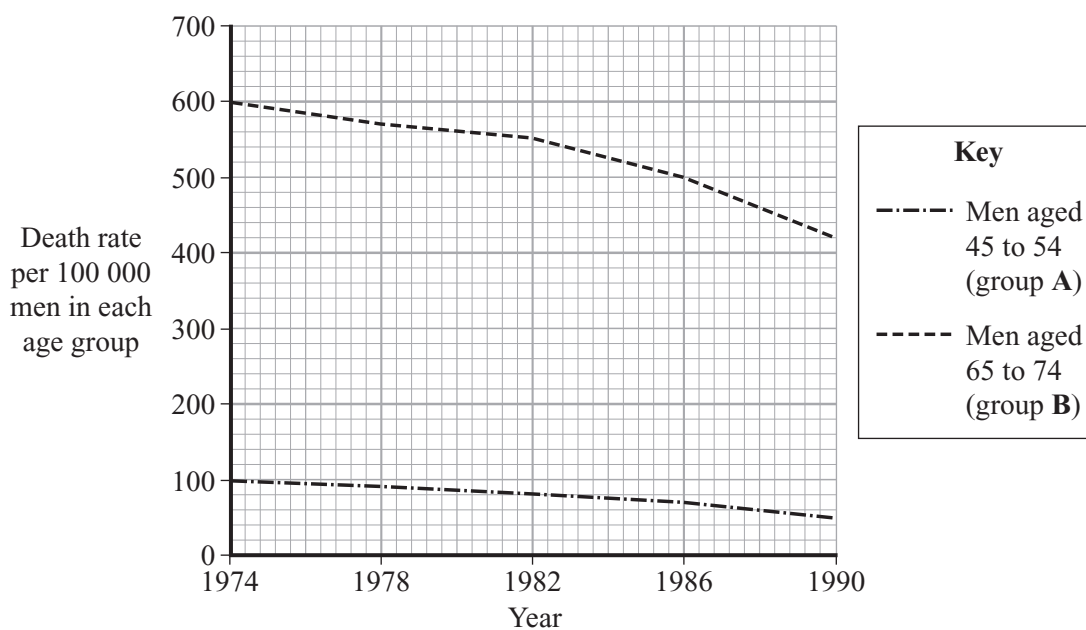
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

**QUESTION FIVE**

The graph shows the death rate from lung cancer among men in two different age groups.



**5.1** In a population of one million men aged 65 to 74, how many would have died from lung cancer in 1974?

- A 100
- B 600
- C 4500
- D 6000

- 5.2** In any particular year, the death rate from lung cancer for men between 55 and 64 years of age is likely to be . . . . .
- A** between the death rates for age groups **A** and **B**.
  - B** higher than the death rate for age group **B**.
  - C** lower than the death rate for age group **A**.
  - D** the same as the death rate for age group **B**.
- 5.3** The best interpretation of the graph is that . . . . .
- A** death from lung cancer is more likely in younger men.
  - B** medical care improved from 1974 to 1990.
  - C** more older men die from lung cancer than younger men.
  - D** older men have smoked more cigarettes than younger men.
- 5.4** Lung cancer can be caused by . . . . .
- A** alcohol.
  - B** drug abuse.
  - C** solvent abuse.
  - D** substances in tobacco smoke.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION SIX**

Wheat plants make their own food by photosynthesis.

**6.1** The tiny holes which allow gases to move in and out of plant leaves are called . . . . .

- A guard cells.
- B root hair cells.
- C stomata.
- D xylem.

**6.2** The waste gas given off by wheat plants during photosynthesis is . . . . .

- A carbon dioxide.
- B nitrogen.
- C oxygen.
- D water vapour.

**6.3** On a winter's day it is dull but not freezing.

The rate of photosynthesis of wheat plants is most likely to be limited by . . . . .

- A a shortage of chlorophyll.
- B a shortage of light.
- C a shortage of oxygen.
- D a shortage of water.

**6.4** During photosynthesis, plants . . . . .

- A produce glucose which may be used in respiration.
- B produce starch which may be used in respiration.
- C turn glucose into starch.
- D turn starch into glucose.

