



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NASIONALE
SENIOR SERTIFIKAAT**

GRAAD 12

**LFSC.2
LEWENSWETENSKAPPE V2
NOVEMBER 2014**

PUNTE: 150

TYD: 2½ uur

Hierdie vraestel bestaan uit 16 bladsye.

OGGENDSESSIE



INSTRUKSIES EN INLIGTING

Lees die volgende instruksies aandagtig deur voordat die vrae beantwoord word.

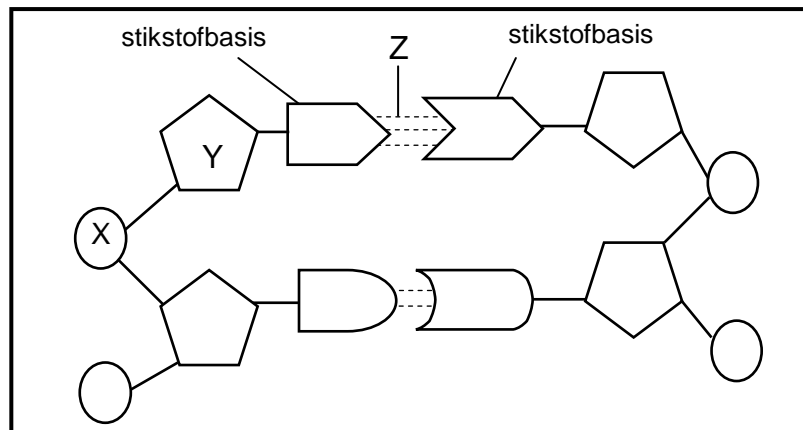
1. Beantwoord AL die vrae.
2. Skryf AL die antwoorde in die ANTWOORDEBOEK.
3. Begin die antwoorde op ELKE vraag boaan 'n NUWE bladsy.
4. Nommer die antwoorde korrek volgens die nommeringstelsel wat in hierdie vraestel gebruik is.
5. Bied jou antwoorde volgens die instruksies van elke vraag aan.
6. Maak ALLE sketse met potlood en die byskrifte met blou of swart ink.
7. Teken diagramme, vloedigramme en tabelle slegs wanneer dit gevra word.
8. Die diagramme in hierdie vraestel is NIE noodwendig volgens skaal geteken NIE.
9. MOENIE grafiekpapier gebruik nie.
10. Jy moet 'n nieprogrammeerbare sakrekenaar, gradeboog en passer gebruik, waar nodig.
11. Skryf netjies en leesbaar.



AFDELING A**VRAAG 1**

1.1 Verskeie opsies word as moontlike antwoorde vir die volgende vrae gegee. Kies die antwoord en skryf slegs die letter (A tot D) langs die vraagnommer (1.1.1 tot 1.1.10) in die ANTWOORDEBOEK neer, byvoorbeeld 1.1.11 D.

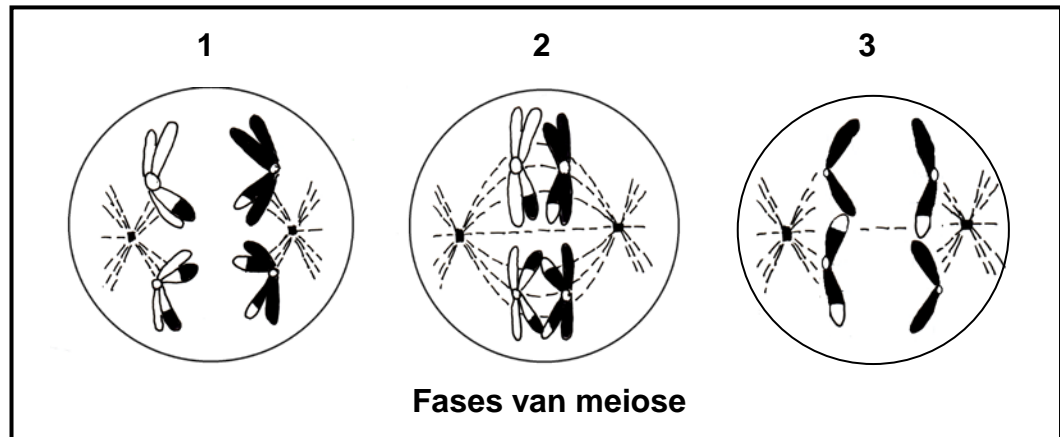
1.1.1 Die diagram hieronder toon 'n gedeelte van 'n DNS/DNA-molekuul.



Die korrekte byskrifte vir deel **X**, **Y** en **Z** onderskeidelik is ...

- A deoksiribosesuiker, fosfaat en waterstofbinding.
 - B fosfaat, deoksiribosesuiker en waterstofbinding.
 - C ribosesuiker, stikstofbasis en peptiedbinding.
 - D fosfaat, ribosesuiker en waterstofbinding.
- 1.1.2 As 10% van die basisse in 'n DNS/DNA-molekuul adenien is, wat is die verhouding van adenien tot guanien in dieselfde molekuul?
- A 1 : 1
 - B 4 : 1
 - C 1 : 3
 - D 1 : 4
- 1.1.3 Lamarck se 'wette' van gebruik en ongebruik en oorerwing van verworpe kenmerke was ...
- A verwerp, omdat slegs kenmerke wat die nageslag bevoordeel, oorgeërf kan word.
 - B nie verwerp nie, omdat bewyse toon dat verworpe kenmerke oorgeërf kan word.
 - C verwerp, omdat slegs kenmerke waarvoor in die DNS/DNA gekodeer word, oorgeërf kan word.
 - D nie verwerp nie, omdat Darwin se teorie Lamarck se idees ondersteun.

- 1.1.4 Die diagramme hieronder verteenwoordig verskillende fases van meiose.



Die korrekte volgorde van die fases is ...

- A 1, 2 en 3.
 B 2, 3 en 1.
 C 3, 1 en 2.
 D 2, 1 en 3.
- 1.1.5 Twee vrugtevlieë met rooi oë het gepaar en 150 rooiogvlieë en 48 witoogvlieë geproduseer. Uit hierdie inligting kan ons met redelike sekerheid aflei dat die ...
- A witoogtoestand resessief is en beide ouers heterosigoties is.
 B rooiogtoestand dominant is en dat beide ouers homosigoties vir rooi oë is.
 C witoogtoestand resessief is en beide ouers homosigoties vir rooi oë is.
 D rooiogtoestand resessief is en beide ouers heterosigoties is.
- 1.1.6 Watter EEN van die volgende monohibriede kruisings sal 'n fenotipiese verhouding van 1 : 1 tot gevolg hê? 'n Kruising waar ...
- A beide ouers heterosigoties is.
 B beide ouers homosigoties vir die dominante kenmerk is.
 C een ouer heterosigoties en die ander ouer homosigoties resessief is.
 D een ouer heterosigoties en die ander ouer homosigoties dominant is.

1.1.7 Bestudeer die lys hieronder.

1. Fossiele
2. Homoloë strukture
3. Biogeografie
4. Genetika

Watter EEN van die kombinasies van die bogenoemde kan as bewys van evolusie gebruik word?

- A Slegs 1, 2 en 3
- B 1, 2, 3 en 4
- C Slegs 2, 3 en 4
- D Slegs 1, 3 en 4

1.1.8 Een rede waarom sekere mense teen genetiese modifikasie gekant is, is dat ...

- A die gebruik van onkruidodders verminder word.
- B gewasopbrengste verbeter word.
- C die smaak en kwaliteit van voedsel verbeter word.
- D die potensiële impak op menslike gesondheid onbekend is.

1.1.9 Homoloë chromosome word beskryf as ...

- A eenders met betrekking tot struktuur en kodering vir dieselfde kenmerke.
- B 'n produk van die verdeling van chromosome.
- C identiese dogterchromatiede wat deur DNS/DNA-replisering gevorm word.
- D twee chromosome wat vir verskillende kenmerke kodeer.

