DEPARTMENT OF EDUCATION
REPUBLIC OF SOUTH AFRICA

DEPARTEMENT VAN ONDERWYS
REPUBLIEK VAN SUID-AFRIKA

SENIOR CERTIFICATE EXAMINATION - 2004
SENIORSERTIFIKAAT-EKSAMEN - 2004

BIOLOGY P1
BIOLOGIE V1

STANDARD GRADE
STANDAARDGRAAD

OCTOBER/NOVEMBER 2004
OKTOBER/NOVEMBER 2004

306-2/1

Marks: 150
Punte : 150

2 Hours
2 Ure

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

BIOLOGY SG: Paper 1

306 2 1 SG

INSTRUKSIES EN INLIGTING AAN KANDIDATE

Lees die volgende sorgvuldig 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 bo-aan 'n nuwe bladsy.
4. Nommer die antwoorde presies soos die vrae genommer is.
5. Skryf netjies en leesbaar.
6. Indien die vrae nie beantwoord word volgens elke vraag se instruksies nie, sal punte afgetrek word.
7. Alle tekeninge moet met 'n potlood gemaak word en die byskrifte met ink.
8. Gebruik diagramme en vloeidiagramme slegs wanneer dit versoek word.
9. Die diagramme in die vraestel is nie noodwendig volgens skaal geteken nie.
10. Grafiekpapier mag NIE gebruik word 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 use 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** van jou keuse langs die toepaslike vraagnommer te skryf.

1.1.1 Al die biochemiese prosesse wat in die selle van lewende organismes plaasvind, staan gesamentlik bekend as ...

A metabolisme.
B anabolisme.
C katabolisme.
D fermentasie.

1.1.2 Die bloedvat wat glukose, nadat dit deur die dunderm geabsorbeer is, na die lewer vervoer, is die ...

A leweraar.
B lewerpoortaar.
C lewerslagaar.
D borsbuis.

1.1.3 Watter van die onderstaande kombinasies het betrekking op die funksies van vette in die liggaam?

(i) Energieberging
(ii) Hitte-isolering
(iii) Spieraanhegting
(iv) Skokabsorbering

A (i), (ii) en (iii)
B (ii), (iii) en (iv)
C (i), (iii) en (iv)
D (i), (ii) en (iv)

1.1.4 Watter EEN van die volgende word as 'n digtheidsafhanklike faktor beskou?

A 'n Storm
B 'n Droogte
C Temperatuur
D Predasie

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.

1.1.1 All biochemical processes which take place in the cells of living organisms are collectively called ...

A metabolism.
B anabolism.
C catabolism.
D fermentation.

1.1.2 The blood vessel which transports glucose to the liver after being absorbed in the small intestine is the ...

A hepatic vein.
B hepatic portal vein.
C hepatic artery.
D thoracic duct.

1.1.3 Which of the combinations below is related to the functions of fats in the body?

(i) Energy storage
(ii) Heat insulation
(iii) Muscle attachment
(iv) Shock absorption

A (i), (ii) and (iii)
B (ii), (iii) and (iv)
C (i), (iii) and (iv)
D (i), (ii) and (iv)

1.1.4 Which ONE of the following is regarded as a density-dependent factor?

A A storm
B A drought
C Temperature
D Predation

1.1.5 Kompetisie tussen diere van dieselfde spesie vir dieselfde bronne staan bekend as ...

A territorialiteit.
B interspesifieke kompetisie.
C intraspesifieke kompetisie.
D parasitisme.

1.1.6 Die ingebore vermoë van 'n bevolking om te vermeerder, staan bekend as ...

A mortaliteit.
B fekunditeit.
C migrasie.
D nataliteit. (6 x 2) **(12)**

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

1.2.1 Die pigment in blare wat lig vasvang

1.2.2 Die algemene energiedraer in selle

1.2.3 Die membraan wat die binnewand van die borskas uitvoer en die longe omsluit

1.2.4 Die naam van die soliede voedselbolletjie wat in die esofagus afbeweeg

1.2.5 Die afbreek van aminosure in die lewer

1.2.6 Die verwydering van onverteerde voedselreste uit die liggaam **(6)**

1.1.5 Competition for the same resources between animals of the same species is known as ...

A territoriality.
B interspecific competition.
C intraspecific competition.
D parasitism.

1.1.6 The inherent ability of a population to increase is known as ...

A mortality.
B fecundity.
C migration.
D natality. (6 x 2) **(12)**

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 The light-trapping pigment found in the leaves

1.2.2 The general energy carrier in cells

1.2.3 The membrane lining the interior of the thoracic cavity and covering the lungs

1.2.4 The name given to the solid food ball which passes down the oesophagus

1.2.5 The breakdown of amino acids in the liver

1.2.6 The removal of undigested food from the body **(6)**

1.3 Pas die stellings in KOLOM I by die items in KOLOM II. Skryf slegs die **letter** van die korrekte antwoord langs die toepaslike vraagnommer.

KOLOM I		KOLOM II	
1.3.1	Die energieryke koolhidraat wat tydens fotosintese gevorm word	A	Vertering
1.3.2	Versamel in die spiere tydens anaërobiese toestande en strawwe oefeninge	B	Alkohol
1.3.3	Die opbreek van groot onoplosbare voedsel na oplosbare stowwe	C	Absorpsie
1.3.4	Die afbreek van vette in baie klein druppeltjies wat in suspensie in die water bly	D	Ingestie
1.3.5	Die eindproduk van proteïenvertering	E	Aminosure
1.3.6	Word veroorsaak deur 'n tekort aan vitamien C	F	Melksuur
1.3.7	'n Produk wat gevorm word tydens die fermentasie van gisselle	G	Emulsifisering
		H	Skeurbuik
		I	Glukose

(7 x 2) **(14)**

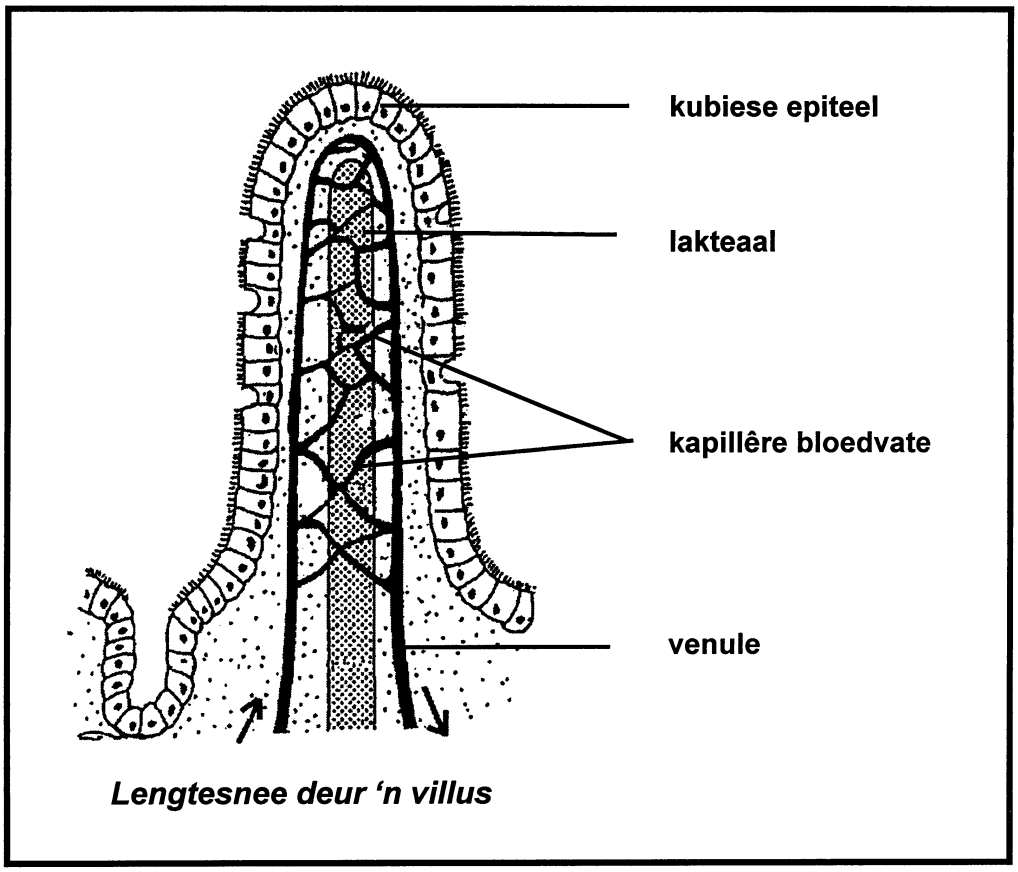
1.3 Match the statements in COLUMN I with the items in COLUMN II. Write only the **letter** of the correct answer next to the relevant question number.

