Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

IBANGA 12

SEPTEMBA 2020

LIFE SCIENCES IPHEPHA LESIBINI

AMANQAKU: **150**

IXESHA: **iiyure 2½**

Eli phepha lemimbuzo linamaphepha ayi-16.

IMIYALELO NENGCACISO

Funda le miyalelo ilandelayo ngononophelo phambi kokuba uphendule imibuzo.

1. Phendula YONKE imibuzo.
2. Bhala ZONKE iimpendulo kwiNCWADI YEEMPENDULO yakho.
3. Qala impendulo yombuzo NGAMNYE ekuqaleni kwephepha ELITSHA.
4. Sebenzisa inombolo mpendulo ngokwenkqubo yokubhala amanani esetyenzisiweyo kwiphepha lemibuzo.
5. Bhala iimpendulo zakho ngokwemiyalelo yombuzo ngamnye.
6. Yenza YONKE imizobo ngepensile uze ulabhelishe nge inki eblu okanye emnyama.
7. Zoba imizobo, iitayble okanye iiflow tshats kuphela xa kuceliwe.
8. Imizobo yeli phephe AYIZOTYWANGA ngokwe sikeyli.
9. UNGAYISEBENZISI igraf pheypha.
10. Ungayisebenzisa ikhatyhulayitha engaprogranywanga, iprotrekta nekhampus apho kukho imfuneko.
11. Zonke iimpendulo mazibalwe zibenedesimali eziMBINI.
12. Bhala ngocoselelo nangokucacileyo.