1.1.10 Vier verskillende fenotipes is moontlik in die F_1 -generasie as die ouers se bloedgroepe ... is.

- A B en B
- B A en B
- C O en AB
- D AB en AB

(10 x 2) **(20)**



- 1.2 Gee die korrekte **biologiese term** vir elk van die volgende beskrywings. Skryf slegs die term langs die vraagnommer (1.2.1 tot 1.2.10) in die ANTWOORDEBOEK neer.
- 1.2.1 'n Alleel wat nie die fenotipe beïnvloed wanneer dit in die heterosigotiese toestand voorkom nie
- 1.2.2 'n Gedeelte van 'n DNS/DNA-molekuul wat vir 'n spesifieke kenmerk kodeer
- 1.2.3 Die produksie van 'n geneties identiese kopie van 'n organisme deur biotegnologie te gebruik
- 1.2.4 Die manipulering van die genetiese materiaal van 'n organisme om gewenste veranderinge te kry
- 1.2.5 Die doelbewuste teel van organismes om gewenste kenmerke wat deur die mens gekies is, te kry
- 1.2.6 Die verduideliking dat spesies vir lang tydperke geen fisiese verandering ondergaan nie, gevolg deur kort tydperke van vinnige fisiese verandering
- 1.2.7 Die fase van meiose waartydens die homologe chromosome verdeel en na teenoorgestelde pole begin beweeg
- 1.2.8 Die defek in selverdeling wat tot Downsindroom lei
- 1.2.9 Die struktuur wat bestaan uit twee chromatiede wat deur 'n sentromeer verbind is
- 1.2.10 'n Verduideliking vir iets wat in die natuur waargeneem is en wat deur feite, wette en getoetste hipoteses ondersteun word

(10)

- 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 **GEENEEN** van die items in KOLOM II nie. Skryf **slegs A**, **slegs B**, **beide A en B** of **geeneen** langs die vraagnommer (1.3.1 tot 1.3.6) in die ANTWOORDEBOEK neer.

KOLOM I		KOLOM II	
1.3.1	Het die vorm van die DNS/DNA-molekuul ontdek	A:	Francis Crick
		B:	James Watson
1.3.2	Elke gameet ontvang slegs een alleel vir elke kenmerk	A:	Mendel se beginsel van segregasie
		B:	Darwin se teorie van natuurlike seleksie
1.3.3	'n Voordeel van genetiese modifikasie	A:	Verhoog die rakleefyd van voedsel
		B:	Verhoog weerstand teen siekte
1.3.4	'n Voorbeeld van 'n voortplantingsisolerings-meganisme	A:	Spesiespesifieke hofmakery
		B:	Onvrugbare nageslag
1.3.5	Tipe variasie wat by die mens deur velkleur verteenwoordig word	A:	Deurlopende variasie
		B:	Niedeurlpende variasie
1.3.6	'n Groep eenderse organismes wat kan kruisteel om 'n vrugbare nageslag te produseer	A:	Spesie
		B:	Genus

(6 x 2)

(12)

- 1.4 Ongeveer 70% van mense kry 'n bitter smaak wanneer 'n stof genaamd PTC op hulle tonge geplaas word. Hulle word 'proeërs' ('tasters') genoem. Alle ander mense kan PTC nie proe nie en word 'proe-blind' ('taste blind') genoem. Die 'proeër'-alleel is dominant en die 'proe-blind'-alleel is resessief.

By mense is normale velpigmentasie ook dominant oor die albinotoestand (geen pigmentasie nie).

Die letters in die sleutel hieronder moet gebruik word om die allele van die verskillende kenmerke hierbo te verteenwoordig.

Sleutel:

T – proeër

t – proe-blind

N – normale velpigmentasie

n – geen velpigmentasie nie (albino)

'n Man wat heterosigoties is vir beide die proe van PTC en velpigmentasie trou met 'n vrou wat proe-blind vir PTC en 'n albino is.

- 1.4.1 Noem waarom die voorbeeld hierbo 'n dihibriede kruising verteenwoordig. (1)
- 1.4.2 Skryf neer:
- (a) Die genotipe van die vrou (1)
- (b) AL die moontlike gamete van die man (2)
- 1.4.3 Die man en vrou het 'n kind met genotipe **ttNn**. Wat is die kind se fenotipe? (2)
- 1.4.4 'n Man en 'n vrou kan slegs kinders met die genotipe **TtNn** voortbring. Die vrou se genotipe is **ttnn**. Gee die enigste moontlike genotipe van die man. (2)

(8)

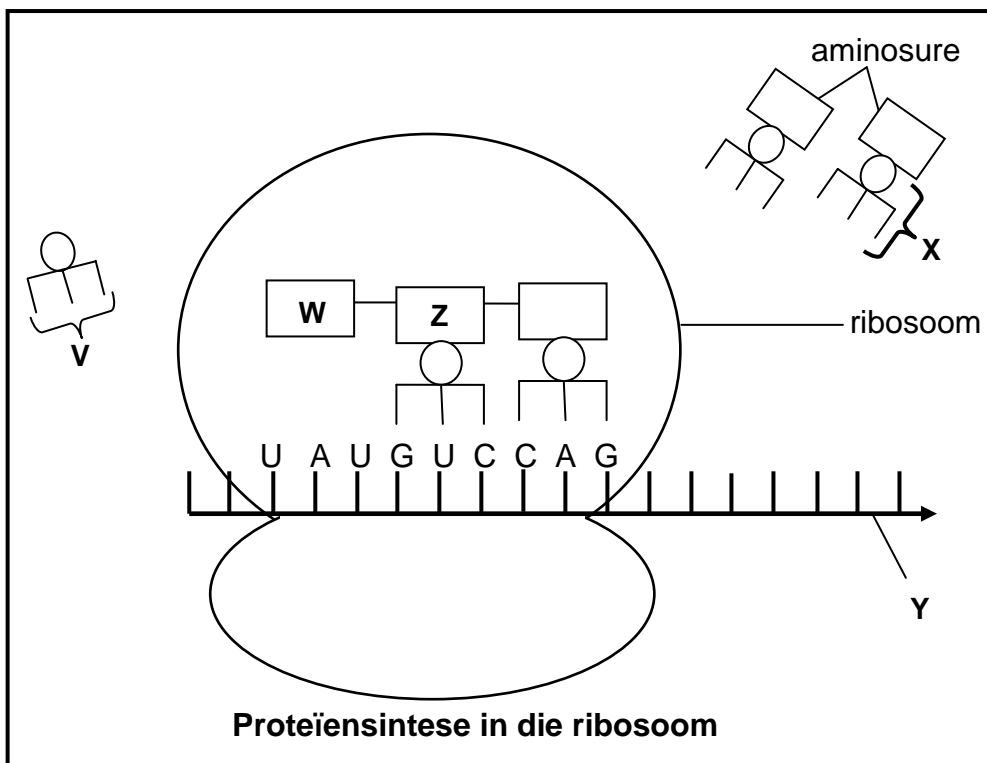
TOTAAL AFDELING A: 50



AFDELING B

VRAAG 2

2.1 Bestudeer die diagram hieronder wat 'n deel van die proses van proteïensintese toon.



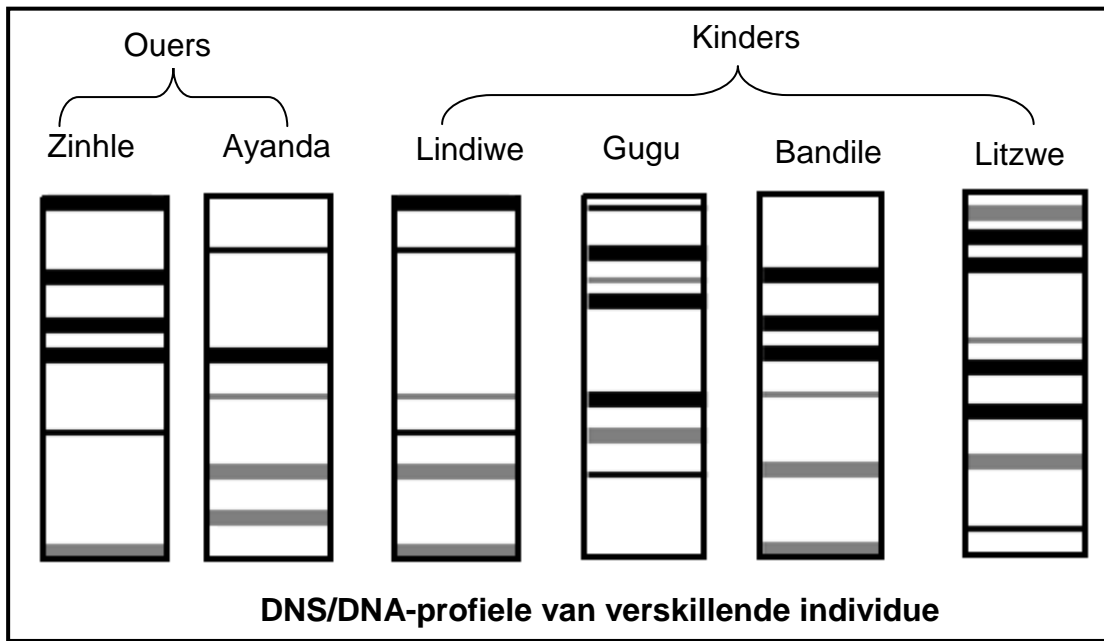
- 2.1.1 Identifiseer die stadium van proteïensintese wat in die diagram hierbo getoon word. (1)
- 2.1.2 Identifiseer molekule **X** en **Y**. (2)
- 2.1.3 Gee die term vir die groep van drie stikstofbasse wat deur **V** aangedui word. (1)
- 2.1.4 Gee die stikstofbasse op die DNS/DNA-string wat vir die basisse UAU op molekule **Y** kodeer. (1)
- 2.1.5 Gebruik die tabel hieronder om aminosuur **W** te identifiseer.

