



DEPARTMENT OF EDUCATION  
REPUBLIC OF SOUTH AFRICA

DEPARTEMENT VAN ONDERWYS  
REPUBLIEK VAN SUID-AFRIKA

**SENIOR CERTIFICATE EXAMINATION - 2004**  
**SENIORSERTIFIKAAT-EKSAMEN - 2004**

**BIOLOGY P2**  
**BIOLOGIE V2**

**STANDARD GRADE**  
**STANDAARDGRAAD**

**OCTOBER/NOVEMBER 2004**  
**OKTOBER/NOVEMBER 2004**

**306-2/2**

**Marks: 150**  
**Punte : 150**

**2 Hours**  
**2 Ure**

**This question paper consists of 16 pages.**  
**Hierdie vraestel bestaan uit 16 bladsye.**

BIOLOGY SG: Paper 2



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**INSTRUKSIES EN INLIGTING AAN KANDIDATE**

Lees die volgende noukeurig deur voordat die vrae beantwoord word:

1. Beantwoord AL die vrae.
2. Skryf AL die antwoorde in die ANTWOORDEBOEK.
3. Begin elke vraag se antwoord boaan 'n nuwe bladsy.
4. Nommer die antwoorde presies soos die vrae genummer is.
5. Skryf netjies en leesbaar.
6. Indien antwoorde nie volgens die instruksies van elke vraag aangebied word nie, sal punte afgetrek word.
7. Alle tekeninge moet met potlood gemaak word en die byskrifte met ink.
8. Teken slegs diagramme en vloedigramme indien dit vereis word.
9. Die diagramme in die vraestel is nie noodwendig volgens skaal geteken nie.
10. Die gebruik van grafiekpapier is NIE toelaatbaar NIE.
11. Nie-programmeerbare sakrekenaars en passers mag gebruik word.



**INSTRUCTIONS AND INFORMATION TO CANDIDATES**

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. Write neatly and legibly.
6. If answers are not presented according to the instructions of each question, marks will be deducted.
7. All drawings should be done in pencil and labelled in ink.
8. Only draw diagrams and flow charts when requested to do so.
9. The diagrams in the question paper may not necessarily be drawn to scale.
10. The use of graph paper is NOT permitted.
11. Non-programmable calculators and compasses may be used.

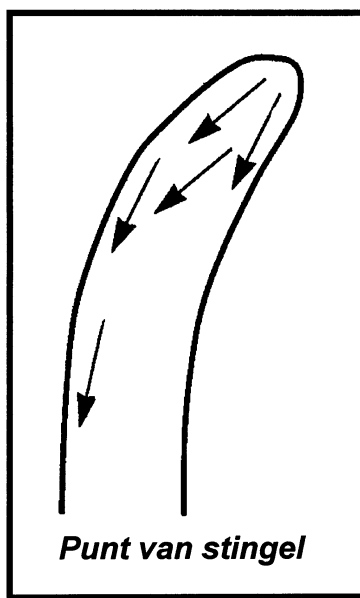


## AFDELING A

## VRAAG 1

1.1 Verskeie moontlike antwoorde word vir elke vraag verskaf. Dui die korrekte antwoord aan deur slegs die **letter** langs die toepaslike vraagnommer te skryf.

Vraag 1.1.1, 1.1.2 en 1.1.3 is op die volgende diagram gebaseer:



1.1.1 Watter stof, by die punt van die stingel geproduseer, sal in die rigting deur die pyle aangedui, beweeg?

- A Water
- B Soute
- C Hormone
- D Sitoplasma

1.1.2 Indien die plant aan lig van alle kante af blootgestel word, sal die stingel ...

- A aanhou groei in die getoonde rigting.
- B in die teenoorgestelde rigting groei.
- C regop groei.
- D doodgaan.

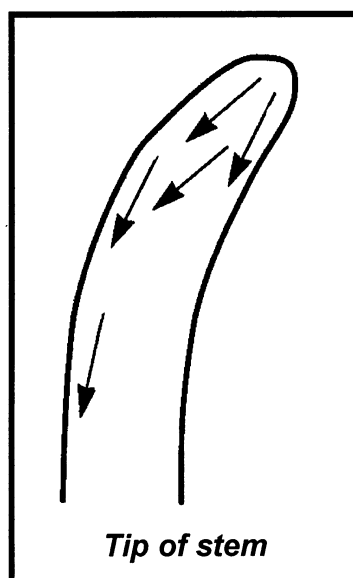


## SECTION A

## QUESTION 1

- 1.1 Various possible answers are provided for each question. Indicate the correct answer by writing only the **letter** of your choice next to the relevant question number.

Questions 1.1.1, 1.1.2 and 1.1.3 are based on the following diagram:



- 1.1.1 Which substance, produced at the tip of the stem, will move in the direction indicated by the arrows?
- A Water
  - B Salts
  - C Hormones
  - D Cytoplasm
- 1.1.2 If the plant is exposed to light from all sides, the stem will ...
- A keep on growing in the direction shown.
  - B grow in the opposite direction.
  - C grow upright.
  - D die.



1.1.3 Die jong stingel groei na die lig ...

- (i) om te verseker dat die blare aan lig blootgestel word.
- (ii) omdat selverlenging groter is aan die kant blootgestel aan lig.
- (iii) omdat selverlenging groter is aan die donker kant.

- A Slegs (i) is korrek
- B (i) en (ii) is korrek
- C (i) en (iii) is korrek
- D Slegs (ii) is korrek

1.1.4 Die regulering van pH van die liggaam is 'n funksie van die ...

- A vel.
- B nier.
- C long.
- D lewer.

1.1.5 'n Plant verlep wanneer ...

- A dieselfde hoeveelheid water afgegee word as wat geabsorbeer word.
- B die stomata toe is.
- C waterverlies waterabsorpsie oorskry.
- D waterabsorpsie waterverlies oorskry. (5 x 2) (10)

1.2 Gee die korrekte **biologiese term** vir elk van die volgende beskrywings. Skryf slegs die **term** langs die toepaslike vraagnommer.

1.2.1 Gespesialiseerde selle met filtrasiesplete, wat in die kapsel van Bowman voorkom

1.2.2 'n Metode van hitte-energie-oordrag vanaf die oppervlak van die liggaam na kouer lug

1.2.3 Die beweging van oplosmiddel molekules vanaf 'n verdunde na 'n gekonsentreerde oplossing oor 'n differensieel deurlatende membraan

1.2.4 'n Aspek van beheersisteme waarin die finale invloed van die sisteem teen die oorspronklike stimulus inwerk

1.2.5 Die boonste wyer gedeelte van die ureter waarin al die nierkelke open

1.2.6 'n Groep plante wat aangepas is om in droë toestande te oorleef

1.2.7 Die proses wat die beweging van die protoplasma weg van die selwand behels wanneer dit in 'n gekonsentreerde oplossing geplaas word (7)



1.1.3 The young stem bends towards the light ...

- (i) to ensure that the leaves are exposed to light.
- (ii) because cell elongation is greater on the side exposed to light.
- (iii) because cell elongation is greater on the dark side.

- A Only (i) is correct
- B (i) and (ii) are correct
- C (i) and (iii) are correct
- D Only (ii) is correct

1.1.4 The regulation of pH of the body is a function of the ...

- A skin.
- B kidney.
- C lung.
- D liver.

1.1.5 A plant wilts when ...

- A the same amount of water is given off as absorbed.
- B the stomata are closed.
- C water loss exceeds water absorption.
- D water absorption exceeds water loss.

(5 x 2) (10)

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

1.2.1 Specialised cells with filtration slits, occurring in the Bowman's capsule

1.2.2 A method of heat energy transfer from the surface of the body to cooler air

1.2.3 The movement of solvent molecules from a dilute to a concentrated solution across a differentially permeable membrane

1.2.4 An aspect of control systems in which the final effects of the system work against the original stimulus

1.2.5 The upper dilated portion of the ureter into which all calyces open

1.2.6 A group of plants which are adapted to survive in dry conditions

1.2.7 The process involving the movement of the protoplasm away from the cell wall when placed in a concentrated solution

(7)



1.3 Pas die inligting in KOLOM I by die items in KOLOM II deur slegs die korrekte **letter** teenoor die toepaslike vraagnommer te skryf.

