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SENIORSERTIFIKAAT-EKSAMEN - 2005

BIOLOGY P1
BIOLOGIE V1

HIGHER GRADE
HOËR GRAAD

FEBRUARY/MARCH 2005
FEBRUARIE/MAART 2005

306-1/1

BIOLOGY HG: Paper 1

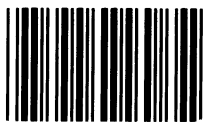
Marks: 200
Punte : 200



2 Hours
2 Ure

This question paper consists of 17 pages.
Hierdie vraestel bestaan uit 17 bladsye.

X05



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 genummer is.
5. Skryf netjies en leesbaar.
6. Indien die vrae nie beantwoord word volgens die instruksies by elke vraag nie, sal kandidate punte verbeur.
7. Alle tekeninge moet met 'n potlood gemaak word en die byskrifte met ink.
8. Gebruik diagramme en vloeddiagramme 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:

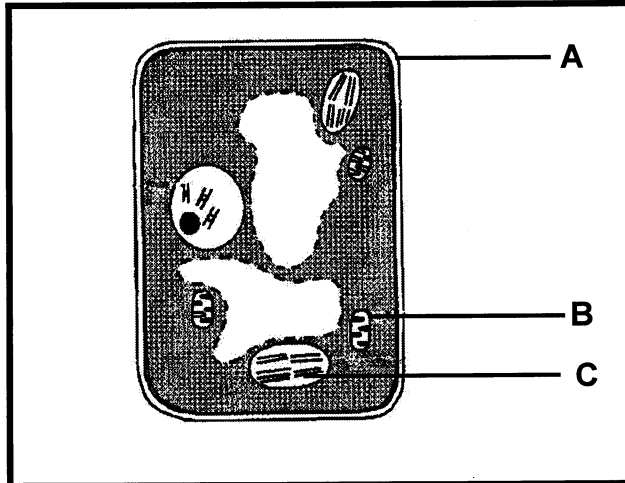
1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answer to each question at the top of a new page.
4. Number the answers exactly as the questions are numbered.
5. Write neatly and legibly.
6. If answers are not presented according to the instructions of each question, candidates will lose marks.
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.

VRAAG 1.1.1 tot 1.1.3 verwys na onderstaande diagram.



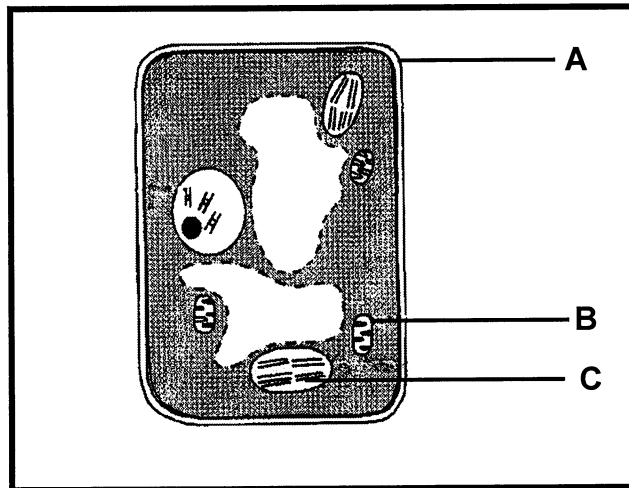
- 1.1.1 Die hoofbestanddeel van A is 'n ...
- A monosakkaried.
 - B disakkaried.
 - C polisakkaried.
 - D proteïen.
- 1.1.2 Die makro-voedingstof wat 'n rol in die oordrag van energie in organel B speel, is...
- A magnesium.
 - B fosfor.
 - C stikstof.
 - D kalsium.
- 1.1.3 Watter element maak deel uit van die pigment wat in organel C voorkom?
- A Kalsium
 - B Magnesium
 - C Swawel
 - D Yster

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 to 1.1.3 refer to the following diagram.



- 1.1.1 The main component of part A is a...

- A monosaccharide.
- B disaccharide.
- C polysaccharide.
- D protein.

- 1.1.2 The macro-nutrient that plays a part in the transfer of energy in organelle B is...

- A magnesium.
- B phosphorus.
- C nitrogen.
- D calcium.

- 1.1.3 Which element forms part of the pigment found in organelle C?

- A Calcium
- B Magnesium
- C Sulphur
- D Iron

1.1.4 Die volgende is betrokke by die proses van sellulêre respirasie:

- (i) Energie
- (ii) Koolhidrate
- (iii) Koolstofdiksied
- (iv) Water
- (v) Suurstof

Watter EEN van die volgende kombinasies verteenwoordig hul betrokkenheid by bogenoemde proses korrek?

- A (ii) + (iii) = (i) + (iv) + (v)
- B (ii) + (iv) = (i) + (iii) + (v)
- C (i) + (ii) = (iii) + (iv) + (v)
- D (ii) + (v) = (i) + (iii) + (iv)

1.1.5 Watter EEN van die volgende stellings in verband met 'n predator en sy prooi is WAAR?

- A Daar is interspesifieke kompetisie
- B Die grootte van die predatorbevolking is digtheidsafhanklik en word beheer deur die grootte van die prooibevolking
- C 'n Toename in die getalle van die predatore veroorsaak 'n toename in die getalle van die prooi
- D 'n Afname in die getalle van die predatore veroorsaak 'n afname in die getalle van die prooi

1.1.6 Die volgende prosesse vind tydens fotosintese plaas:

- (i) Reduksie van koolstofdiksied
- (ii) Die splitsing van water
- (iii) Die sintese van glukose
- (iv) Vorming van suurstofgas
- (v) Vorming van ATP

Watter EEN van die volgende kombinasies is KORREK vir die ligfase?

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

1.1.4 The following are involved in the process of cellular respiration:

- (i) Energy
- (ii) Carbohydrates
- (iii) Carbon dioxide
- (iv) Water
- (v) Oxygen

Which ONE of the following combinations correctly represents their involvement in the above process?

- A (ii) + (iii) = (i) + (iv) + (v)
- B (ii) + (iv) = (i) + (iii) + (v)
- C (i) + (ii) = (iii) + (iv) + (v)
- D (ii) + (v) = (i) + (iii) + (iv)

1.1.5 Which ONE of the following statements is TRUE about the relationship between a predator and its prey?

- A There is interspecific competition
- B The size of the predator population is density dependent and is controlled by the size of the prey population
- C An increased number of predators causes an increased number of prey
- D A decreased number of predators causes a decreased number of prey

1.1.6 The following processes occur during photosynthesis:

- (i) Reduction of carbon dioxide
- (ii) The splitting of water
- (iii) The synthesis of glucose
- (iv) Formation of oxygen gas
- (v) Formation of ATP

Which ONE of the following combinations is CORRECT for the light phase?

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

1.1.7 Watter EEN van die volgende reaksies vind in die lewer van die mens plaas?

- A Ureum → aminosure
- B Stysel → maltose
- C Glikogeen → glukose
- D Gal → hemoglobien

1.1.8 Om 'n stabiele bevolking te handhaaf in 'n gebied waar geen emigrasie en immigrasie plaasvind nie, ...

- A moet voedselvoorsiening beperk word.
- B sal predatore begin verskyn.
- C moet die fekunditeitstempo laer wees as die mortaliteitstempo.
- D moet die mortaliteitstempo dieselfde as die nataliteitstempo wees.

(8 x 2) (16)

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 fase tydens bevolkingsgroei waar diere by hulle nuwe omgewing aanpas

1.2.2 Die maksimum aantal organismes van 'n spesifieke soort wat deur die bronne van die omgewing onderhou kan word

1.2.3 Die proses in die mond waar voedsel tot 'n fyn pulp gekou word

1.2.4 'n Opening wat van die farinks na die tragea lei

1.2.5 Selle op die wande van die villi wat slym afskei

1.2.6 'n Lugbuis wat die larinks met die brongusse verbind

1.2.7 Die splitsing van 'n watermolekuul in waterstof en suurstof tydens fotosintese

1.2.8 Die beweging van individue van 'n bevolking uit 'n habitat (8)

1.1.7 Which ONE of the following reactions takes place in the liver of humans?

- A Urea → amino acids
- B Starch → maltose
- C Glycogen → glucose
- D Bile → haemoglobin

1.1.8 In order to maintain a stable population in an area where emigration and immigration do not occur...

- A food supply must be limited.
- B predators will start appearing.
- C the fecundity rate must be lower than the mortality rate.
- D the mortality rate must be equal to the natality rate.