ICANDELO A

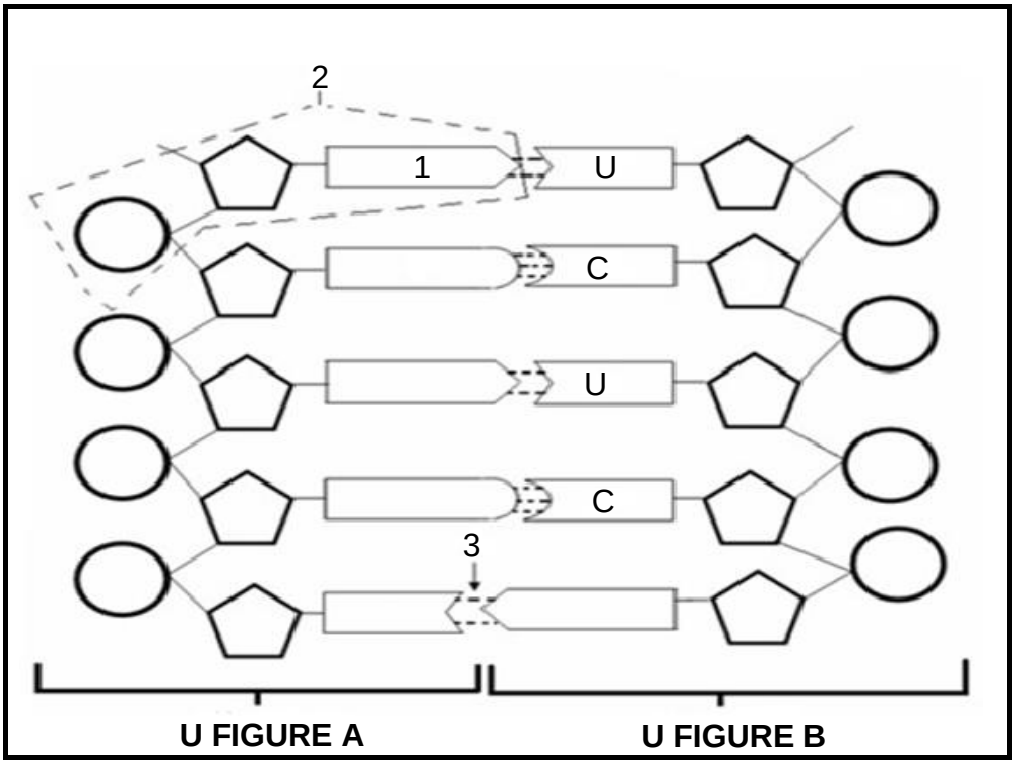
UMBUZO 1

1.1 Iindlela ezahlukeneyo zinikwe njengeempendulo kule mibuzo. Khetha impendulo echanekileyo wandule ukubhala unobumba kuphela wempendulo yakho (A–D) ecaleni kwenombolo yemibuzo (1.1.1–1.1.10) kwiNCWADI YEEMPENDULO, umzekelo 1.1.11 D.

1.1.1 Itrait eneendidi ngeendidi zeephenotypes ngumzekelo we …

A continuous variation
B codominance.
C discontinuous variation.
D complete dominance.

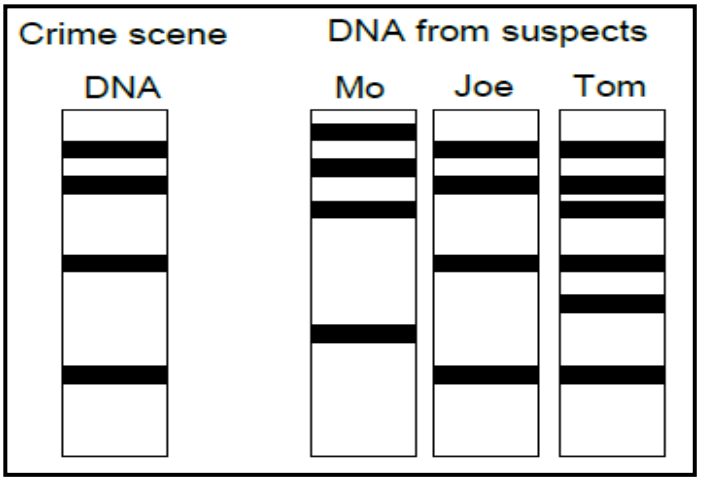
1.1.2 Qwalasela idayagram engezantsi.



Yeyiphi kwezi zinto zidityaniswe apha elungileyo ukuchaza iiparts ze molecule engentla?

	FIGURE B	Molecule 1	Molecule 2	Bond 3
A	DNA	Cytosine	nitrogenous base	Weak Hydrogen
B	DNA	Adenine	nucleotide	Sugar Phosphate
C	RNA	Adenine	nucleotide	Weak Hydrogen
D	RNA	Thymine	nitrogenous base	Weak Hydrogen

UMBUZO 1.1.3 no 1.1.4 babhekisa kumzobo ongezantsi:



1.1.3 Iziphumo zenkqubo ebonakaliswe ngentla zibizwa ...

A icloning.
B iDNA replication.
C ifingerprinting.
D iDNA profiling.

1.1.4 Qwalasela uludwe (list) olungezantsi:

(i) Uvavanyo luka tata (Paternity testing)
(ii) Ukuzalanisa (Matching) iitissues ukwenzela ukufakela amalungu emzimbeni.
(iii) Inkcaza (identification) evela kwiifingerprints
(iv) Ukunyanga ukuphazamiseka kwemfuza (Curing genetic disorders)

Yeyiphi kwezi mpendulo zidityanisiweyo ebonisa ukusetyenziswa kwenkqubo EYIYO kumzobo ongentla ?