tRNA	Aminosuur
GUC	glutamien
UAA	isoleusien
AUA	tirosien
CCC	glisien
GGG	prolien
CAG	valien

- 2.1.6 Noem en beskryf die proses wat in die selkern plaasvind om molekule **Y** te vorm. (5)
- (12)**

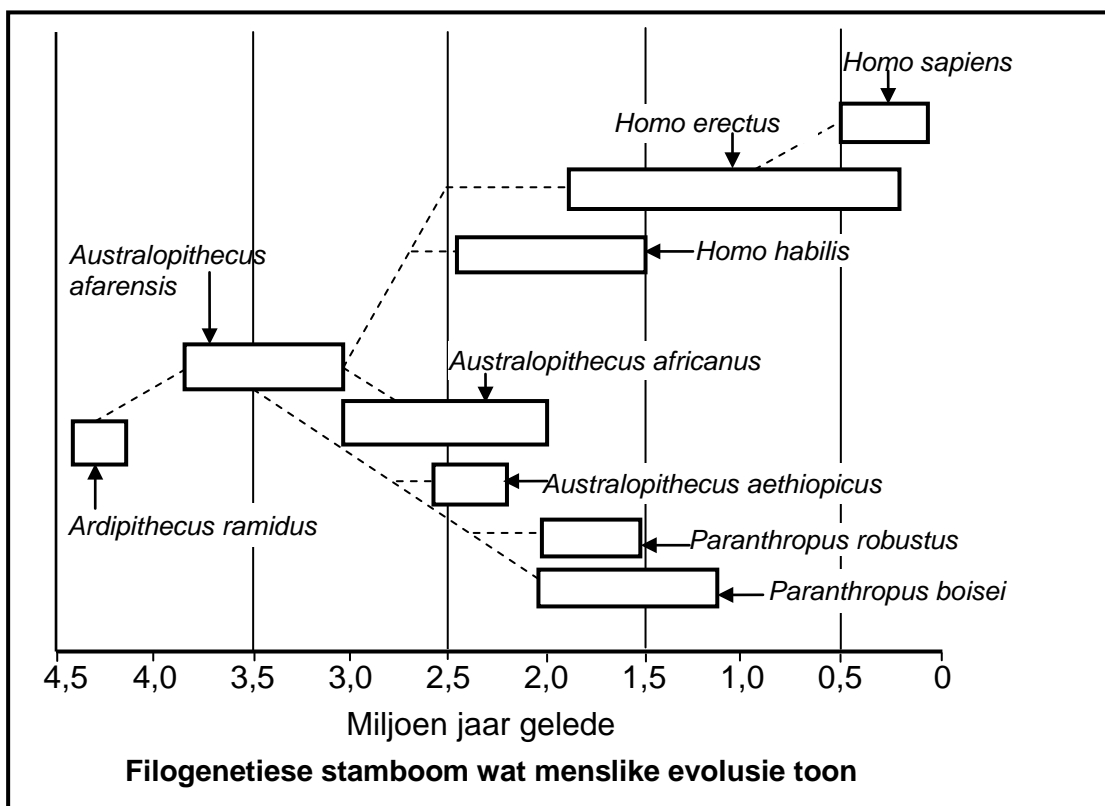
2.2 Die diagram hieronder toon die DNS/DNA-profiel van ses lede van 'n gesin. Hoe groter die ooreenkoms in die posisies van die strepies in die DNS/DNA-profiel van verskillende persone is, hoe nader verwant is hulle.

Die ouers, Zinhle en Ayanda, het vier kinders. Twee van die kinders is hulle biologiese nakomelinge, terwyl die ander twee kinders aangeneem is.



- 2.2.1 Watter TWEE kinders is die biologiese nakomelinge van Zinhle en Ayanda? (2)
 - 2.2.2 Gee 'n verduideliking vir jou antwoord op VRAAG 2.2.1 deur bewyse uit die DNS/DNA-profiel te gebruik. (2)
 - 2.2.3 Behalwe vaderskaptoetse, noem TWEE maniere waarop DNS/DNA-profiel deur mense gebruik kan word. (2)
- (6)**

2.3 Bestudeer die filogenetiese stamboom hieronder wat 'n moontlike voorstelling van die evolusie van die mens toon en beantwoord die vrae wat volg.



[Aangepas uit *Biology: Understanding Life*, Sandra Alters, 1995]

- 2.3.1 Watter organisme, *Paranthropus boisei* of *Homo habilis*, het volgens die filogenetiese stamboom eerste op Aarde verskyn? (1)
 - 2.3.2 Noem TWEE spesies wie se bestaan op Aarde met dié van *Homo erectus* oorvleuel het. (2)
 - 2.3.3 Watter organisme was die direkte voorouer van *Homo habilis*? (1)
 - 2.3.4 Noem VYF kenmerke wat deur al die organismes in die filogenetiese stamboom hierbo gedeel word. (5)
 - 2.3.5 Hoe lank het *Australopithecus africanus* op Aarde bestaan? (1)
- (10)**



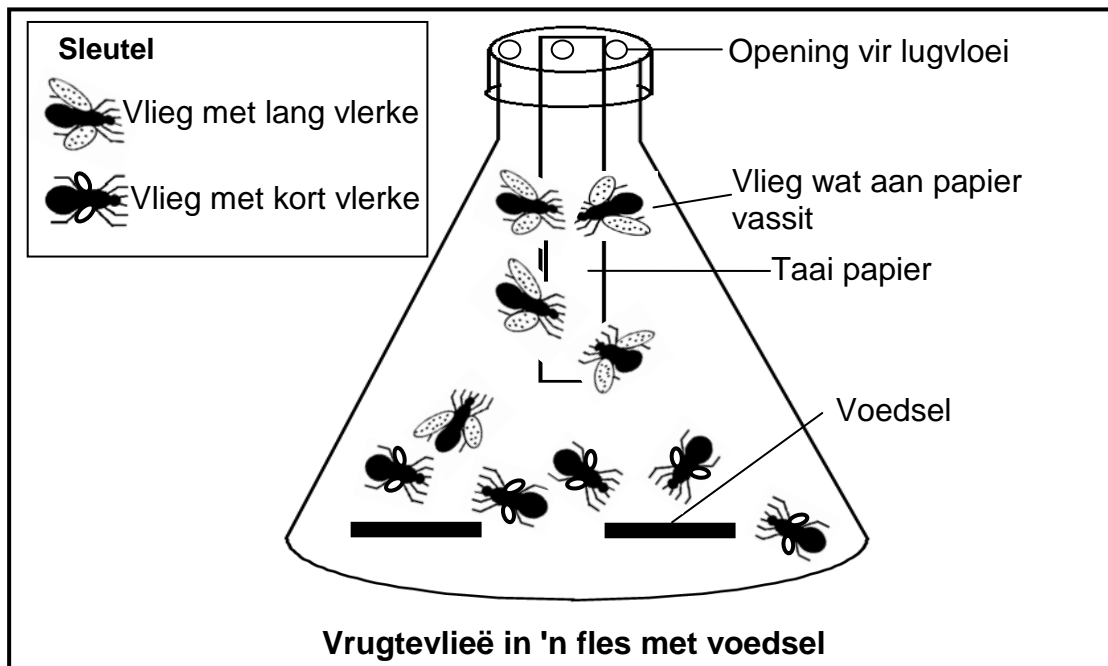
2.4 Daar is variasie in die vlerkengte van vrugtevlieë (*Drosophila melanogaster*). Party het lang vlerke en kan vlieg terwyl ander kort vlerke het en nie kan vlieg nie.

'n Ondersoek is gedoen om te bepaal watter vlieë onder sekere omstandighede sal oorleef.

Die volgende stappe is uitgevoer:

1. Vyf vlieë met kort vlerke en vyf vlieë met lang vlerke is in 'n fles geplaas.
2. Voedsel is op die bodem van die fles geplaas.
3. Die deksel van die fles het lugvloei toegelaat.
4. Taai papier is aan die bokant van die fles gehang. Vlieë wat aan die papier vassit, het gevrek.
5. Die apparaat is vir 24 uur laat staan.

Die resultate van die ondersoek word in die diagram hieronder getoon.



