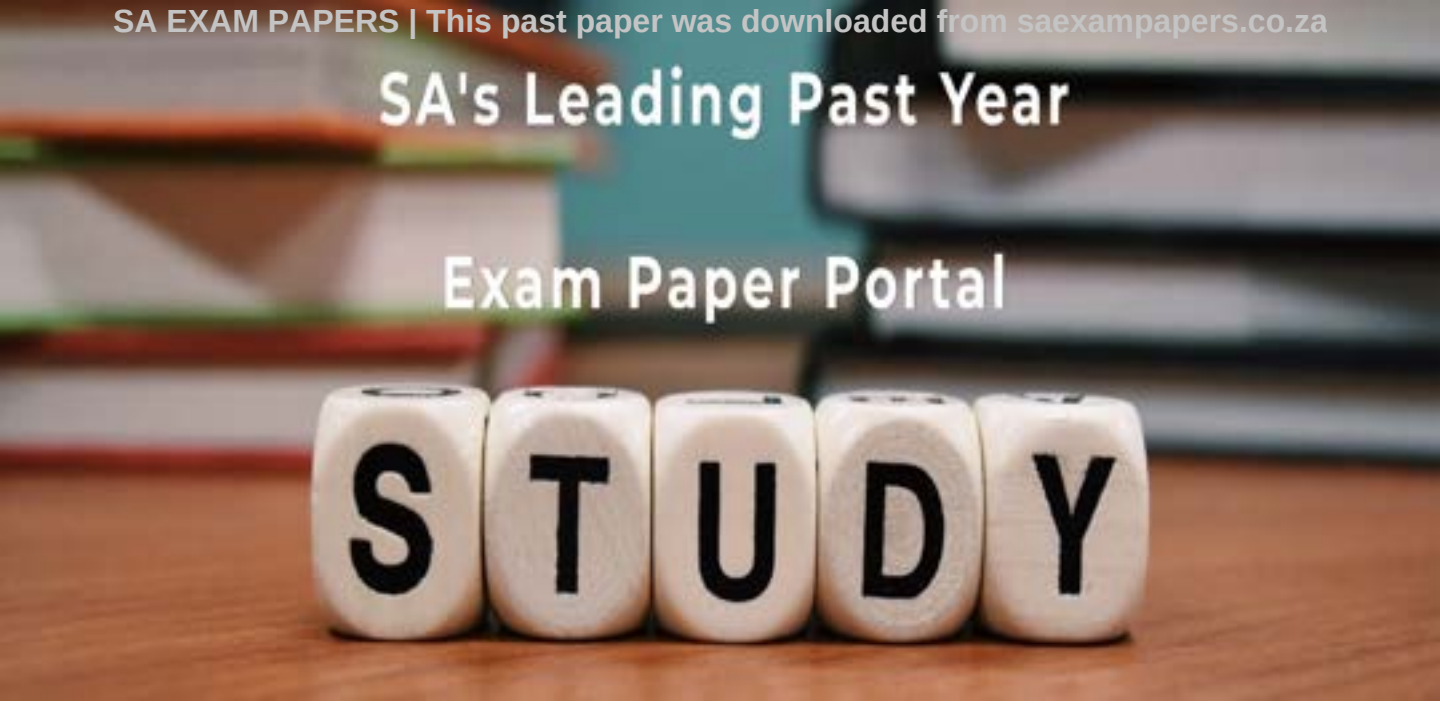

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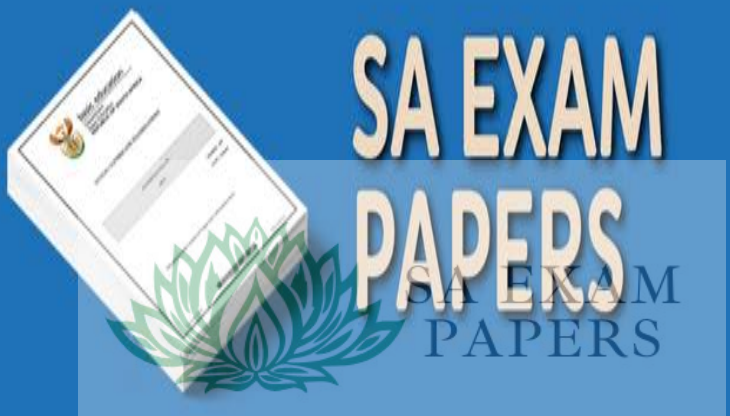


Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Department van Onderwys
Porafensie Ya Kapa Botjahabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE

IBANGA 12

SEPTEMBA 2024

LIFE SCIENCES P2

AMANQAKU: **150**

IXESHA: **2½ liyure**

Eli phepha lemibuzo linamaphepha ayi16.

IMIYALEZO NEENKCUKACA

Funda imiyalelo elandelayo ngenyameko ngaphambi kokuba uphendule imibuzo.

1. Phendula YONKE imibuzo.
2. Bhala zonke iimpendulo kwiNCWADI YOKUPHENDULELA.
3. Qala umbuzo ngamNYE kwiPHEPHA ELITSHA.
4. Nombola iimpedulo ngokuchanekileyo ngokwendlela esetyenzisiweyo kweli phepha lemibuzo.
5. Bonisa iimpendulo zakho ngokwemiyalelo yombuzo ngamnye.
6. YONKE imizobo MAYENZIWE ngepensile ze ulebhelishe ngeinki ebhlowu okanye emnyama.
7. Zoba iidayagram, iitheybhile okanye iitshati xa ucelwa ukuba wenze njalo KUPHELA.
8. Iidayagram zeli phepha lemibuzo AZIZOTYWANGA ngokwesikeyile.
9. UNGALISEBENZISI iphepha legrafu.
10. Sebenzisa ikhalityhuleyitha engeprogranywanga, iprothektha nekhampasi, apho kukho imfuneko.
11. ZONKE iikhalityhuleyishini mazisondezwe kwiindawo eziMBINI zedesimali.
12. Bhala ngokucocekileyo nangokucacileyo.