KOLOM I	KOLOM II
1.3.1 Waterverlies van 'n plant in vloeistofvorm	A Ekskresie
1.3.2 Open in die nierkelk	B Refleksaksie
1.3.3 Verwydering van metaboliese afvalstowwe uit die liggaam	C Worteldruk
1.3.4 Druk water vanaf die xileem van die wortel na die xileem van die stingel	D Halfsirkelvormige kanale
1.3.5 Betrokke by balans en ekwilibrium	E Guttasie
1.3.6 Vinnige outomatiese respons op 'n uitwendige stimulus	F Ureter G Sekresie H Refleksboog I Buise van Bellini J Buise van Eustachius K Transpirasie

(6 x 2) (12)





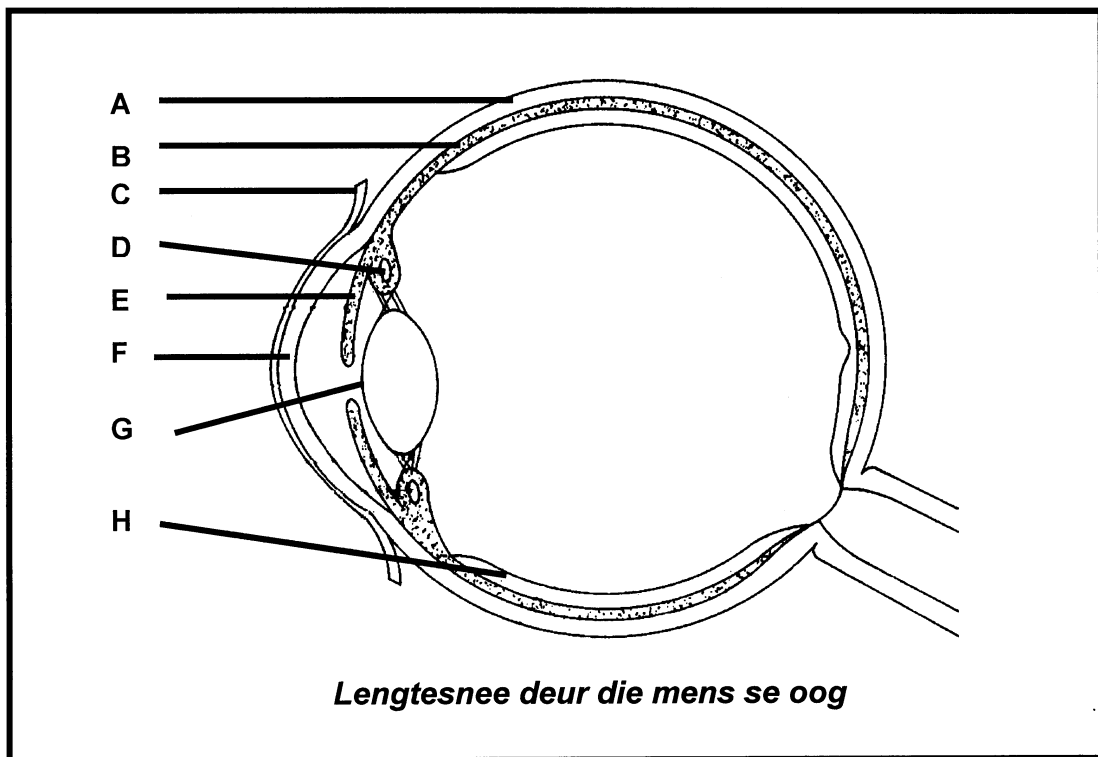
- 1.3 Match the information in COLUMN I with the items in COLUMN II by writing only the correct letter next to the relevant question number.

COLUMN I	COLUMN II
1.3.1 Water loss in the form of a liquid from a plant	A Excretion
1.3.2 Opens into the calyx of kidney	B Reflex action
1.3.3 Removal of metabolic waste substances from the body	C Root pressure
1.3.4 Pushes water from xylem of root to xylem of stem	D Semi-circular canals
1.3.5 Involved in balance and equilibrium	E Guttation
1.3.6 Rapid automatic response to an external stimulus	F Ureter
	G Secretion
	H Reflex arc
	I Ducts of Bellini
	J Eustachian tube
	K Transpiration

6 x 2 (12)



1.4 Bestudeer die volgende diagram en beantwoord die vrae wat volg.



1.4.1 Identifiseer deel C. (1)

1.4.2 Skryf die **letter** van die deel van die oog wat:

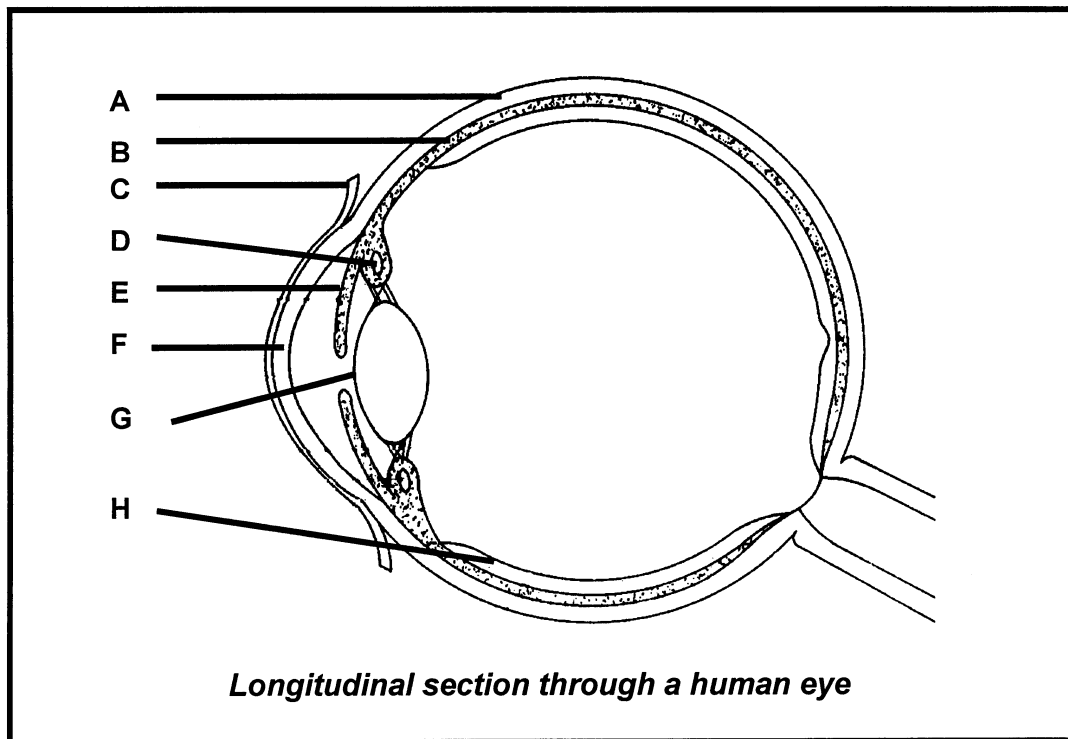
- (i) Deurskynend is en 'n belangrike rol in akkommodasie speel (1)
- (ii) Die oog help om sy vorm te behou (1)
- (iii) Veroorsaak dat die lens sy vorm verander (1)
- (iv) Reageer op ligintensiteit (1)
- (v) Interne weerkaatsing van lig voorkom (1)

1.4.3 Gee EEN verskil tussen deel F en deel A. (2)

1.4.4 Identifiseer deel H en gee sy funksie. (2)  
**(10)**



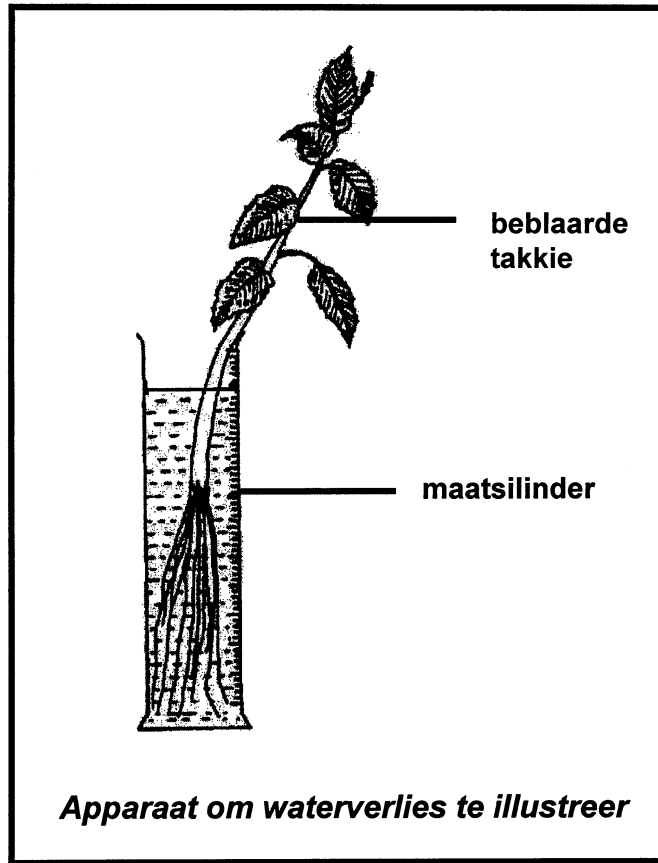
1.4 Study the diagram and then answer the questions that follow.