[Aangepas uit *Biology: Investigate Life on Earth* – Vernon L Avila, 1995]

- 2.4.1 Formuleer 'n hipotese vir die ondersoek. (3)
- 2.4.2 Verduidelik waarom dit nodig is om openinge vir lugvloei te hê. (3)
- 2.4.3 Noem TWEE maniere waarop die betroubaarheid van die ondersoek verbeter kan word. (2)
- 2.4.4 Behalwe vir die opening vir lugvloei, verduidelik TWEE ander voorsorgmaatreëls wat vir hierdie ondersoek getref moet word. (4)

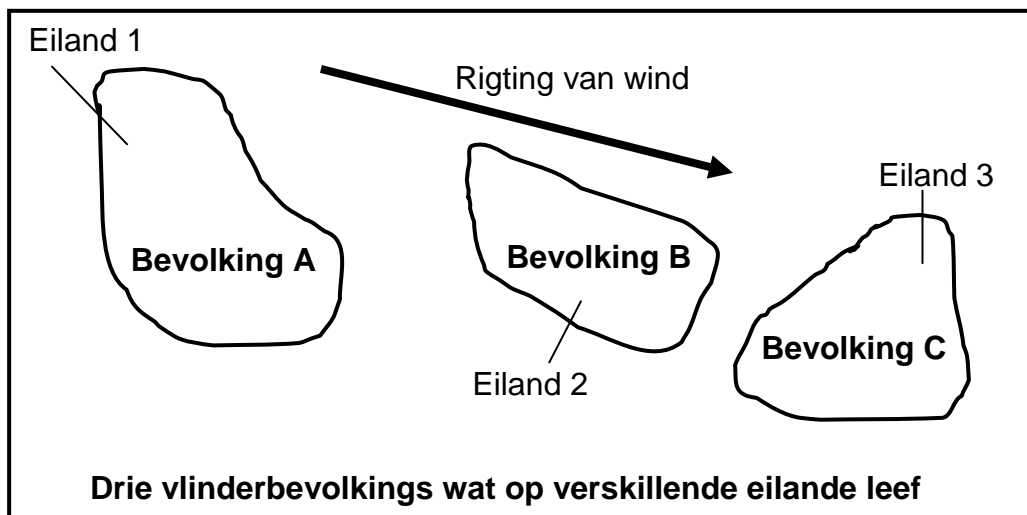
(12)
[40]

VRAAG 3

- 3.1 Drie vlinderbevolkings, **A**, **B** en **C**, leef apart op drie eilande in die oseaan. Die vlinders op Eiland 2 en Eiland 3 het op Eiland 1 ontstaan.

Die eilande ervaar dwarsdeur die jaar sterk oorheersende winde uit die noordweste.

Bevolking **A** en **B** kan kruisteel en vrugbare nakomelinge lewer. Bevolking **B** kan met Bevolking **C** paar, maar die nakomelinge is onvrugbaar. Paring vind glad nie tussen Bevolking **A** en **C** plaas nie.



[Aangepas uit *Advanced Biology*, M Kent, 2000]

- 3.1.1 Hoeveel spesies word deur die drie bevolkings verteenwoordig? (1)
- 3.1.2 Verduidelik jou antwoord op VRAAG 3.1.1. (2)
- 3.1.3 Gebruik die inligting wat verskaf is om te verduidelik hoe spesievorming moontlik in die voorbeeld hierbo kon plaasgevind het. (5)
- (8)**
- 3.2 Bestudeer die paragraaf oor evolusie hieronder en beantwoord die vrae wat volg.

Die 'Uit Afrika'-hipotese beweer dat primitiewe mense ongeveer 1,8 miljoen jaar gelede uit Afrika na al die ander kontinente van die wêreld gemigreer het. Wetenskaplikes het sekere fossielbene van vroeë mense wat in Europa gewoon het bestudeer, en tot die gevolgtrekking gekom dat die mens nie koeimelk voor 7 000 jaar gelede kon verteer nie.

'n Mutasie het plaasgevind wat veroorsaak het dat sekere individue van die menslike bevolking wat in Europa geleef het, koeimelk kon verteer. Hierdie vermoë was voordelig omdat dit deur die jaar addisionele voedingstowwe kon voorsien. Melk is 'n bron van vitamien D en kalsium.

[Aangepas uit *Impact of Selection and Demography on the Diffusion of Lactose Persistence*. PLoS ONE 4(7) D O'Rouke, 2009]

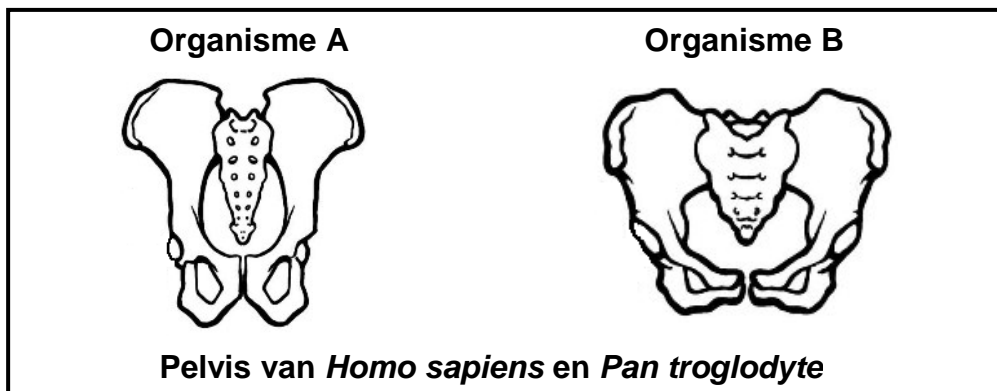
- 3.2.1 Noem EEN voordeel van die vermoë om koeimelk te verteer vir die vroeë mense wat in Europa geleef het. (1)



3.2.2 Verduidelik waarom die primitiewe mense wat uit Afrika migreer het, nie koeimelk kon verteer nie. (2)

3.2.3 Behalwe fossiele, noem EEN ander tipe bewys wat gebruik kan word om die 'Uit Afrika'-hipotese te ondersteun. (1)
(4)

3.3 Bestudeer die diagramme hieronder wat die pelvis van *Homo sapiens* en *Pan troglodyte* (sjimpansee) toon. Die diagramme is nie volgens skaal geteken nie.



3.3.1 Watter organisme, **A** of **B**, is bipedaal (tweevoetig)? (1)

3.3.2 Gee EEN sigbare rede vir jou antwoord op VRAAG 3.3.1. (2)

3.3.3 Verduidelik TWEE voordele van bipedalisme. (4)
(7)

3.4 Die tabel hieronder toon die skedelkapasiteit van verskillende spesies primate.

Spesie	Skedelkapasiteit (cm ³)
Sjimpansee	400
Gorilla	550
<i>Australopithecus</i> sp.	500
<i>Homo habilis</i>	650
<i>Homo erectus</i>	1 000
<i>Homo sapiens</i>	1 500

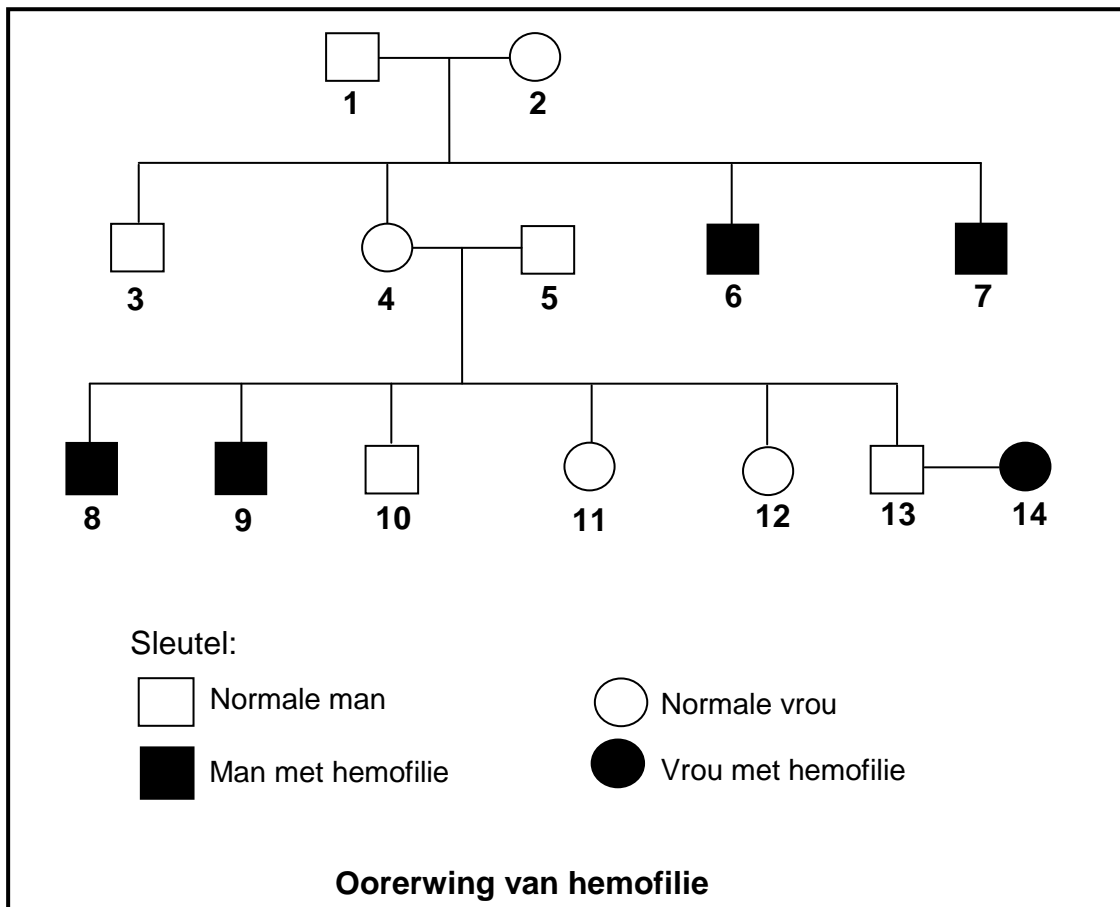
[Aangepas uit *Advanced Biology*, M Kent, 2000]