(8 x 2) (16)

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 phase during population growth where animals adapt to their new environment

1.2.2 The maximum number of organisms of a particular kind that can be supported by resources in the environment

1.2.3 The process by which food is chewed into a fine pulp in the mouth

1.2.4 An opening that leads from the pharynx into the trachea

1.2.5 The mucus secreting cells on the wall of the villi

1.2.6 Air passage connecting the larynx with the bronchi

1.2.7 The splitting of a water molecule into hydrogen and oxygen during photosynthesis

1.2.8 The movement of individuals of a population out of a habitat (8)

- 1.3 Dui aan of elk van die stellings in KOLOM I van toepassing is op **slegs A, slegs B, beide A en B** of **geen** van die items in KOLOM II. Skryf neer **slegs A, slegs B, beide A en B**, of **geen** langs die toepaslike vraagnommer.

	KOLOM I	KOLOM II
1.3.1	Die proses waar ATP uit ADP gesintetiseer word	A Fosforilasie B Fotolise
1.3.2	Voedsel- en watervoorraad raak beperk	A Bevolkingsdigtheid neem af B Omgewingsweerstand
1.3.3	'n Organiese verbinding wat in die lewer gestoor word	A Vette B Vitamien A
1.3.4	Dit breek sukrose af na glukose en fruktose	A Enterokinase B Sukrase
1.3.5	Oksidatiewe fosforilering vind hier plaas	A Mitochondrions B Sitosol
1.3.6	Die struktuur wat die tragea tydens die slukproses sluit	A Pylorus B Fundus

(6 x 2) (12)

- 1.4 Bestudeer die lys voedingstowwe en voedselbronne en beantwoord die vrae wat volg.

Voedingstowwe
Vitamien A (retinol)
Vitamien B ₁ (tiamien)
Vitamien C (askorbiensuur)
Vitamien D (kalsiferol)
Jodium
Yster
Stikstof
Kalsium

Voedselbronne
Lemoene
Wortels
Lewer
Kaas
Vleis
Spinasie
Vis

- 1.4.1 Noem EEN voedingstof en EEN voedselbron uit die bostaande lys wat elk van die volgende gebreke sal voorkom:

- (a) Skeurbuik (2)
- (b) Beri-beri (2)
- (c) Goiter (2)
- (d) Bloedarmoede (2)

- 1.4.2 Noem TWEE voedingstowwe uit die bostaande lys wat vir gesonde beenvorming benodig word. (2)

(10)

- 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 relevant question number.

	COLUMN I	COLUMN II
1.3.1	The process of synthesising ATP from ADP	A Phosphorylation B Photolysis
1.3.2	Food and water supplies become limited	A Population density decreases B Environmental resistance
1.3.3	An organic compound that is stored in the liver	A Fats B Vitamin A
1.3.4	This breaks down sucrose into glucose and fructose	A Enterokinase B Sucrase
1.3.5	Oxidative phosphorylation takes place here	A Mitochondria B Cytosol
1.3.6	The structure that closes the trachea during swallowing	A Pylorus B Fundus

(6 x 2) (12)

- 1.4 Study the list of nutrients and food sources below and then answer the questions.

Nutrients
Vitamin A (retinol)
Vitamin B ₁ (thiamin)
Vitamin C (ascorbic acid)
Vitamin D (calciferol)
Iodine
Iron
Nitrogen
Calcium

Food sources
Oranges
Carrots
Liver
Cheese
Meat
Spinach
Fish

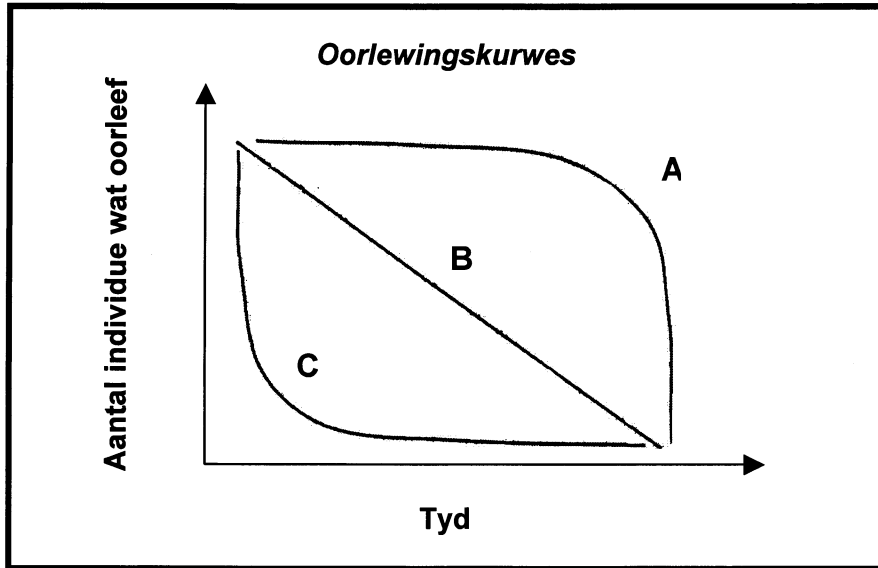
- 1.4.1 Name ONE nutrient and ONE food source from the list above which will prevent each of the following disorders:

- (a) Scurvy (2)
- (b) Beri-beri (2)
- (c) Goitre (2)
- (d) Anaemia (2)

- 1.4.2 Name TWO nutrients from the list above that are required for healthy bone formation.

(2)
(10)

- 1.5 Bestudeer die onderstaande grafiek en lys kenmerke, en beantwoord dan die vrae wat volg.



Lys kenmerke

- a. Slegs 'n paar van die nakomelinge bereik volwassenheid
- b. Mortaliteit kom meestal onder die jong diere voor
- c. Die kurwe is op die meeste soogdiere van toepassing
- d. Daar is 'n gelyke kans om op enige ouderdom te sterf
- e. Die getalle neem in verhouding met tyd toe
- f. Die kurwe verteenwoordig bevolkings met geen ouersorg
- g. Die meeste van die nakomelinge oorleef die beginjare
- h. Die meeste van die nakomelinge bereik volwassenheid

Kies uit die lys en skryf slegs die **letter(s)** van die stellings wat op die volgende van toepassing is:

LET WEL: Elke kenmerk kan slegs een keer gebruik word.

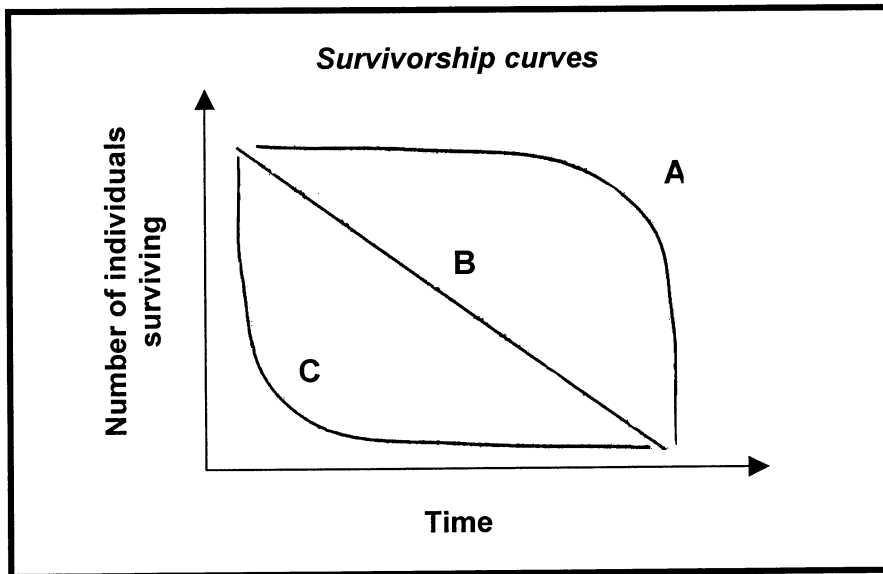
1.5.1 Kurwe A

1.5.2 Kurwe B

1.5.3 Kurwe C

(7)

1.5 Study the graph and list of characteristics below, and then answer the questions.



List of characteristics

- a. Only few of the offspring reach an adult stage
- b. Mortality occurs mainly among the younger animals
- c. The curve is applicable to most mammals
- d. There is an equal chance of dying at all the ages
- e. The numbers increase in proportion with the passing of time
- f. The curve represents populations with no parental care
- g. Most of the offspring survive the initial life stages
- h. Most of the offspring reach maturity

Select from the list and write only the **letter(s)** of the statements that relate to each of the following:

NOTE: Each characteristic can only be used once.