- 1.4.1 Identify part C. (1)
- 1.4.2 Write the **letter** of the part of the eye:
- (i) That is transparent and plays an important role in accommodation (1)
  - (ii) That helps the eye to maintain its shape (1)
  - (iii) That causes the lens to change its shape (1)
  - (iv) That responds to light intensity (1)
  - (v) That prevents internal reflection of light (1)
- 1.4.3 State ONE difference between part F and part A. (2)
- 1.4.4 Identify part H and state its function. (2)
- (10)**



1.5 'n Leerling het die volgende apparaat gebruik om waterverlies in 'n aktief groeiende plant te ondersoek. Die leerling het toegang tot olie en Vaseline.



1.5.1 Verduidelik watter verbetering aan die eksperimentele opstelling gemaak kan word om die betroubaarheid van die resultate te verhoog. (2)

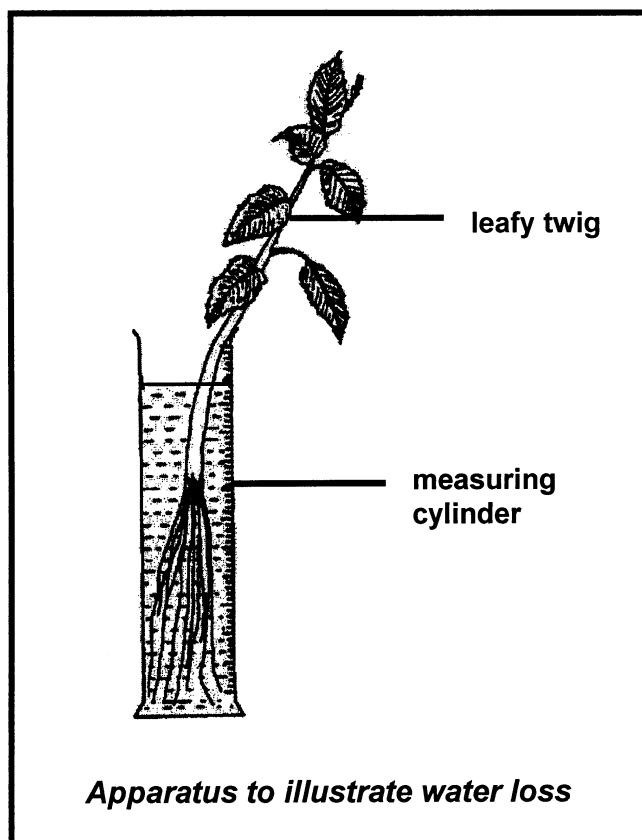
1.5.2 Die leerder het die volgende resultate met die verbeterde apparaat verkry:

	<b>Volume van water in maatsilinder (cm<sup>3</sup>)</b>
<b>By begin</b>	120
<b>Na 24 ure</b>	88

Watter persentasie water van die maatsilinder is deur die plant geabsorbeer na 24 uur? Toon alle berekenings. (3)



- 1.5 A learner used the following apparatus to investigate water loss in an active growing plant. The learner had access to oil and Vaseline.



- 1.5.1 Explain what improvement can be made to the experimental design to increase the reliability of the expected results. (2)
- 1.5.2 The learner obtained the following results using the improved apparatus:

	Volume of water in measuring cylinder (cm <sup>3</sup> )
At start	120
After 24 hours	88

- After 24 hours, what percentage of the water from the measuring cylinder was absorbed by the plant? Show all calculations. (3)



1.5.3 Hoe sal die eksperimentele opstelling van die oorspronklike apparaat verskil indien die leerder ook sou besluit om te ondersoek of:

- (i) Waterverlies hoofsaaklik deur die blare plaasvind (2)
- (ii) Waterverlies hoofsaaklik deur die onderste oppervlak van die blare plaasvind (2)

1.5.4 Gee TWEE maniere waarop die xileemweefsel van die plant vir die funksie daarvan aangepas is. (2)  
(11)

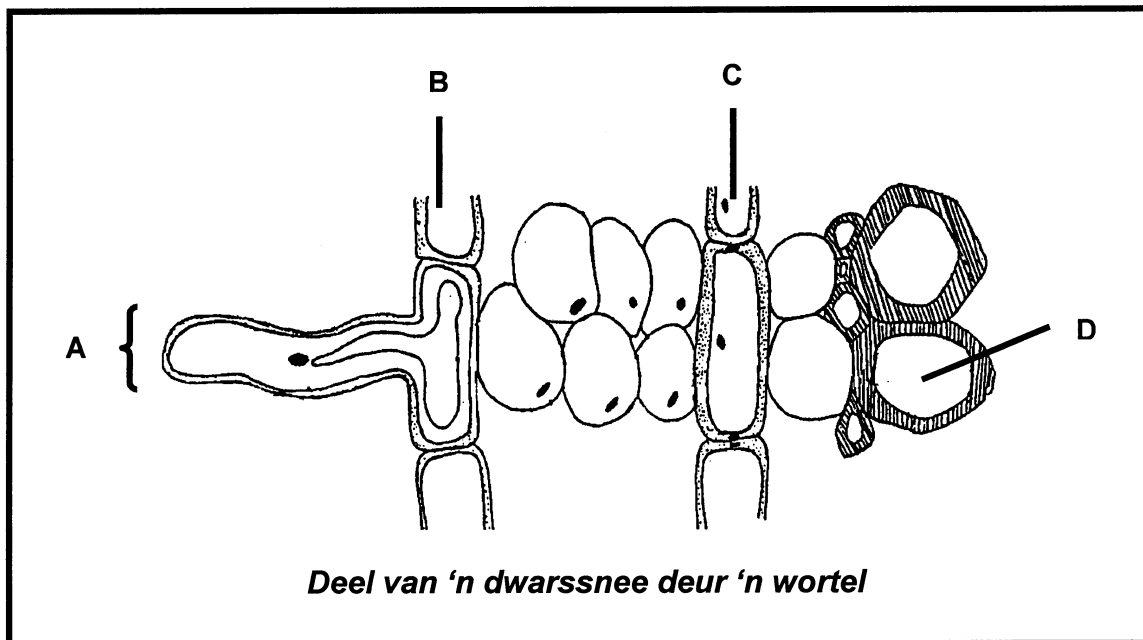
Totaal Vraag 1: 50

TOTAAL AFDELING A: 50

**AFDELING B**

**VRAAG 2**

2.1 Bestudeer die volgende diagram en beantwoord die vrae wat volg.



- 2.1.1 Benoem die laag deur deel C getoon. (1)
- 2.1.2 Maak 'n lys van VIER maniere waarop deel A struktureel aangepas is vir die absorpsie van water. (4)
- 2.1.3 Beskryf TWEE roetes waardeur water van deel B na deel D beweeg. (6)  
(11)



- 1.5.3 How will the experimental design differ from the original apparatus if the learner also decided to investigate whether:
- (i) Water loss takes place mainly through the leaves (2)
  - (ii) Water loss takes place mainly through the lower surface of the leaves (2)
- 1.5.4 List TWO ways in which the xylem tissue of the plant is adapted for its function. (2)  
(11)