ICANDELO A

UMBUZO 1

1.1 Iindlela ezahlukileyo zinikiwe njengeempendulo ezinokuchaneka zokuphendula imibuzo elandelayo zinikiwe. Khetha impendulo echanekileyo ze ubhale unobumba kuphela (A–D) ecaleni kweenombolo zemibuzo (1.1.1 ukuya ku 1.1.9) kwiINCWADI YOKUPHENDULELA, umzekelo 1.1.10 D.

1.1.1 'lifektha' ezahlukileyo ezilawula iimpawu ezahlukileyo zezinto ezahlukeneyo, azohlukanisi enye kwenye nangayiphi na indlela, kwaye zizilungelelanisa ngokuzimeleyo ngexesha lokwenziwa kwegamete.

Oku kubhekiselele kwi ...

A Mendel's Principle of Segregation.
B Mendel's Principle of Independent assortment.
C Lamarck's 'law' of the inheritance of acquired characteristics.
D Chance fertilisation.

1.1.2 Iimultiple allele zibakhona xa ...

A iallele enye ikhontrola i-inherirtence yejini.
B iiallele ezimbini zikhontrola i-inheritance yejini.
C iiallele zifuzwe kubazali bobabini.
D ngaphezulu kweeallele ezimbini zikhontrola i-inheritance yejini.

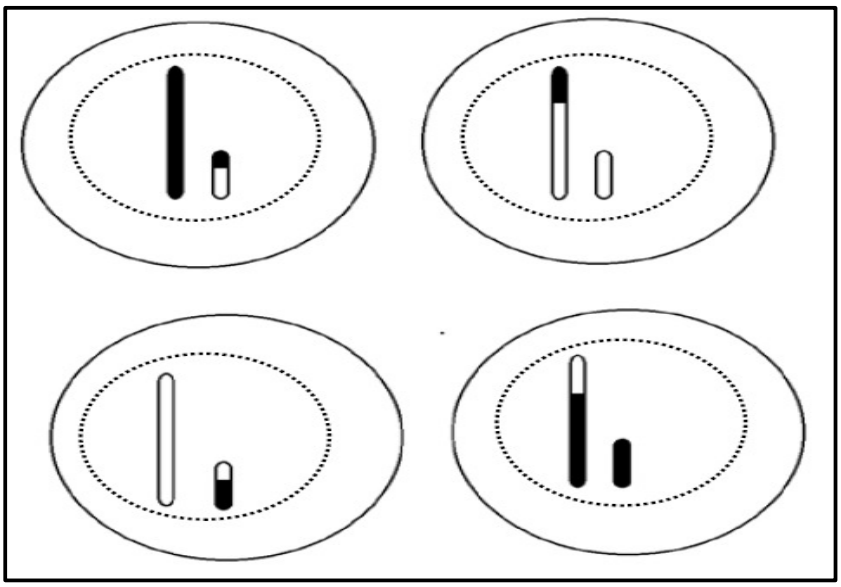
1.1.3 Zingaphi iinitrogenous bheyisi ezifumaneka kwiprotheni eyenziwe nge-66 amino acid?

A 198
B 22
C 132
D 66

1.1.4 Umahluko phakathi kwestructure seenucleic acid.

	DNA	RNA
A	Double-stranded molecule	Single-stranded
B	Contains the nitrogenous base, uracil	Contains the nitrogenous base, thymine
C	Straight structure	Helical structure
D	Shorter molecule	Longer molecule

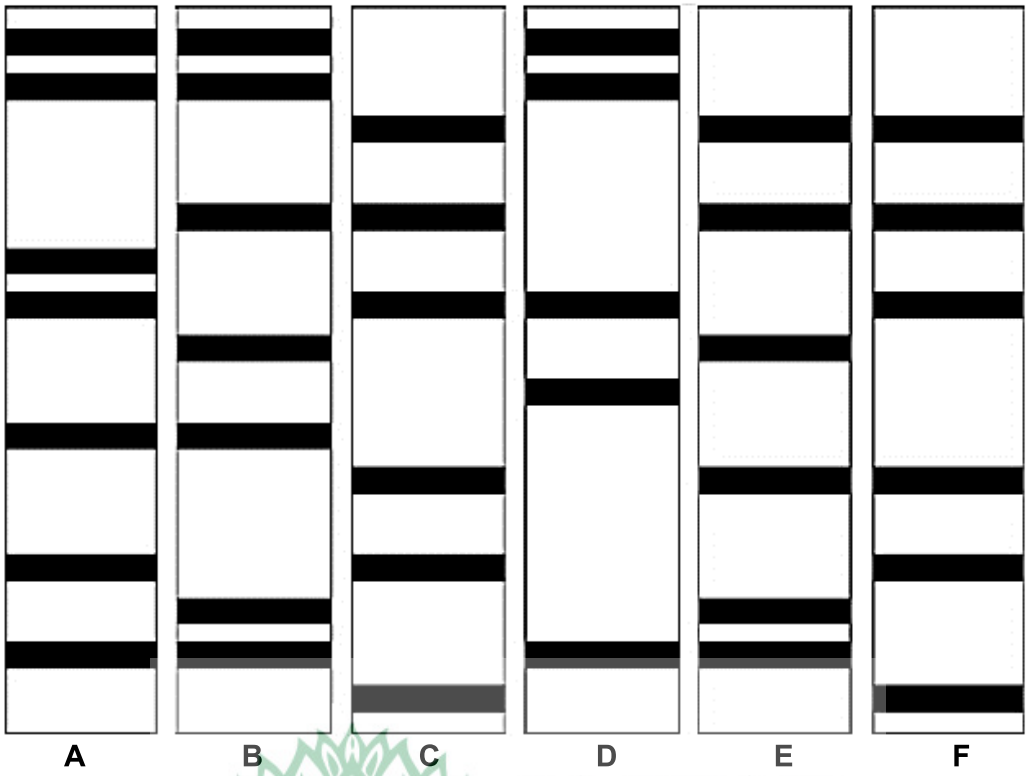
1.1.5 Idayagram engezantsi ibonisa iphase kwicell division.