COLUMN I	COLUMN II
1.3.1 The energy-rich carbohydrate that is formed during photosynthesis	A Digestion
1.3.2 Accumulates in muscles under anaerobic conditions and strenuous exercise	B Alcohol
1.3.3 The breakdown of large insoluble food substances into soluble substances	C Absorption
1.3.4 The breakdown of fats into very small droplets which remain suspended in water	D Ingestion
1.3.5 The end-product of protein digestion	E Amino acids
1.3.6 This is caused by the lack of vitamin C	F Lactic acid
1.3.7 A product of fermentation in yeasts	G Emulsification
	H Scurvy
	I Glucose

(7 x 2) **(14)**

1.4 Elk van die onderstaande diagramme het een foutiewe byskrif. Skryf die foutiewe byskrif en langsaan die korrekte byskrif.

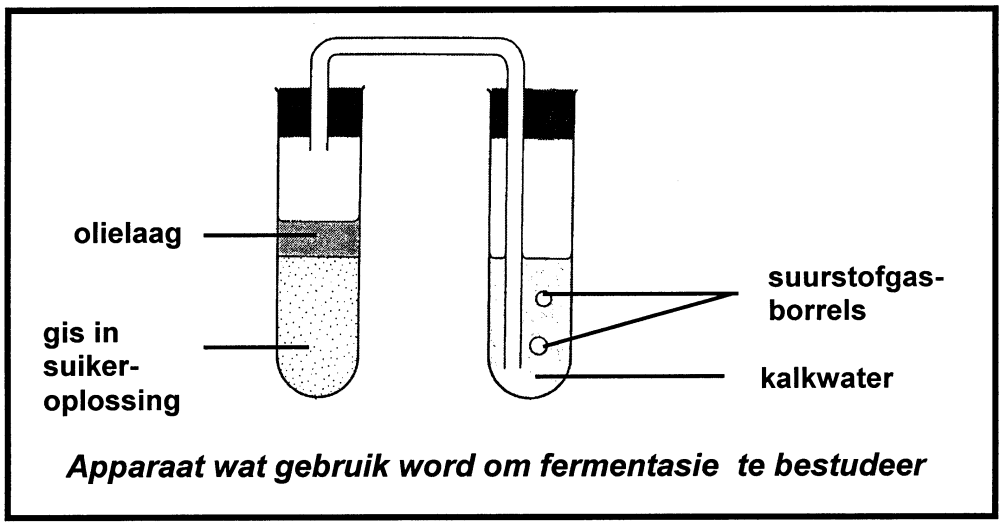
1.4.1



Lengtesnee deur 'n villus

(2)

1.4.2

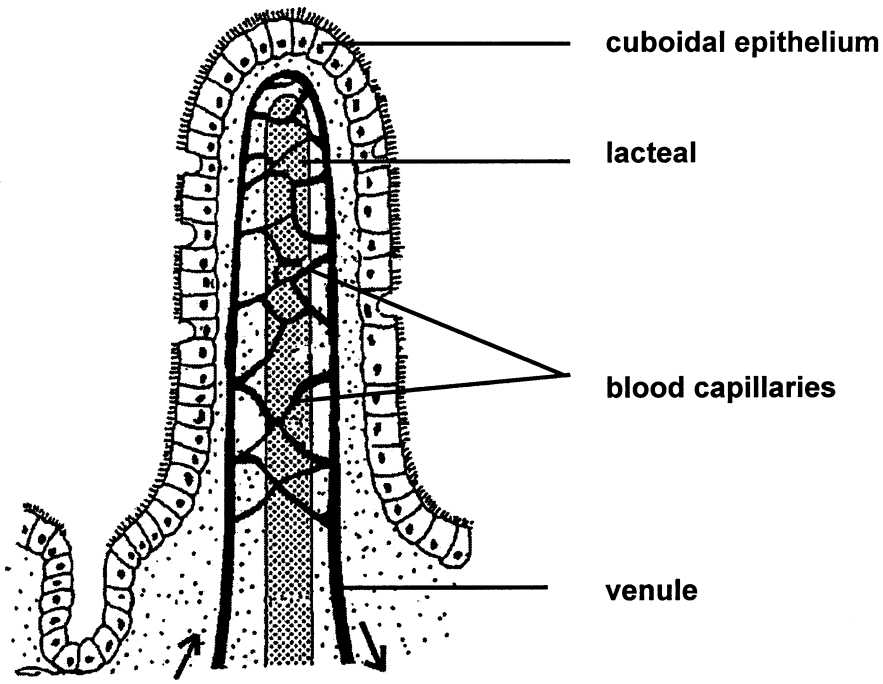


Apparaat wat gebruik word om fermentasie te bestudeer

(2)
(4)

1.4 Each of the diagrams below has one incorrect label. Write the incorrect label and next to each the correct label.

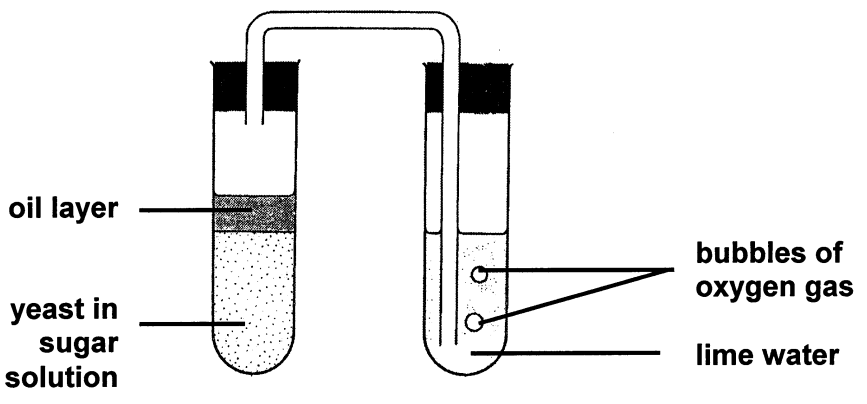
1.4.1



Longitudinal section of a villus

(2)

1.4.2

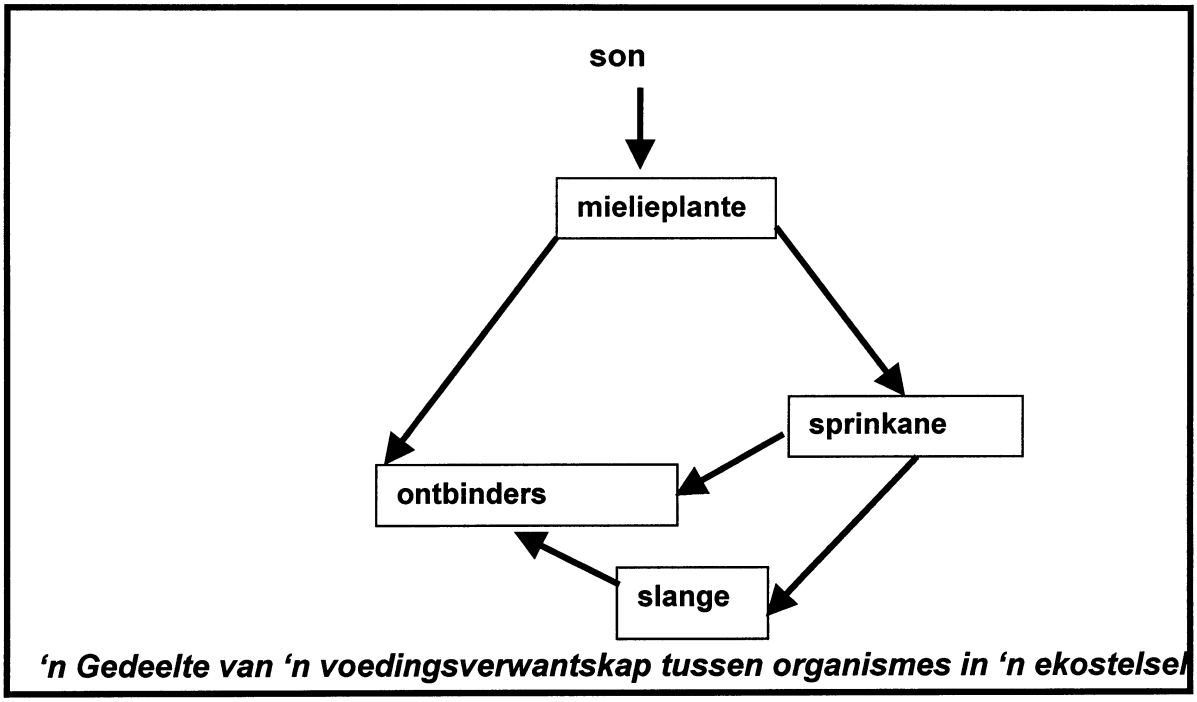


Apparatus used to study fermentation

(2)
(4)

1.5 Teken 'n benoemde diagram van die bou van die respiratoriese lugweë vanaf en insluitende die larinks totdat dit die longe binnedring. **(7)**

1.6 Bestudeer die onderstaande vloeidiagram en beantwoord dan die vrae wat volg.



'n Gedeelte van 'n voedingsverwantskap tussen organismes in 'n ekostelsel

1.6.1 Gee die korrekte term vir die volgende organismes in hierdie voedingsverwantskap:

(i) Mielieplante (1)

(ii) Slange (1)

