

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education  
March 2006

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

**346002**



Wednesday 8 March 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

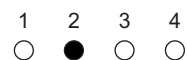
**Instructions**

- 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**

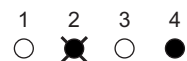
- Use a **black ball-point pen**.

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

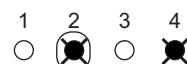


- Do **not** extend beyond the circles.

- 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.

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You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.  
The Higher Tier starts on page 14 of this booklet.

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**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.

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**QUESTION ONE**

The drawing shows a lemur. Lemurs feed on tree leaves.



The table is about different receptors in the lemur's body.

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 lemur to . . .
<b>1</b>	detect chemicals in the leaves.
<b>2</b>	feel the branches.
<b>3</b>	keep its balance on the branches.
<b>4</b>	see predators.

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**QUESTION TWO**

The table shows the functions of different parts of plants.

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

**chloroplast**

**phloem**

**root**

**root hair**

<b>Part of plant</b>	<b>Function</b>
<b>1</b>	holds the plant in the soil
<b>2</b>	its main job is to absorb water from the soil
<b>3</b>	transports substances from the leaves to the developing fruits
<b>4</b>	uses energy from light to make food

**QUESTION THREE**

This question is about waste produced by humans.

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

**bladder**

**kidney**

**liver**

**lungs**

Waste carbon dioxide leaves the body through the ... **1** ... .

Urea is produced in the ... **2** ... .

Urine is produced in the ... **3** ... .

Urine is stored in the ... **4** ... .

**Turn over ►**

**QUESTION FOUR**

This question is about how plants grow.

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

**gravity**

**hormones**

**light**

**moisture**

The shoots of plants grow towards . . . **1** . . . and against the force of . . . **2** . . . .

Roots grow towards . . . **3** . . . .

The growth of the shoots is controlled by . . . **4** . . . .

**QUESTION FIVE**

The diagram shows the eye.

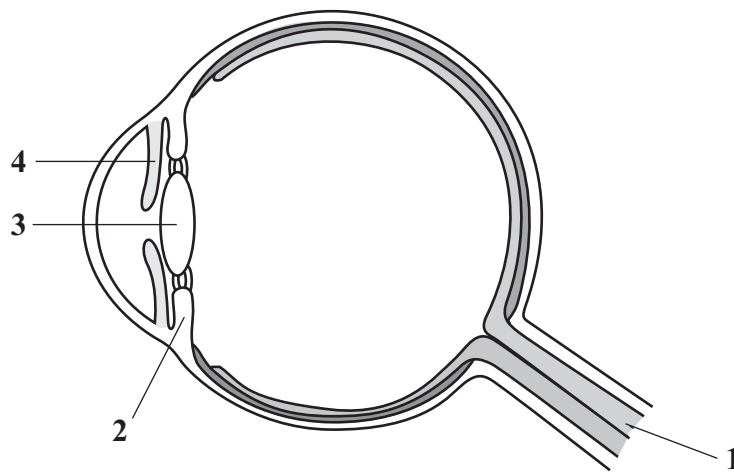
Match words from the list with the labels **1–4** on the diagram.

**carries impulses to the brain**

**contains ciliary muscles**

**controls the size of the pupil**

**focuses light on the retina**



**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.

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**QUESTION SIX**

The smoking of cigarettes may damage body organs.

Which **two** of the following organs are most likely to be damaged by the smoking of cigarettes?

**blood vessels**

**brain**

**liver**

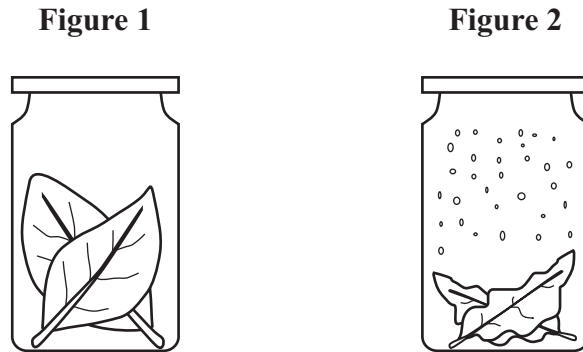
**lungs**

**pancreas**

**QUESTION SEVEN**

**Figure 1** shows a glass jar with an airtight lid containing freshly picked leaves.

**Figure 2** shows the same jar after two hours. The inside of the jar is now covered with small drops of water.



Which **two** of the following does this show happened during the experiment?

