



# education

Department of Education  
REPUBLIC OF SOUTH AFRICA

## SENIOR CERTIFICATE EXAMINATION – 2008

**BIOLOGY P2**

**HIGHER GRADE**

**MAY/JUNE 2008**

**MARKS: 200**

**TIME: 2 hours**

**This question paper consists of 18 pages.**

**INSTRUCTIONS AND INFORMATION**

Read the following carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answer to each question at the top of a NEW page.
4. Number the answers exactly as the questions are numbered.
5. If answers are not presented according to the instructions of each question, candidates will lose marks.
6. ALL drawings should be done in pencil and labelled in ink.
7. Draw diagrams and flow charts only when requested to do so.
8. The diagrams in the question paper may not necessarily be drawn to scale.
9. The use of graph paper is NOT permitted.
10. Non-programmable calculators, protractors and compasses may be used.
11. Write neatly and legibly.

**SECTION A****QUESTION 1**

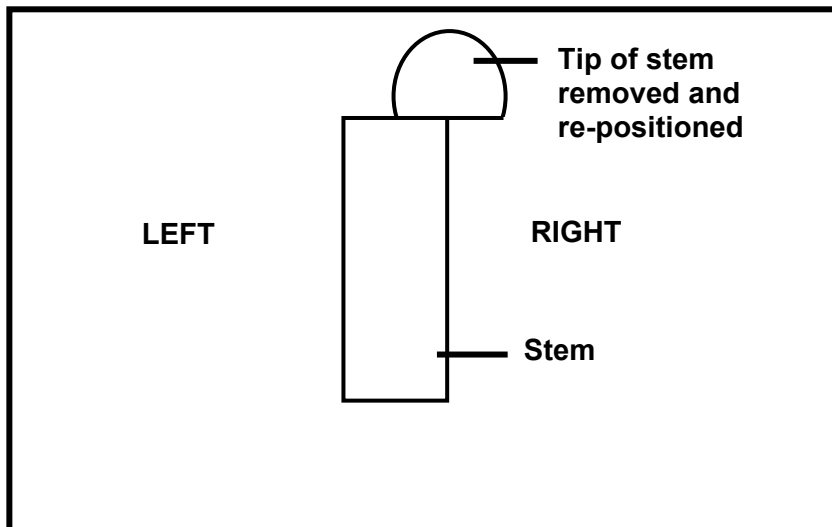
1.1 Various possible options are provided as answers to the following questions. Choose the correct answer and write only the letter (A – D) next to the question number (1.1.1 – 1.1.8) in the ANSWER BOOK.

1.1.1 The movement of urine from the kidney to the bladder along the ureter is caused by ...

- A the contraction of the kidney.
- B the contraction of the bladder.
- C active transport.
- D peristalsis of the walls of the ureter.

QUESTIONS 1.1.2 and 1.1.3 are based on the following diagram.

The tip of an actively growing seedling was removed and then placed on one side of the stem as shown in the diagram below. The seedling was kept in a dark room.

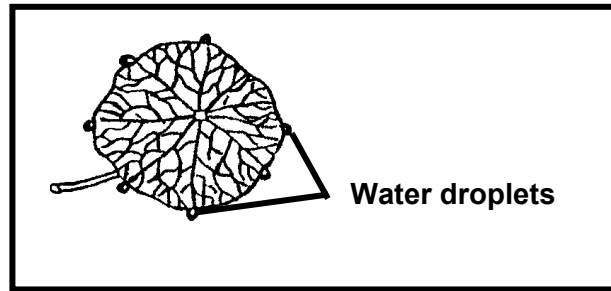


1.1.2 The following is the expected result of the investigation:

- A No further lengthening of the stem will take place
- B The stem will grow straight upwards
- C The stem will bend to the left
- D The stem will bend to the right