1.6.2 Noem TWEE digtheidsonafhanklike faktore wat 'n invloed op die mieliebevolking kan hê. (2)

1.6.3 Die daaglikse energiebegroting vir die sprinkane is soos volg:

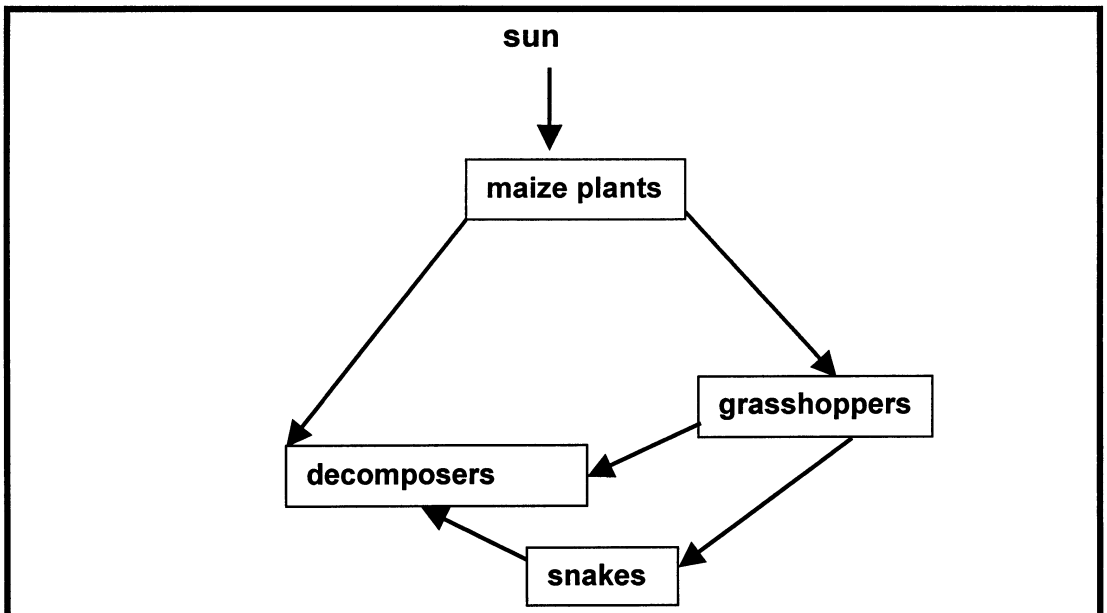
Verbruik (V)	= 65 kJ
Uitskeiding en feses (E + F)	= 10 kJ
Respirasie (R)	= 20 kJ
Produksie (P)	= ?

Deur gebruik te maak van die formule **P = V – R – (E + F)**, bereken die hoeveelheid energie wat die sprinkane aan die slange beskikbaar stel. Toon alle berekeninge. (3)
(7)

Totaal Vraag 1: 50
TOTAAL AFDELING A: 50

1.5 Make a labelled drawing of the structure of the respiratory tubes from, and including, the larynx until it enters the lungs. **(7)**

1.6 Study the flow diagram below and then answer the questions that follow.



Part of a feeding relationship among organisms in an ecosystem

1.6.1 Give the correct term for the following organisms in this feeding relationship:

(i) Maize plants (1)

(ii) Snakes (1)

1.6.2 List TWO density-independent factors that can affect the population of maize plants. (2)

1.6.3 The daily energy budget for the grasshoppers is as follows:

Consumption (C)	= 65 kJ
Excretion and faeces (E + F)	= 10 kJ
Respiration (R)	= 20 kJ
Production (P)	= ?

Using the formula **P = C – R – (E + F)**, calculate the energy that grasshoppers can make available to snakes. Show all calculations. (3)
(7)

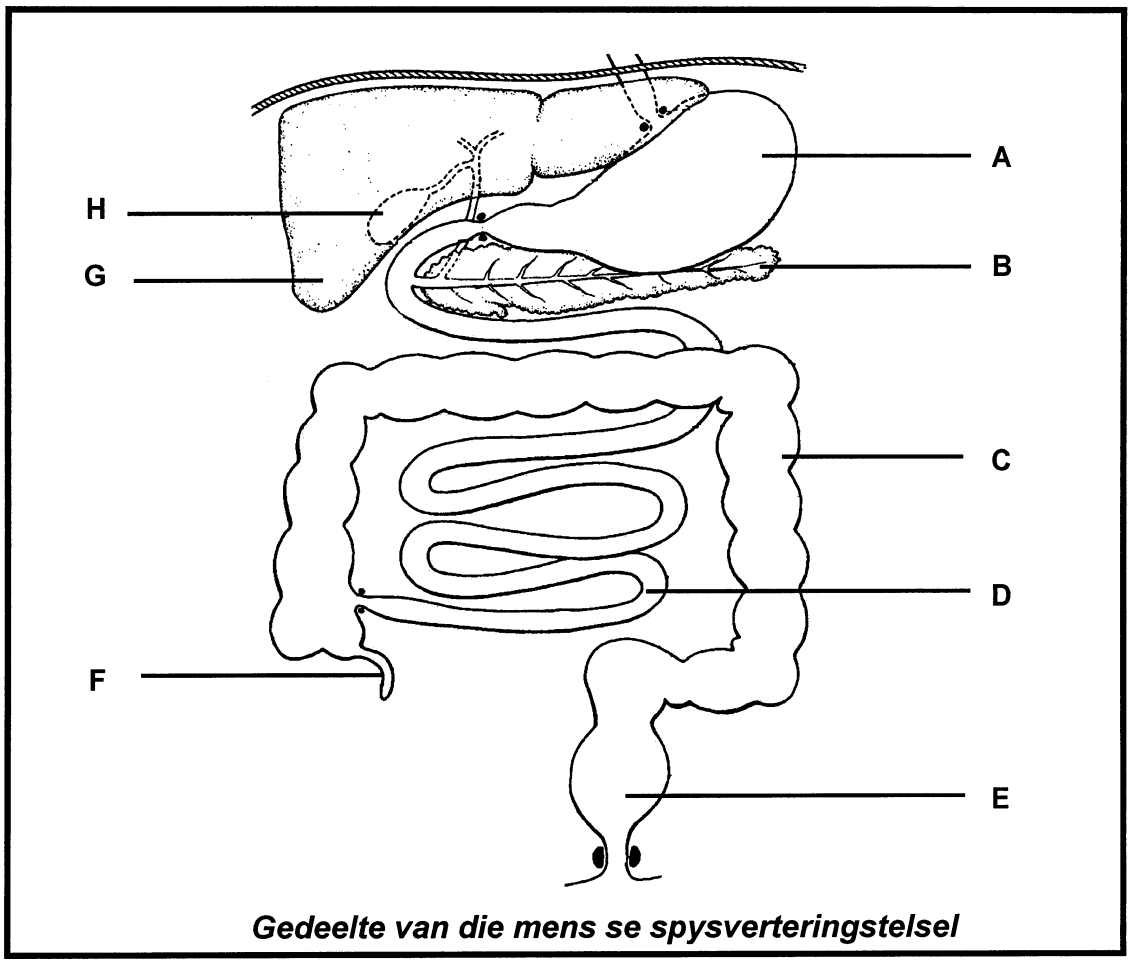
Total Question 1: 50

TOTAL SECTION A: 50

AFDELING B

VRAAG 2

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



Gedeelte van die mens se spysverteringstelsel

2.1.1 Benoem organe B, C, E, F en H. (5)

2.1.2 Noem:

(i) DRIE stowwe wat in G geberg kan word (3)

(ii) TWEE hormone wat deur B afgeskei word (2)

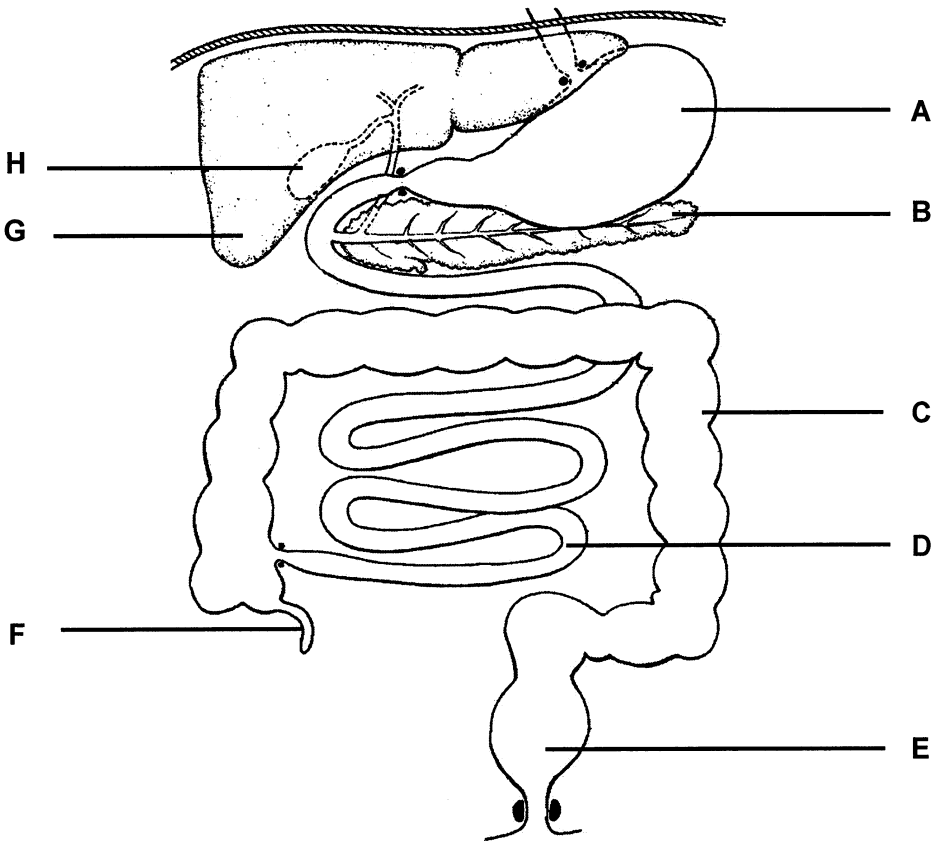
(iii) Die chemiese stof wat 'n suurmedium in A skep (1)