**the leaves lost their cuticle**

**the leaves photosynthesised**

**the leaves respired**

**the leaves transpired**

**the leaves wilted**

**Turn over for the next question**

**Turn over ►**

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

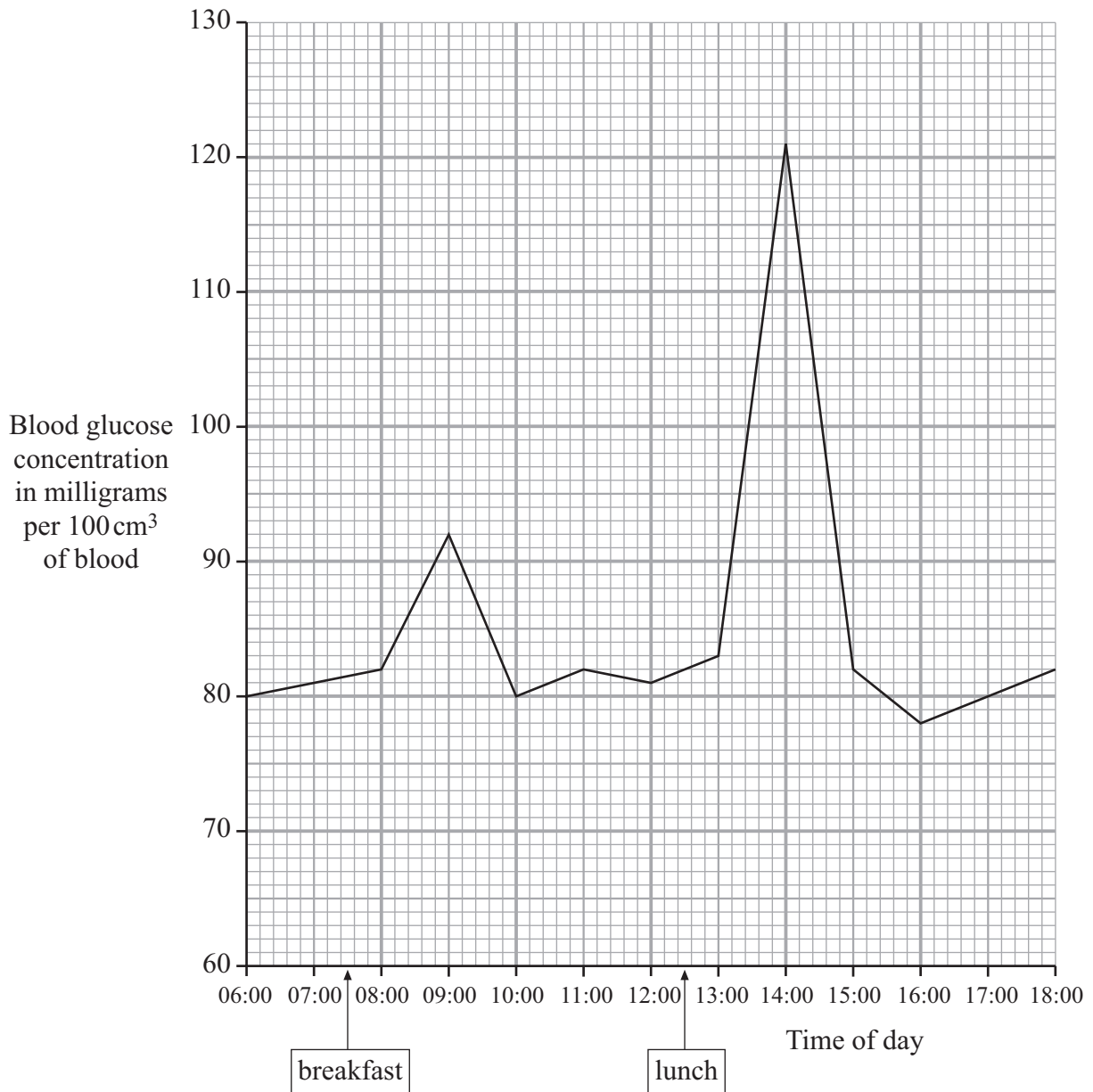
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

**QUESTION EIGHT**

The graph shows the changes in the blood glucose concentration in a healthy person over a 12-hour period.