1.5.1 Curve A

1.5.2 Curve B

1.5.3 Curve C

(7)

- 1.6 In 'n ondersoek om te bepaal of lig noodsaaklik is vir fotosintese, is 'n blaar verkry van 'n plant wat vir 48 uur in 'n donker kas geplaas is voordat dit weer aan lig blootgestel is.

Verwys na die onderstaande diagram en beantwoord die vrae wat volg.

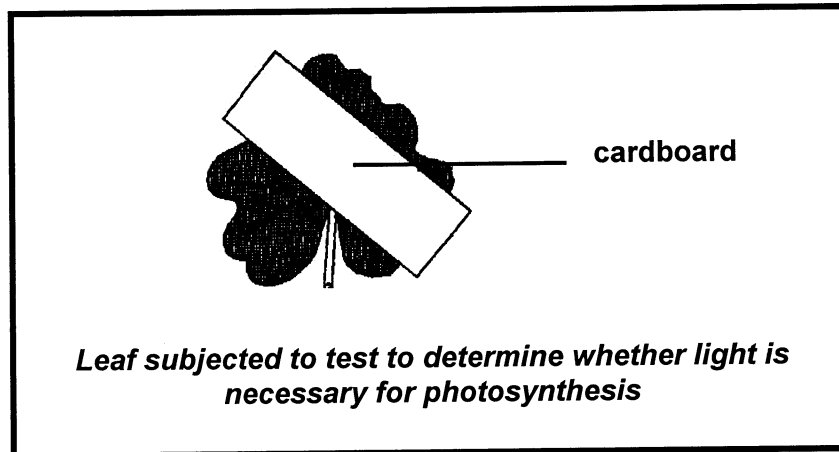


- 1.6.1 Hoekom is die plant in 'n donker kas geplaas? (2)
- 1.6.2 Hoekom word net 'n deel van die blaar met karton bedek? (2)
- 1.6.3 Teken 'n diagram, met byskrifte, van die blaar om die resultate van die styseltoets, nadat die ondersoek voltooi is, aan te dui. (3)
- (7)

Totaal Vraag 1: 60
TOTAAL AFDELING A: 60

- 1.6 In an investigation to determine whether light is necessary for photosynthesis a leaf was obtained from a plant that was first placed in a dark cupboard for 48 hours before it was again exposed to light.

Refer to the diagram below to answer the questions that follow.



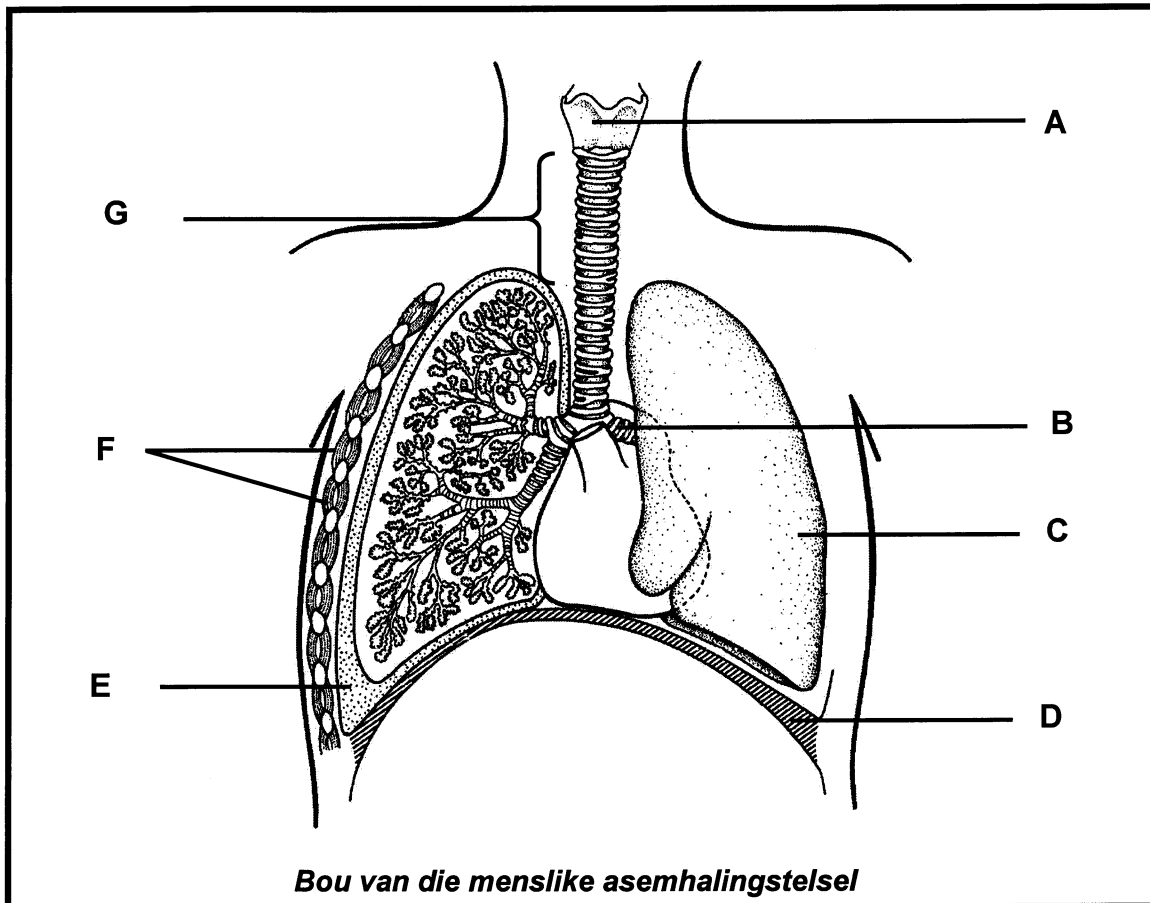
- 1.6.1 Why was the plant placed in a dark cupboard? (2)
- 1.6.2 Why is only part of the leaf covered with cardboard? (2)
- 1.6.3 Draw a labelled diagram of the leaf to show the results after the starch test at the end of the investigation. (3)
(7)

Total Question 1: 60
TOTAL SECTION A: 60

AFDELING B

VRAAG 2

2.1 Bestudeer die onderstaande diagram en beantwoord dan die vrae.



2.1.1 Gee byskrifte vir dele A, B, D en F. (4)

2.1.2 Noem EEN funksie van elk van die volgende:

(a) Die vloeistof in deel E (1)

(b) Die kraakbeenringe in deel B (1)

(c) Die epiteelweefsel wat die binnekant van deel G uitvoer (1)