- 1.1.3 This investigation could also be used to show the following:
- A Negative phototropism in plants
  - B Geotropism in plants
  - C That substances which promote growth are formed at the tip of the stem
  - D That the tip of the stem is not necessary for the lengthening of the stem
- 1.1.4 All ectothermic animals have ...
- (i) little control over their body temperature.
  - (ii) no hair on the skin.
  - (iii) no pigment in the skin.
  - (iv) no sweat glands.
- A Only (i) is correct.
  - B (i), (ii) and (iv) are correct.
  - C (i), (ii) and (iii) are correct.
  - D (iii) and (iv) are correct.
- 1.1.5 Which of the following structures will enable a dancer to carry out dance movements?
- 1 Cerebellum
  - 2 Proprioceptors
  - 3 Hypothalamus
  - 4 Cerebral cortex
- A 1 only
  - B 1 and 2
  - C 1, 2 and 3
  - D 1, 2, and 4
- 1.1.6 Which of the following parts of the brain regulates appetite?
- A Medulla oblongata
  - B Cerebellum
  - C Hypothalamus
  - D Cerebrum

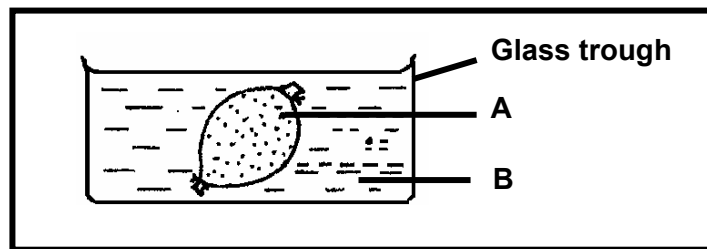
1.1.7 Study the diagram below.



The diagram illustrates ...

- A guttation.
- B diffusion.
- C transpiration.
- D exosmosis.

1.1.8 The diagram below shows a plastic bag filled with solution A and placed in a glass trough containing solution B for 8 hours. After a while, the volume of the bag and its mass increased.



The liquid labelled B in the diagram is most likely to have had a ...

- A higher water potential than solution A.
- B lower water potential than solution A.
- C similar water potential to solution A.
- D higher solute concentration than solution A.

**(8 x 2) (16)**

1.2 Give the correct **biological term** for each of the following descriptions. Write only the **term** next to the question number.

- 1.2.1 The fluid that fills the space within the eyeball behind the lens of the eye
- 1.2.2 Part of the retina where the nerve cells leave the eye
- 1.2.3 The protective outermost layer of the human eye
- 1.2.4 The ability of the lens in the human eye to focus light rays onto the retina when viewing near or far objects
- 1.2.5 The movement of gas molecules from a region of high concentration to a region of low concentration
- 1.2.6 The cells that surround the stomata in a leaf
- 1.2.7 The equal but opposite force exerted by the cell wall to balance turgor pressure

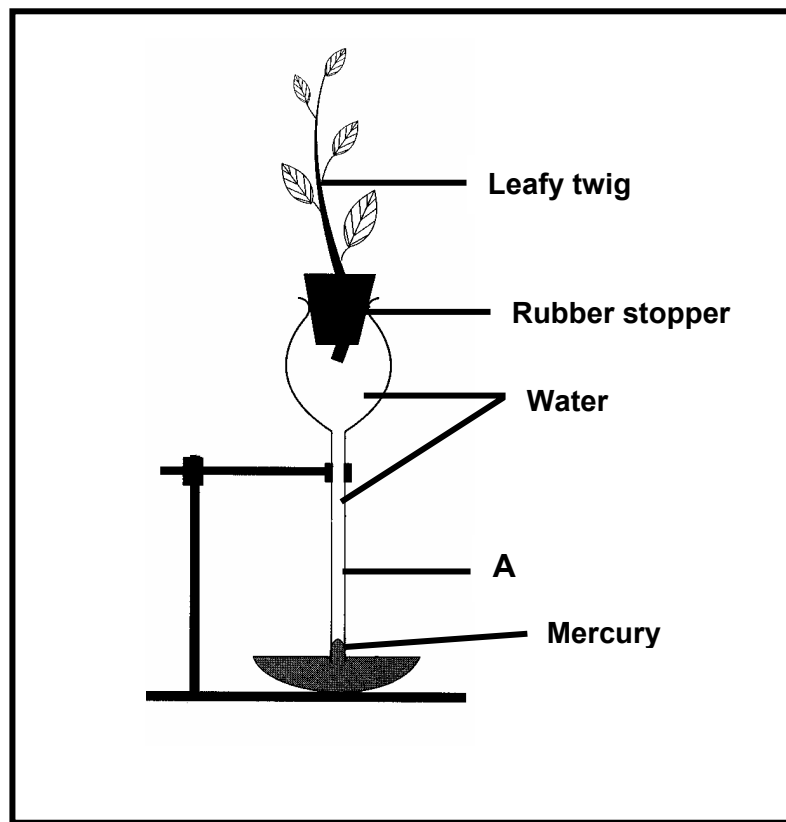
(7)

1.3 Indicate whether each of the statements in COLUMN I, applies to **A only**, **B only**, **both A and B** or **none** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number.