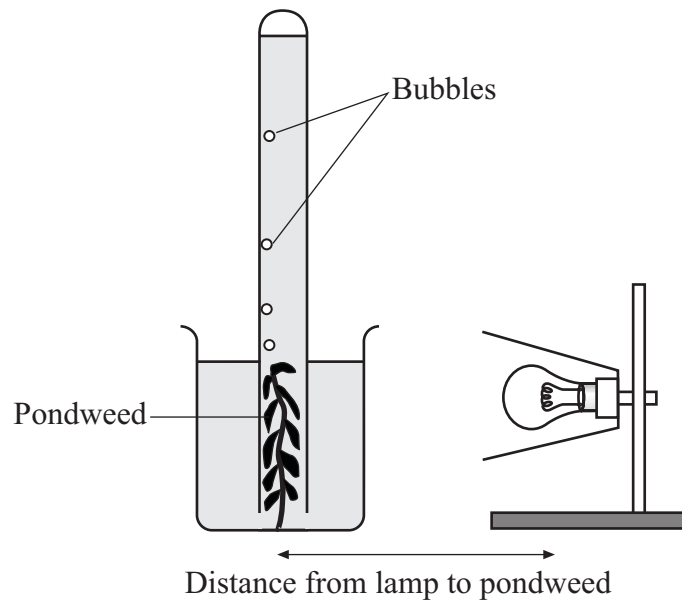


- 
- 8.1** The difference between the minimum concentration of glucose and the maximum concentration of glucose was . . .
- A** 40 mg per 100 cm<sup>3</sup> of blood.
  - B** 41 mg per 100 cm<sup>3</sup> of blood.
  - C** 43 mg per 100 cm<sup>3</sup> of blood.
  - D** 45 mg per 100 cm<sup>3</sup> of blood.
- 8.2** For how long was the blood glucose concentration at or above 80 mg per 100 cm<sup>3</sup> of blood between 06:00 and 14:00?
- A** 6 hours
  - B** 7 hours
  - C** 8 hours
  - D** 9 hours
- 8.3** What is the most likely cause of the fall in the blood sugar concentration between 14:00 and 15:00?
- A** Glucose being converted to glucagon.
  - B** Glucose being excreted.
  - C** Secretion of insulin.
  - D** The pancreas absorbing glucose.
- 8.4** The concentration of glucose in the blood is controlled by . . .
- A** enzymes.
  - B** hormones.
  - C** nerve impulses.
  - D** the brain.

**Turn over ►**

**QUESTION NINE**

A student set up the following apparatus to measure the rate of photosynthesis in pondweed.



The student counted the number of bubbles given off by the pondweed with the lamp at different distances from the pondweed. The counts were repeated 5 times and the average was calculated (to the nearest whole number).

The table shows the student's results.

Distance between pondweed and lamp in cm	Number of bubbles produced per minute					
	1 <sup>st</sup> count	2 <sup>nd</sup> count	3 <sup>rd</sup> count	4 <sup>th</sup> count	5 <sup>th</sup> count	Average
10	58	62	60	57	63	60
20	41	37	36	39	37	<b>X</b>
30	31	9	27	29	29	29
40	21	19	20	17	24	20
50	15	12	13	12	14	13
60	4	8	6	7	9	7

**9.1** What is the value of **X**?

- A** 31
- B** 36
- C** 38
- D** 39

**9.2** Why was the average for the 30 cm distance calculated as 29 and not as 25?

- A** The first count was ignored as it was much higher than the others were.
- B** The lamp was too far away from the pondweed.
- C** The second count was ignored as it was inconsistent with the others.
- D** To make the experiment more accurate.

**9.3** The results suggest that . . .

- A** increasing the amount of light increases the rate of photosynthesis.
- B** increasing the distance between the lamp and the pondweed increases the rate of photosynthesis.
- C** light affects respiration.
- D** light affects the rate of transpiration.