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

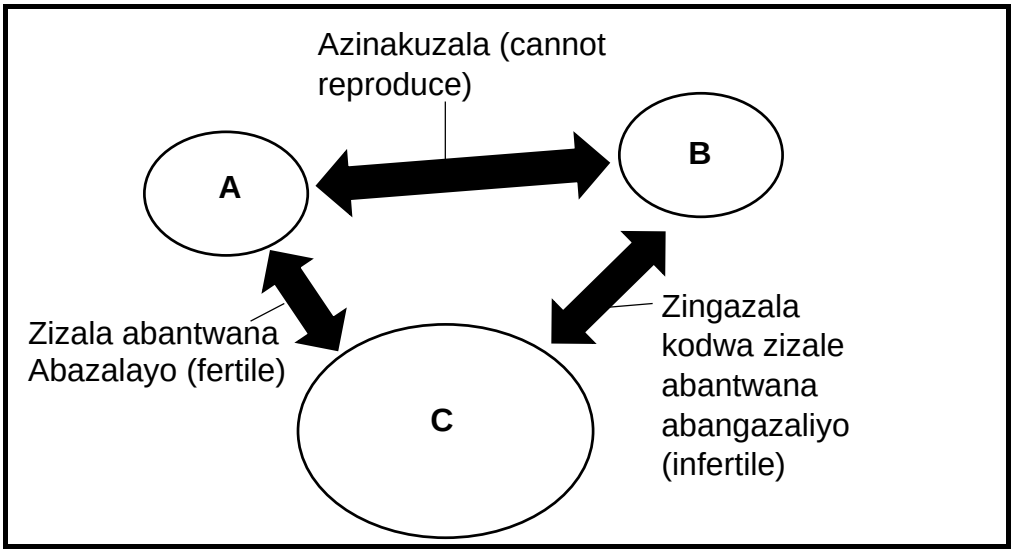
1.1.5 Xa ijini (gene) iflowa phakathi kweepopulation ezimbini imiswa (stopped), oku kulandelayo kuthi kwenzeke:

A I speciation
B I adaptation
C I resistance
D I variation

1.1.6 Yeyiphi kwezi engumzekelo we artificial selection?

A Ukuxhathisa (resistance) kweDDT kwiingcongconi
B Ukuzaliswa (Breeding) kweenkomo ukwandisa ukuvelisa (production) ubisi
C Ukuxhathisa kwe antibiotic kwibacteria
D Ukuvela (development) kohlobo olwahlukileyo lwee Galapagos finch

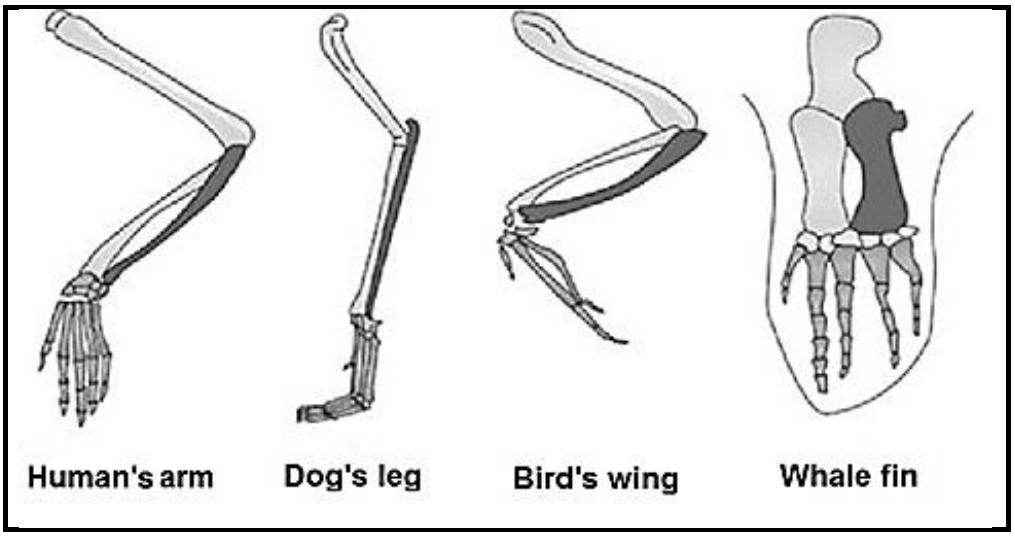
1.1.7 Umzobo ongezantsi imele iintlobo ezintathu zezispecies (**A**, **B** no **C**), apho enye ihlala kwisiqithi esahlukileyo (island) esohlulwe lulwandle.