COLUMN I	COLUMN II
1.3.1 Promotes growth in plants	A Abscisic acid B Gibberellins
1.3.2 Plays a role in the perception of gravitational pull and registering the position of the head in space	A Sacculus B Utriculus
1.3.3 Part of the autonomic nervous system	A Sympathetic nervous system B Parasympathetic nervous system
1.3.4 Promotes the ripening of fruit	A Cytokinins B Ethylene
1.3.5 Controls the size of the pupil	A Iris B Suspensory ligament
1.3.6 Plays a role in concentrating light rays on the retina	A Ciliary muscle B Cornea
1.3.7 Results in a low water potential in the cell sap	A Increased turgor pressure B Increased cell wall pressure
1.3.8 Absorbs water from the soil	A Tracheids B Xylem vessels

(8 x 2) (16)

- 1.4 Study the diagram below of the apparatus used in an investigation and answer the questions that follow.



- 1.4.1 State the aim of the investigation illustrated in the diagram. (2)
- 1.4.2 Which plant tissue does the part labelled A represent? (1)
- 1.4.3 Explain TWO structural adaptations of the tissue mentioned in QUESTION 1.4.2. (4)
- 1.4.4 State TWO precautions you would take while setting up this investigation. (2)
- 1.4.5 Explain how any ONE xerophytic adaptation of leaves would slow down the process being investigated. (3)
- 1.4.6 Give TWO environmental factors that could influence the results of this investigation. (2)

**(14)**

- 1.5 Read the passage below and answer the questions that follow.

**Acute glomerulonephritis/Bright's disease**

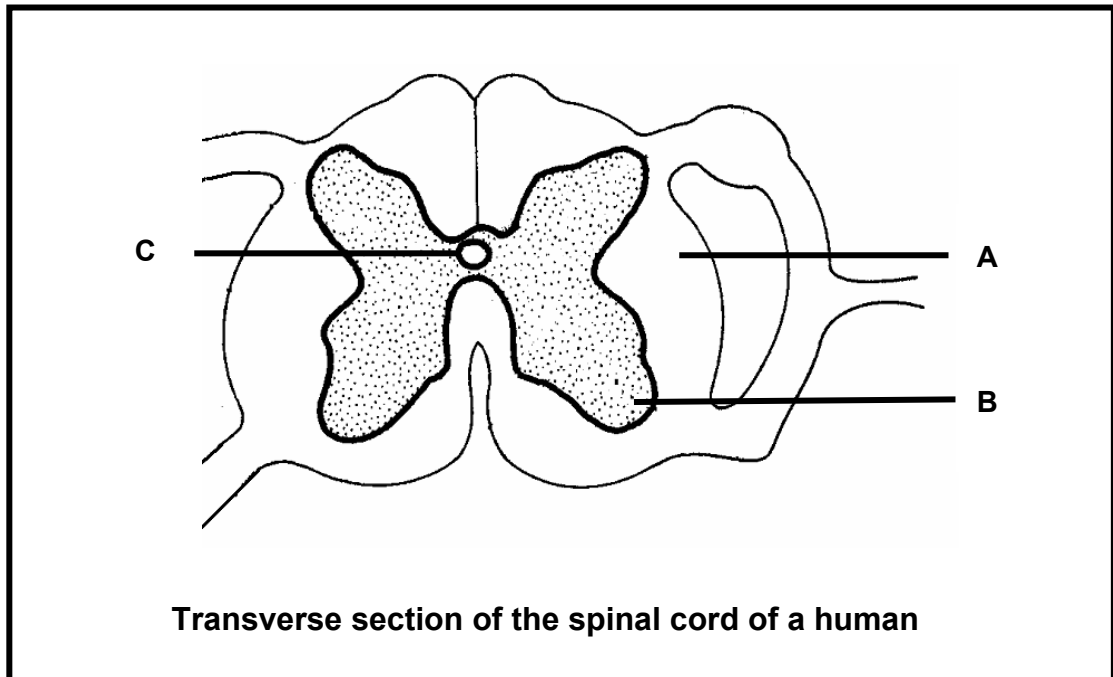
Children may suffer from kidney failure after a severe throat infection. The streptococcal bacteria that infect the throat secrete a toxic substance to which the body reacts. The immune system forms antibodies, which destroy these toxins. These antibodies may also destroy the endothelial cells and the basal membranes of the glomeruli, increasing their permeability. As a result blood cells may pass into the renal tubes to be excreted in the urine. This is called acute glomerulonephritis/Bright's disease.