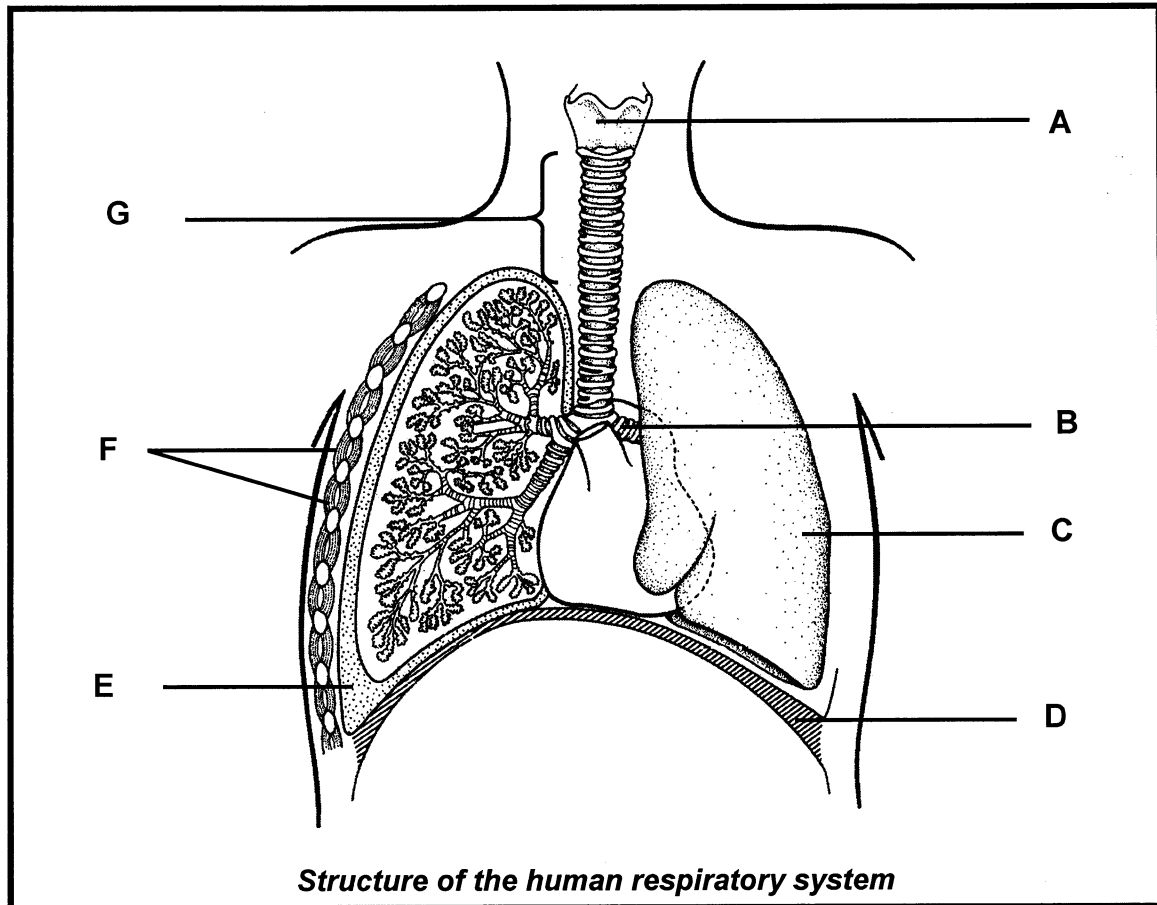
2.1.3 Beskryf die veranderinge wat in dele C en D tydens inaseming sal voorkom. (4)

(11)

SECTION B

QUESTION 2

2.1 Study the diagram below and then answer the questions.



2.1.1 Provide labels for the parts A, B, D and F. (4)

2.1.2 State ONE function of each of the following:

(a) The fluid in part E (1)

(b) The cartilagenous rings in part B (1)

(c) The epithelial tissue that lines the inside of part G (1)

2.1.3 Describe the changes that will occur in part C and D during inhalation. (4)
(11)

2.2 Die onderstaande tabel toon die resultate van 'n ondersoek waarby 'n fikse en gesonde mens betrokke was. Tydens die ondersoek is die persoon aan die volgende toestande onderwerp:

- Lê plat vir die duur van die ondersoek
- Lug met verskillende koolstofdiksiedkonsentrasies gegee om in te asem, terwyl die suurstofkonsentrasie vir die duur van die ondersoek dieselfde gebly het

Tydens die ondersoek is die tempo en diepte van die persoon se asemhaling gemeet en die volume is daarvolgens bereken.

Konsentrasie CO ₂ wat ingeasem is (%)	Aantal asemhalings per minuut	Totale volume lug ingeasem per minuut (liter)
0,04	14	9,4
0,08	14	10,3
1,50	15	11,9
2,30	15	13,7
3,10	15	18,5
5,50	20	29,5
6,00	27	56,8

- 2.2.1 Stel 'n doel vir die ondersoek voor. (2)
- 2.2.2 Beskryf hoe 'n toename in die koolstofdiksiedkonsentrasie die volgende beïnvloed:
- (a) Die tempo van asemhaling (2)
- (b) Die volume lug wat per minuut ingeasem word (2)
- 2.2.3 Waarom het die volume van die ingeasemde lug per minuut vermeerder van 11,9 liter tot 18,5 liter terwyl die aantal asemhalings dieselfde op 15 per minuut gebly het? (3)
- 2.2.4 Beskryf die homeostatiese meganisme wat veroorsaak dat die tempo en diepte van asemhaling toeneem wanneer 'n persoon aan strawwe oefeninge deelneem. (7)
- (16)

2.2 The table below shows the results of an investigation involving a human. The person involved in the investigation was fit and healthy, and was subjected to the following conditions:

- Lay down throughout the investigation
- Was given air to breathe which had different concentrations of carbon dioxide while the oxygen concentration remained the same throughout the investigation

During the investigation the rate and depth of breathing of this person was measured and the volume was determined from this.

Concentration of CO ₂ breathed in (%)	Number of breaths per minute	Total volume of air breathed per minute (litres)
0,04	14	9,4
0,08	14	10,3
1,50	15	11,9
2,30	15	13,7
3,10	15	18,5
5,50	20	29,5
6,00	27	56,8

2.2.1 Suggest an aim for this investigation. (2)

2.2.2 Describe how the increase in carbon dioxide concentration affects the following:

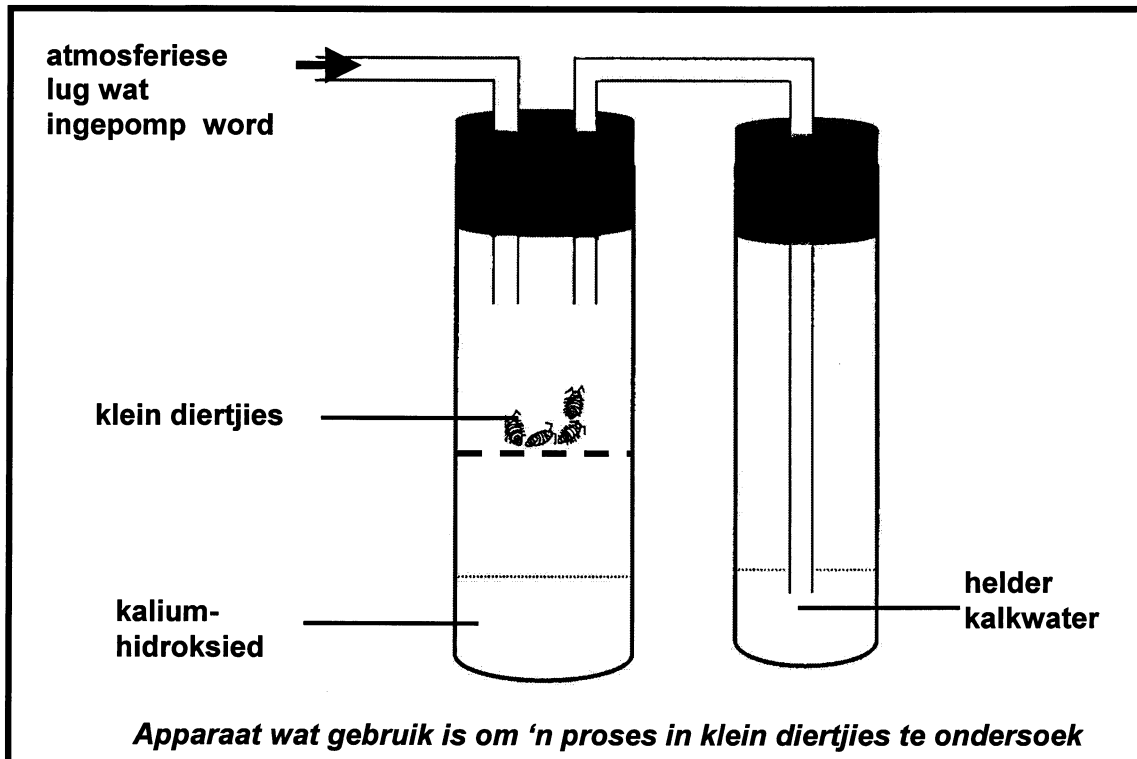
(a) The rate of breathing (2)

(b) The volume of air breathed in per minute (2)

2.2.3 Why did the volume of air breathed in per minute increase from 11,9 litres to 18,5 litres while the number of breaths remained the same at 15 per minute? (3)

2.2.4 Describe the homeostatic mechanism that causes the rate and depth of breathing to increase when a person engages in strenuous exercise. (7)
(16)