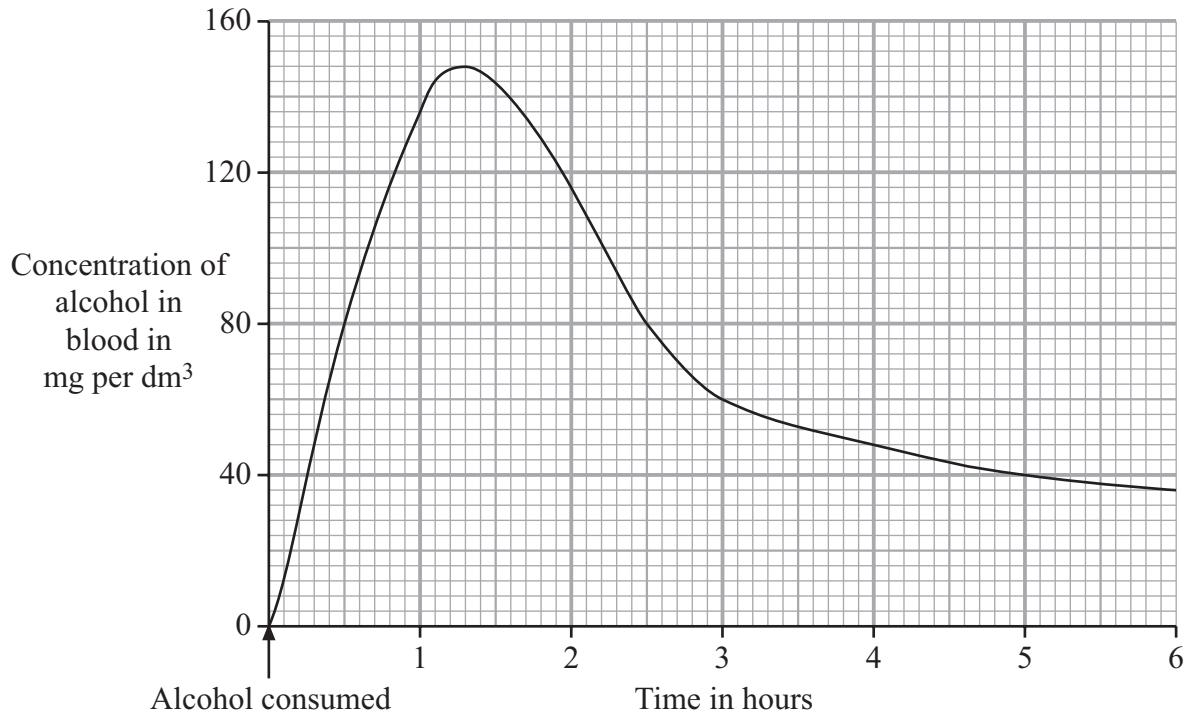
**9.4** What other factor is likely to affect the number of bubbles given off?

- A** The amount of glucose in the pondweed.
- B** The amount of nitrate in the pondweed.
- C** The amount of oxygen in the water.
- D** The temperature of the water.

**Turn over ►**

**QUESTION TEN**

The graph shows the concentration of alcohol in the blood of a person over a period of several hours after taking a drink of alcohol. The legal limit for the concentration of alcohol in the blood of drivers is 80 mg per dm<sup>3</sup>.



**10.1** How long did it take for the concentration of alcohol to reach the legal limit?

- A 0.5 hours
- B 1.3 hours
- C 2.5 hours
- D 6.0 hours

**10.2** Between what times after drinking the alcohol would it be illegal to drive?

- A 0 – 0.5 hours
- B 0.5 – 2.5 hours
- C 1.5 – 3 hours
- D 3 – 6 hours

**10.3** How is alcohol damaging to the body?

- A** It damages the lungs, liver and brain.
- B** It is addictive and causes emphysema.
- C** It leads to lack of self-control and damages the liver.
- D** It leads to lack of self-control and damages the lungs.

**10.4** Drinking large amounts of alcohol in one evening can cause . . .

- A** alcohol dependence.
- B** heart disease.
- C** lung cancer.
- D** unconsciousness.

**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 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

The diagram shows the eye.

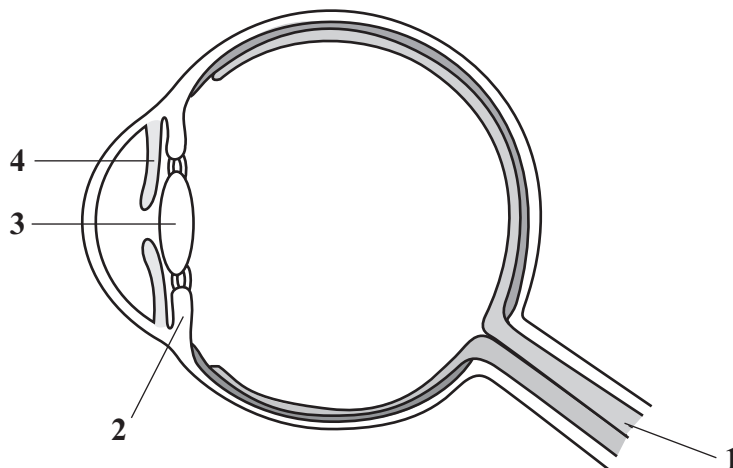
Match words from the list with the labels **1–4** on the diagram.