3.4.1 Noem TWEE voordele van die groot skedelkapasiteit van *Homo sapiens*. (2)

3.4.2 Trek 'n staafgrafiek om die data in die tabel te verteenwoordig. (6)
(8)



3.5 Die stamboomdiagram hieronder toon die oorerwing van hemofilie in 'n familie. Die alleel wat hemofilie veroorsaak, word deur X^h verteenwoordig en die normale alleel word deur X^H verteenwoordig.



3.5.1 Bepaal die:

- (a) Fenotipe van individu 4 (1)
- (b) Genotipe van individu 2 (2)

3.5.2 Verduidelik waarom vroue 'n kleiner kans het om aan hemofilie te ly. (3)

3.5.3 Gebruik 'n genetiese kruising om die persentasie kans dat individue 13 en 14 'n seun met hemofilie sal hê, voor te stel. (7)
(13)
[40]

TOTAAL AFDELING B: 80



AFDELING C**VRAAG 4**

Beskryf hoe meiose en verskillende tipes mutasies tot genetiese variasie bydra en die rol van hierdie variasie in natuurlike seleksie.

Inhoud: **(17)**
Sintese: **(3)**

LET WEL: GEEN punte sal toegeken word vir antwoorde in die vorm van vloeidiagramme, diagramme of tabelle NIE.

TOTAAL AFDELING C: 20
GROOTTOTAAL: 150





WESTERN CAPE

QUESTION 4

SECTION C

Describe how meiosis and different types of mutations contribute to genetic variation and the role of this variation in natural selection.

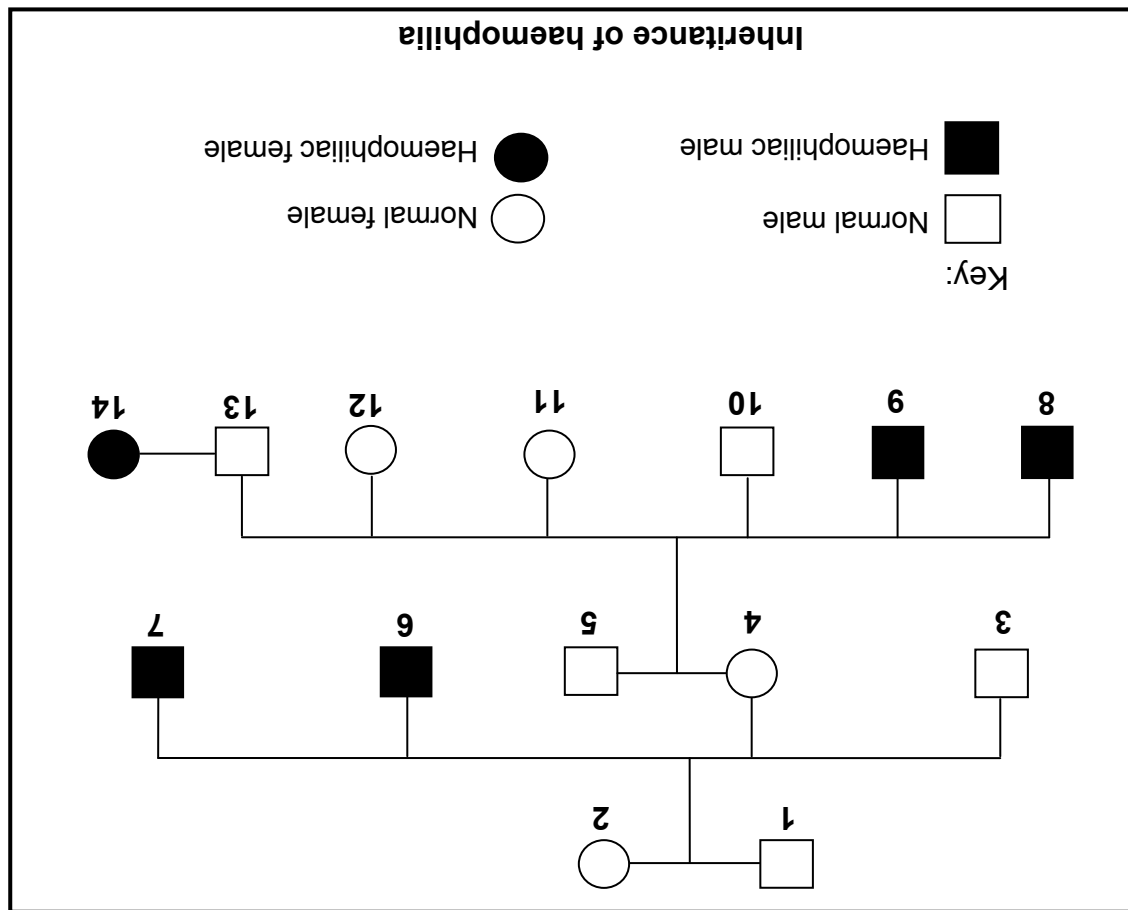
Content: (17)
Synthesis: (3)

NOTE: NO marks will be awarded for answers in the form of flow charts, diagrams or tables.

TOTAL SECTION C: 20
GRAND TOTAL: 150

3.5

The pedigree diagram below shows the inheritance of haemophilia in a family. The allele causing haemophilia is represented by X^h and the normal allele is represented by X^H .



3.5.1 Determine the:

(a) Phenotype of individual 4

(b) Genotype of individual 2

3.5.2 Explain why females have a smaller chance of suffering from haemophilia. (3)

3.5.3 Represent a genetic cross to show the percentage chance of individuals 13 and 14 having a haemophilic son. (7)

[13]
[40]

TOTAL SECTION B: 80



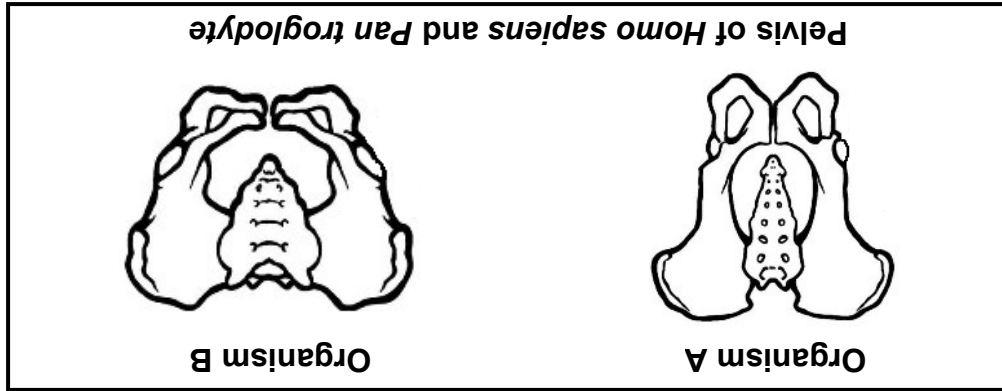


- 3.4.1 State TWO advantages of the large cranial capacity of *Homo sapiens*. (2)
- 3.4.2 Draw a bar graph to represent the data in the table. (6)

[Adapted from *Advanced Biology*, M Kent, 2000]