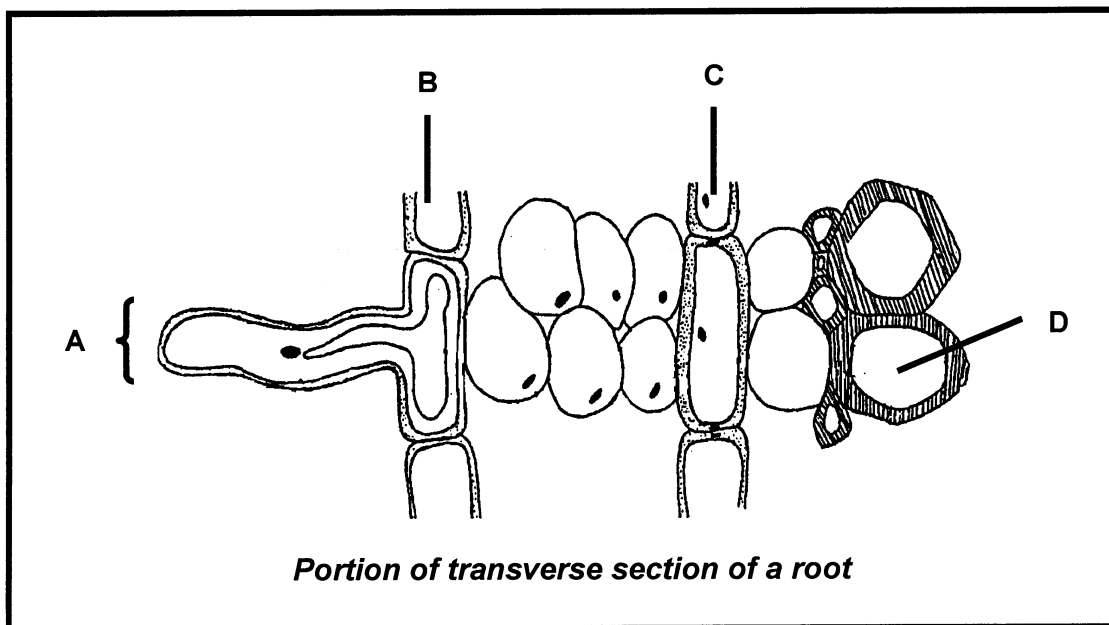
**Total Question 1: 50**

**TOTAL SECTION A: 50**

## SECTION B

### QUESTION 2

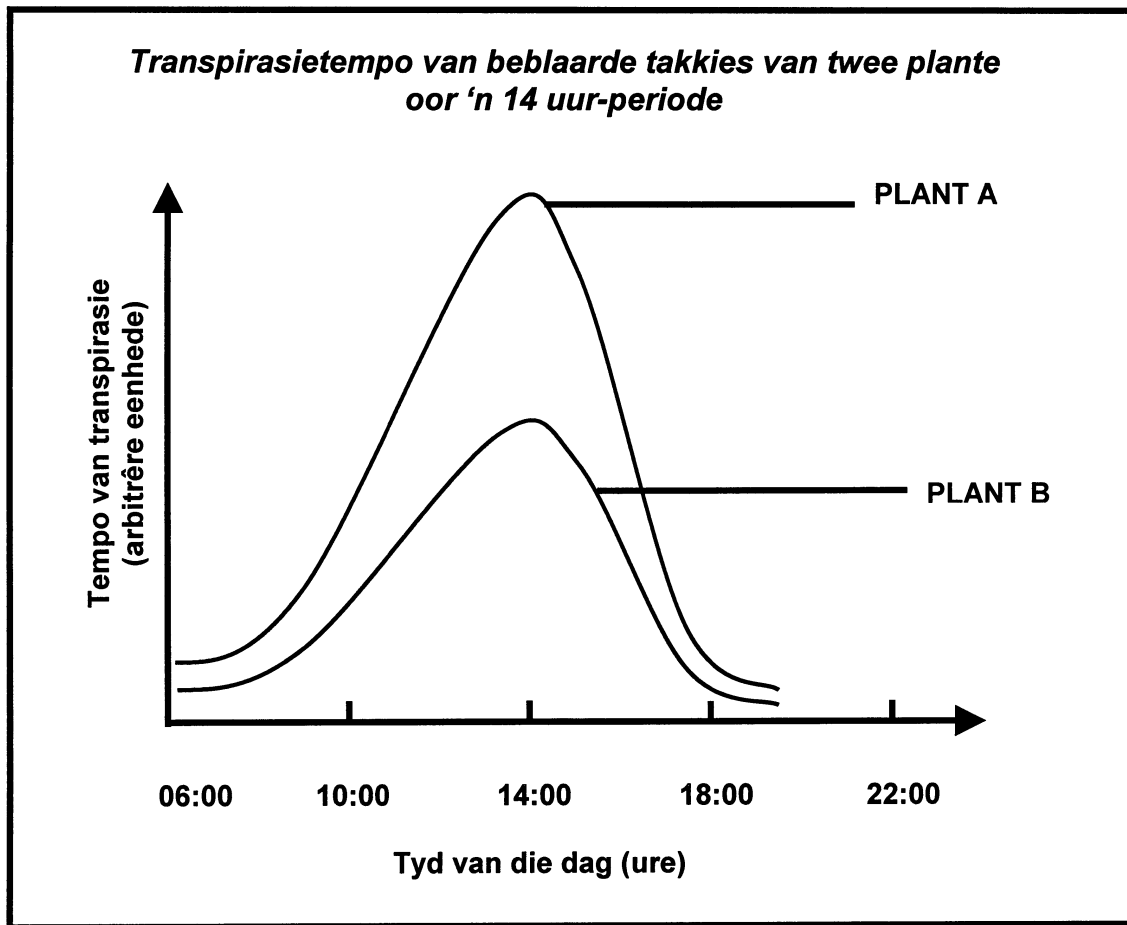
2.1 Study the diagram and answer the questions that follow.



- 2.1.1 Label the layer indicated by part C. (1)
- 2.1.2 List FOUR ways in which part A is structurally adapted for the absorption of water. (4)
- 2.1.3 Describe TWO pathways by which water moves from part B to D. (6)  
(11)



2.2 Bestudeer die onderstaande grafiek en beantwoord die vrae wat volg.



2.2.1 Op watter tyd van die dag, volgens die grafiek, was die tempo's van transpirasie die hoogste? (1)

2.2.2 Gee DRIE moontlike strukturele verskille tussen die blare van plant A en plant B. (6)  
(7)

2.3 Beantwoord die volgende vrae rakende die huidmondjies in plante.

2.3.1 Verduidelik kortliks die meganisme waardeur huidmondjies oopmaak. (5)

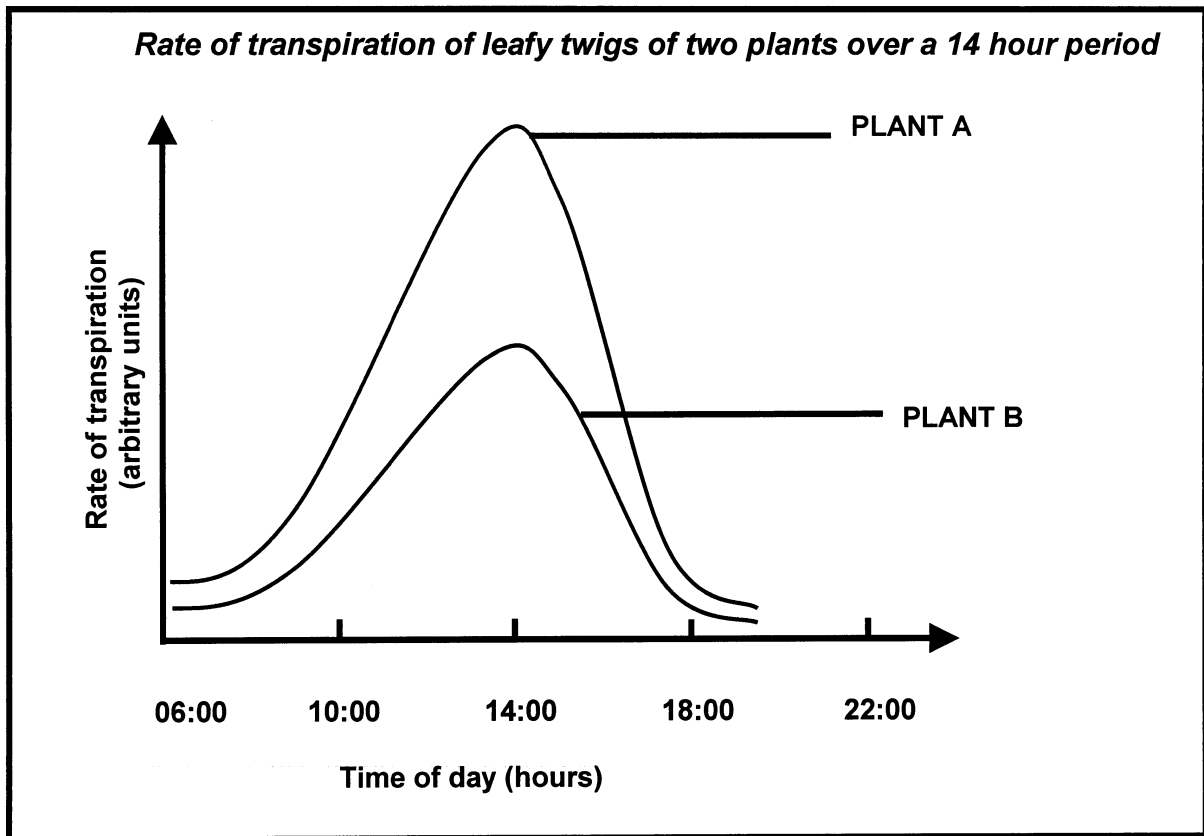
2.3.2 Noem TWEE omgewingsfaktore wat die grootte van die huidmondjie-  
opening beïnvloed. (2)  
(7)