- 1.5.1 What is the cause of Bright's disease? (1)
- 1.5.2 Will the urine of a person suffering from Bright's disease contain any proteins? (1)
- 1.5.3 Explain your answer in QUESTION 1.5.2. (2)
- 1.5.4 Explain why doctors sometimes treat this disease with medication that inhibits the immune system. (3)

**TOTAL QUESTION 1: 60**  
**TOTAL SECTION A: 60**

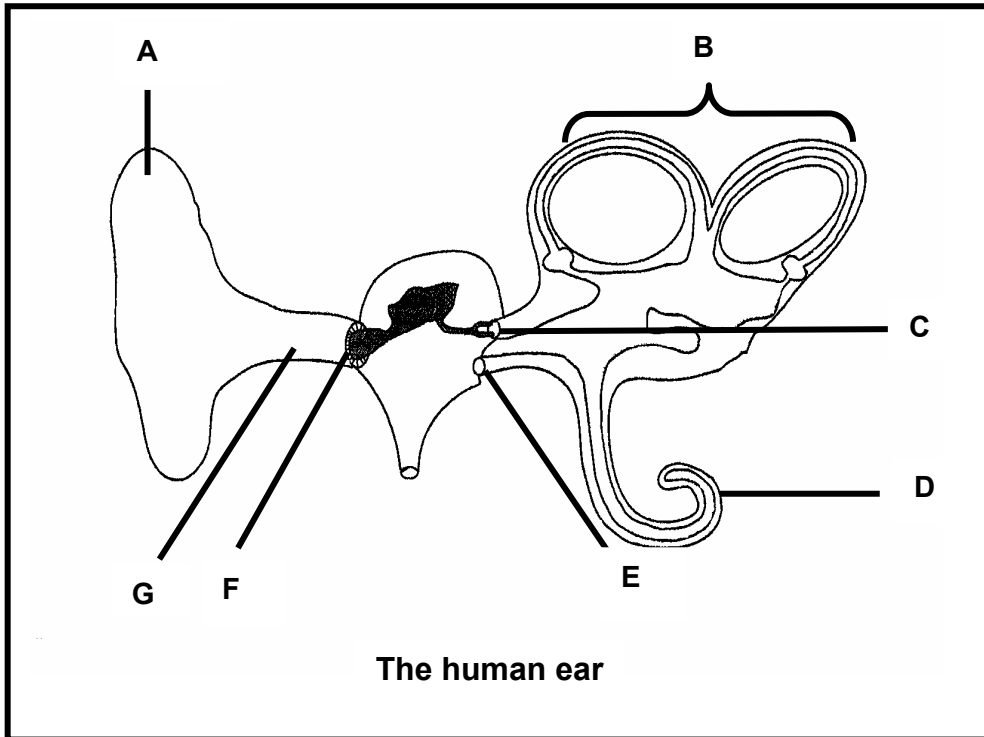
**SECTION B****QUESTION 2**

- 2.1 Study the diagram of the spinal cord below and answer the questions that follow.



- 2.1.1 Identify parts A, B and C. (3)
- 2.1.2 State TWO ways in which the spinal cord is protected. (2)
- (5)