2.1.3 Maak 'n lys van TWEE funksies van C. (2)
(13)

SECTION B

QUESTION 2

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



Part of the human digestive system

2.1.1 Label organs B, C, E, F and H. (5)

2.1.2 Name:

(i) THREE substances that can be stored in G (3)

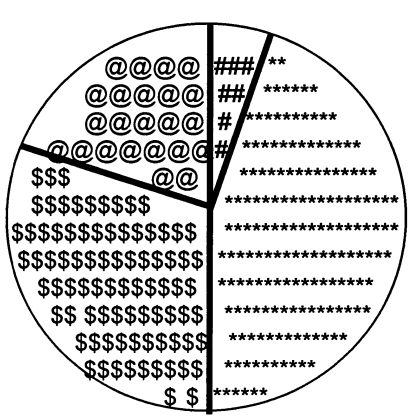
(ii) TWO hormones secreted by B (2)

(iii) The chemical substance which creates an acidic pH in A (1)

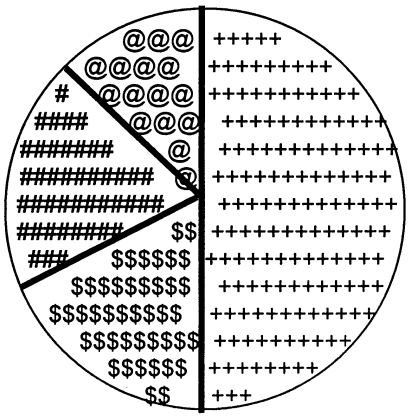
2.1.3 List TWO functions of C. (2)
(13)

2.2 Die onderstaande sirkelgrafieke illustreer die samestelling van twee voedselsoorte. Beantwoord die vrae wat daarop gebaseer is.

Samestelling van twee voedselsoorte

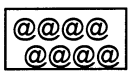


VOEDSEL X

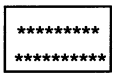


VOEDSEL Y

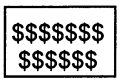
Sleutel



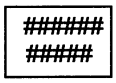
water



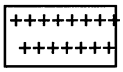
vesel



koolhidrate



proteïen



kalsium

2.2.1 Watter voedsel is die geskikste om hardlywigheid te voorkom? Gee 'n rede vir die antwoord. (2)

2.2.2 Watter persentasie voedsel Y bestaan uit kalsium? (2)

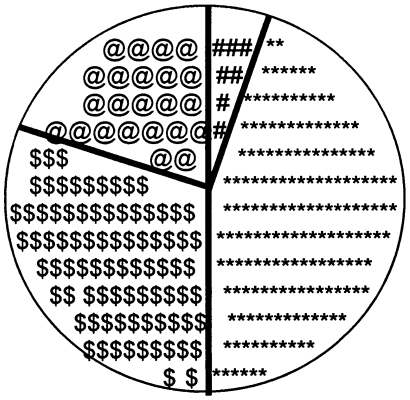
2.2.3 Maak 'n lys van DRIE funksies van water in voeding. (3)
(7)

2.3 Beskryf 'n toets wat jy sou uitvoer om vir die teenwoordigheid van vette in 'n voedsel monster te toets. **(5)**

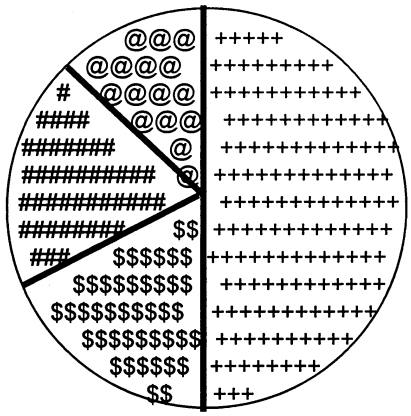
Totaal Vraag 2: 25

2.2 The pie charts below indicate the composition of two types of foods. Answer the questions based on it.

Composition of two types of foods



FOOD X



FOOD Y

Key:

@@@@ @@@@ **water**

********* ********* **fibre**

$$$$$$$ $$$$$$ **carbohydrates**

protein

+++++++ +++++++ **calcium**

2.2.1 Which food is best suited to prevent constipation? Give a reason for the answer. (2)

2.2.2 What percentage of food Y consists of calcium? (2)

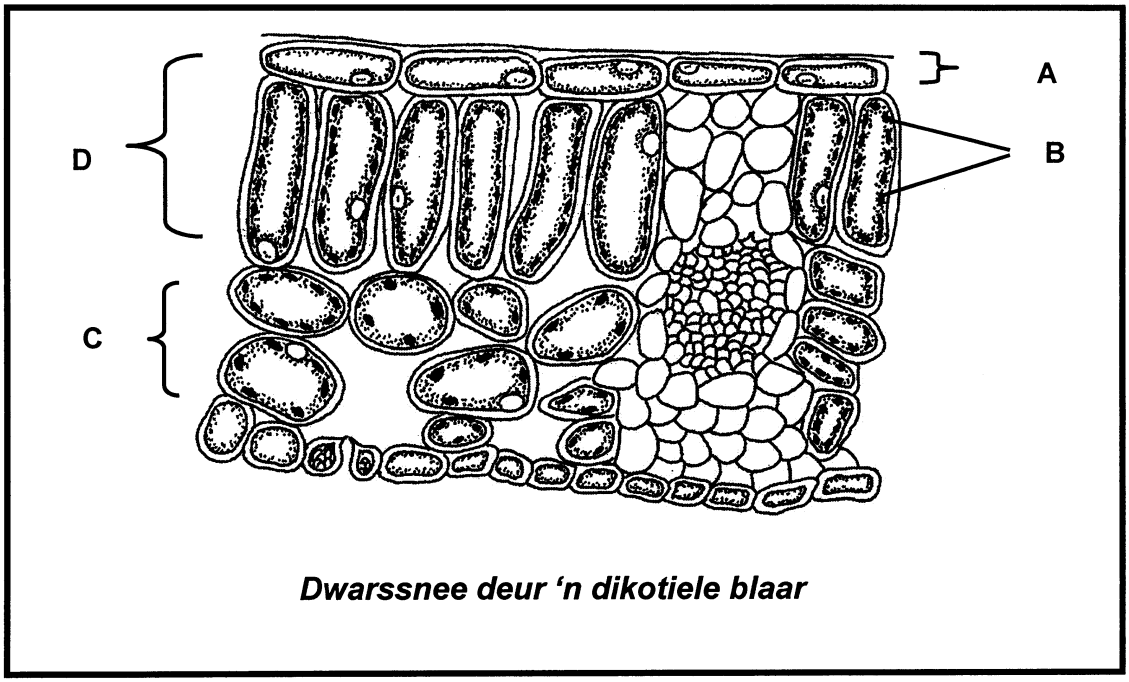
2.2.3 List THREE functions of water in nutrition. (3)
(7)

2.3 Describe a test you would perform to determine the presence of fats in a food sample. **(5)**

Total Question 2: 25

VRAAG 3

3.1 Bestudeer die onderstaande diagram en beantwoord dan die vrae wat volg.



Dwarssnee deur 'n dikotiele blaar

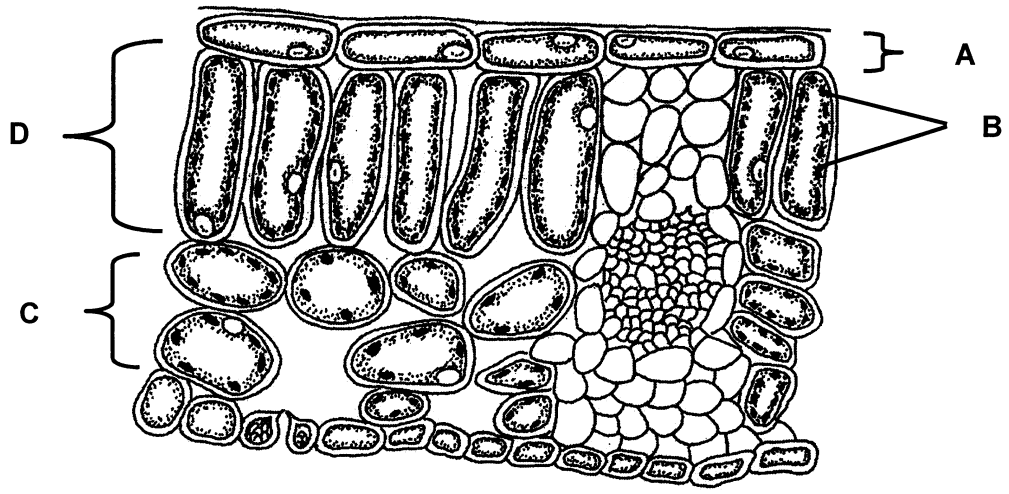
3.1.1 Gee die name van weefsels A, C en D asook die organelle B. (4)