Iphase ekwidayagram engentla yi …

A prophase II
B telophase II
C telophase I
D Telophase

IMIBUZO 1.1.6 NO1.1.7 ISEKWE KWIDNA PROFILING ENGEZANTSI.



1.1.6 Abazali bomntu **B** ngu …

A A no F.
B C no E.
C A no E.
D D no F.

1.1.7 Yeyiphi ENYE kwiindlela ezilandelayo engasetyenziselwa iDNA profilingi?

A Kufaniso lweetissue zokufakelwa kwelungu.
B Kuxilongo lweeinherited disorder.
C Ukuveliswa konyango lweeinherited disorder.
D Kubungqina bebhayoloji kumatyala olwaphulomthetho.

1.1.8 Iidiploid chromosome khompozishini yamadoda aphilileyo yi ...

A 44 autosomes + XX gonosomes.
B 22 autosomes + Y gonosomes.
C 22 autosomes + XY gonosomes.
D 44 autosomes + XY gonosomes.

1.1.9 Imutation inokuba nemiphumela elandelayo:

(i) Ikhowudi yeamino acid efanayo
(ii) Itshintshe iprotheyini eyenziweyo
(iii) Ibangele izifo kwiorganism
(iv) Ingabonakaliswa kwiphenotype yeorganism
(v) Yandise amathuba okusinda

Yeyiphi ENYE kwiindibanisela ezingentla eyenzeka kuphela ngenxa yeemutation eziyingozi?

A (i), (ii) no (iv)
B (ii) no (v)
C (iii) kuphela
D (ii) no (iii)

(9 x 2) (18)

1.2 Nika **ibhayolojikhali them** echanelekileyo yenkcazelo ngaNYE kwezilandelayo. Bhala igama kuphela ecaleni kwenombolo yemibuzo (1.2.1 ukuya ku1.2.9) ENCWADINI YOKUPHENDULELA.

1.2.1 Ukumelwa kwenani, imilo kunye nokucwangciswa kweechromosomes kwinucleus yesomatic cell

1.2.2 Indawo ye-extra nuclear DNA kwiiplant cell kuphela

1.2.3 Ipoyinti yokudibana yeenon-sister chromatid xa ziovalephana kwicrossing over

1.2.4 Uhlobo lwegazi oluneerecessive allele ezimbini

1.2.5 Indawo yejini kwichromosome

1.2.6 Istrandi seDNA apho iinucleotide zincamathela khona ukwakha iDNA strandi esitsha

1.2.7 Imeko eboniswa yichromosome eyongezelelweyo kwindawo u21

1.2.8 Uhlobo lweebhondi ezibamba iinitrogenous bheyisi kwiDNA molecule

1.2.9 Imeko yecell apho kukho iseti enye kuphela yeechromosome

(9 x 1) (9)

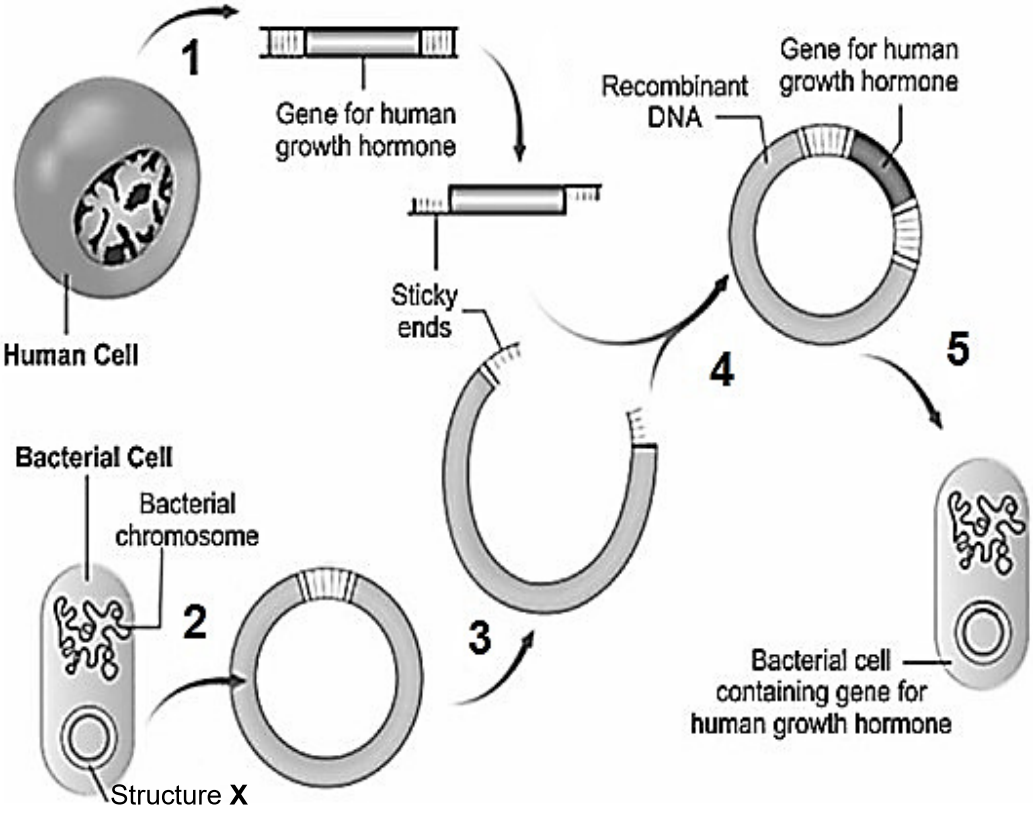
1.3 Bonisa ukuba iinkcazelo ezikuKHOLAM I zisebenza ku**A KUPHELA**, ku**B KUPHELA**, **kuA noB** okanye **AKUKHO NANYE** kwiiayithem ezikuKHOLAM II. Bhala u**A kuphela**, u**B kuphela**, u**A noB** okanye **akukho naye** ecaleni kweenombolo yemibuzo (1.3.1 ukuya ku 1.3.3) ENCWADINI YOKUPHENDULELA.