2.2 Study the following diagram of the human ear and answer the questions that follow.



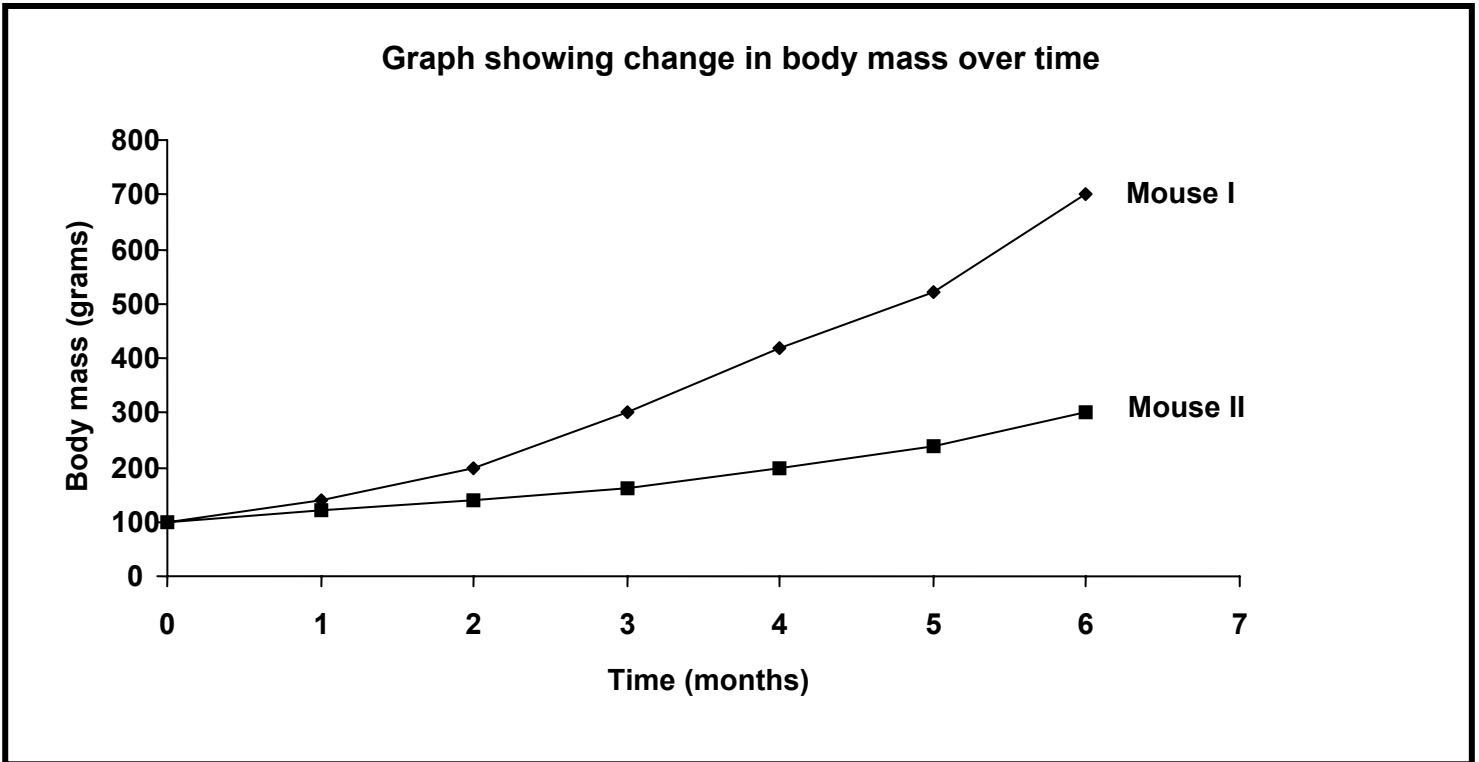
- 2.2.1 Identify parts B and G. (2)
- 2.2.2 State the function of each of parts C and E. (2)
- 2.2.3 Explain:
- (a) Why you can often clear a buzzing/humming in the ear by swallowing (3)
  - (b) Why the membrane labelled F is much larger than membrane C (2)
- 2.2.4 A dog has lost part A in an accident. Part A is replaced with a stiff, non-elastic, solid plastic structure.
- (a) Is the plastic structure as effective as the original ear of the dog? (1)
  - (b) Explain your answer to QUESTION 2.2.4 (a). (2)
- 2.2.5 Explain how part D and the retina of the eye function in similar ways. (4)
- 2.2.6 Give ONE reason for part D being spirally shaped. (2)
- (18)**

- 2.3 Answer the following questions on the nervous system.
- 2.3.1 Make a labelled diagram showing the external structure of the brain. (5)
- 2.3.2 Name the part of the brain:
- (a) Where the reflex centre for swallowing is found (1)
  - (b) Which receives impulses from the sacculus and utriculus (1)
  - (c) Involved in reasoning (1)
- (8)
- 2.4 Explain why, when a person enters a dimly lit room after being in bright sunlight, objects become visible only after a while. (4)

**TOTAL QUESTION 2: 35**

**QUESTION 3**

3.1 The graph below shows the change in mass of two young mice from the same litter (born from the same parents) over time. One of the two mice was injected with a substance secreted by an endocrine gland. Study the graph and answer the questions that follow.