**carries impulses to the brain**

**contains ciliary muscles**

**controls the size of the pupil**

**focuses light on the retina**



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**QUESTION TWO**

This question is about some of the important molecules and ions found inside plants.

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

**cellulose**

**nitrate**

**starch**

**water**

<b>Molecule or ion</b>	<b>Use in plant</b>
<b>1</b>	an insoluble storage substance
<b>2</b>	takes minerals from the roots to the leaves
<b>3</b>	used to make cell walls
<b>4</b>	used to make proteins

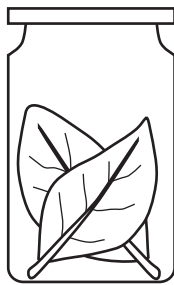
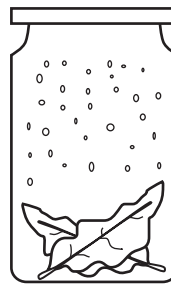
**Turn over for the next question**

**Turn over ►**

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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****Figure 1** shows a glass jar with an airtight lid containing freshly picked leaves.**Figure 2** shows the same jar after two hours. The inside of the jar is now covered with small drops of water.**Figure 1****Figure 2**Which **two** of the following does this show happened during the experiment?**the leaves lost their cuticle****the leaves photosynthesised****the leaves respired****the leaves transpired****the leaves wilted**



**QUESTION FOUR**

Which **two** of the following are responses to a fall in core body temperature?

**a decrease in the water content of the blood**

**a reduction in blood flow in the blood vessels in the skin**

**constriction of blood vessels supplying the skin capillaries**

**dilation of skin capillaries**

**movement of blood vessels away from skin surface**

**Turn over for the next question**

**Turn over ►**

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

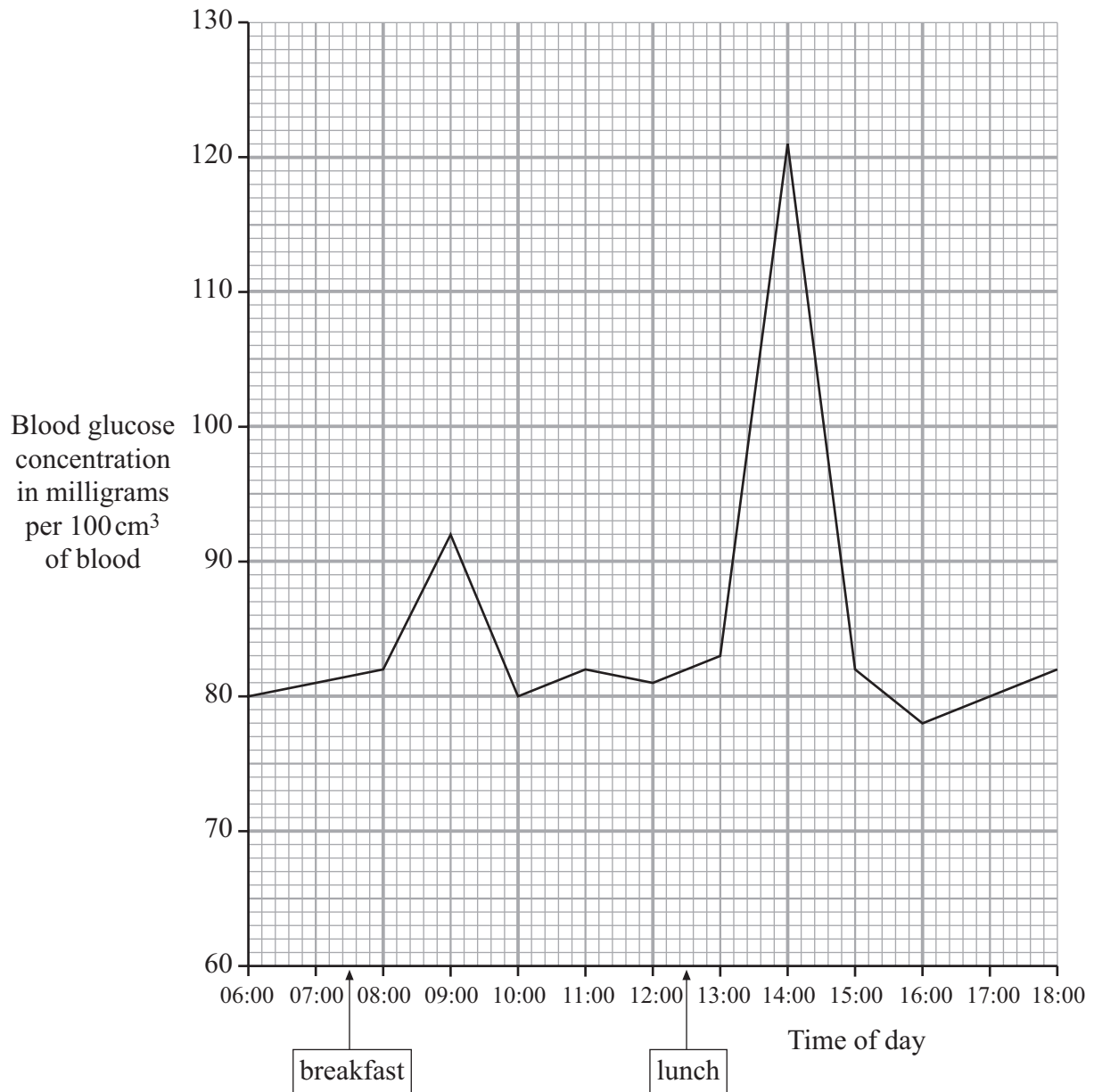
Each of these questions has four parts.