KHOLAMNI I		KHOLAMNI II	
1.3.1	Uhloblo lwevariation olukhoyo kwiindidi zegazi	A:	Co-dominance
		B:	Discontinuous variation
1.3.2	Icytokinesis yenzeka kabini	A:	Meiosis
		B:	Mitosis
1.3.3	Ukungabikho kweeblood clotting factor	A:	Haemophilia
		B:	Colour-blindness

(3 x 2) (6)

1.4 Igrowth hormone ibalulekile ekukhuthazeni ukukhula kwamathambo kunye nezihlunu. Inokuveliswa kubantu abangenokuyivelisa, okanye abayivelisa kancinci le hormone kusetyenziswa irecombinant DNA theknoloji.

IHUMAN GROWTH HORMONE PRODUCTION KUSETYENZISWA IRECOMBINANT DNA THEKNOLOJI.



1.4.1 Xela ibiotechnology prosesi eboniswe ngasentla. (1)

1.4.2 Chaza istructure **X** esifumaneka kwibhaktheriya cell esetyenziswe kwiprosesi engentla. (1)

1.4.3 Xela iiorganic catalyst ezisetyenziselwa ukusika istructure **X**. (1)

1.4.4 Nika inzuzo ibeNYE:

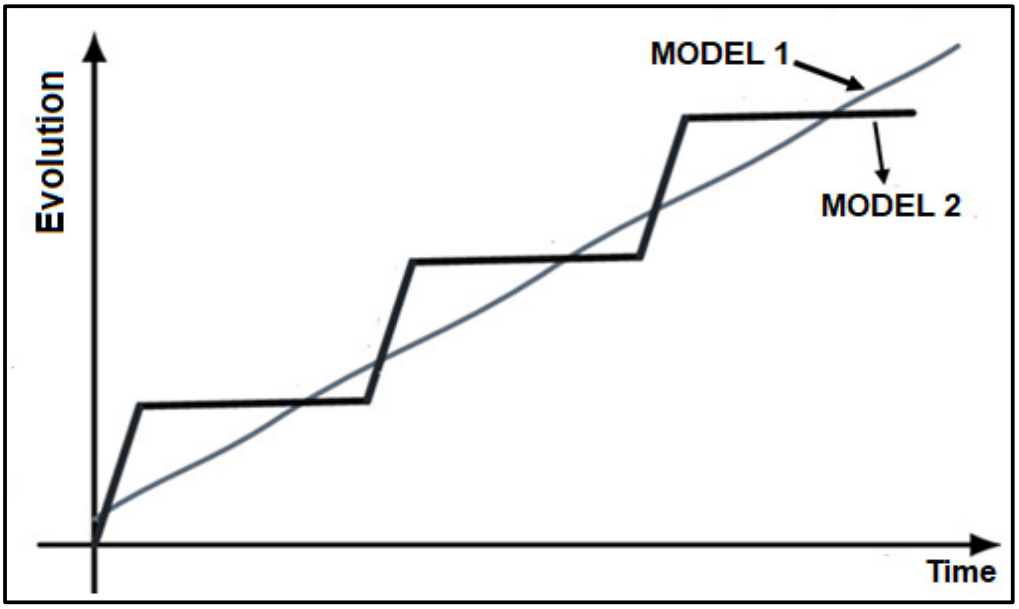
(a) Yokusetyenziswa kwegrowth hormone ziimbaleki (1)

(b) Yeprosesi echazwe kuMBUZO 1.4.1 kubantu abanesifo seswekile (1)

1.4.5 Chaza iimpawu eziMBINI zeebhaktheria ezenza ukuba zilungele ukusetyenziswa kwiprosesi engentla. (2)

1.4.6 Chaza ubeMNYE umsebenzi oqwalaselweyo weziphelo ezincangathi njengoko kuboniswe kwiprosesi engasentla. (1)

1.5 Idayagram engezantsi ibonisa iimodeli ezimbini ezisetyenziselwa ukucacisa itheory ye-evolution.



1.5.1 Chaza i-evolutionary theory KUMODELI 2. (1)

1.5.2 Xela oososayensi abaBINI abeza netheory ye-evolution EKUMODELI **2**. (2)

1.5.3 Yeyiphi i-evolutionary MODEL u **1** okanye **2**:

(a) Ebonisa utshintsho oluncinci ngokucotha kwizinto eziphilayo ukususka kwenye igeneration ukuya kwenye? (1)