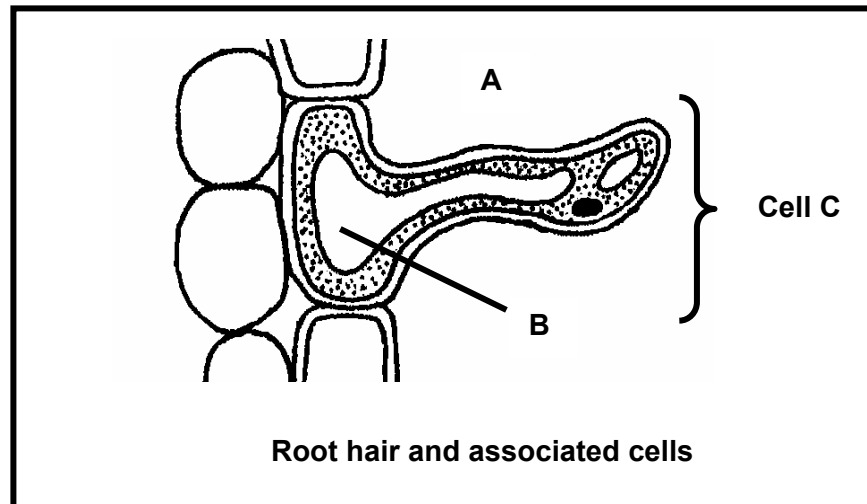


- 3.1.1 Name the endocrine gland that secretes the substance that was injected into one of the mice. (1)
- 3.1.2 Which mouse (I or II) was injected with the secretion? (1)
- 3.1.3 Name the secretion that was injected into the mouse mentioned in QUESTION 3.1.2. (1)
- 3.1.4 Explain your answer to QUESTION 3.1.3. (2)
- 3.1.5 At what time was there approximately a hundred percent difference in mass between the two mice? (2)
- 3.1.6 Explain why each of the following needs to be kept constant for the two mice during the investigation:
  - (a) Temperature (2)
  - (b) Diet (2)

- 3.1.7 It was found that the secretion from the gland identified in QUESTION 3.1.1 did not have a significant effect on an adult mouse. Give a possible explanation for this. (3)  
**(14)**
- 3.2 Give an explanation for each of the following observations made by a person watching an athletics event:
- 3.2.1 A light-skinned athlete participating in the 100-metre event looks pale just before the race begins (4)
- 3.2.2 The light-skinned athlete appears reddish immediately after the 100-metre race (4)  
**(8)**
- 3.3 Various changes occur in the body as a result of changes in the environment.
- 3.3.1 A 5 000-metre athlete and a spectator (someone sitting in the shade watching) of the same sex, age and mass have the same concentration of water in their bodies before the race.
- Tabulate ONE difference between a spectator sitting in the shade and an athlete who has just run the 5 000-metre race for each of the following:
- (a) State of contraction/relaxation of the hair erector muscles (2)
- (b) Amount of water excreted by the kidneys immediately after the race (2)
- (c) Amount of thyroxin in the blood (2)
- Table (1)
- 3.3.2 Explain your answer to QUESTION 3.3.1(b). (3)
- 3.3.3 State THREE ways in which heat is lost from the human body. (3)  
**(13)**
- TOTAL QUESTION 3: 35**