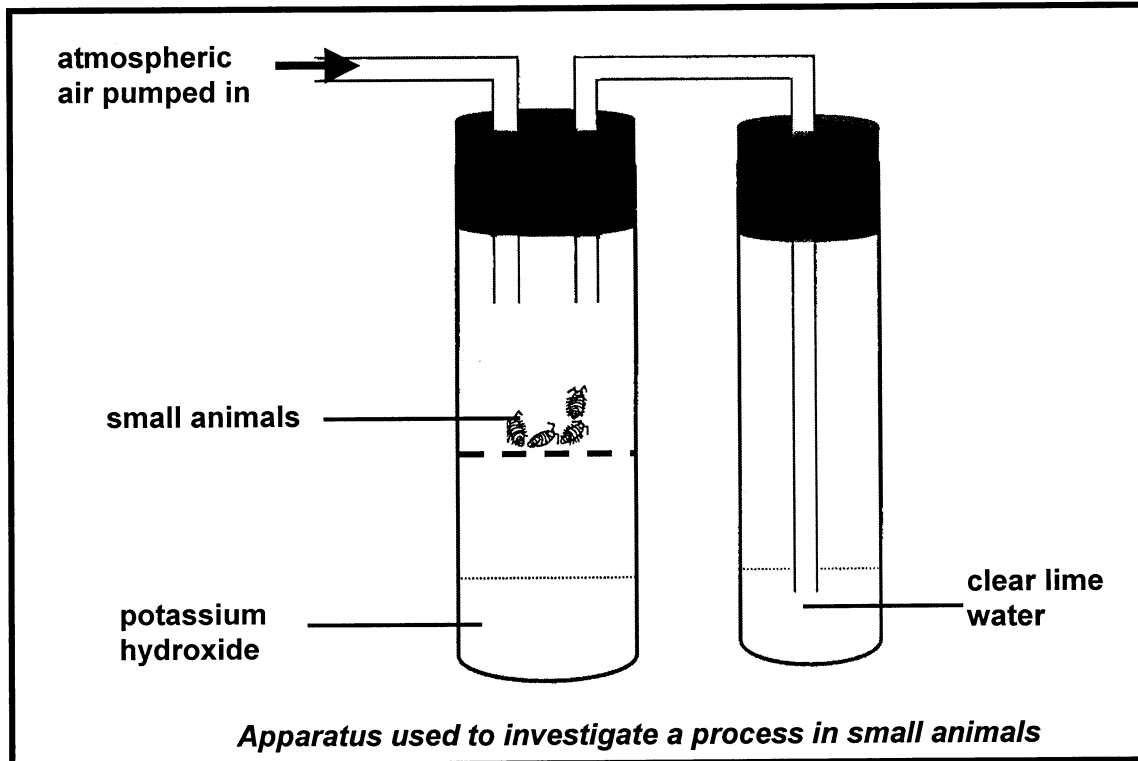
- 2.3 'n Groep Graad 12-leerders het 'n ondersoek ontwerp soos in onderstaande diagram getoon word.
Bestudeer die diagram en beantwoord dan die vrae.



- 2.3.1 Noem die biochemiese proses wat die leerders van plan was om te ondersoek. (2)
- 2.3.2 Noem EEN funksie vir elk van die volgende:
- (a) Kaliumhidroksied (1)
- (b) Helder kalkwater (1)
- 2.3.3 Verduidelik TWEE maniere waarop die eksperimentele ontwerp verbeter behoort te word om geldige en betroubare resultate te kry. (4)
- (8)

Totaal Vraag 2: 35

- 2.3 A group of Grade 12 learners designed an investigation as illustrated below. Study the diagram and then answer the questions.

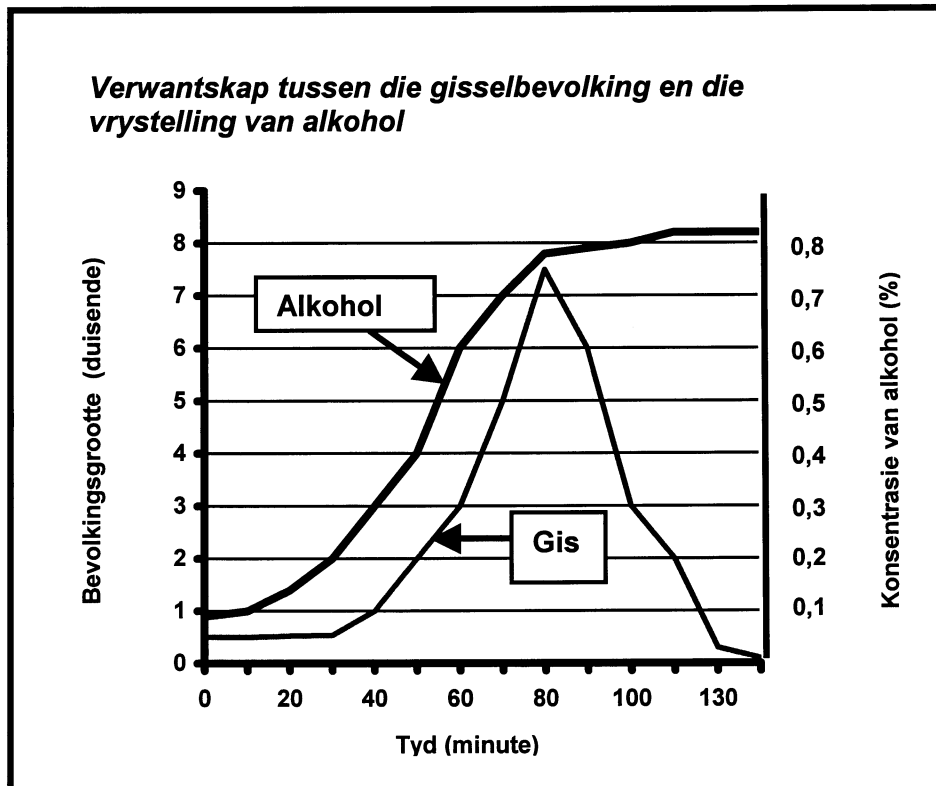


- 2.3.1 Name the biochemical process that the learners intended to investigate. (2)
- 2.3.2 State ONE function of each of the following:
- (a) Potassium hydroxide (1)
- (b) Clear lime water (1)
- 2.3.3 Explain TWO ways in which the experimental design should be improved to obtain valid and reliable results. (4)
- (8)**

Total Question 2: 35

VRAAG 3

- 3.1 Tabuleer VIER verskille tussen aërobiese en anaërobiese respirasie. (9)
- 3.2 'n Onderzoek is uitgevoer om die produksie van alkohol deur 'n gisselbevolking aan te dui. Die resultate word in die onderstaande grafiek aangedui.



- 3.2.1 Waarom word 'n termosfles eerder as 'n glasbottel gebruik om die gisselle in te laat groei? (2)
- 3.2.2 Identifiseer die tipe groeivorm wat deur die gisselbevolking voorgestel word. (1)
- 3.2.3 Maak 'n lys van TWEE vereistes waaraan 'n bevolking moet voldoen voordat dit as 'n bevolking kan bekend staan. (2)
- 3.2.4 Gee 'n verduideliking vir die vorm van die grafiek van die gisselbevolking vir die tydperk tussen 40 tot 90 minute. (4)
- 3.2.5 Beskryf kortliks die verwantskap tussen die groei van die gisselbevolking en die vrystelling van alkohol. (3)
- 3.2.6 Verduidelik hoe die groei van die gisselbevolking en die vrystelling van alkohol beïnvloed sou word indien 'n ander nie-alkoholiese produserende mikro-organisme, wat dieselfde voedsel benodig, by die gisselbevolking gevoeg word. (2)
- 3.2.7 Noem DRIE faktore in die ondersoek wat jy as omgewingsfaktore sou beskou. (3)