**Totaal Vraag 2: 25**





2.2 Study the graph below and answer the questions that follow.



2.2.1 At what time of the day, according to the graph, were the rates of transpiration the highest? (1)

2.2.2 State THREE possible structural differences between the leaves of plant A and plant B. (6)  
 (7)

2.3 Answer the following questions regarding stomata in plants.

2.3.1 Briefly explain the mechanism by which the stoma opens. (5)

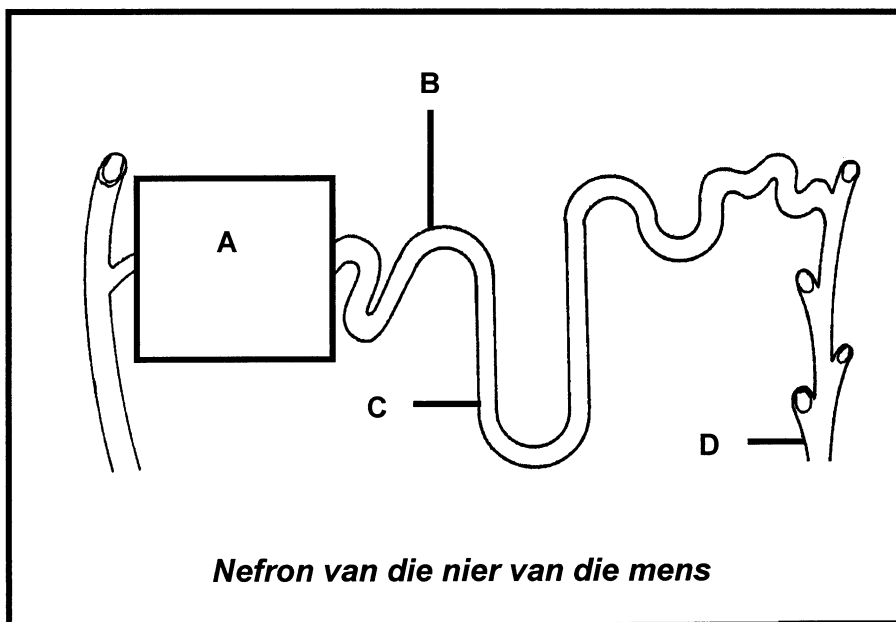
2.3.2 Name TWO environmental factors which may influence the size of the stomatal pore. (2)  
 (7)

**Total Question 2: 25**



**VRAAG 3**

3.1 Bestudeer die onderstaande diagram. Die blok genoem A, verteenwoordig 'n deel van die struktuur wat weggelaat is.

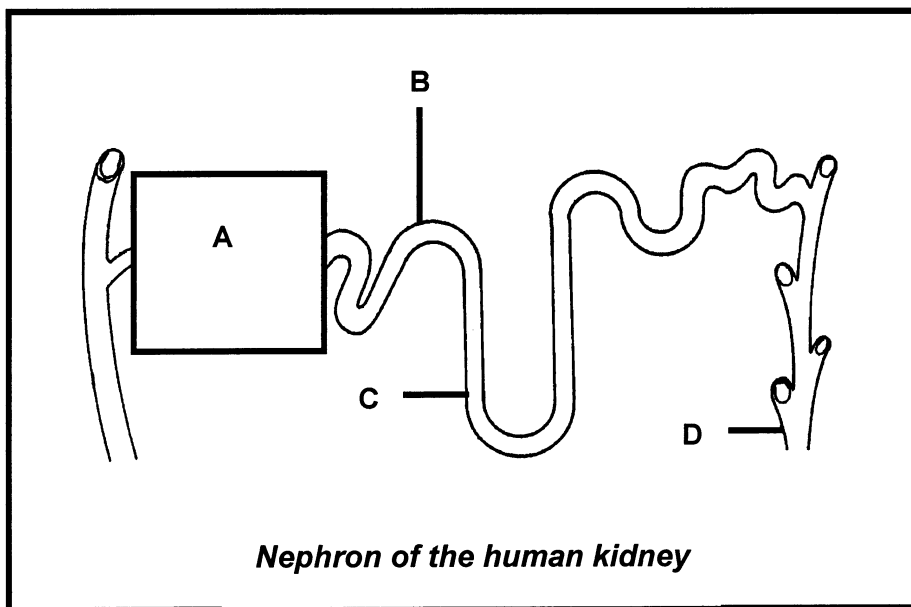


- 3.1.1 Benoem die dele B, C en D. (3)
  - 3.1.2 Wat word die vloeistof in D genoem? (1)
  - 3.1.3 Skryf die **letters** van die dele wat in die medulla van die nier teenwoordig is. (2)
  - 3.1.4 Teken 'n benoemde diagram van die struktuur wat weggelaat is by A. (7)
  - 3.1.5 Verduidelik TWEE maniere waarop die selle van die buisie, gemerk B, struktureel aangepas is vir hulle funksie. (4)
- (17)**



**QUESTION 3**

- 3.1 Study the diagram below. The block labelled A represents a part of the structure that has been omitted.



- 3.1.1 Name the parts labelled B, C and D. (3)
- 3.1.2 What is the fluid in D called? (1)
- 3.1.3 Write the **letters** of the parts which are present in the medulla of the kidney. (2)
- 3.1.4 Draw a labelled diagram of the structure omitted (missing) at A. (7)
- 3.1.5 Explain TWO ways in which the cells of the tubule marked B are structurally suited for their function. (4)
- (17)



3.2 Bestudeer die onderstaande tabel en beantwoord die vrae wat volg.

**Daaglikse filtrasie, herabsorpsie en ekskresietempo's van sekere stowwe in die nier van die mens**

Stof	Tempo (arbitrêre eenhede) per 24 uur		
	A Filtrasie	B Herabsorpsie	C Ekskresie
Water	8 720 000	7 840 000	?
Natrium	24 310	24 060	250
Glukose	900	890	0

- 3.2.1 Watter hoeveelheid water sal in die urien uitbeweeg gedurende die 24 uur-periode? (2)
- 3.2.2 Verduidelik die verskil in die herabsorpsie- en ekskresietempo's van glukose in B en C. (2)
- 3.2.3 Afgesien van ureum, noem TWEE ander stikstofbevattende afvalprodukte wat deur die nier uitgeskei kan word. (2)
- 3.2.4 Noem die siekte wat met die teenwoordigheid van glukose in C geassosieer word. (1)
- 3.2.5 Noem die hormoon wat die deurlatendheid van die nierbuisies vir water beïnvloed. (1)

**(8)**

**Totaal Vraag 3: 25**



3.2 Study the table below and answer the questions that follow.

**Daily filtration, re-absorption and excretion rates of certain substances in the human kidney**

Substance	Rate (arbitrary units) per 24 hours		
	A Filtration	B Re-absorption	C Excretion
Water	8 720 000	7 840 000	?
Sodium	24 310	24 060	250
Glucose	900	890	0

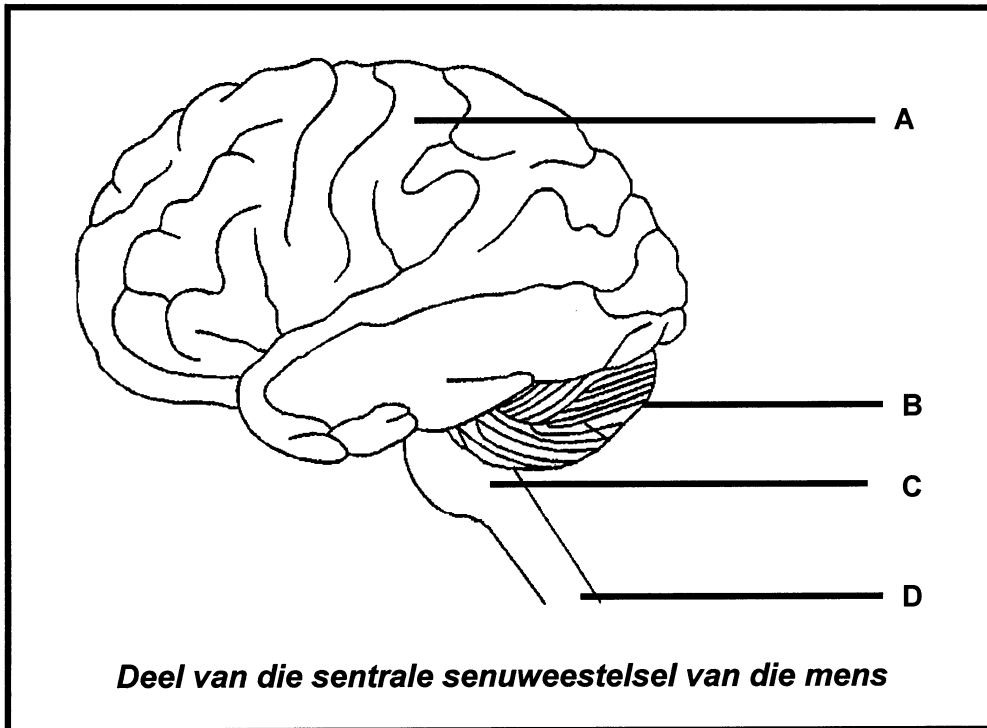
- 3.2.1 What quantity of water will pass out in the urine during a 24-hour period? (2)
- 3.2.2 Explain the difference in the re-absorption and excretion rate of glucose in B and C. (2)
- 3.2.3 Apart from urea, name TWO other nitrogenous waste products, which can be excreted by the kidney. (2)
- 3.2.4 Name the disease associated with the presence of glucose in C. (1)
- 3.2.5 Name the hormone influencing the permeability of kidney tubules to water. (1)
- (8)