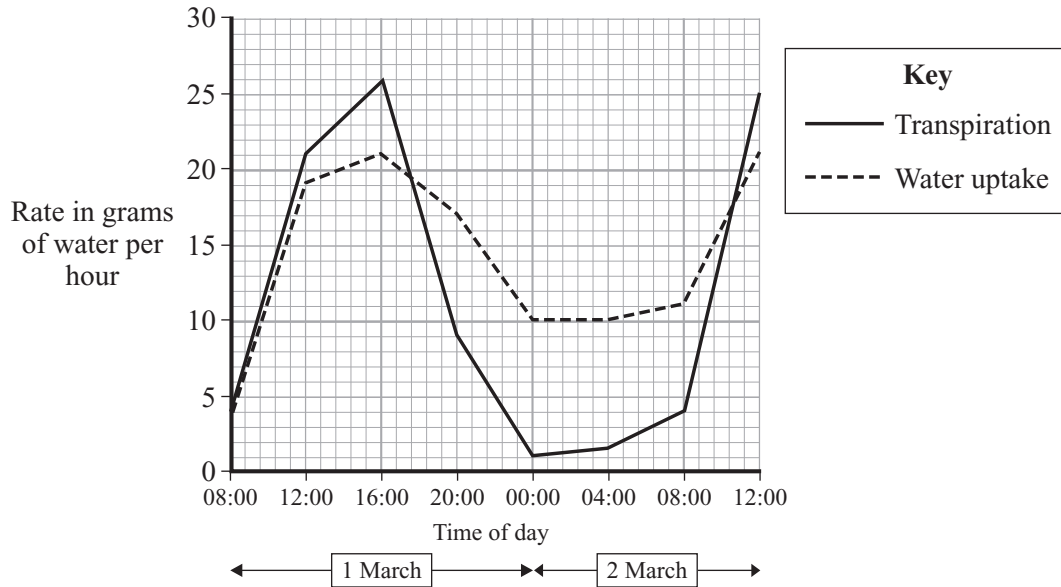
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**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

### QUESTION SEVEN

The graph shows the rate of transpiration and the rate of water uptake for a small bush.



7.1 Which statement does the graph show is true for this bush?

- A Most water is taken up when it is dark
- B The rate of transpiration is always greater than the rate of water uptake
- C The rate of transpiration varies throughout the day
- D The rate of water uptake is always greater than the rate of transpiration

7.2 The rate of transpiration is greatest at . . . . .

- A 12:00 hours on 1 March.
- B 16:00 hours on 1 March.
- C 04:00 hours on 2 March.
- D 12:00 hours on 2 March.