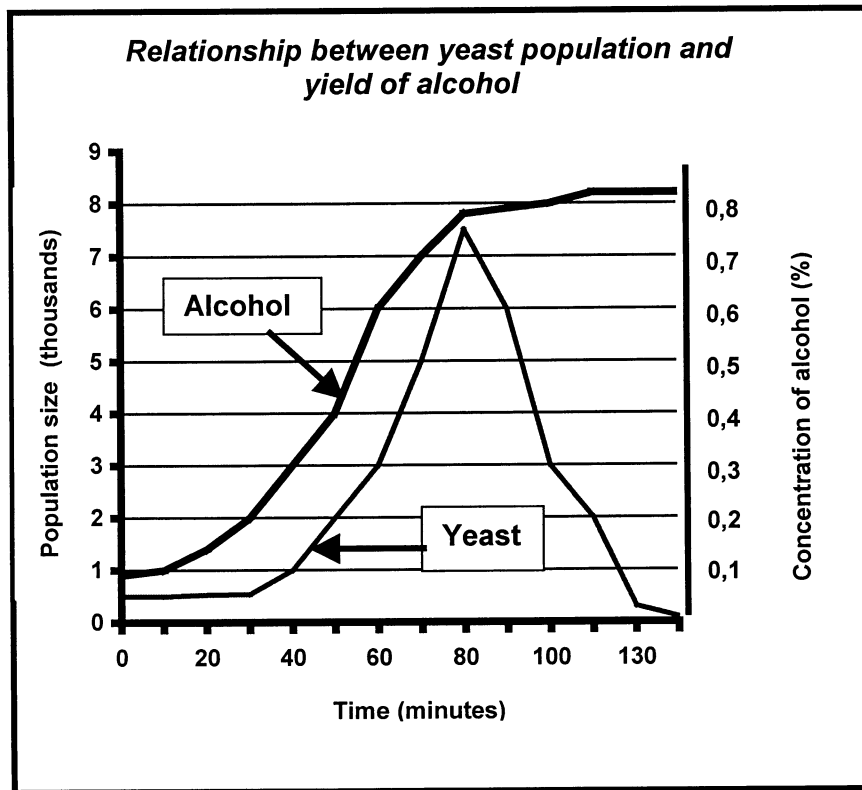
(17)

QUESTION 3

3.1 Tabulate FOUR differences between aerobic and anaerobic respiration. **(9)**

3.2 An investigation was carried out to show alcohol production by a population of yeast cells.

The results are shown in the graph below.



3.2.1 Why was a thermos flask used rather than a glass bottle to grow the yeast population? **(2)**

3.2.2 Identify the type of growth form represented by the yeast population. **(1)**

3.2.3 List TWO requirements that a group of organisms must satisfy before it can be called a population. **(2)**

3.2.4 Give an explanation for the shape of the graph of the yeast population between the period 40 to 90 minutes. **(4)**

3.2.5 Briefly describe the relationship between the growth of yeast and the yield of alcohol. **(3)**

3.2.6 Explain how the growth of the yeast population and the yield of alcohol would be affected if another non-alcohol producing micro-organism, requiring the same food, was added to the yeast population. **(2)**

3.2.7 State THREE factors in the investigation which you would consider to be environmental factors. **(3)**

(17)

3.3 Bestudeer die inligting in onderstaande tabel, en beantwoord die vrae wat volg.

Die energiebegroting van twee bevolkings

Bestemming van energie	Bevolking A	Bevolking B
Respirasie (R)	360 kJ	12 kJ
Ekskresie (E = U + F)	620 kJ	20 kJ
Voedsel geëet (C)	1 000 kJ	40 kJ
Sekondêre produksie (P)	? kJ	8 kJ

- 3.3.1 Gebruik die formule $C = P + R + E$ en bepaal die sekondêre produksie van bevolking A. (3)
- 3.3.2 Definieer die begrip sekondêre produksie. (2)
- 3.3.3 In watter bevolking, A of B, is die vertering en absorpsie van voedsel meer doeltreffend? Verduidelik jou antwoord. (4)
(9)

Totaal Vraag 3: 35

3.3 Study the information in the table below and answer the questions that follow.

The energy budget of two populations

Fate of energy	Population A	Population B
Respiration (R)	360 kJ	12 kJ
Excretion (E = U + F)	620 kJ	20 kJ
Food eaten (C)	1 000 kJ	40 kJ
Secondary production (P)	? kJ	8 kJ

- 3.3.1 Use the formula $C = P + R + E$ and determine the secondary production of population A. (3)
- 3.3.2 Define the term secondary production. (2)
- 3.3.3 Which population, A or B, is more efficient at digesting and absorbing food? Explain the answer. (4)
- (9)

Total Question 3: 35

VRAAG 4

- 4.1 Die volgende inligting verskyn op die verpakking van 'n tipe graankos wat deur 'n jong seun geëet word. Bestudeer dit en beantwoord dan die vrae wat daarop gebaseer is.

Samestelling van die voedingswaarde van die graankos

Bestanddele	Voedingsgegevens (Waardes per 100 g)	
	Hawermout, geroosterde graanvlokkies, sukroestroop, bruinsuiker, plantolie, songedroogde rosyne	Energie
Proteïen		12,5 g
Koolhidrate		50 g
Vette		12,5 g
Vesel		25 g
Cholesterol		0 mg

- 4.1.1 Noem TWEE redes waarom die jong seun elk van die volgende voedingsowwe benodig:
- (a) Proteïen (2)
- (b) Vesel (2)
- 4.1.2 Die totale energiewaarde van 100 g graankos is 2 000 kJ. Die seun benodig 5 500 kJ energie per dag. Hoeveel graankos moet hy eet om dit te bereik (met die veronderstelling dat hy geen ander voedsel eet nie)? Toon ALLE berekenings. (3)
- 4.1.3 Teken 'n sirkelgrafiek van die 100 g graankos, om die relatiewe verhouding van die proteïene, koolhidrate, vette en vesel te illustreer. (10)
- 4.1.4 Verduidelik die voordeel wat die graankos het omdat dit geen cholesterol bevat nie. (3)
- (20)

QUESTION 4

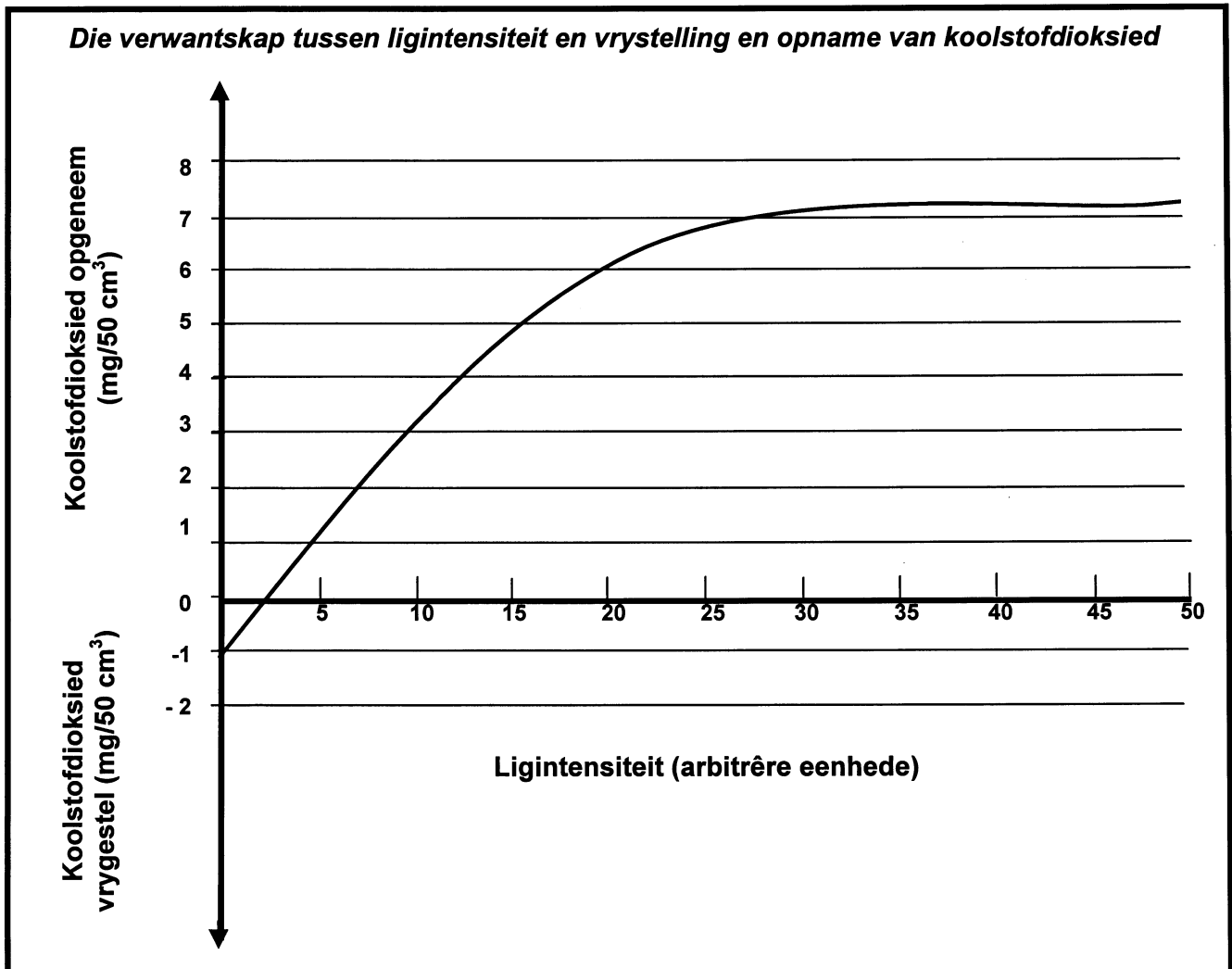
- 4.1 The following information appears on the package of a brand of cereal eaten by a young boy. Study it and then answer the questions based on it.