Yeyiphi ENYE kwezi nkcazelo zilandelayo echanekileyo?

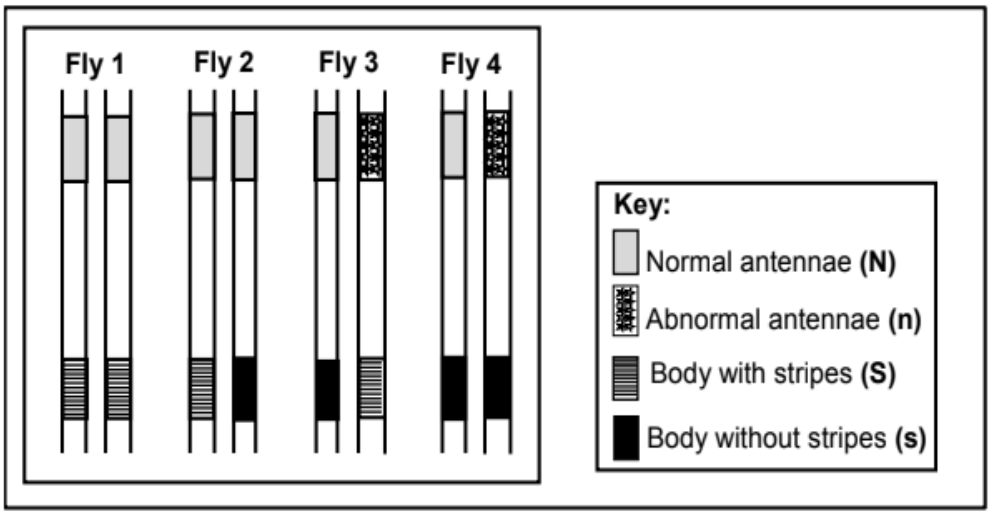
A Zontathu ezi ntlobo zeepopulation azifani
B Upopulation **B** no **C** ziintlobo ezingafaniyo yena u **A** no **B** ziintlobo ezifanayo
C Upopulation **A** no **C** luhlobo olufanayo yena u**B** no **C** luhlobo olungafaniyo
D Zontathu iipopulation luhlobo olufanayo.

1.1.8 Izitho zangaphambili (forelimbs) ze vertebrates, njengoko kubonisiwe ngezantsi zingumzekelo we …



A vestigial structures.
B homologous structures.
C analogous structures.
D convergent evolution.

1.1.9 Lo mzobo ubonisa ihomologous chromosome pair number 3 kwi fruit fly nganye kwezine (4). Ii alleles ze antenna shape (normal or abnormal) ne body pattern (enemigca okanye engenamigca) zibonakalisiwe kwii chromosomes.



Yeyiphi impukane (fly) e homozygous kwishape ye antennae iphinde ibe heterozygous kwi body pattern?

A Fly 1
B Fly 2
C Fly 3
D Fly 4

1.1.10 I hummingbird isebenzisa umlomo wayo omde ukutya incindi yeeflowers. Ngokuka Gould no Eldridge's theory of punctuated equilibrium umlomo omde wehummingbird ukhule …

A ngokukhawuleza kwixesha elifutshane.
B kuba ngokuye ihummingbird iwusebenzisa umlomo wayo uye ukhula ngokukhula.
C kuba umlomo wazo uhlala utshintsha ngalo lonke ixesha.
D wamane usibamde ngokubamde ngokokuhamba kwexesha.

(10 x 2) (20)

1.2 Nika **ithem yebhayiloji** elichanekileyo endaweni yezi nkcazelo zilandelayo. Bhala Igama kuphela ecaleni kwenombolo yemibuzo (1.2.1–1.2.8) ENCWADINI YOKUPHENDULA.