Species	Cranial capacity (cm ³)
Chimpanzee	400
Gorilla	550
<i>Australopithecus</i> sp.	500
<i>Homo habilis</i>	650
<i>Homo erectus</i>	1 000
<i>Homo sapiens</i>	1 500

- 3.4 The table below shows the cranial capacities of different species of primates. (7)
- 3.3.1 Which organism, A or B, is bipedal? (1)
- 3.3.2 Give ONE observable reason for your answer to QUESTION 3.3.1. (2)
- 3.3.3 Explain TWO advantages of bipedalism. (4)



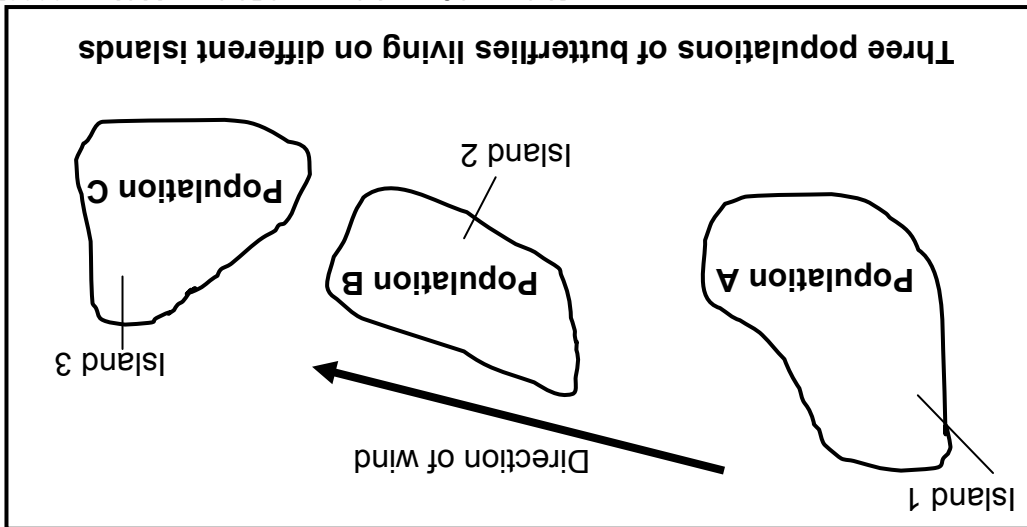
- 3.3 Study the diagrams below showing the pelvis of *Homo sapiens* and *Pan troglodyte* (chimpanzee). The diagrams are not drawn to scale. (4)
- 3.2.2 Explain why the primitive humans that migrated out of Africa were unable to digest cows' milk. (2)
- 3.2.3 Apart from fossils, name ONE other type of evidence that can be used to support the 'Out of Africa' hypothesis. (1)

QUESTION 3

3.1

Three populations of butterflies, **A**, **B** and **C** live separately on three oceanic islands. The butterflies on Island 2 and Island 3 originated from Island 1. The islands experience strong prevailing winds from the north-west throughout the year.

Populations **A** and **B** can interbreed and produce fertile offspring. Population **B** can mate with Population **C**, but the offspring are infertile. Mating does not occur between Populations **A** and **C** at all.



[Adapted from *Advanced Biology*, M Kent, 2000]

3.1.1 How many species are represented by the three populations? (1)

3.1.2 Explain your answer to QUESTION 3.1.1. (2)

3.1.3 Use the information provided to explain how speciation might have taken place in the above example. (5)

(8)

3.2

Study the passage on evolution below and answer the questions that follow.

The 'Out of Africa' hypothesis suggests that primitive humans migrated from Africa to all other continents of the world about 1,8 million years ago. Scientists that studied some fossilised bones of early humans that lived in Europe concluded that humans were unable to digest cow's milk before 7 000 years ago.

A mutation occurred that resulted in some individuals of the human population living in Europe being able to digest cow's milk. This ability was beneficial as it provided additional nutrients all year round. Milk is a source of vitamin D and calcium.

[Adapted from *Impact of Selection and Demography on the Diffusion of Lactose Persistence*. PLOS ONE 4(7) D O'Rourke, 2009]

3.2.1 State ONE advantage of being able to digest cows' milk to early humans that lived in Europe. (1)



2.4

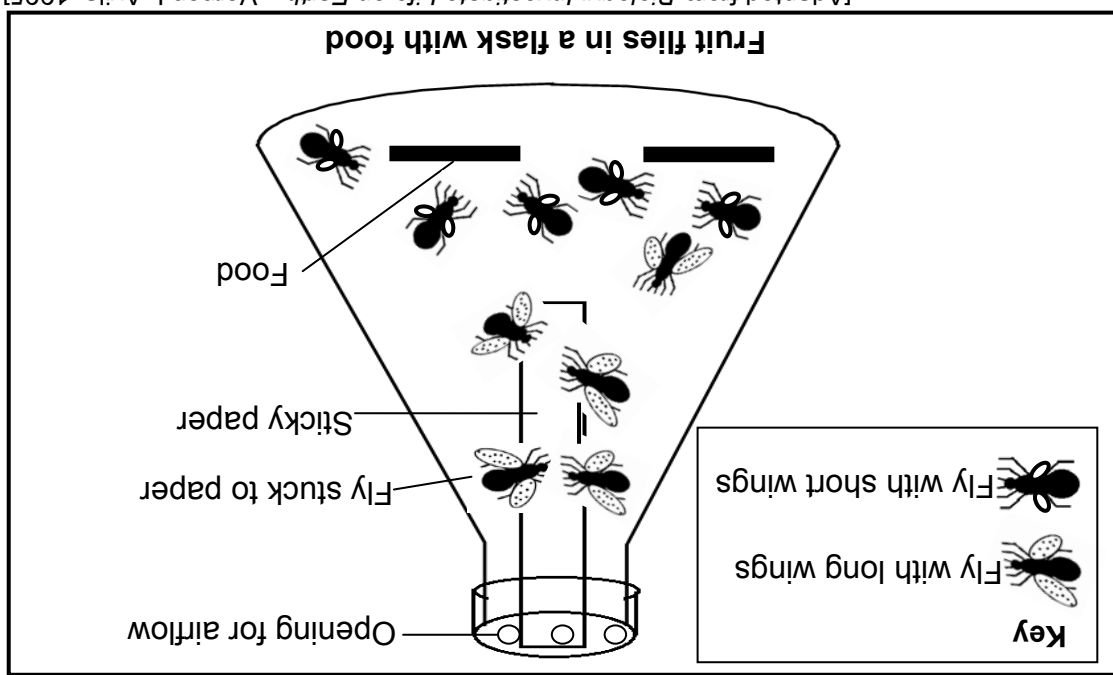
There is variation in the wing length of fruit flies (*Drosophila melanogaster*). Some have long wings and can fly while others have short wings and cannot fly.

An investigation was conducted to determine which flies would survive under certain conditions.

The following steps were carried out:

1. Five flies with short wings and five flies with long wings were placed in a flask.
2. Food was placed at the bottom of the flask.
3. The lid of the flask allowed airflow.
4. Sticky paper was suspended from the top of the flask. Flies that got stuck to the paper died.
5. The apparatus was left for 24 hours.

The results of the investigation are shown in the diagram below.



[Adapted from *Biology: Investigate Life on Earth* – Vernon L Avila, 1995]

- 2.4.1 Formulate a hypothesis for the investigation. (3)
- 2.4.2 Explain why it is necessary to have openings for airflow. (3)
- 2.4.3 State TWO ways in which the reliability of the investigation could be improved. (2)
- 2.4.4 Other than the opening for airflow, explain TWO other precautions that should be taken in this investigation. (4)