Nutritional composition of cereal

Ingredients	Nutritional Information (Values per 100 g)	
Whole rolled oats, roasted wheat flakes, cane syrup, brown sugar, vegetable oil, sun-dried raisins	Energy	2 000 kJ
	Protein	12,5 g
	Carbohydrates	50 g
	Fats	12,5 g
	Fibre	25 g
	Cholesterol	0 mg

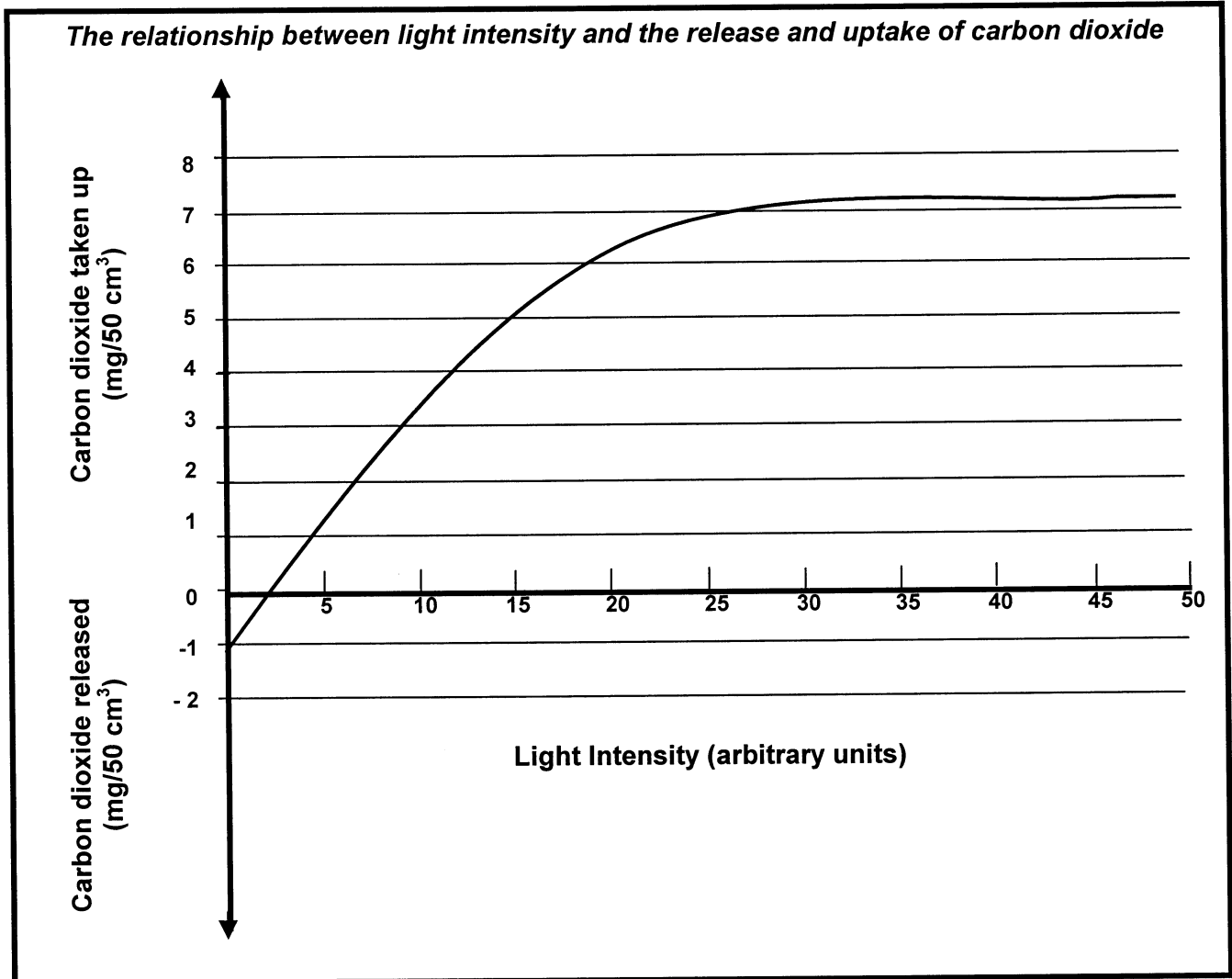
- 4.1.1 State TWO reasons why the young boy requires each of the following nutrients:
- (a) Protein (2)
- (b) Fibre (2)
- 4.1.2 The total energy value of a 100 g cereal is 2 000 kJ. The boy requires 5 500 kJ of energy per day. How much cereal does he need to eat in order to obtain this (assuming that he does not eat any other foods)? Show ALL calculations. (3)
- 4.1.3 Draw a pie chart to illustrate the relative proportions of protein, carbohydrate, fats and fibre of this 100 g of cereal. (10)
- 4.1.4 Explain the advantage of this cereal having no cholesterol. (3)
- (20)**

- 4.2 'n Onderzoek is gedoen om die verwantskap tussen ligintensiteit en die vrystelling en opname van koolstofdioksied in die blare van plante te bepaal. Die resultate word in onderstaande grafiek getoon.



- 4.2.1 In watter reeks ligintensiteit word koolstofdioksied vrygestel? (2)
- 4.2.2 Noem die proses in blare wat koolstofdioksied gebruik. (1)
- 4.2.3 Waarom word die meeste koolstofdioksied vrygestel by 'n ligintensiteit van nul (0) eenhede? (2)
- 4.2.4 Hoeveel koolstofdioksied word deur die blare opgeneem by 'n ligintensiteit van 20 eenhede? (2)
- 4.2.5 By 'n ligintensiteit van ongeveer 2 eenhede, is daar geen netto verandering in die koolstofdioksiedkonsentrasie wat die plant omring nie. Gee 'n verduideliking hiervoor. (2)

4.2 An investigation was conducted to determine the relationship between light intensity and the release and uptake of carbon dioxide by the leaves of a plant. The results are indicated in the graph below.



- 4.2.1 At what range of light intensities is carbon dioxide released? (2)
- 4.2.2 Name the process, taking place in the leaves, which uses the carbon dioxide. (1)
- 4.2.3 Why is most carbon dioxide released when the light intensity is zero (0) units? (2)
- 4.2.4 How much carbon dioxide is taken up by the leaves at a light intensity of 20 units? (2)
- 4.2.5 When the light intensity is approximately 2 units, there is no net change in the concentration of carbon dioxide surrounding the plant. Give an explanation for this. (2)