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**QUESTION FIVE**

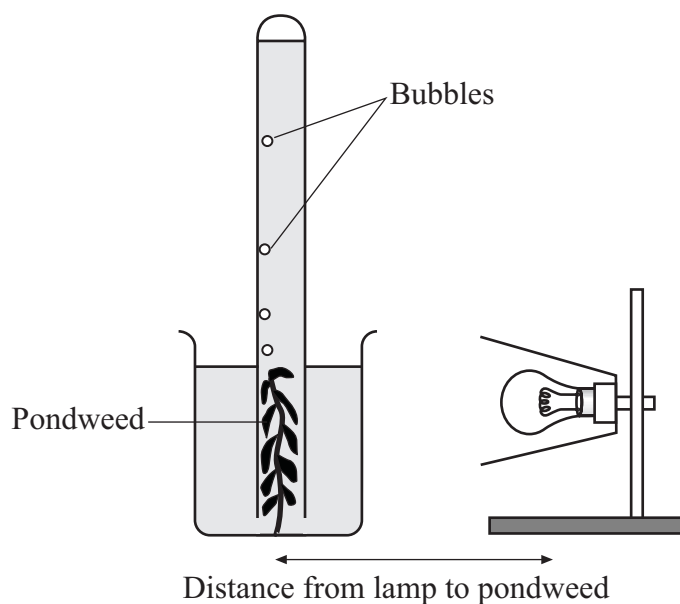
The graph shows the changes in the blood glucose concentration in a healthy person over a 12-hour period.



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- 5.1** The difference between the minimum concentration of glucose and the maximum concentration of glucose was . . .
- A** 40 mg per 100 cm<sup>3</sup> of blood.
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- 5.4** The concentration of glucose in the blood is controlled by . . .
- A** enzymes.
  - B** hormones.
  - C** nerve impulses.
  - D** the brain.

**QUESTION SIX**

A student set up the following apparatus to measure the rate of photosynthesis in pondweed.



The student counted the number of bubbles given off by the pondweed with the lamp at different distances from the pondweed. The counts were repeated 5 times and the average was calculated (to the nearest whole number).