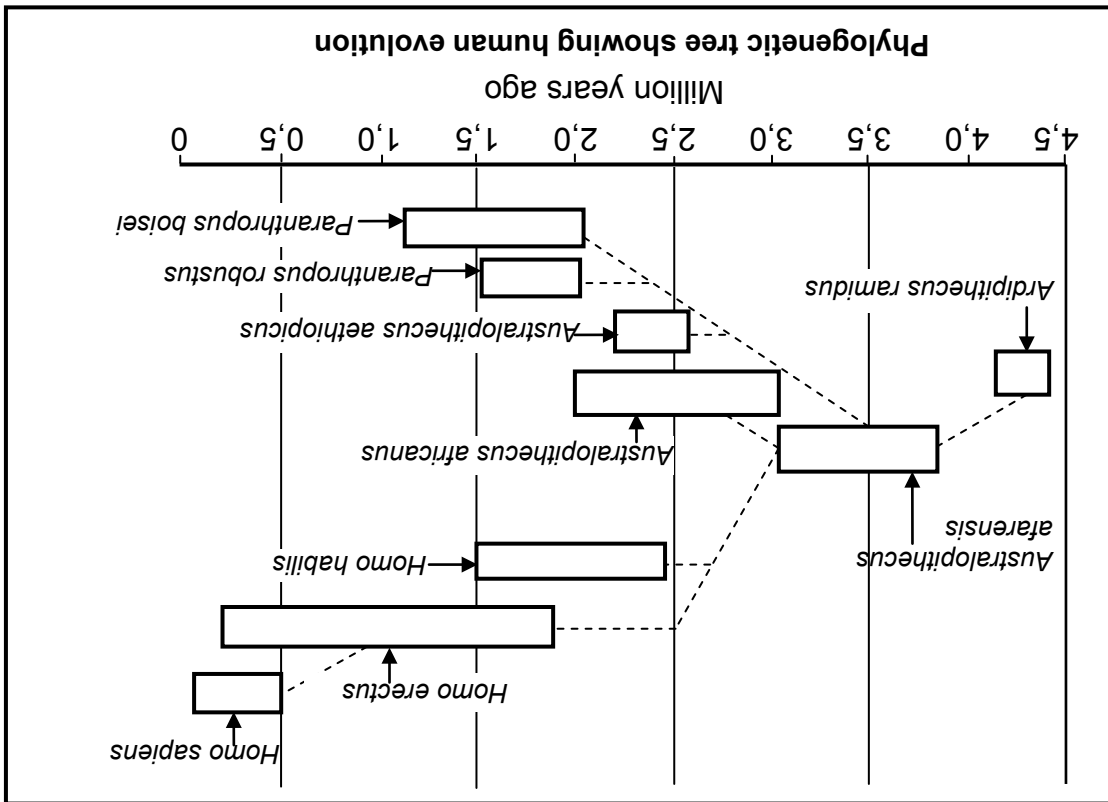
[12]
[40]





- 2.3.1 According to the phylogenetic tree, which organism, *Paranthropus boisei* or *Homo habilis*, appeared first on Earth? (1)
- 2.3.2 Name TWO species whose existence on Earth overlapped with that of *Homo erectus*. (2)
- 2.3.3 Which organism was the direct ancestor of *Homo habilis*? (1)
- 2.3.4 List FIVE characteristics that are shared by all the organisms in the above phylogenetic tree. (5)
- 2.3.5 How long did *Australopithecus africanus* exist on Earth? (1)
- (10)**

[Adapted from *Biology: Understanding Life*, Sandra Alters, 1995]

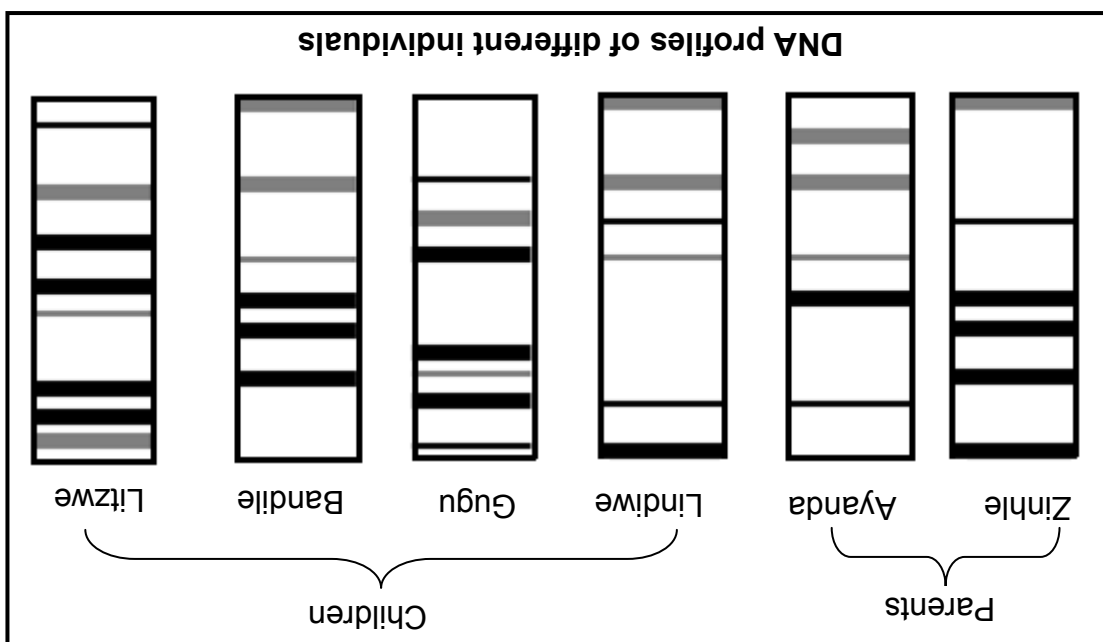


2.3 Study the phylogenetic tree below showing a possible representation of human evolution and answer the questions which follow.

2.2

The diagram below shows the DNA profiles of six members of a family. The greater the similarity in the position of the bands in the DNA profiles of different individuals, the more closely they are related.

The parents, Zinhle and Ayanda, have four children. Two of the children are their biological offspring while the other two children are adopted.



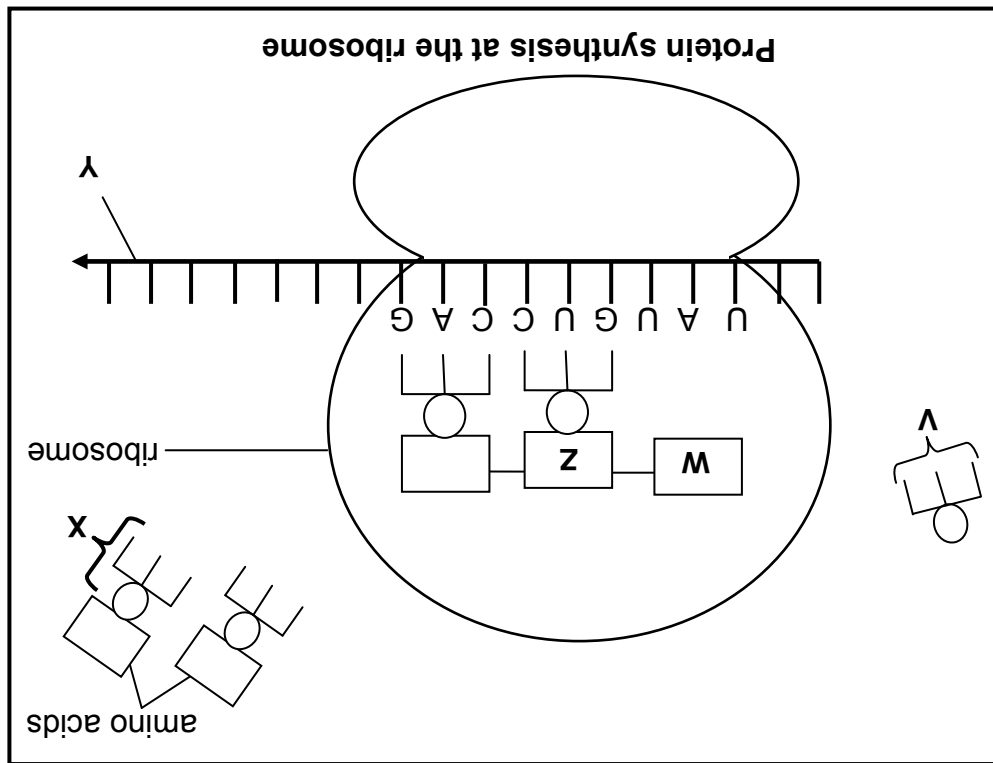
- 2.2.1 Which TWO children are the biological offspring of Zinhle and Ayanda? (2)
- 2.2.2 Give an explanation for your answer to QUESTION 2.2.1 using evidence from the DNA profiles. (2)
- 2.2.3 Apart from paternity testing, state TWO ways in which DNA profiling is of use to humans. (2)

(6)



SECTION B
QUESTION 2

2.1 Study the diagram below which shows a part of the process of protein synthesis.



2.1.1 Identify the stage of protein synthesis that is shown in the diagram above. (1)

2.1.2 Identify molecules X and Y. (2)

2.1.3 State the term for the group of three nitrogenous bases indicated by V. (1)

2.1.4 Give the nitrogenous bases on the DNA strand that codes for the bases UAU on molecule Y. (1)

2.1.5 Use the table below to identify amino acid W. (2)

tRNA	Amino acid
GUC	glutamine
UAA	isoleucine
AUA	tyrosine
CCC	glycine
GGG	proline
CAG	valine

(2)

2.1.6 Name and describe the process that occurs in the nucleus to produce molecule Y. (5)

(12)





50 TOTAL SECTION A:

- 1.4.1 State why the example above represents a dihybrid cross. (1)
- 1.4.2 Write down: (1)
- (a) The genotype of the woman
- (b) ALL the possible gametes of the man (2)
- 1.4.3 The man and woman have a child whose genotype is **ttNn**. What is the child's phenotype? (2)
- 1.4.4 A man and a woman are only able to produce children with the genotype **TtNn**. The woman's genotype is **ttnn**. State the only possible genotype of the man. (2)
- (8)

<p>Key:</p> <p>T – taster</p> <p>t – taste-blind</p> <p>N – normal skin pigmentation</p> <p>n – no skin pigmentation (albino)</p>
--

The letters in the key below must be used to represent the alleles for the different characteristics above.