1.2.1 Olunye uhlobo (alternate forms) lweentlobo ezifanayo zee genes.

1.2.2 Ubume bendalo (Natural shape) be DNA molecule.

1.2.3 Inqanaba kwicell cycle apho I DNA iphindaphindeka(replication) khona.

1.2.4 Izinto eziphilayo ezineempawu ezifanayo, zihlala kunye, zivelise bantwana aba chumileyo (fertile).

1.2.5 Isigaba kwi Meiosis xa I crossing over isenzeka.

1.2.6 Umzobo obonisa ubukho bobudlelwane bendalo (possible evolutionary relationships) phakathi kwee ntlobo ezahlukeneyo.

1.2.7 Ukufundwa kokwaangoku nongolwahlulo (distribution) lweezpicies (species) kulo lonke ihlabathi

1.2.8 Inkqubo apho zithi zife zonke iintlobo ze zpicies (species) kungashiyeki nesinye.

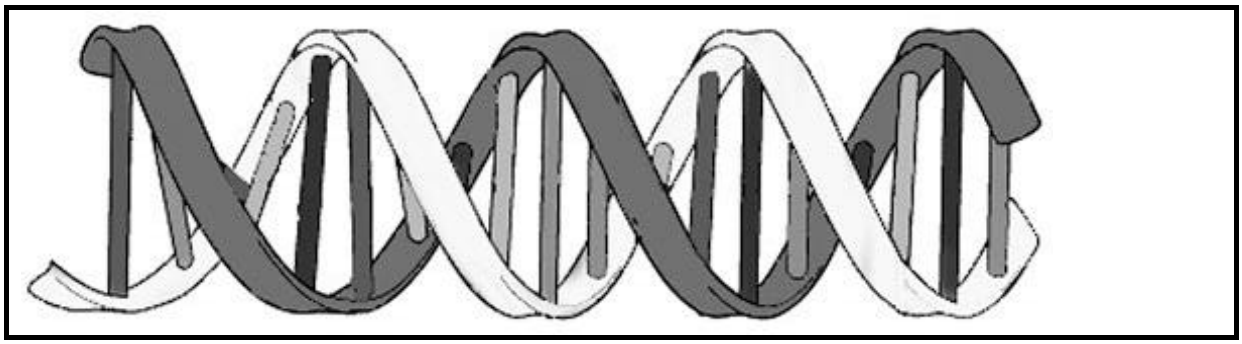
(8 x 1) (8)

1.3 Bonisa ukuba inkcazelo ekuKHOLAM II i-aplaya ku **A KUPHELA**, ku-**B KUPHELA**, **ku A no B** okanye **AYISEBENZI NAKANYE (NONE)** kwiithem eziku KHOLUMN II. Bhala **A kuphela**, **B kuphela**, **A no B** or **ayisebenzi nakanye** ecaleni kwenombolo yemibuzoto (1.3.1–1.3.3) ENCWADINI YEEMPENDULO.

KHOLAM I		KHOLAM II
1.3.1	Inzululwazi efunda ngee fossils kuphela	A: Palaeontologist B: Archaeologist
1.3.2	Iyafuneka ukuze lukwazi ukwenzeka ukhetho lweendalo (natural selection)	A: Ukungafani (Variation) B: Ukhuphiswano (Competition)
1.3.3	Reproduction isolating barrier	A: Zizala (Breeding) ngamaxesha ohlukeneyo onyaka B: Abantwana abangachumangaa (Infertile offspring)

(3 x 2) (6)