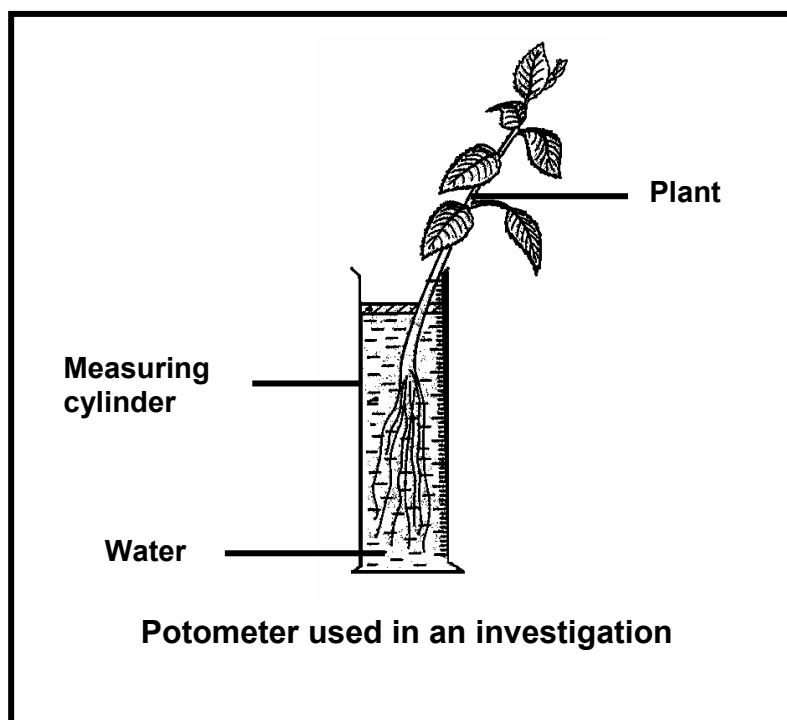
**QUESTION 4**

4.1 Study the diagram below and answer the questions that follow.



- 4.1.1 Give TWO structural features of the root hair, visible in the diagram, that make it able to absorb water. (2)
- 4.1.2 Describe how water moves from the soil (A) until it reaches part B. (5)
- 4.1.3 Explain what will happen if cell C is placed in a solution with a higher concentration of dissolved substances than its cell sap. (3)
- 4.1.4 Name the phenomenon that best describes the state of the cell described in QUESTION 4.1.3. (1)
- 4.1.5 Explain why a low temperature in the soil will slow down absorption of water by the root hairs. (1)
- (12)**

- 4.2 The investigation below was conducted by two learners. Four potometers were set up under different environmental conditions during the day. The measuring cylinder contained 250 ml of water at the beginning of the investigation. The volume of water in the measuring cylinder was measured at regular time intervals. The difference between each reading and the original water level was used as an indication of the amount of water absorbed by the plant. These results are shown in the table below.



Temperature in °C	Environmental conditions	Volume of water absorbed by the plant (ml)					
		0 minutes	30 minutes	60 minutes	90 minutes	120 minutes	150 minutes
10	Calm, dry	0	10	20	35	60	65
25	Calm, dry	0	20	30	55	75	100
25	Windy, dry	0	25	40	60	95	125
25	Calm, humid	0	10	25	Reading not taken	50	60

NOTE: 'Calm' means the air is not moving.