Also in humans, normal skin pigmentation is dominant to the albino condition (no pigmentation).

About 70% of people get a bitter taste when a substance called PTC is placed on their tongue. They are referred to as 'tasters'. All other people are unable to taste PTC and are referred to as 'taste-blind'. The 'taster' allele is dominant and the 'taste-blind' allele is recessive.

1.4

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 (1.3.1 to 1.3.6) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	Discovered the shape of the DNA molecule	A: Francis Crick B: James Watson	
1.3.2	Each gamete receives only one allele for each characteristic	A: Mendel's principle of segregation B: Darwin's theory of natural selection	
1.3.3	An advantage of genetic modification	A: Increases shelf life of food B: Increases resistance to disease	
1.3.4	An example of a reproductive isolating mechanism	A: Species-specific courtship behaviour B: Infertile offspring	
1.3.5	Type of variation represented by skin colour in humans	A: Continuous variation B: Discontinuous variation	
1.3.6	A group of similar organisms that can interbreed to produce fertile offspring	A: Species B: Genus	

(6 x 2)

(12)



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 to 1.2.10) in the ANSWER BOOK.

- 1.2.1 An allele that does not influence the phenotype when found in the heterozygous condition
- 1.2.2 A section of a DNA molecule that codes for a specific characteristic
- 1.2.3 The production of a genetically identical copy of an organism using biotechnology
- 1.2.4 The manipulation of the genetic material of an organism to get desired changes
- 1.2.5 The deliberate breeding of organisms for desirable characteristics selected by humans
- 1.2.6 The explanation that species experience long periods without physical change, followed by short periods of rapid physical change
- 1.2.7 The phase of meiosis during which homologous chromosomes separate and start moving towards opposite poles
- 1.2.8 The defect in cell division that leads to Down syndrome
- 1.2.9 The structure that is made up of two chromatids joined by a centromere
- 1.2.10 An explanation for something that has been observed in nature and which can be supported by facts, laws and tested hypotheses

(10)

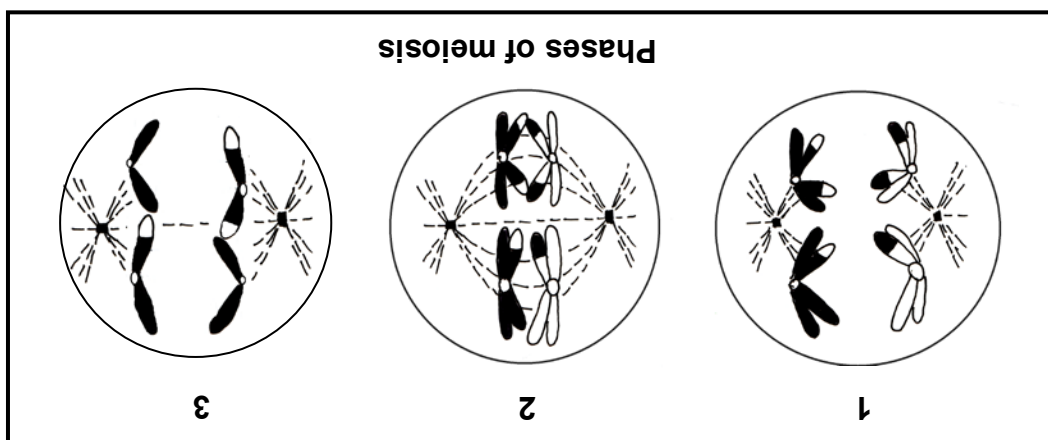




- 1.1.7 Study the list below.
1. Fossils
 2. Homologous structures
 3. Biogeography
 4. Genetics
- Which ONE of the combinations of the above can be used as evidence for evolution?
- A 1, 2 and 3 only
 B 1, 2, 3 and 4
 C 2, 3 and 4 only
 D 1, 3 and 4 only
- 1.1.8 One reason why some people are opposed to genetic modification is that ...
- A the use of herbicides is reduced.
 B crop yields are improved.
 C the taste and quality of food is improved.
 D the potential impact on human health is unknown.
- 1.1.9 Homologous chromosomes are described as ...
- A being similar in structure and coding for the same characteristics.
 B a product of the division of chromosomes.
 C identical daughter chromatids formed through DNA replication.
 D two chromosomes that code for different characteristics.
- 1.1.10 Four different phenotypes are possible in the F₁-generation if the parents' blood groups are ...
- A B and B.
 B A and B.
 C O and AB.
 D AB and AB.
- (10 x 2) (20)

1.1.4

The diagrams below represent different phases of meiosis.



The correct order of the phases is ...

- A 1, 2 and 3.
- B 2, 3 and 1.
- C 3, 1 and 2.
- D 2, 1 and 3.

1.1.5

Two red-eyed fruit flies were mated and they produced 150 flies with red eyes and 48 flies with white eyes. From this information we can reasonably conclude that the ...

- A white-eyed condition is recessive and both parents are heterozygous.
- B red-eyed condition is dominant and both parents are homozygous for red eyes.
- C white-eyed condition is recessive and both parents are homozygous for red eyes.
- D red-eyed condition is recessive and both parents are heterozygous.

1.1.6

Which ONE of the following monohybrid crosses will result in a phenotypic ratio of 1 : 1? A cross where ...

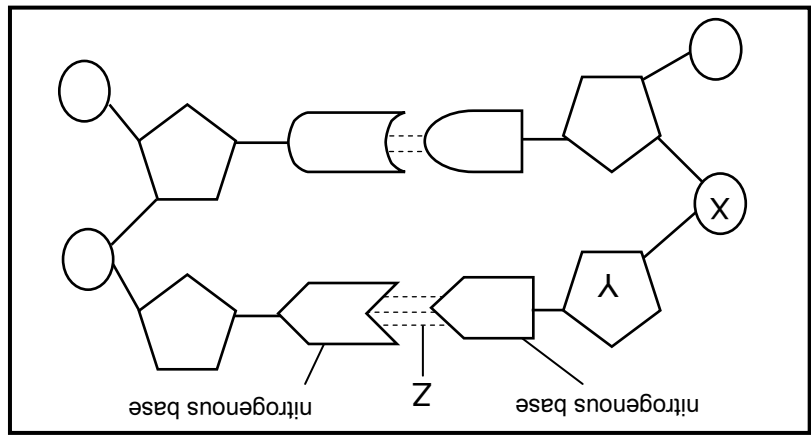
- A both parents are heterozygous.
- B both parents are homozygous for the dominant characteristic.
- C one parent is heterozygous and the other parent is homozygous recessive.
- D one parent is heterozygous and the other parent is homozygous dominant.



SECTION A
QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 The diagram below shows part of a DNA molecule.



The correct labels for parts X, Y and Z respectively are ..

- A deoxyribose sugar, phosphate and hydrogen bond.
- B phosphate, deoxyribose sugar and hydrogen bond.
- C ribose sugar, nitrogenous base and peptide bond.
- D phosphate, ribose sugar and hydrogen bond.

1.1.2

If 10% of the bases in a molecule of DNA are adenine, what is the ratio of adenine to guanine in the same molecule?

- A 1 : 1
- B 4 : 1
- C 1 : 3
- D 1 : 4

1.1.3

Lamarck's 'laws' of use and disuse and inheritance of acquired characteristics were ...

- A rejected, because only characteristics that benefit offspring can be inherited.
- B not rejected, because evidence shows that acquired characteristics can be inherited.
- C rejected, because only characteristics that are coded for in the DNA can be inherited.
- D not rejected, because Darwin's theory supports Lamarck's ideas.





INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Make ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, flow charts or tables only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You must use a non-programmable calculator, protractor and a compass where necessary.
11. Write neatly and legibly.



MORNING SESSION

This question paper consists of 16 pages.

TIME: 2½ hours

MARKS: 150

LFSC.2
LIFE SCIENCES P2
NOVEMBER 2014

GRADE 12

NATIONAL
SENIOR CERTIFICATE

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

basic education