1.4 Umzobo ungezantsi umele imodeli ye DNA eyaphakanyiswa (proposed) ziinzululwazi ngo 1953.



1.4.1 Nika igama le nzululwazi eyapapasha kuqala isakhiwo seDNA. (2)

1.4.2 Buthini ubume bendalo (natural Shape) be DNA? (1)

1.4.3 Nika imisebenzi yeDNA ibe miBINI. (2)

1.4.4 Ifunyanwa ndawoni iDNA kwicell yomntu? (2)

1.4.5 Nika igama lenye inzululwazi eyawongwa (awarded) ngeNobel prize ngokufumaneka kwesakhiwo seDNA. (1)

1.5 Kuhlobo oluthile lwesityalo kufundwe ngeempawu ezimbini, umbala wentyantyambo (flower colour) kunye nobude besityalo (Plant height). Uphawu (characteristic) ngalunye lohluka kabini kolunye. Iintyantyambo zingabomvu okanye zibemhlophe ngombala zona izityalo zingazide okanye zibezifutshane.

Xa izityalo ezibini ezi heterozygous kumbala wentyantyambo nobude besityalo zi crosiwe (crossed), iioffspring eziyi 9 zaba nombala obomvu kwaye zabazide, eziyi 3 zabamhlophe zabazide, eziyi 3 zababomvu zabafutshane saze esi 1 sabamhlophe sasimfutshane.

The alleles for each characteristic are shown in the table below.

UPHAWU (CHARACTERISTIC)	I ALLELE EBALASELEYO (DOMINANT)	I ALLELE ENGABALASELANGA (RECESSIVE)
Umbala wentyatyambo	F	f
Ubude besityalo	H	h

1.5.1 Lithini igama le genetic cross ebandakanya iimpawu ezimbini? (1)

1.5.2 Nika :

(a) Iphenotype ebalaseleyo yombala wentyatyambo (1)

(b) IGenotype yesityalo esifutshane esineentyatyambo ezimhlophe (2)

(c) IPhenotype yesityalo esi heterozygous kumbala wentyatyambo siphinde sibe homozygous dominant kubude be sityalo (2)

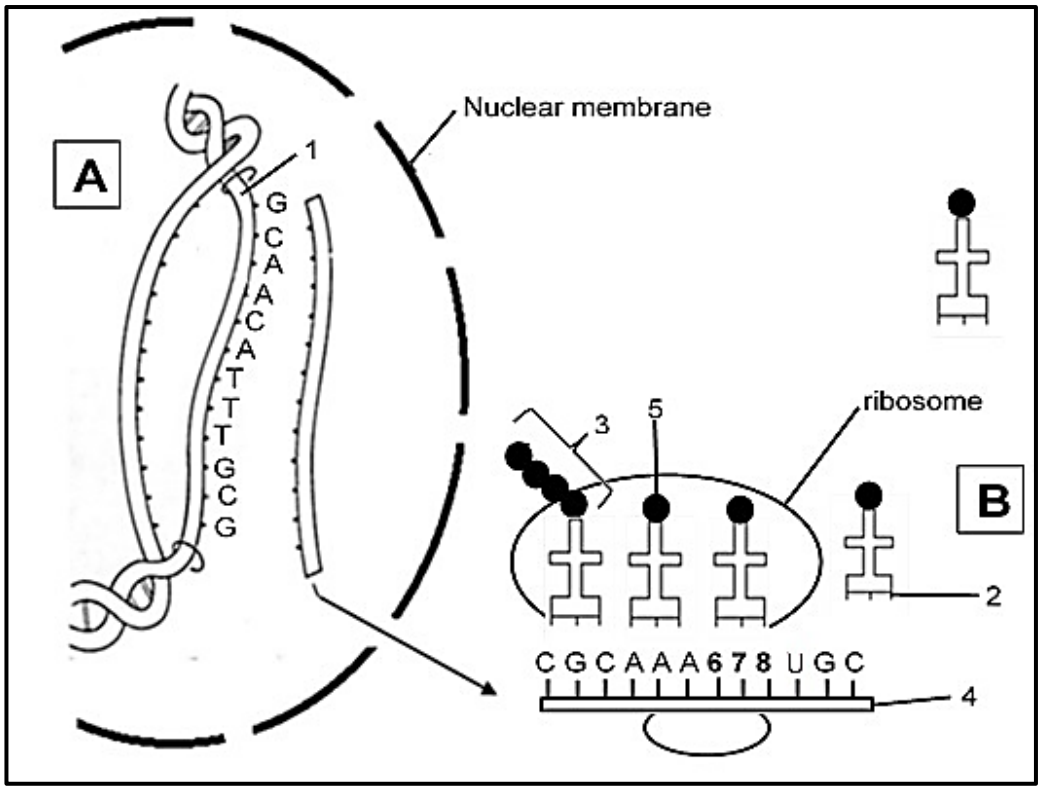
(d) Iigametes ezinokwenzeka kwisityalo esi heterozygous red, na heterozygous tall (2)