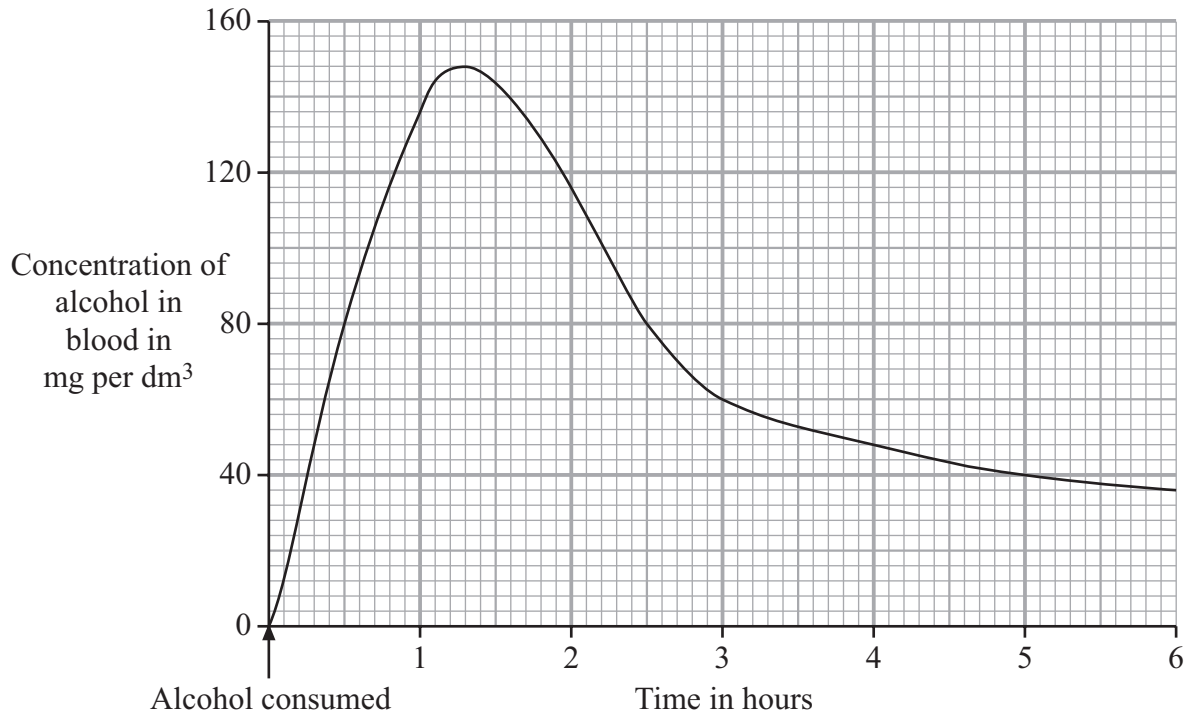
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**QUESTION SEVEN**

The graph shows the concentration of alcohol in the blood of a person over a period of several hours after taking a drink of alcohol. The legal limit for the concentration of alcohol in the blood of drivers is 80 mg per dm<sup>3</sup>.



**7.1** How long did it take for the concentration of alcohol to reach the legal limit?

- A** 0.5 hours
- B** 1.3 hours
- C** 2.5 hours
- D** 6.0 hours

**7.2** Between what times after drinking the alcohol would it be illegal to drive?

- A** 0 – 0.5 hours
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- C** 1.5 – 3 hours
- D** 3 – 6 hours

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- C** It leads to lack of self-control and damages the liver.
- D** It leads to lack of self-control and damages the lungs.