3.1.2 Verduidelik DRIE maniere, soos waargeneem in die diagram, waarop die blaar struktureel aangepas is vir die proses van fotosintese. (6)

3.1.3 Noem TWEE redes waarom fotosintese as 'n biologies belangrike proses beskou word. (2)
(12)

QUESTION 3

3.1 Study the diagram below and then answer the questions that follow.



Transverse section through a dicotyledonous leaf

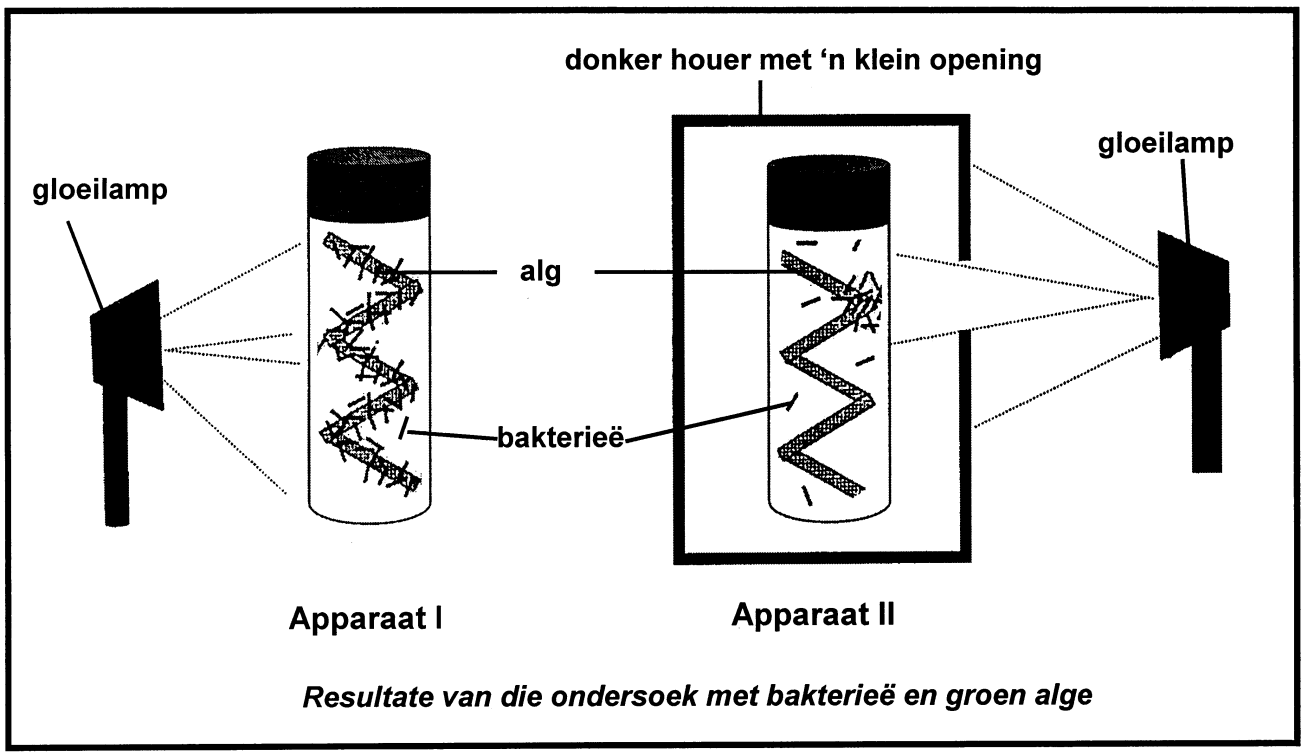
3.1.1 State the names of the tissues A, C and D and the organelles B. (4)

3.1.2 Explain THREE ways that are visible in the diagram, in which the leaf is structurally suited for the process of photosynthesis. (6)

3.1.3 State TWO reasons why photosynthesis is considered to be biologically important. (2)
(12)

3.2 Die onderstaande diagram verteenwoordig die apparaat wat die resultate toon van 'n ondersoek met 'n sekere bakteriespesie en 'n groen algspesie, *Spirogyra*.

Die bakterieë word deur suurstof aangetrek.



Resultate van die ondersoek met bakterieë en groen alge

3.2.1 Gee 'n verduideliking vir elk van die volgende waarnemings:

(i) In Apparaat I word die bakterieë rondom die hele algfilament aangetref (2)

(ii) In Apparaat II, is 'n konsentrasie van bakterieë slegs rondom die deel van die algfilament waarop 'n ligstraal geskyn het, aangetref. (2)

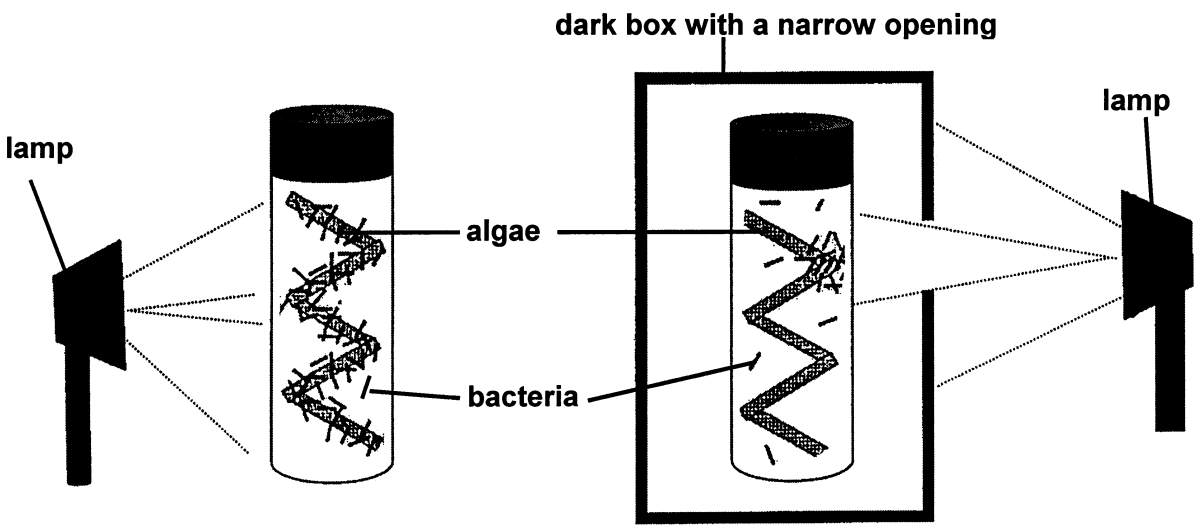
3.2.2 Noem:

(i) Die proses verantwoordelik vir die produksie van suurstof deur die alge (1)

(ii) EEN vereiste vir die proses genoem in VRAAG 3.2.2 (i) (1)
(6)

3.2 The diagram below represents the apparatus showing the results of an investigation with a certain species of bacterium and a species of the green algae, *Spirogyra.*

The bacteria are attracted to oxygen.



Results of investigation with bacteria and green algae

3.2.1 Give an explanation for each of the following observations:

(i) The bacteria in Apparatus I were found around the entire algal filament (2)

(ii) The concentration of bacteria around the algal filament only where a beam of light was allowed in, in Apparatus II (2)

3.2.2 Name:

(i) The process responsible for the production of oxygen by the algae (1)

(ii) ONE requirement for the process mentioned in QUESTION 3.2.2 (i) (1)
(6)

3.3 Tydens 'n uitstappie het leerders mis/feses van twee verskillende soogdierspesies, A en B, versamel. Hulle het die mis in kleiner deeltjies verdeel en dit onder 'n mikroskoop bestudeer. Daarbenewens het hulle ook oplossings van die mis vir verskillende voedselstowwe getoets.

Die resultate word in die onderstaande tabel aangedui.