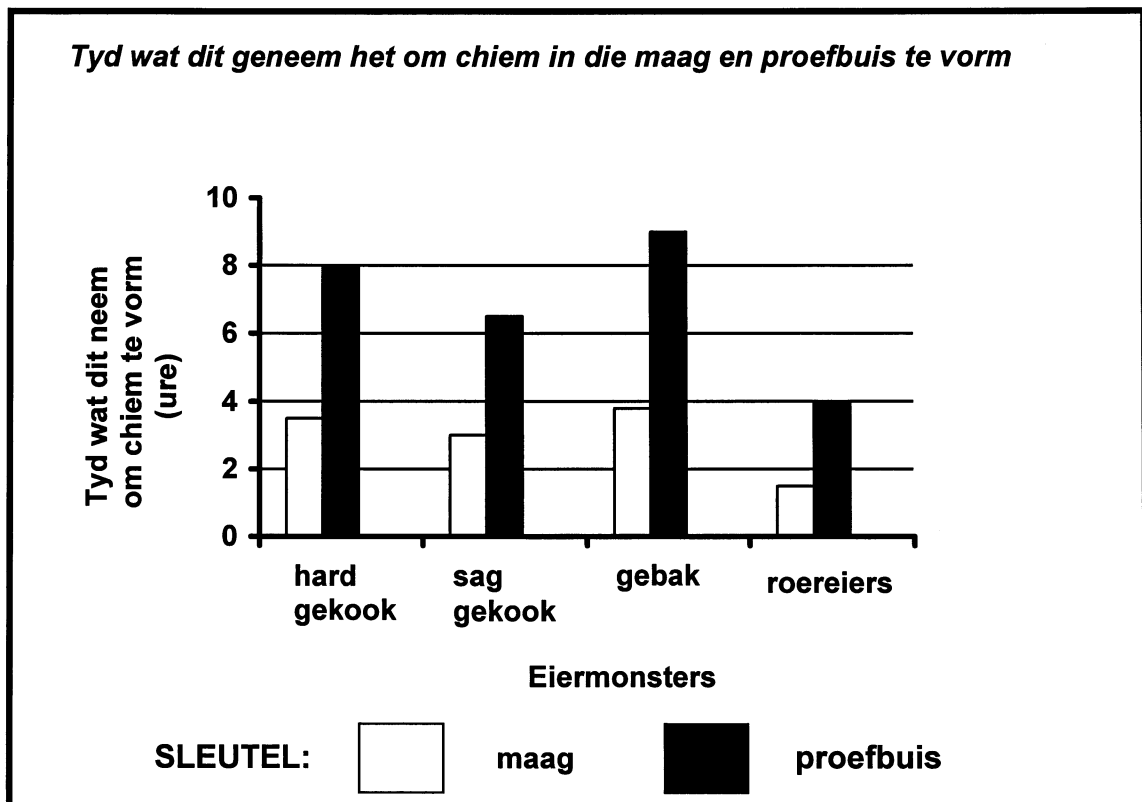
- 4.2.6 By 'n ligintensiteit van meer as 25 eenhede, bly die hoeveelheid koolstofdiksied wat opgeneem word, konstant.
Stel 'n verduideliking vir die waarneming voor. (4)
- 4.2.7 Noem TWEE eksterne faktore wat tydens die ondersoek konstant gehou moet word. (2)
- (15)**

Totaal Vraag 4: 35
TOTAAL AFDELING B: 105

AFDELING C

VRAAG 5

- 5.1 'n Wetenskaplike het 'n ondersoek op vertering waarby maagsap betrokke is, uitgevoer. Sy het die tyd wat dit geneem het om 50 g verskillende gekookte eiermonsters om chiem in die maag te vorm, vergelyk met die tyd wat dit neem vir dieselfde monster in 'n proefbuis wat maagsap bevat, om chiem te vorm. Die proefbuis is by 'n temperatuur van 37°C gehou.
Die resultate word in onderstaande grafiek aangedui.



- 5.1.1 Hoekom word die temperatuur van die proefbuis by 37°C gehou? (2)

4.2.6 At light intensities above 25 units, the amount of carbon dioxide taken up remains the same.
Suggest an explanation for this observation. (4)

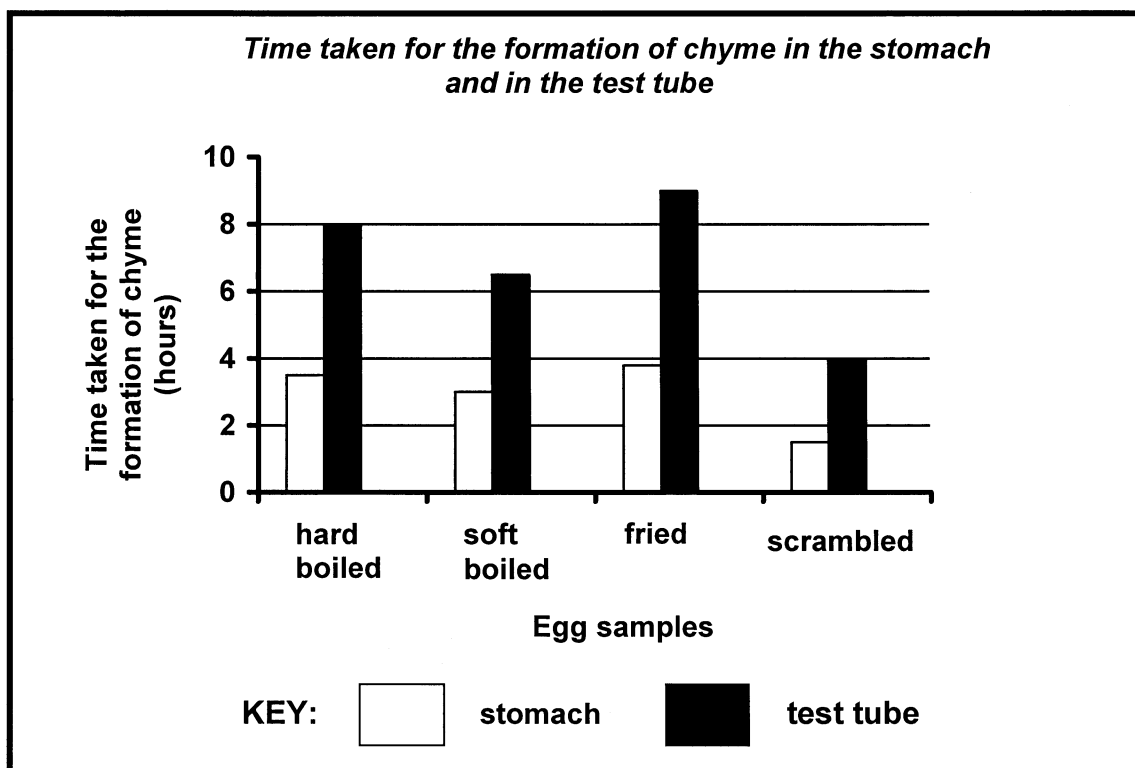
4.2.7 Name TWO external factors that need to be kept constant during the investigation. (2)
(15)

Total Question 4: 35
TOTAL SECTION B: 105

SECTION C

QUESTION 5

5.1 A scientist conducted an investigation on digestion, involving gastric juice. She compared the time taken for 50 g of different cooked egg samples to form chyme in the stomach, with the time taken for the same sample to form chyme in a test tube containing gastric juice. The test tube was maintained at 37°C. The results are indicated in the graph below.



5.1.1 Why was the temperature of the test tube maintained at 37°C? (2)

5.1.2 Noem:

- (a) EEN faktor (behalwe temperatuur) wat vir die duur van die ondersoek konstant gehou moes word (1)
- (b) EEN faktor wat nie tydens die ondersoek beheer kon word nie (1)

5.1.3 Bepaal die volgende deur van die grafiek gebruik te maak:

- (a) Die monster wat die langste tyd geneem het om chiem in die maag te vorm (2)
- (b) Die monster wat in die kortste tyd chiem in die proefbuis gevorm het (2)

5.1.4 Verskaf 'n verduideliking vir elk van die volgende waarnemings:

- (a) Die roereiers het vinniger chiem as die ander voedselmonsters gevorm (2)
- (b) Die vorming van chiem was in al die monsters vinniger in die maag as in die proefbuis (2)

5.1.5 Beskryf EEN manier waarop die vorming van chiem van die hardgekookte eiers in die proefbuis verkort kan word. (2)

5.1.6 Noem DRIE kenmerke van maagsap wat dit geskik maak om eiers te verteer. (3)
(17)

5.2 Beskryf die chemiese vertering van vette en die absorpsie daarvan in die dunderm.

Feitlike Inhoud: 15
Sintese: 03 (18)

Totaal Vraag 5: 35
TOTAAL AFDELING C: 35
GROOTTOTAAL: 200

5.1.2 Name:

- (a) ONE factor other than temperature which was kept constant during the investigation (1)
- (b) ONE factor which could not be controlled during this investigation (1)

5.1.3 Determine the following from the graph:

- (a) The sample which took the longest time to form chyme in the stomach (2)
- (b) The sample which took the shortest time to form chyme in the test tube (2)

5.1.4 Provide an explanation for each of the following observations:

- (a) The formation of chyme of the scrambled eggs being faster than the other food samples (2)
- (b) The formation of chyme of all samples being faster in the stomach than in the test tube (2)

5.1.5 Describe ONE way in which the time for the formation of chyme of the hard boiled eggs in the test tube could be shortened. (2)

5.1.6 List THREE features of gastric juice which make it suitable to digest eggs. (3)
(17)

5.2 Describe the chemical digestion of fats and their absorption in the small intestine.

Factual Content: 15

Synthesis: 03

(18)

Total Question 5: 35
TOTAL SECTION C: 35
GRAND TOTAL: 200