**Total Question 3: 25**



**VRAAG 4**

4.1 Bestudeer die onderstaande diagram en beantwoord die vrae wat volg.

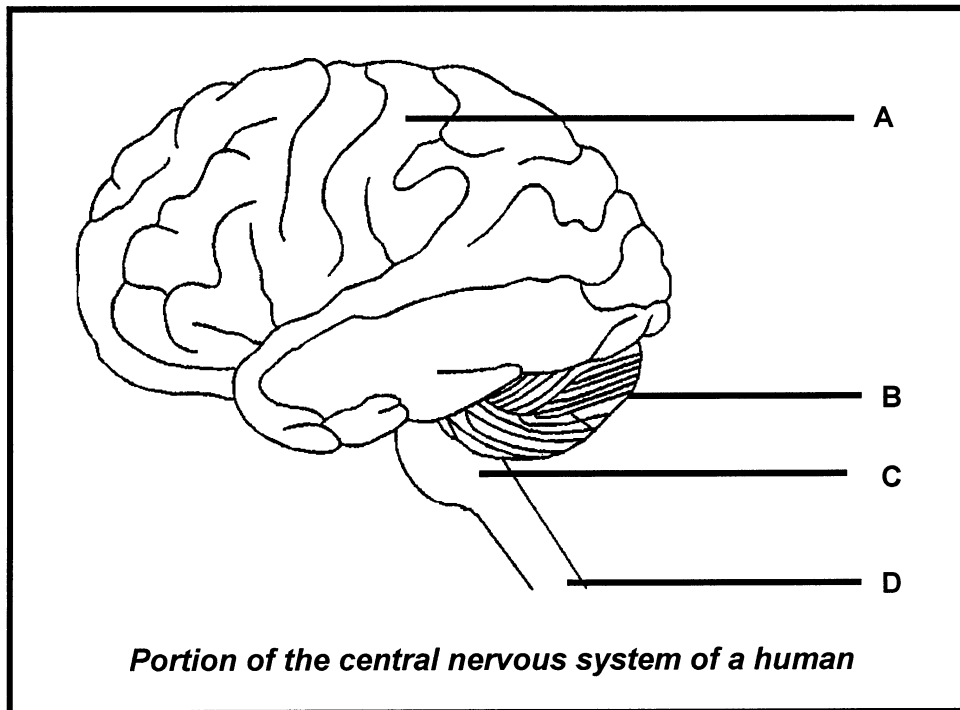


- 4.1.1 Identifiseer die benoemde dele A, B, C en D. (4)
  - 4.1.2 Gee TWEE funksies van D. (2)
  - 4.1.3 Indien iemand per ongeluk op 'n skerp speld met sy kaal voet trap, word die voet onmiddellik opgelig sonder om oor die aksie te dink. Noem die struktuur wat hierdie vinnige onbewuste aksie teweeg bring. (1)
  - 4.1.4 Verduidelik die pad wat deur die impuls gevolg word om die aksie wat in VRAAG 4.1.3 genoem word, voort te bring. (5)
  - 4.1.5 Beskryf EEN voordeel van die aksie genoem in VRAAG 4.1.3. (2)
- (14)**



**QUESTION 4**

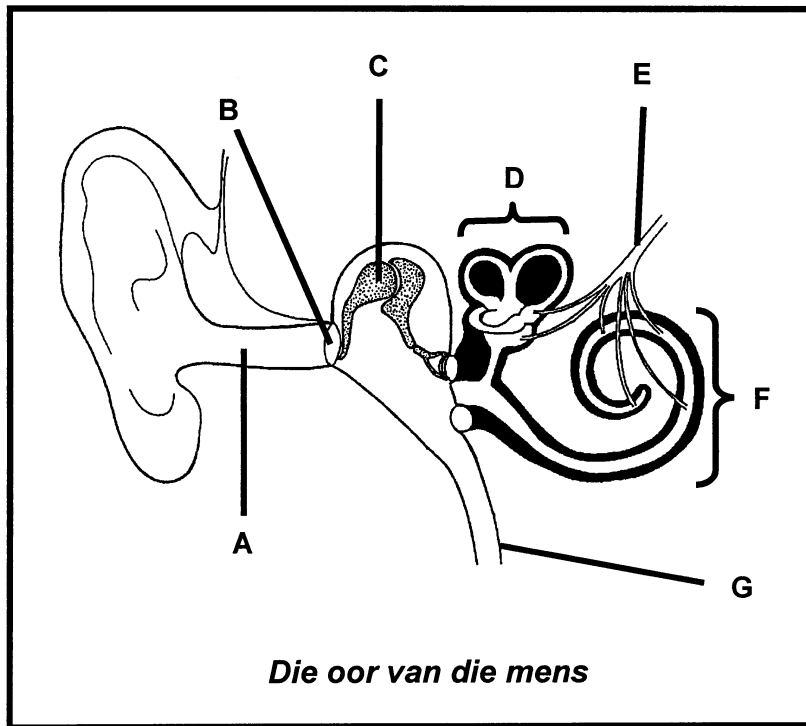
4.1 Study the diagram below and answer the questions that follow.



- 4.1.1 Identify the parts labelled A, B, C and D. (4)
- 4.1.2 State TWO functions of D. (2)
- 4.1.3 If someone accidentally steps on a sharp pin with a bare foot, the foot is immediately lifted without thinking of the action.  
Name the structure which brings about the rapid unconscious action. (1)
- 4.1.4 Describe the path followed by the impulse to bring about the action named in QUESTION 4.1.3. (5)
- 4.1.5 Describe ONE advantage of the action named in QUESTION 4.1.3. (2)
- (14)**



4.2 Bestudeer die onderstaande diagram en beantwoord die vrae wat volg.



4.2.1 Identifiseer die benoemde dele B, C, D en F. (4)

4.2.2 Verduidelik hoe die pinna van die oor vir sy funksie aangepas is. (2)

4.2.3 Skryf die **letter** van die deel wat:

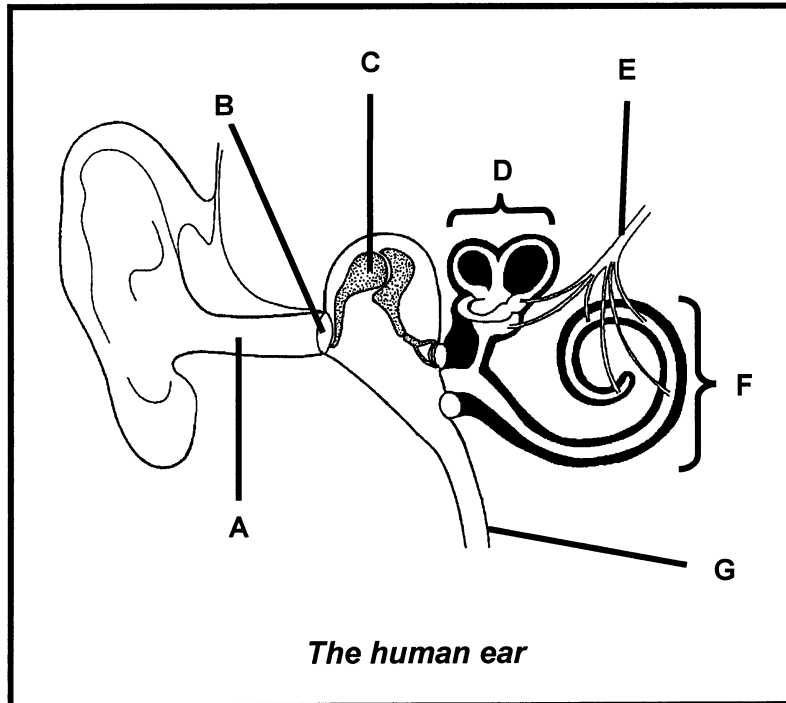
- (i) Reseptore vir balans bevat (1)
  - (ii) 'n Wasagtige stof genaamd serumen afskei (1)
  - (iii) Die druk aan weerskante van deel B balanseer (1)
  - (iv) Impulse na die brein gelei (1)
  - (v) Die orgaan van Corti bevat (1)
- (11)**