Samestelling van die mis	Soogdier A	Soogdier B
Epidermale selle van gras	Teenwoordig	Afwesig
Epidermale selle van struike	Teenwoordig	Afwesig
Sade	Teenwoordig	Afwesig
Stysel	Teenwoordig	Afwesig
Suikers	Teenwoordig	Teenwoordig
Oplosbare proteïen	Teenwoordig	Teenwoordig
Soogdierhare	Afwesig	Teenwoordig
Vet	Afwesig	Teenwoordig

3.3.1 Noem EEN groot verskil in die tipe dieet van die twee soogdiere. (2)

3.3.2 Identifiseer TWEE bronne van vesel wat deur soogdier A geëet word. (2)

3.3.3 Maak 'n lys van DRIE funksies van vesel in die dieet. (3)
(7)

Totaal Vraag 3: 25

3.3 During a field trip learners collected dung (faeces) from two different species of mammals, A and B. They broke up the dung and observed these under the microscope. In addition, they also tested solutions of the dung for different food substances.

The results are indicated in the table below.

Composition of dung	Mammal A	Mammal B
Epidermal cells of grass	Present	Absent
Epidermal cells of shrubs	Present	Absent
Seeds	Present	Absent
Starch	Present	Absent
Sugars	Present	Present
Soluble protein	Present	Present
Mammal fur	Absent	Present
Fat	Absent	Present

3.3.1 State ONE major difference in the type of diet of the two mammals. (2)

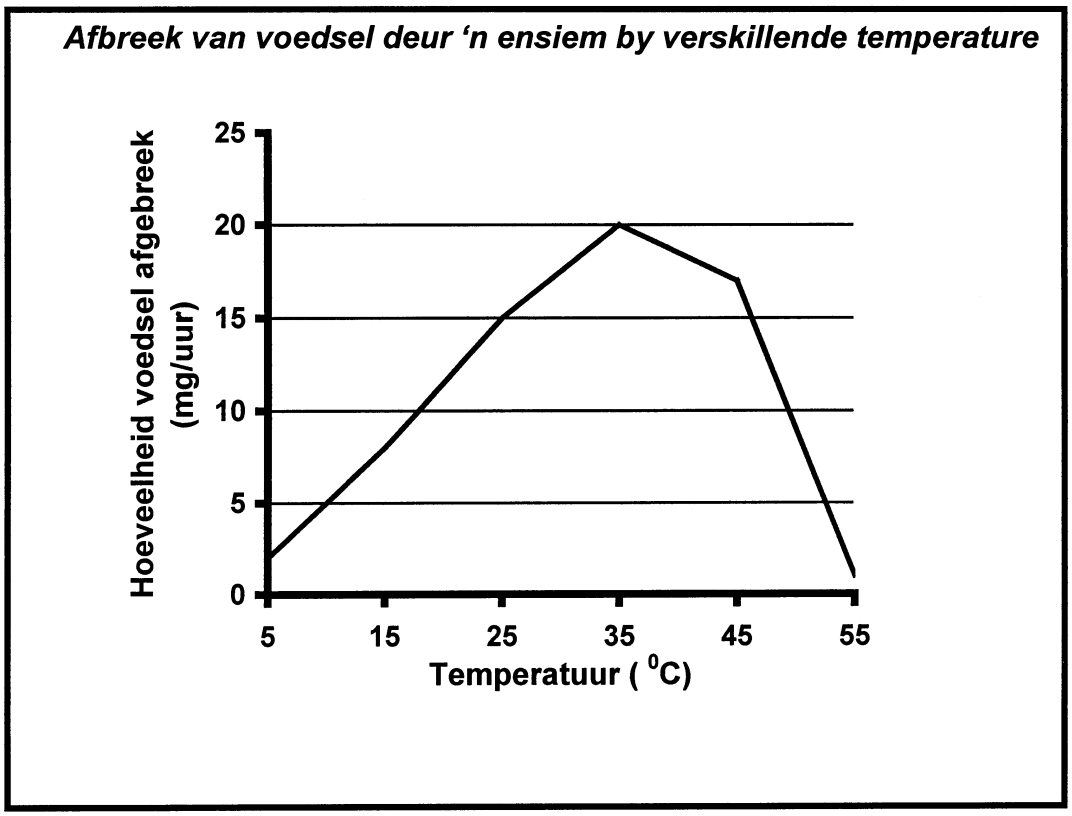
3.3.2 Identify TWO sources of fibre eaten by mammal A. (2)

3.3.3 List THREE functions of fibre in the diet. (3)
(7)

Total Question 3: 25

VRAAG 4

4.1 Gebruik die inligting in die onderstaande grafiek om die vrae te beantwoord.



4.1.1 By watter temperatuur werk die ensiem die **beste**? (2)

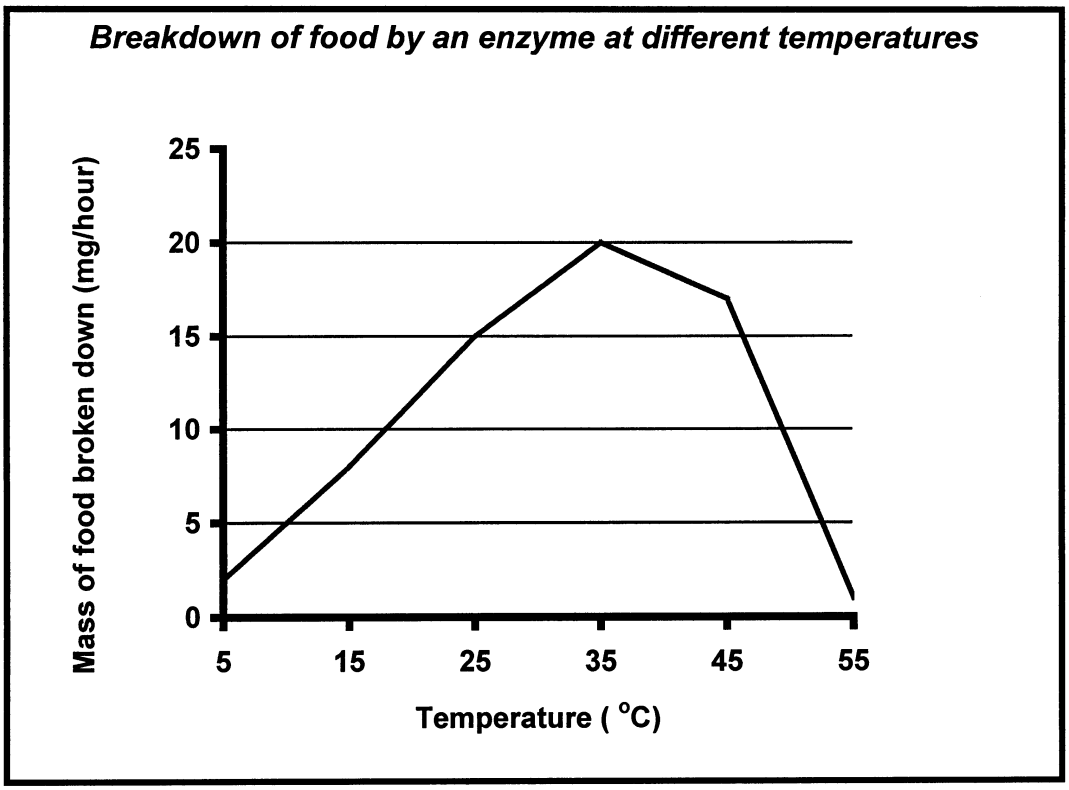
4.1.2 Hoeveel voedsel word by 25°C afgebreek? (2)

4.1.3 Gee 'n verduideliking vir die vorm van die grafiek tussen 5°C tot 35°C. (4)

4.1.4 Wat stel die inligting in die grafiek voor in verband met die hoeveelheid voedsel wat afgebreek kan word by 65°C?
Verduidelik die antwoord. (3)
(11)

QUESTION 4

4.1 Use the information in the graph below to answer the questions.



4.1.1 At which temperature does the enzyme work the **best**? (2)

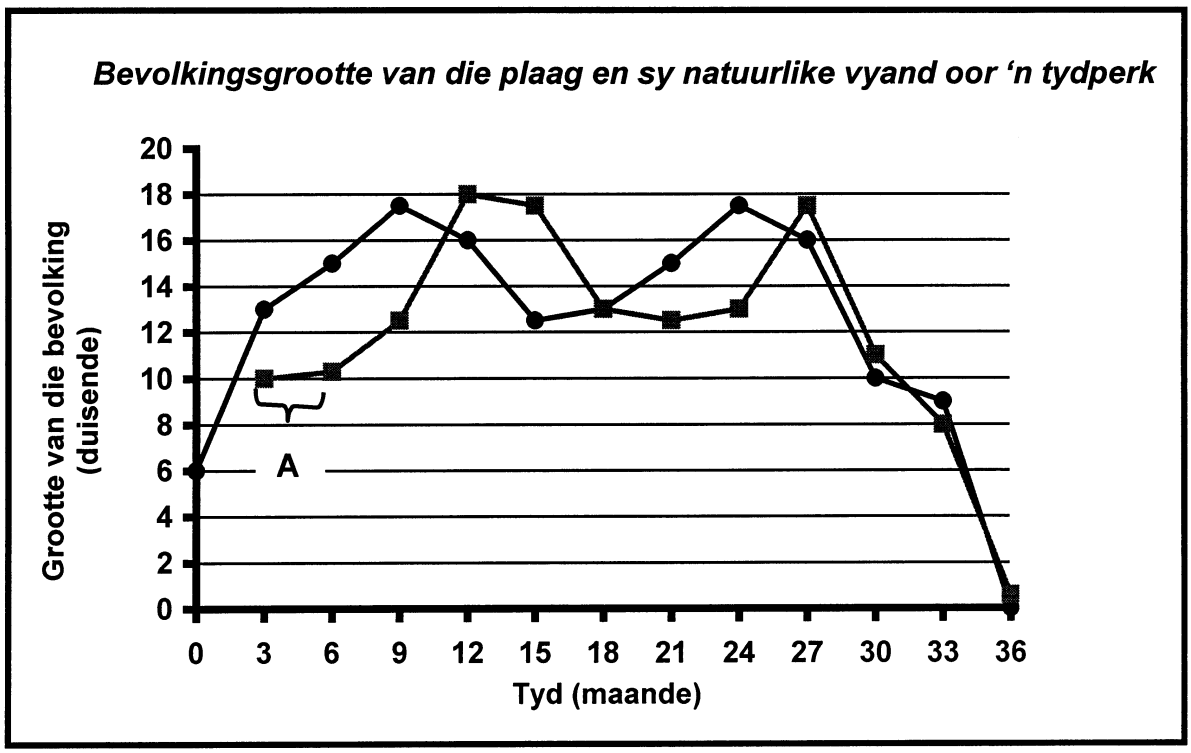
4.1.2 What mass of food is broken down at 25°C? (2)