**7.4** Drinking large amounts of alcohol in one evening can cause . . .

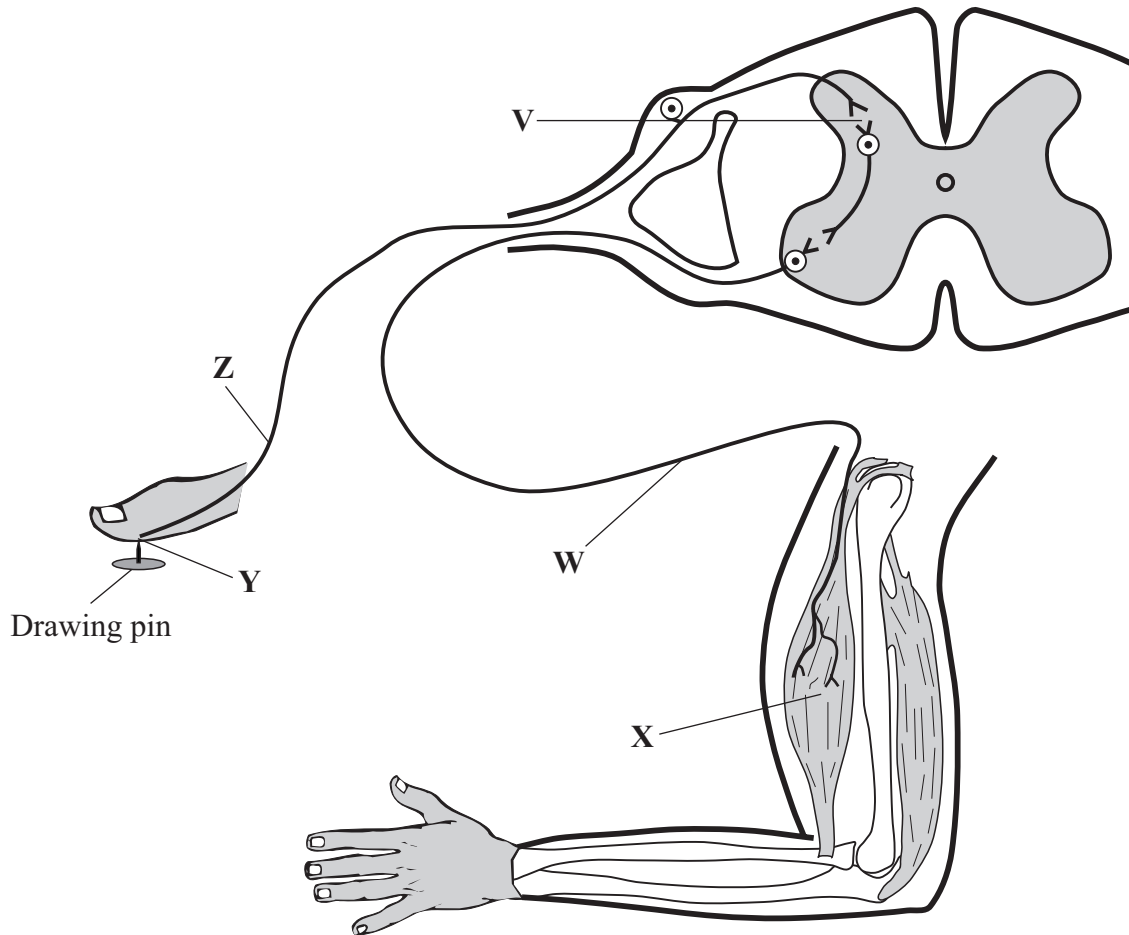
- A** alcohol dependence.
- B** heart disease.
- C** lung cancer.
- D** unconsciousness.

**Turn over for the next question**

**Turn over ►**

**QUESTION EIGHT**

A student accidentally touches a drawing pin. Her hand is automatically moved away from the pin. The drawing shows the parts involved in this reflex action.



**8.1** In this reflex action the receptor is found at . . .

- A W
- B X
- C Y
- D Z



8.2 In this reflex action the effector is found at . . .

- A W
- B X
- C Y
- D Z

8.3 Impulses are transmitted across the synapse at V by . . .

- A a chemical.
- B ADH.
- C capillaries.
- D electricity.

8.4 Which line of the table is correct?

	Type of neurone	
	Motor	Sensory
A	Z	W
B	W	Z
C	W	W
D	Z	Z

**Turn over for the next question**

**Turn over ►**

**QUESTION NINE**

The kidney helps to maintain the body's internal environment.

**9.1** Which of the following is **all** reabsorbed in the kidney?

- A Dissolved ions
- B Sugar
- C Urea
- D Water

**9.2** ADH is produced by the . . .

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

**9.3** ADH is produced when . . .

- A the blood sugar level is too low.
- B the core body temperature is too high.
- C the urea content of the blood is too high.
- D the water content of the blood is too low.

**9.4** What is the result of a rise in the concentration of ADH in the blood?

- A The concentration of urine increases.
- B The kidneys filter more blood.
- C The liver produces more urea.
- D The volume of urine increases.

**QUESTION TEN**

The table shows the amount of sweat produced in  $\text{cm}^3$  per hour at rest and during exercise at different air temperatures.

Level of activity	Sweat produced in $\text{cm}^3$ per hour at different air temperatures			
	26.7°C	32.2°C	37.8°C	43.3°C
Rest	47	95	237	567
Exercise	378	710	946	1420

**10.1** How much more sweat was produced per hour at 37.8°C as a result of exercise?

- A 615  $\text{cm}^3$
- B 709  $\text{cm}^3$
- C 719  $\text{cm}^3$
- D 946  $\text{cm}^3$

**10.2** The best interpretation of the information in the table is that . . .

- A exercise reduces sweat production.
- B increasing air temperature increases sweat production.
- C sweating cools the body.
- D sweating only occurs when the air temperature is about 20°C.

**10.3** Core body temperature is controlled by . . .

- A receptors in the skin.
- B sensors in the muscles.
- C sweat glands in the skin.
- D the thermoregulatory centre in the brain.

**Question 10 continues on the next page**

**Turn over ►**

**10.4** Which substances are removed from the body by sweating?

- A** Hormones
- B** Ions
- C** Sugars
- D** Waste gases

**END OF TEST**