**Totaal Vraag 4: 25**





4.2 Study the diagram and answer the following questions.



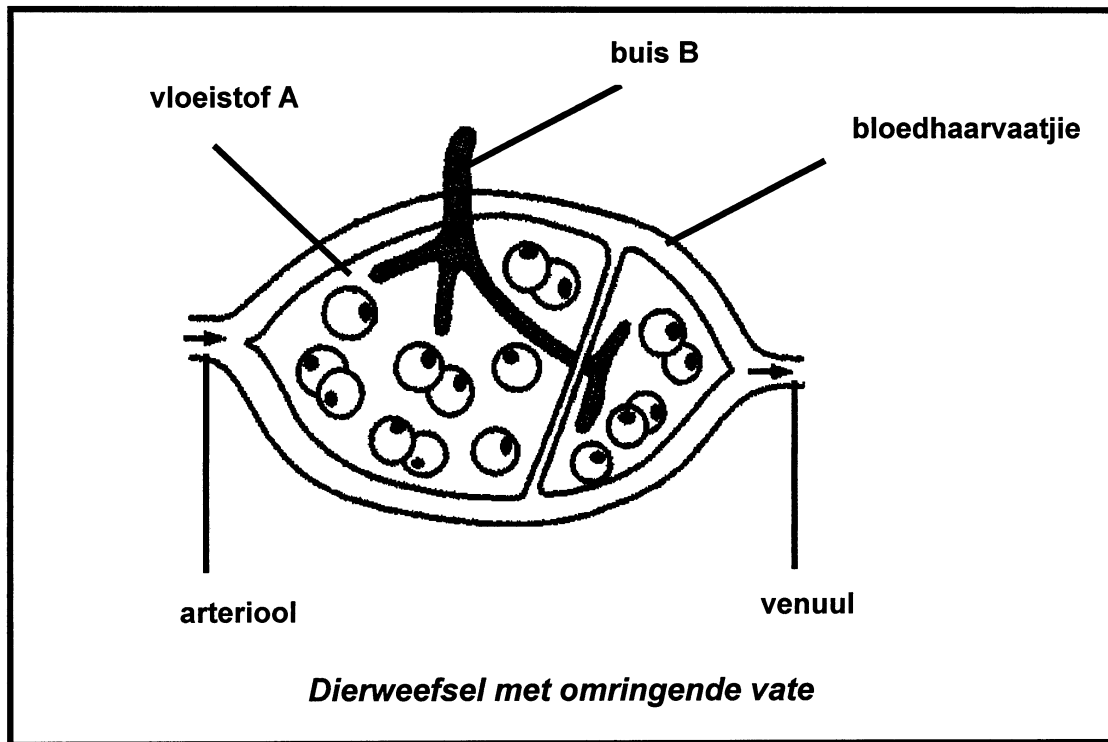
- 4.2.1 Identify the parts labelled B, C, D and F. (4)
- 4.2.2 Explain how the pinna of the ear is suited for its function. (2)
- 4.2.3 Write the **letter** of the part which:
- (i) Has receptors for balance (1)
  - (ii) Secretes a waxy substance called cerumen (1)
  - (iii) Equalizes pressure on either side of part B (1)
  - (iv) Transmits impulses to the brain (1)
  - (v) Part in which the organ of Corti is found (1)
- (11)**

**Total Question 4: 25**



**VRAAG 5**

5.1 Bestudeer die onderstaande diagram en beantwoord die vrae wat volg.

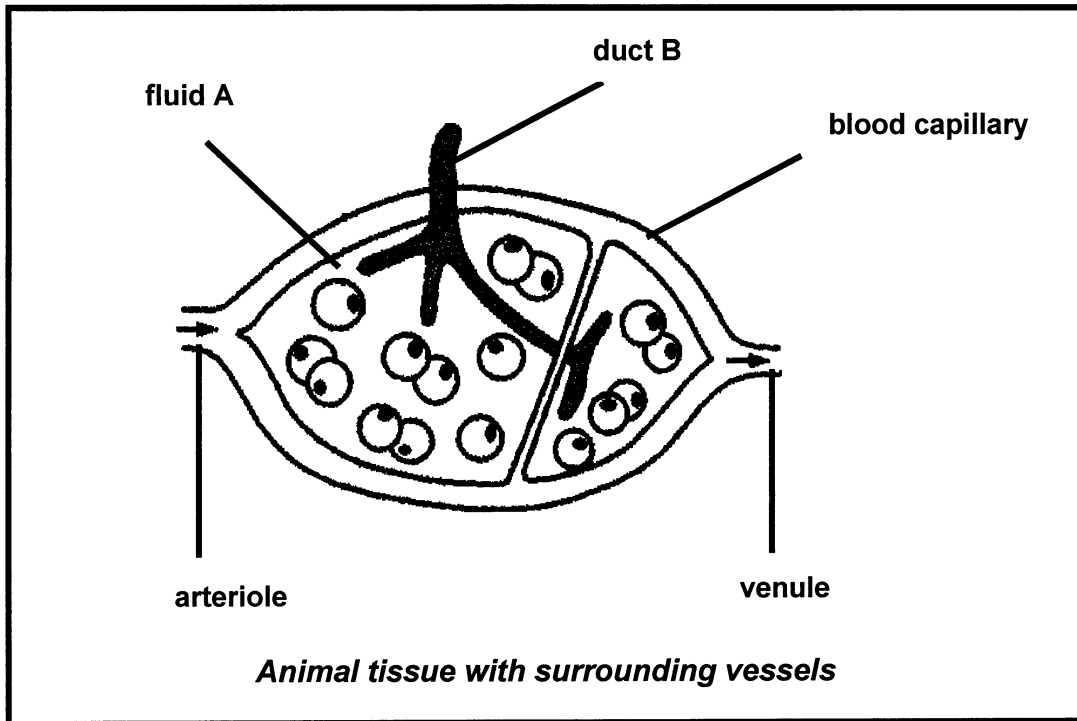


- 5.1.1 Gee EEN verskil tussen die samestelling van die bloed en vloeistof A. (2)
  - 5.1.2 Maak 'n lys van VIER faktore wat vloeistof A beïnvloed wat selmetabolisme sou kon beïnvloed. (4)
  - 5.1.3 Identifiseer buis B. (1)
  - 5.1.4 Verduidelik wat in die liggaam kan gebeur indien buis B geblokkeer is. (3)
- (10)**