4.1.3 Give an explanation for the shape of the graph between 5°C to 35°C. (4)

4.1.4 What does the information in the graph suggest about the amount of food that would be broken down at 65°C?
Explain the answer. (3)
(11)

4.2 'n Insekplaag is per ongeluk op 'n plaas vrygestel. Binne maande het dit 'n ernstige probleem geraak omdat die insekplaag geen vyande (predatore) in die nuwe habitat gehad het nie. Om die probleem op te los, het die boer besluit om die natuurlike vyand van die plaag vry te stel.
Data oor die groeipatrone van die insekbevolking sowel as die bevolking van die natuurlike vyand (predatore) is gehou.

Die resultaat word in die onderstaande grafiek aangedui.



4.2.1 Volgens die grafiek, hoeveel predatore is op die plaas vrygestel? (2)

4.2.2 Wat word fase A op die grafiek genoem? (1)

4.2.3 Verduidelik die vorm van die grafiek by A. (2)

4.2.4 Was die vrylating van die natuurlike vyand sukseksvol om die plaagbevolking te beheer of nie? (1)

4.2.5 Gee 'n rede vir die antwoord in VRAAG 4.2.4. (2)

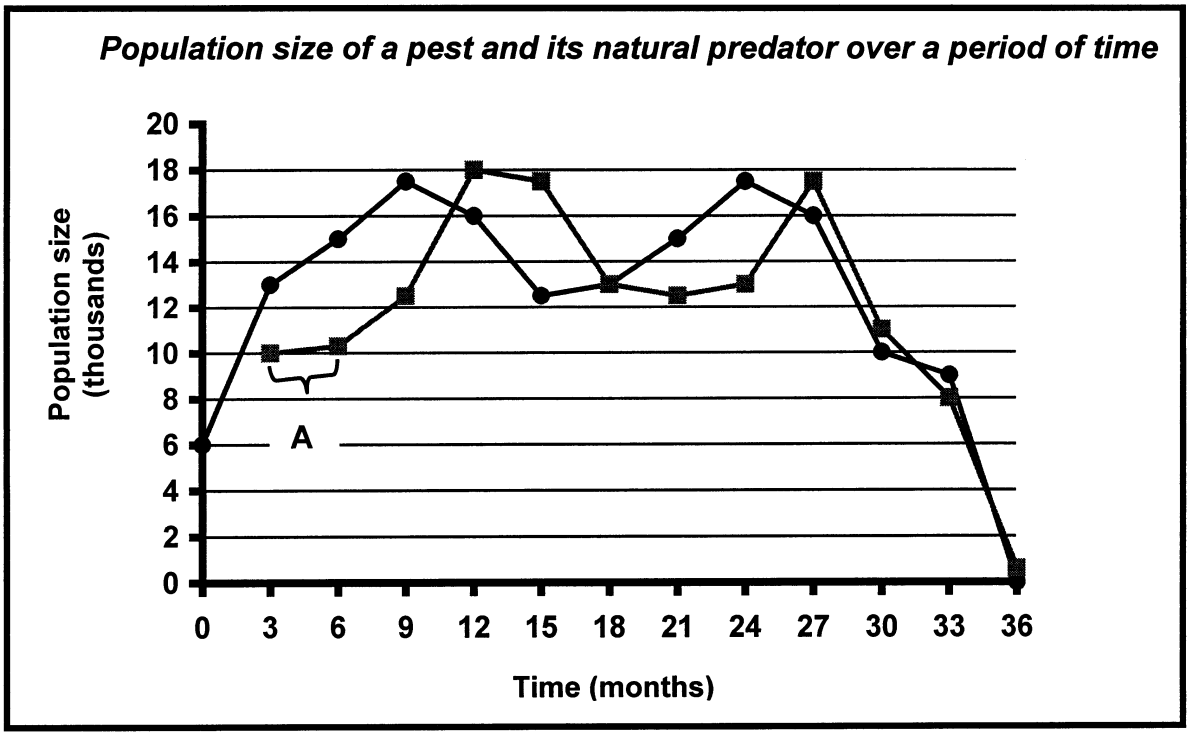
4.2.6 Stel EEN rede voor waarom die boer besluit het om eerder 'n natuurlike vyand as chemiese middels te gebruik om die plaagbevolking te beheer. (2)

4.2.7 Beskryf kortliks die verwantskap tussen die insekplaagbevolking en sy natuurlike vyand. (4)
(14)

Totaal Vraag 4: 25

4.2 An insect pest was accidentally introduced onto a farm. Within months it had become a serious problem as it had no enemies (predators) in its new habitat. To solve this problem, the farmer decided to introduce the natural enemy of this pest. Data was kept on the growth patterns of the insect population and the population of its natural enemy (predators).

The result is indicated in the graph below.



4.2.1 According to the graph, how many predators were introduced onto the farm? (2)

4.2.2 What is phase A on the graph called? (1)

4.2.3 Explain the shape of the graph at A. (2)

4.2.4 Was the introduction of the natural enemy successful in controlling the pest population or not? (1)

4.2.5 Give a reason for the answer in QUESTION 4.2.4. (2)

4.2.6 Suggest ONE reason why the farmer decided to use the natural enemy instead of chemicals in controlling the pest population. (2)

4.2.7 Briefly describe the interaction between the insect pest population and its natural enemy. (4)
(14)

Total Question 4: 25

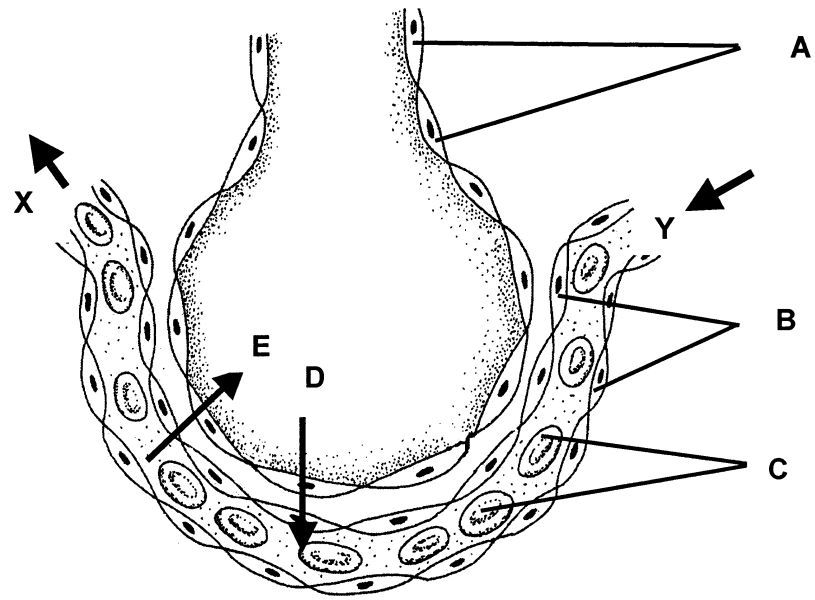
VRAAG 5

5.1 Voltooi die volgende tabel deur slegs die nommers 5.1.1 tot 5.1.7 in jou antwoordeboek te skryf en langs elkeen die ontbrekende inligting.