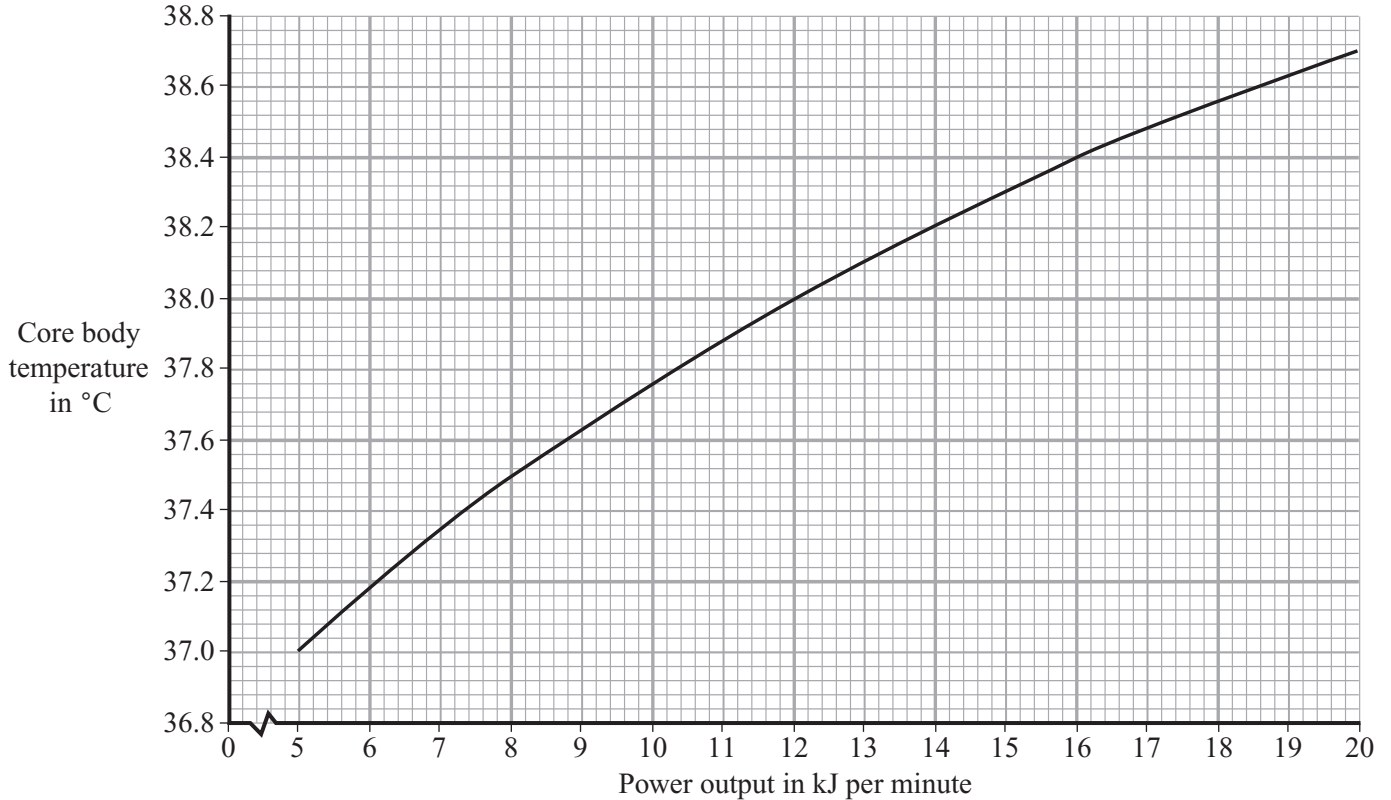
- 7.3** The difference between the rate of transpiration and the rate of water uptake on 1 March at 16:00 hours is . . . . .
- A** 5 g per hour
  - B** 6 g per hour
  - C** 26 g per hour
  - D** 47 g per hour
- 7.4** Transpiration is . . . . .
- A** the diffusion of water from cell to cell in the leaf.
  - B** the loss of water through the leaves of a plant.
  - C** the movement of water from the stem to the leaf.
  - D** the movement of water through cell membranes.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION EIGHT**

The graph shows how core body temperature changes as power output increases during exercise.



- 8.1** By how much does the core body temperature change when power output increases from 8 kJ to 12 kJ per minute?
- A 0.05 °C  
B 0.50 °C  
C 0.70 °C  
D 1.20 °C
- 8.2** By how many times does the power output increase when core body temperature increases from 37 °C to 38.3 °C?
- A 2 times  
B  $2\frac{1}{2}$  times  
C 3 times  
D  $3\frac{1}{2}$  times.



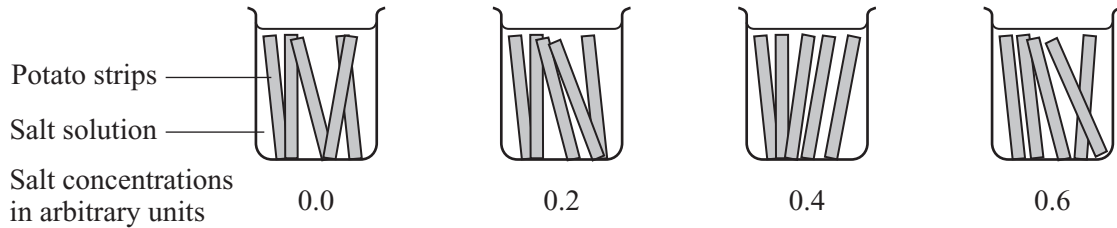
- 8.3** When body temperature rises too high . . . . .
- A** capillaries move closer to the skin surface.
  - B** more blood passes through the skin capillaries.
  - C** muscles contract rapidly.
  - D** skin capillaries constrict.
- 8.4** The rise in core body temperature is detected by receptors in the . . . . .
- A** brain.
  - B** heart.
  - C** pituitary gland.
  - D** skin.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