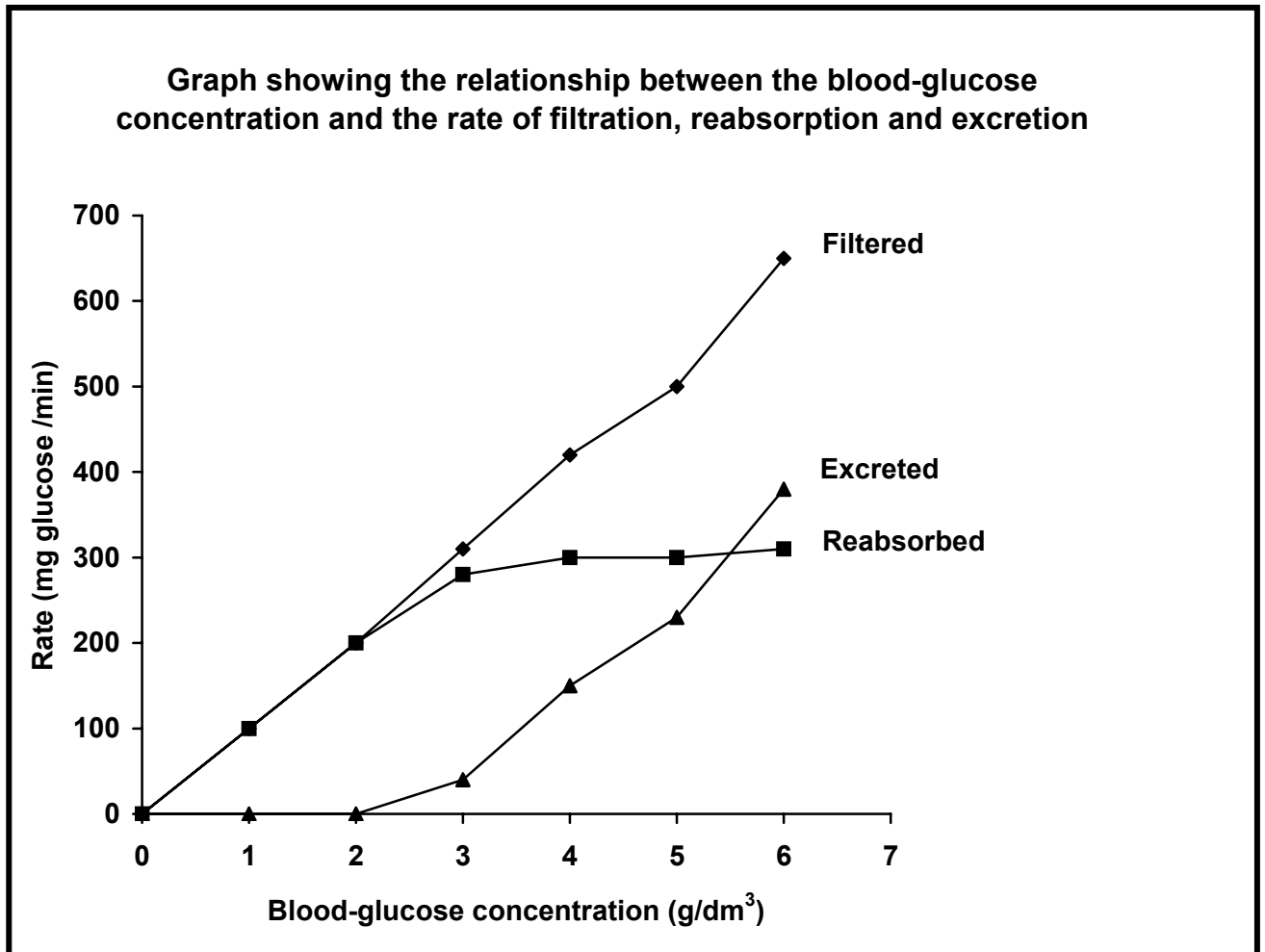
- 4.2.1 Which set of environmental conditions gives the highest rate of water uptake? (1)
- 4.2.2 Calculate the average amount of water uptake during this investigation for the set of conditions mentioned in QUESTION 4.2.1. Show ALL calculations. (4)

- 4.2.3 State ONE reason why the conditions named in QUESTION 4.2.1 give the highest rate. (1)
- 4.2.4 Plot TWO line graphs on the same system of axes to show the water uptake for windy, dry conditions **and** calm, humid conditions. (13)
- 4.2.5 Use your graph to determine the likely value of the missing data when the reading was not taken. (2)
- 4.2.6 State TWO factors that should be kept constant in this investigation. (2)

**TOTAL QUESTION 4: 35**  
**TOTAL SECTION B: 105**

**QUESTION 5**

5.1 The graph below shows the relationship between the blood-glucose concentration and the rate at which it is filtered, re-absorbed and excreted by the nephron. Study the graph and answer the questions that follow.



- 5.1.1 What is the maximum rate of glucose re-absorption by the nephron? (2)
- 5.1.2 At which blood-glucose concentration will glucose appear in the urine for the first time? (2)
- 5.1.3 Explain why glucose sometimes appears in the urine. (5)
- 5.1.4 Will the presence of glucose in the collecting ducts lead to the formation of a larger or smaller amount of urine? (1)
- 5.1.5 Explain your answer to QUESTION 5.1.4. (2)
- 5.1.6 In which part of the renal tubule is most of the glucose re-absorbed from the filtrate? (1)

5.1.7 Explain how pH is regulated by the nephrons when the blood becomes too acidic. (4)  
(17)

5.2 The regulation of the water content in the body of an animal is an important Factor in the maintenance of a constant internal environment. Explain the above statement by referring to the role played by the kidneys in conserving water in the human body.

**Factual content:** (15)

**Synthesis:** (3)

(18)

**NOTE: NO marks will be awarded to answers in the form of diagrams or flow charts.**

**TOTAL QUESTION 5: 35**

**TOTAL SECTION C: 35**

**GRAND TOTAL: 200**