(b) Exhaswa kukungabikho kwetransitional fosili? (1)

(c) Exhaswa ngusosayensi oweza netheory of evolution by natural selection? (1)

1.5.4 Chaza okwenzekayo kwispecies kwiindawo **A** no**B** KWIMODELI **2**, ngokulandelelana. (2)

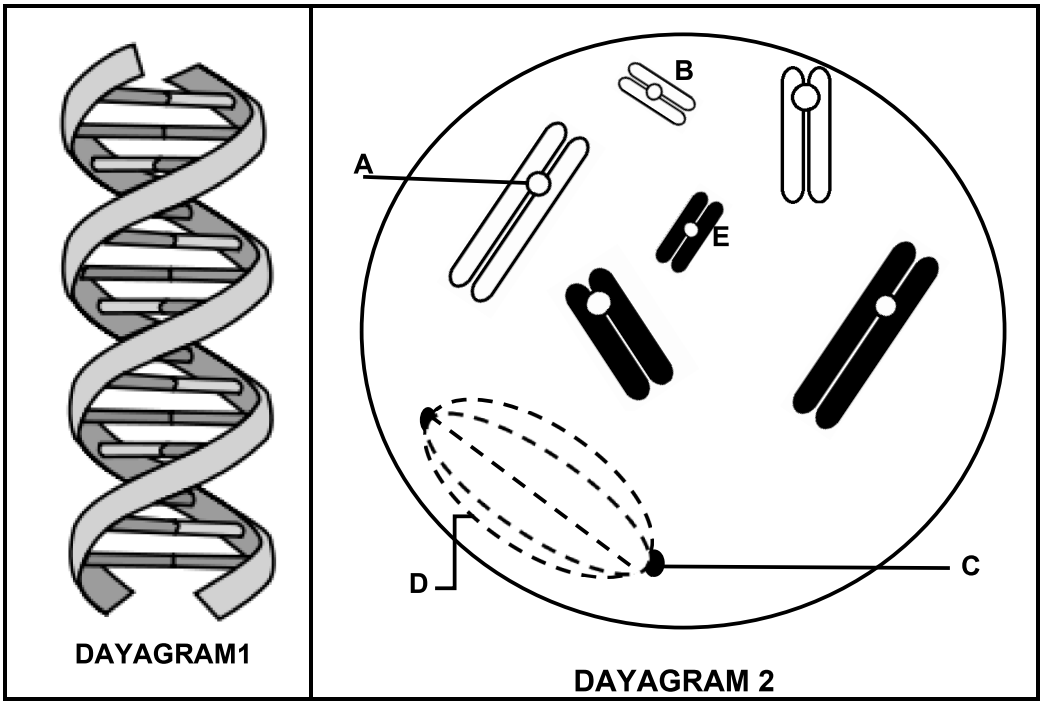
1.5.5 Chaza uhlobo lwe-evolution apho kukho utshintsho kuphawu lwespecies esithile ngokuhamba kwexesha. (1)

EWONKE AMANQAKU ECANDELO A: 50

ICANDELO B

UMBUZO 2

2.1 Idayagram engezantsi ibonisa iDNA molecule kunye nephase kwimeiosis.



DAYAGRAM1 DAYAGRAM 2

2.1.1 Yeyiphi iphase yemeiosis emelwe KUDAYAGRAM **2**? (1)

2.1.2 Xela:

(a) Indawo **C** (1)

(b) Igama eliquka ichromosome **B** kunye no-**E** (1)

(c) Iphase kwimeiosis apho indawo **A** yohlukana khona (1)

2.1.3 Zingaphi iichromatids ezineDNA efanayo evela kwiichromosome ezihlikihlwe mnyama KUDAYAGRAM **2**? (1)

2.1.4 Chaza ukwakhiwa kwenucleotide KUDAYAGRAM **1**. (2)

2.1.5 Nika igama kwaye uchaze ukubaluleka kweprosesi eyenzeka kwi-DNA ngexesha leinterphase ze ikhokelele ekubonakaleni kwe-chromosome KUDAYAGRAM **2**. (3)

2.1.6 Chaza indima yendawo **D** kwimetaphase **I** yemeiosis. (3)

2.2 Xela igama kwaye uchaze iprosesi apho itRNA idlala indima ekwakhiweni kweprotheni. (5)

2.3 Funda isicatshulwa esingezantsi.

Igene Therapy yindlela yezonyango esebenzisa igenetic material ukuthintela kwaye izifo ezifana necystic fibrosis, isifo sesickle cell kunye nokuguga kwe-macular. Kwimacular degeneration iiretina cell zonakele. Ezi genetic diseases zibangelwa zii gene mutation kwiDNA molecule ekhokelela ekwenzekeni kweeprotheni ezineziphene. Kwigene therapy, iindawo zemutant gene ezilandelelanayo ziyasuswa kwiDNA ze zithathelwe indawo zijini echanekileyo ezilandelelanayo. Iistem cell zisetyenziswa ukudlulisa ijini ecanekileyo elandelelanayo ukuvelisa iprotheni esebenzayo.