Dele/Strukture betrokke	Inaseming	Uitaseming
diafragma	5.1.1 (trek saam of verslap)	5.1.2 (trek saam of verslap)
5.1.3	trek saam en veroorsaak dat die borskas oplig	verslap
volume van die borsholte	5.1.4	5.1.5
5.1.6 in die borsholte	5.1.7	verhoog

(7)

5.2 Bestudeer die onderstaande diagram en beantwoord die vrae wat daarop gebaseer is.



Lengtesnee deur 'n alveolus en geassosieerde kapillêre bloedvat

5.2.1 Skryf die nommers (i) tot (v) in jou antwoordeboek en langs elkeen die **letter** wat elk van die volgende verteenwoordig:

(i) Plaveiselepiteelselle van die alveolus (1)

(ii) Die rigting waarin die meeste suurstofmolekules sal beweeg (1)

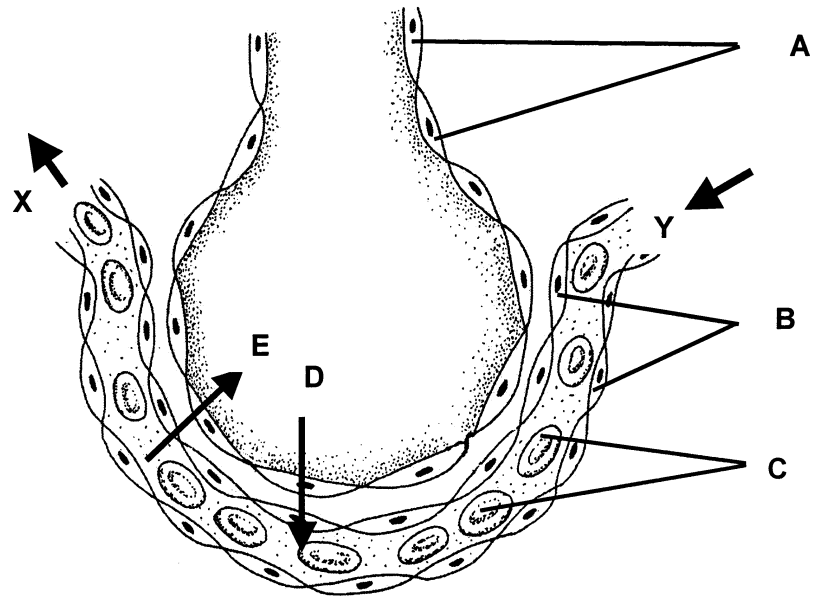
QUESTION 5

5.1 Complete the following table by writing the numbers 5.1.1 to 5.1.7 in your answer book and next to each the missing information.

Parts/Structures involved	Inhalation	Exhalation
diaphragm	5.1.1 (contracted or relaxed)	5.1.2 (contracted or relaxed)
5.1.3	contracts and causes the rib cage to lift	relaxes
volume of thoracic cavity	5.1.4	5.1.5
5.1.6 in thoracic cavity	5.1.7	increases

(7)

5.2 Study the diagram below and answer the questions based on it.



Longitudinal section through an alveolus and an associated blood capillary

5.2.1 Write the numbers (i) to (v) in your answer book and next to each the **letter** which represents each of the following:

(i) Squamous epithelial cells of alveolus (1)

(ii) The direction in which most oxygen molecules will move (1)

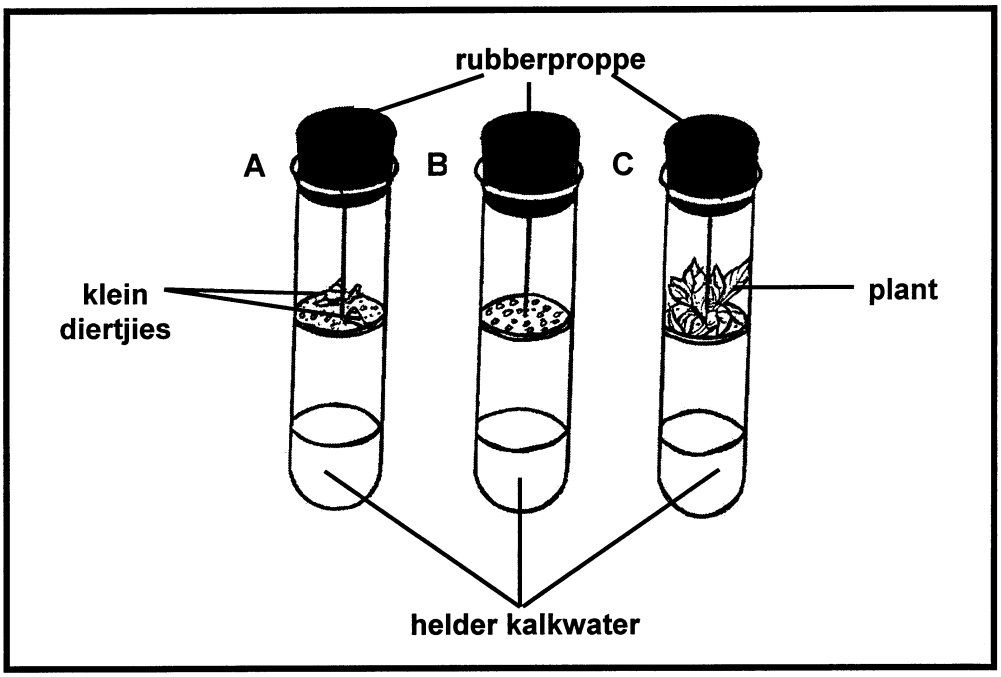
(iii) Rooibloedselle (1)

(iv) Die gedeelte met die **hoogste** koolstofdioksiedkonsentrasie in die kapillêre bloedvat (1)

(v) Die gedeelte met die **laagste** suurstofkonsentrasie in die kapillêre bloedvat (1)

5.2.2 Verduidelik TWEE maniere waarop die gedeelte wat in die diagram voorgestel word, aangepas is vir gaswisselling. (4)
(9)

5.3 Die onderstaande diagram stel die apparaat voor wat in 'n ondersoek gebruik is. Die eksperiment is in die donker uitgevoer.



5.3.1 Gee die **doel** vir die ondersoek. (2)

5.3.2 Wat is die doel van elk van die volgende:

(i) Proefbuis B (1)
(ii) Kalkwater (1)

5.3.3 Tabuleer die verwagte **resultate** in elk van die proefbuise. (4)

5.3.4 Noem EEN faktor wat in al die proefbuise dieselfde moet bly tydens die ondersoek. (1)
(9)

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

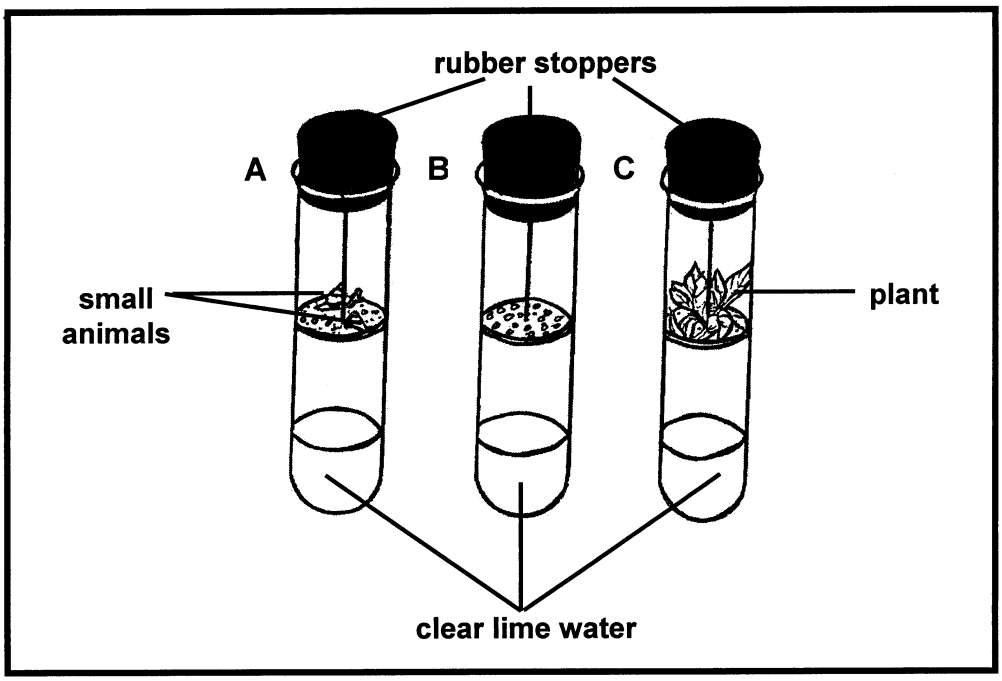
(iii) Red blood corpuscles (1)

(iv) The area of **highest** carbon dioxide concentration in the blood capillary (1)

(v) The area of **lowest** oxygen concentration in the blood capillary (1)

5.2.2 Explain TWO ways in which the parts shown in the diagram are adapted for gaseous exchange. (4)
(9)

5.3 The diagram below represents the apparatus used in an investigation. The apparatus was kept in the dark.



5.3.1 State the **aim** of this investigation. (2)

5.3.2 What is the purpose of each of the following:

(i) Test tube B (1)
(ii) Lime water (1)

5.3.3 Tabulate the expected **results** in each of the test tubes. (4)

5.3.4 Name ONE factor that needs to be the same in all test tubes in this investigation. (1)
(9)

Total Question 5: 25
TOTAL SECTION B: 100
GRAND TOTAL: 150