**QUESTION 5**

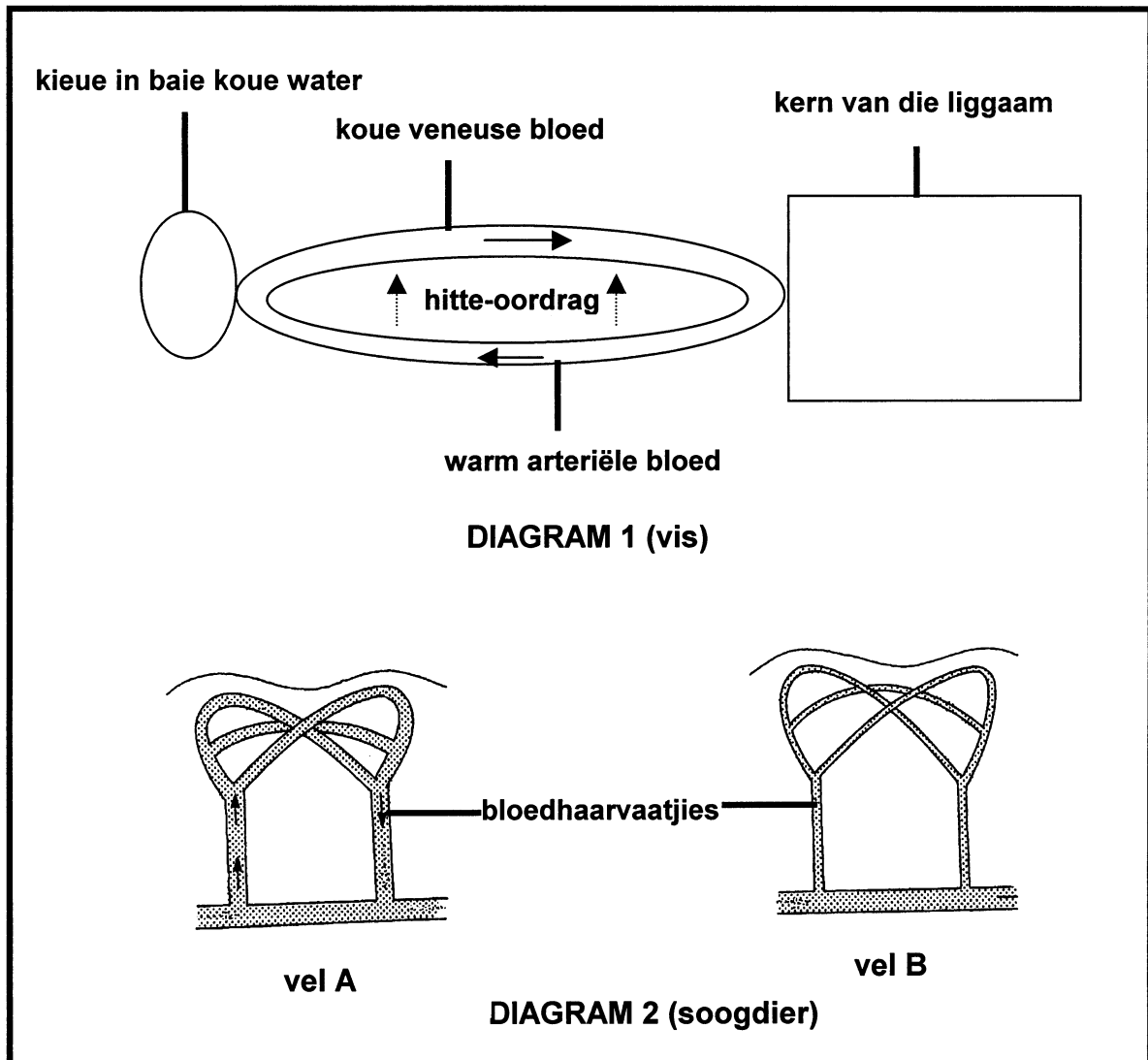
5.1 Study the following diagram and answer the questions that follow.



- 5.1.1 State ONE difference between the composition of the blood and fluid A. (2)
- 5.1.2 List FOUR factors influencing fluid A that could affect cell metabolism. (4)
- 5.1.3 Identify duct B. (1)
- 5.1.4 Explain what might happen in the body if duct B is blocked. (3)
- (10)**



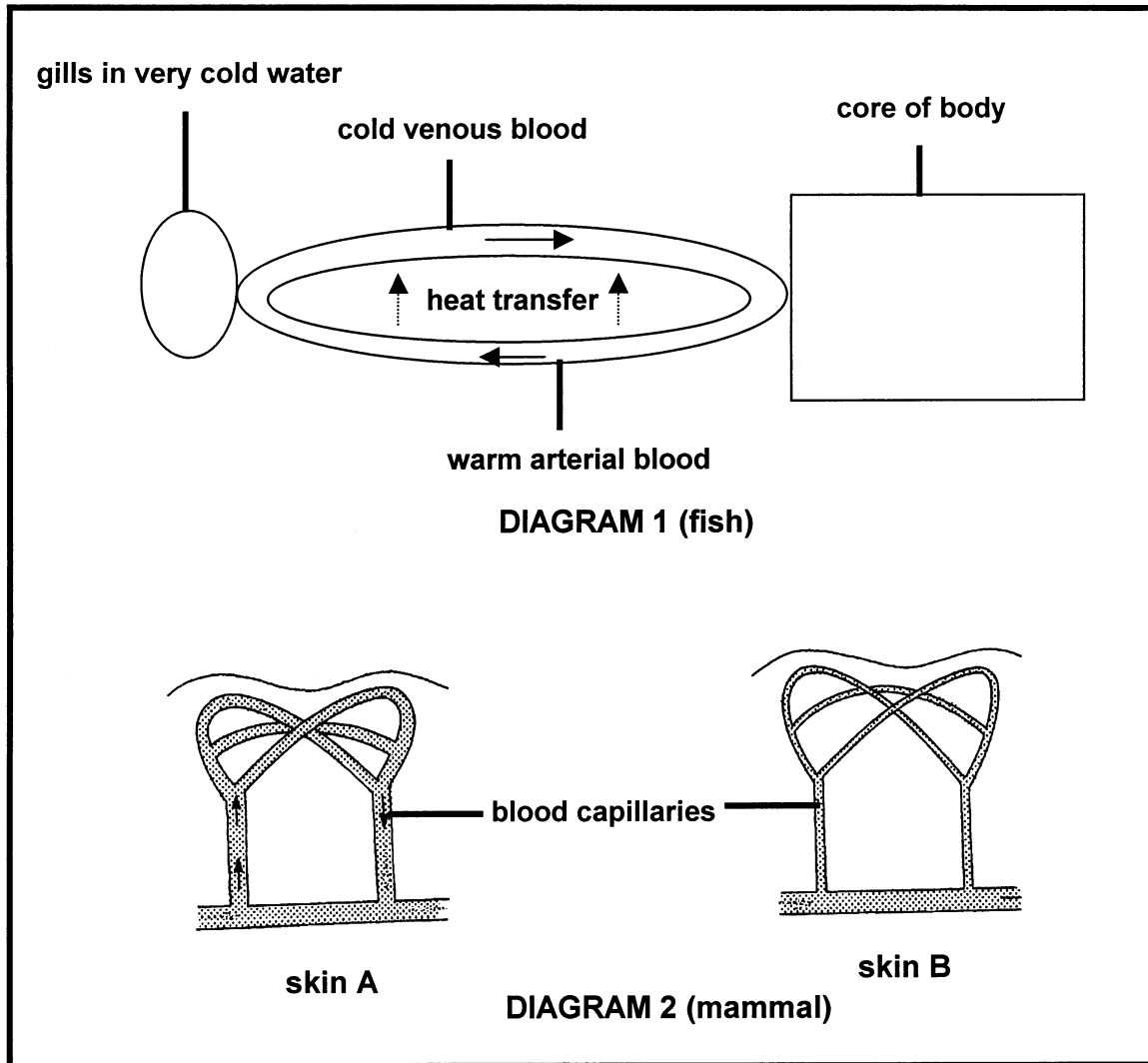
5.2 Bestudeer die onderstaande diagramme en beantwoord die vrae wat volg.



- 5.2.1 Verduidelik waarom baie min hitte vanaf arteriële bloed na die kieuë in baie koue water oorgedra word in DIAGRAM 1. (2)
- 5.2.2 (i) Watter vel (A of B) in DIAGRAM 2, sal warmer voel? (1)
- (ii) Gee 'n rede vir jou antwoord in VRAAG 5.2.2(i). (2)
- 5.2.3 Gee EEN rede waarom die liggaamstemperatuur van 'n persoon konstant gehou moet word. (2)
- (7)



5.2 Study the following diagrams and answer the questions that follow.



- 5.2.1 Explain why very little heat is transferred from the arterial blood to the gills in very cold water in DIAGRAM 1. (2)
- 5.2.2 (i) Which skin (A or B) in DIAGRAM 2, will feel warmer? (1)
- (ii) Give a reason for your answer in QUESTION 5.2.2 (i). (2)
- 5.2.3 Give ONE reason why the body temperature of a person has to be kept constant. (2)
- (7)



## 5.3 Beantwoord die volgende vrae oor hormone.

## 5.3.1 Noem die endokriene klier wat elk van die volgende afskei:

- (i) TSH (1)
- (ii) Adrenalien (1)
- (iii) Tiroksien (1)
- (iv) Groeihormoon (1)

## 5.3.2 Daar is gevind dat die tiroksienkonsentrasie van 'n gesonde volwassene baie laag gebly het vir 'n tydperk van drie maande.

- (i) Sal die persoon gewig optel of verloor indien hy voortgaan met sy normale dieet in hierdie tydperk? (1)
- (ii) Verduidelik jou antwoord in VRAAG 5.3.2(i). (3)  
(8)

**Totaal Vraag 5: 25****TOTAAL AFDELING B: 100****GROOTTOTAAL: 150**

5.3 Answer the following questions on hormones.

5.3.1 Name the endocrine gland which secretes each of the following:

- (i) TSH (1)
- (ii) Adrenalin (1)
- (iii) Thyroxin (1)
- (iv) Growth hormone (1)

5.3.2 It was found that the thyroxin concentration of a healthy adult remained very low for a period of three months.

- (i) Will the person gain or lose weight if he continued with his normal diet during this period? (1)
  - (ii) Explain your answer in QUESTION 5.3.2 (i). (3)
- (8)**

**Total Question 5: 25**

**TOTAL SECTION B: 100**

**GRAND TOTAL: 150**