2.3.1 Xela ZibeMBINI iisource apho iistem cell zinokufunyanwa khona (2)

2.3.2 Nika sibesiNYE isifo sokubona eyenzelwe ukusinyanga I gene therapy. (1)

2.3.3 Igenetic mutation yenzeke kwisection yemolecule yeDNA njengoko kuboniswe ngezantsi.

Original sequence	TTT	TCA	GGT	ACG	CAC
Mutated sequence	TTT	TCA	GGT	ACC	CAC
Base triplet	**1**	**2**	**3**	**4**	**5**

Bhala I namba ye base triplet ebonakalisa I gene mutation. (1)

2.3.4 Itheyibhile engezatsi ibonakalisa iicodon kunye nee amino acid ezizikhowudelayo.

CODONS	AMINO ACIDS
AAA	Lysine
GAG	Glutamic acid
CAC	Histidine
UGC	Cysteine
ACU	Threonine
AGU	Serine
GAU	Aspartate
UGG	Tryptophan
UUU	Phenylalanine
CCA	Proline
GUG	Valine

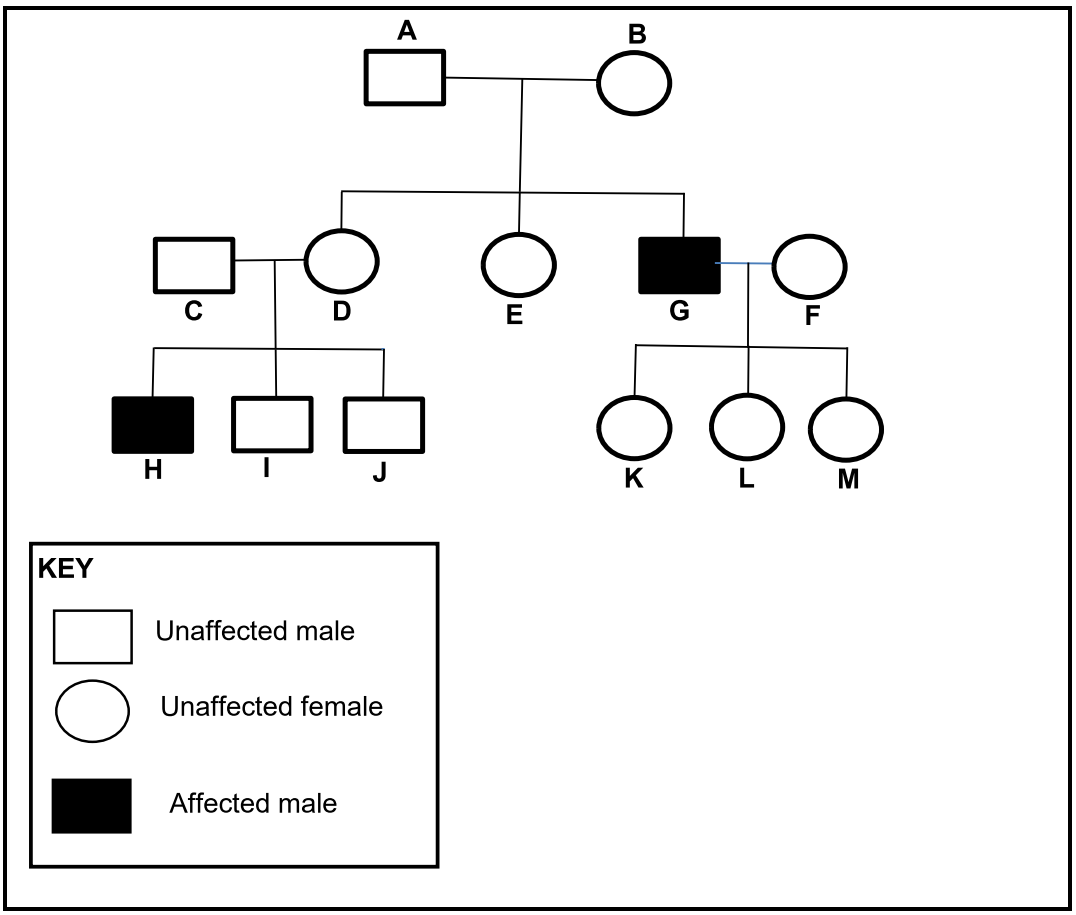
(a) Nika iamino acid ye base triplet **5** kuMBUZO 2.3.3. (1)

(b) Cacisa igene therapy ingalulungisa njani ulandelelwano olu mutated ukwenza iprotheyini esebenzayo. (3)

(c) Zoba idayagram yemolecule ethwala I message e khowuded ye protein synthesis enee complementary codon ezichanekileyo ze base triplet **2.** (4)

2.4 I-Leigh syndrome yiautosomal recessive genetic disorder enqabileyo echaphazela icentral nervous system kubantwana abancinci. Le meko inokuchaphazela nabantu abadala kwaye kwiimeko ezininzi ikhokelela ekufeni kwabantwana besebancinane.

Ipedigree dayagram engezantsi ibonisa ukufuzwa kwale disorder kusapho. I-allele **b** isetyenziselwa abantu abachaphazelekayo.



2.4.1 Ithetha ntoni iterm *autosomal recessive?* (2)

2.4.2 Bhala iLETTER yomntwana ekunokwenzeka ukuba afe kwi **F_2** generation. (1)

2.4.3 Chaza indlela umntwana okhankanywe kwiQUESTION 2.4.2 achaphazeleke ngayo kwiLeigh syndrome. (2)

2.4.4 Chaza iMendelian law of dominance ekhoyo kwiiphenotype zabantu ngabanye **K**, **L** kunye no-**M**. (1)

2.4.5 Cacisa impendulo yakho kwiQUESTION 2.4.4. (3)

2.5 IFragile X syndrome yisex linked dominant inheritance. Iallele ebangela le meko yidominant-$\mathbf{X^R}$, ngelixa abantu abangenayo ifragile **X** syndrome banerecessive allele $\mathbf{X^r}$.