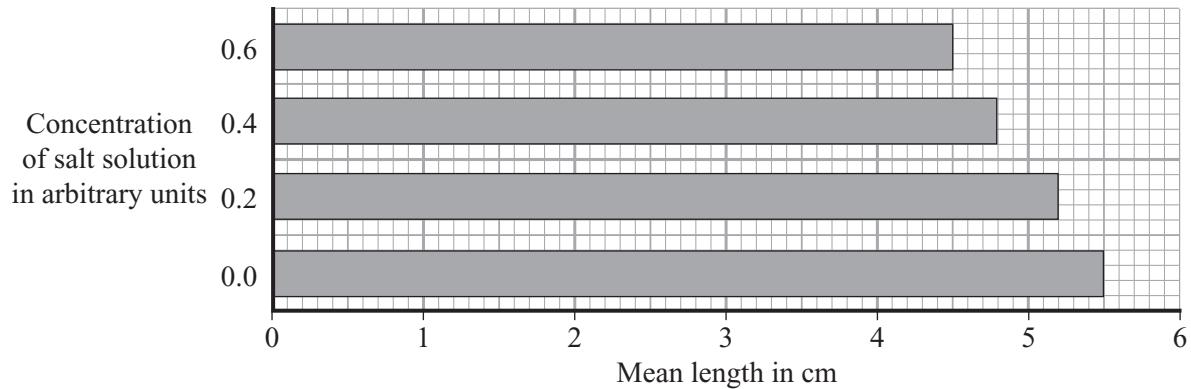
**QUESTION NINE**

Thin strips of potato tissue were cut. They were all the same width and exactly 5 cm long. They were placed in a series of salt solutions of different concentrations.



After two hours, the strips were removed, carefully dried and measured for length.

The mean length of the strips of potato was recorded and is shown on the chart.



- 9.1** The potato strips in a salt solution with a concentration of 0.6 arbitrary units . . . . .
- A** decreased in length by 0.5 cm.
  - B** decreased in length by 1 cm.
  - C** increased in length by 0.5 cm.
  - D** increased in length by 1 cm.
- 9.2** At which concentration would you expect the length of the potato strips to remain unchanged?
- A** 0.3 arbitrary units
  - B** 0.5 arbitrary units
  - C** 0.7 arbitrary units
  - D** 1.0 arbitrary units

**9.3** What process caused the change in length of the potato strips?

- A Active transport
- B Osmosis
- C Transpiration
- D Transport of salts within the potato cells

**9.4** Water entering plant cells . . . . .

- A increases the salt concentration of the cell sap.
- B maintains the turgor of the cell.
- C makes the cell walls weaker.
- D reduces the pressure on the cell walls.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION TEN**

It is important to maintain a constant internal environment in the body.

ADH affects the production of urine to help the body maintain a correct water balance.

The table gives some data on urine production for a healthy person, for a person given additional ADH, and for a person who does not make enough ADH.

<b>Condition</b>	<b>Volume of filtrate produced by kidney in dm<sup>3</sup> per day</b>	<b>Volume of urine released in dm<sup>3</sup> per day</b>
Healthy person	180	2.5
Person given additional ADH	180	0.5
Person lacking ADH	180	23.3

**10.1** What is the difference in urine production between a healthy person and a person given additional ADH?

- A 2.0 dm<sup>3</sup> per day
- B 3.0 dm<sup>3</sup> per day
- C 22.8 dm<sup>3</sup> per day
- D 23.8 dm<sup>3</sup> per day

**10.2** ADH is produced by the . . . . .

- A bladder.
- B kidney.
- C pancreas.
- D pituitary gland.

**10.3** ADH reduces the volume of urine released by the body by . . . . .

- A causing more water to be secreted into the tissues.
- B causing the bladder to retain urine for longer.
- C increasing the re-absorption of water and ions from the blood.
- D increasing the re-absorption of water in the kidney.

10.4 Which line in the table is true?

	<b>Blood entering the kidney contains</b>	<b>Urine contains</b>
<b>A</b>	urea, glucose	glucose, urea
<b>B</b>	urea, glucose, ions	glucose, urea
<b>C</b>	urea, glucose, ions	urea, excess ions
<b>D</b>	urea, ions	glucose, urea, excess ions

**END OF TEST**

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