AMANQAKU ECANDELO A: 50

ICANDELO B

UMBUZO 2

2.1 Qwalasela umzobo ongezantsi.



2.1.1 Nika igama leprocess emelwe ngu **A** no **B** bedibene. (1)

2.1.2 Yenzeka ndawoni kwicell iprocess eku**B**? (1)

2.1.3 Xela ezi zilandelayo:

(a) Molecule **1** (1)

(b) Polymer **3** (1)

2.1.4 Nika ulandelelwano oluchanekileyo lweebase ezinokumela amanani **6**, **7**, **8**. (2)

2.1.5 Bhala i anticodon elayibhelwe **2**. (1)

SEBENZISA I TABLE ENGEZANTSI NEDAYAGRAM ENGENTLA UKUPHENDULA IMIBUZO ILANDELAYO

II ANTICODONS ZE tRNA IICORRESPONDING AMINO ACIDS ZAZO EZIZITHWALAYO	
tRNA ANTICODONS	**AMINO ACIDS**
UUU	Lysine
ACA	Cysteine
GCA	Arginine
GUU	Glutamine
CCA	Glycine
AAA	Phenylalanine

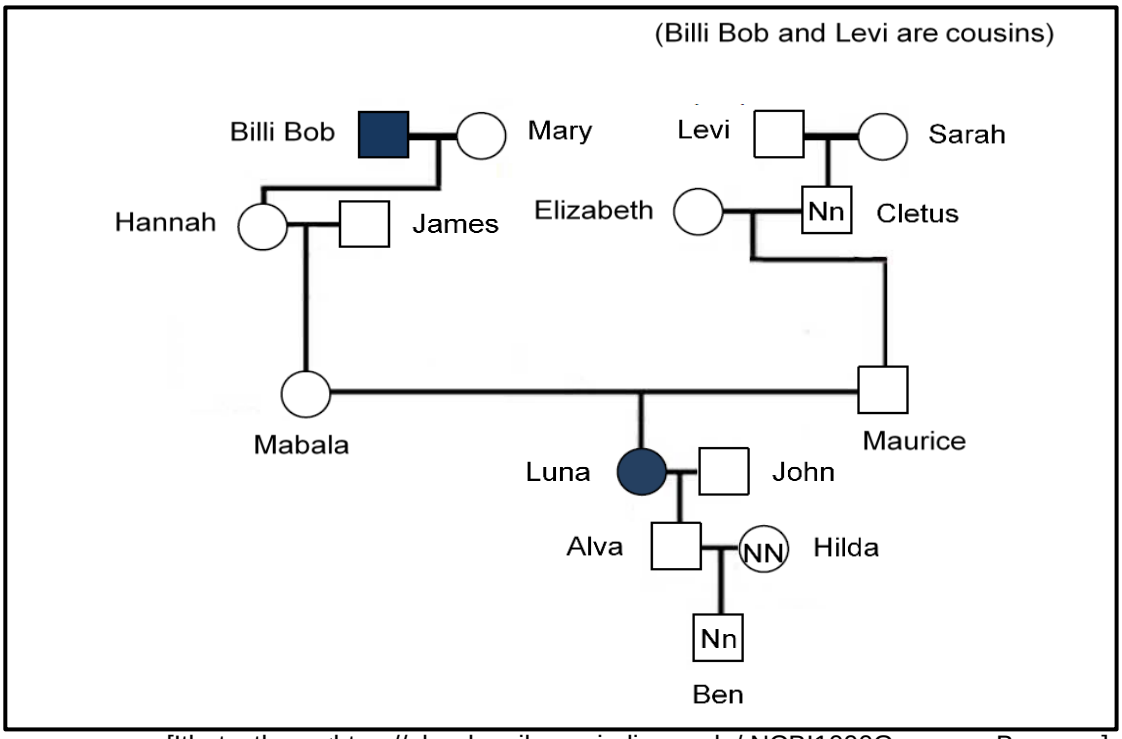
2.1.6 Yintoni iDNA base triplet zeGlycine? (2)