2.5.1 Chaza iphenotype yomntu onegenotype $\mathbf{X^RX^r}$. (2)

2.5.2 Cacisa isizathu sokuba amadoda namabhinqa babe namathuba alinganayo okuba nefragile X syndrome. (2)

2.5.3 Indoda enegenotype $\mathbf{X^RY}$ itshata nomfazi onegenotype $\mathbf{X^rX^r}$.

Sebenzisa igenetic cross ukucacisa iprobability yokuba esi sibini sibe nonyana onefragile **X** syndrome. (7)

[50]

UMBUZO 3

3.1 Emahasheni, ibay hair coat colour **(B)** idominant kwi black hair coat colour **(b)**, kunye ne smooth hair **(H)** idominant kwi-curly **(h)**.

Umfama uye waabrida iblack hair coated horses ezine curly hair ubomi bakhe bonke kwaye zonke iifoals (inzala) zisoloko zikhangeleka njengabazali bazo nge black hair coat ene curly hair.

3.1.1 Nika isizathu esiNYE sokuba lo ngumzekelo wedihybrid cross. (1)

3.1.2 Chaza uhlobo lokukhetha olwavumela umfama ukuba abride iiblack hair coated horses ezine curly hair bonke ubomi bakhe. (1)

3.1.3 Cebisa ESINYE isizathu sokuba umfama abride iiblack hair coated horses ezine curly hair iigenerationi ezininzi. (1)

3.1.4 Xela igenotype:

(a) Yomzali wehashi eline black hair coat ene curly hair (2)

(b) Ye gametes zehashi eliheterozygous kuzo zombini ihair colour ne hair type (2)

3.1.5 Chaza iphenotyhic ratio ye offspring eyakufumaneka ukuba amahashe amaBINI aheterozygous kwiicharacteristic zombini aye acroswa. (2)

3.2 Funda esi sicatshulwa singezantsi uze uphendule imibuzo elandelayo.

IAfrican penguin population (iSpheniscus demersus) yehlile eMzantsi Afrika kwaye linokuba ngabikho ngo2035. Oku kungenxa yokulahleka kwendawo yokuhlala kunye nokuloba ngokugqithisileyo kokutya kwabo okuphambili, iisardini (ipilchardi). Ii African penguin zasezikhuphisana ngeendawo zokuloba zorhwebo eKapa neesardines. Iindawo zokuloba zorhwebo zixabisa iibhiliyoni zeerandi kwaye ziqeshe abantu abaninzi.

IiSardine yisource yokutya okuneprotein engaxabisi kakhulu kwaye ivunwa ngobuninzi kwinyanga ka March ukuya kuMeyi eMzantsi Afrika ekwalixesha lokukhwelana kwepenguin yaseAfrika. Ngexesha lokukhwelana zombini iintlobano zeAfrican penguin zenza izandi ezivakalayo ukubiza amaqabane azo. Abalondolozi bendalo bafuna ukuba urhulumente anciphise inani leesardini ezivunwa ziindawo zokuloba zorhwebo.

African penguin

3.2.1 Nika ubungqina kwisicatshulwa obuchaza ukuba ipenguin yaseAfrika iya kutshabalala kwixesha elizayo. (1)

3.2.2 Ngokwesicatshulwa:

(a) Chaza izizathu eziBINI zokuncipha kwenani le African penguin. (2)

(b) Chonga zibeMBINI iireproductive isolating mechanism ezikhoyo kwiiAfrican penguin (2)

3.2.3 Chaza indlela ukunciphisa inani leesardines ezivuniweyo:

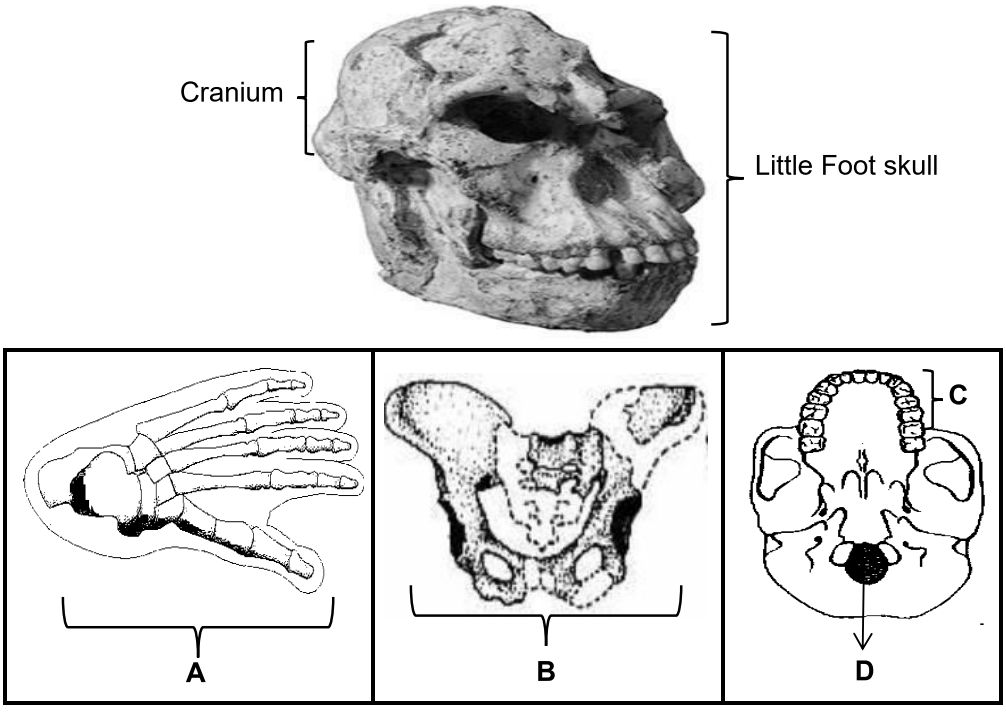
(a) Kunokunciphisa uqoqosho (2)

(b) Kunokunceda kakuhle iipenguin zaseAfrika (2)

3.3 Chaza ukuba senzeka njani ispecies esithsa kwi geographic barrier. (7)

3.4 U Little Foot yi-fossil ye-hominid eyafunyanwa kwimiqolomba yaseSterkfontein nguProffesor Ron Clarke Amathambo we little foot abonisa ukuba le fossil yayineempawu ezininzi ezifana nezo zifumaneka ebantwini.

ANATOMICAL STRUCTURES OF THE GENUS THAT LITTLE FOOT BELONGS TO



3.4.1 Lithini igama eliscientific le Little Foot? (1)

3.4.2 Bhala I letter ebonisa ukuba igenus:

(a) Yayineecanines ezincinci (1)

(b) Ispinal column yayingena kwi skull vertically ukunceda kwibipedalism (1)

(c) Zazifana iiforelimb zazo nezabantu (1)

3.4.3 Chaza indlela istructure **B** esibonisa ngayo le genus itshintshe kakhulu kune primitive ape kodwa itshintshe kancinci kunabantu. (2)

3.4.4 Chaza ukubaluleka kwenguqu kubungakanani be-cranium be little foot kobabantu banamhlanje. (2)

3.4.5 I little foot isetyenziswa njengobungqina befossil kwi 'Out-of-Africa' hypothesis.

(a) Xela obuNYE ubungqina obuhamba ne 'Out-of-Africa' hypothesis. (1)

(b) Cacisa ukuba iifossil zegenus ye Little Foot zisetyenziswa njani kwi 'Out-of-Africa' hypothesis. (2)

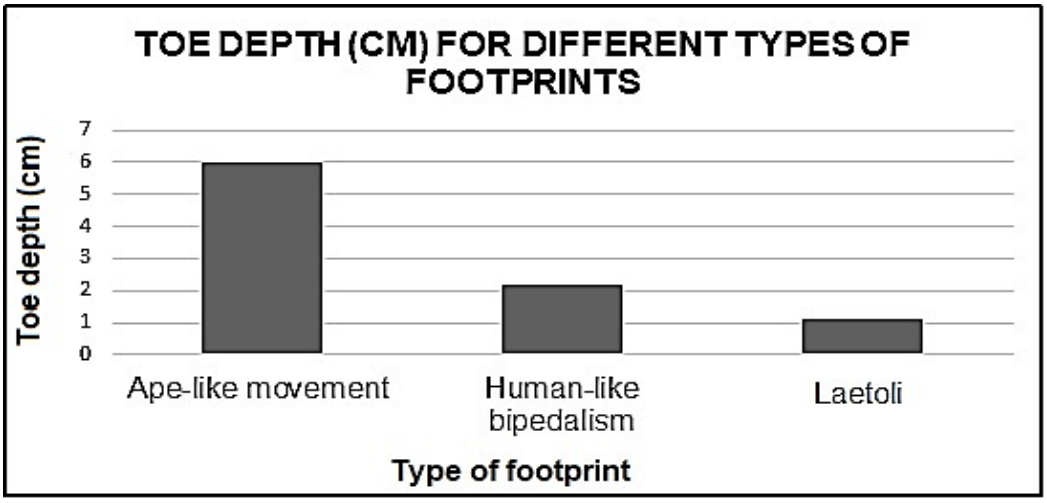
3.5 ILaetoli footprints yi3,6 million old fossil eyafunyanwa yipalaeontologist uMary Leakey eTanzania. Ishape yeenyawo neenzwane ibonisa ukuba ezi footprints zenziwa yibipedal hominid ancestor eyayikwazi ukuma nkqo.

Kwaqhutywa uphando ukufumanisa ukuba aba bantu benza iLaetoli footprints bahamba besebenzisa ibipedalism efana neyomntu okanye intshukumo efana ngakumbi neye-ape (i-bent-knee, i-bent-hip).

Inkqubo yaba ngolu hlobo lulandelayo:

- Ubunzulu bokuba iinzwane zacinezela kuthuthu lweenyawo zeLaetoli ezigciniweyo zalinganiswa kwaye zabhalwa.
- Abathathi-nxaxheba abasibhozo abangabantu bacelwa ukuba bahambe esantini kwaye ubunzulu beenyawo zabo balinganiswa kwaye babhalwa.
- Abathathi-nxaxheba abangabantu emva koko bacelwa ukuba balinganise (ukukhuphela) ukuhamba kweeapes ngokusebenzisa intshukumo (bent-knee, bent-hip") efana neyeape ngokuhamba esantini.
- Ubunzulu beenzwane zabo balinganiswa kwaye babhalwa.

Iziphumo zophando zibhalwe kwigraph engezantsi.



3.5.1 Chaza injongo yolu phando. (1)

3.5.2 Xela ukuba i idependent variable yaamentwa njani kolu phando. (1)

3.5.3 Nika abemaTHATHU amanyathelo okucwangcisa olu phando. (3)

3.5.4 Nika izizathu eziBINI zokuba olu phando lungathathwa njengento engathembekanga. (2)

3.5.5 Nika uhlobo lweefootprint ezinobunzulu obude beenzwane. (1)

3.5.6 Inkulu izihlandlo ezingaphi l toe depth ye human-like bipedalism xa ithelekiswa ne Laetoli footprint. Bonisa ZONKE izibalo. (2)

3.5.7 Zoba itheyibhile ebonisa inkcukacha ekwigrafu. (4)
[50]

EWONKE AMANQAKU ECANDELO B: 100
EWONKE AMANQAKU: 150