2.1.7 Nika iamino acid eleyibhelwe **5**. (1)

2.1.8 Cacisa ukuba icomposition yeprotein ingatshintsha njani xa ibase sequence yecodon yesibini kwimolucule 4 (ukususka ekhohlo) ibingu UUU endaweni ka AAA. (3)

2.2 I 'Blue people' yigenetic disorder eyenzeka kuba umntu engakwazi ukukhupha (produce) ienzyme etshintsha imethemoglobin (eblue) ibe yihaemoglobin ebomvu. Oku kwenza amaqondo aphezulu emethemoglobin egazini. Yenze ulusu lujike lube blue, imilebe yomlomo ibe purple negazi eli chocolate brown.

Idayagram engezantsi ibonisa amalungu osapho aneblue skin. Iigenotype zamanye amalungu osapho ziyaziwa kwaye zibonakalisiwe kwidiagram.



[Ithatyathwe <htpp://ghr.nlm.nih.gov;indiana.edu/;NCBI1000Genomes Browser.]

2.2.1 Xela uhlobo lwedayagram engentla. (1)

2.2.2 Nika i:

(a) nkangeleko (Phenotype) kaLuna (1)

(b) genes ngaphakathi (Genotype) kaHannah (1)

2.2.3 Ingaba esi sigulo senziwa yidominant okanye yirecessive allele? (1)

2.2.4 Nika isizathu sempendulo yakho ekuMBUZO 2.2.3. (2)

2.2.5 UMabala no Maurice bobabini banebala lolusu eli normal.Sebenzisa igenetic cross ubonisa ukuba ingenzeka njani into yokuba unyana wabo uLuna abe nolusu olu blue. (7)

2.3 Funda lo mhlathi ulandelayo.

Iintlanzi zase Antarctic zivelile (evolved) ukulungiselela imeko yokubasemanzini anomkhence eSouthern Ocean. Zihlala emanzini engaphantsi kuka 0º C. Ngokwesiqhelo iicell zinokukhenkcezeka kwaye zigqabhuke kweli qondo ziyibulale intlanzi. Iintlazi zase Antarctica zadivelopha iiprotein esebenza njenge sinyibikilisi mkhenkce (antifreeze). Ezi protein zinyibikilisi mkhenkce (antifreeze protein) zinceda intlanzi ukuba zingakhenkcezeki kobu bomi bazo bomkhenkce ngokukhusela ukwenzeka kwamasuntswana (ice crystals) omkhenkce kwiicell.

Ezi protein zinyibikilisi mkhenkce zingabaluleka kwezoshishino (commercially). Iingcali zesayensi zingazisebenzisa ezi antifreeze protein genes ngokudala izityalo ezikwaziyo ukumelana nengqele okanye zingasetyenziswa ekugcineni (preserve) ukutya kukwelona qondo libandayo. Zinqanda ukwenzeka kwamasuntswana omkhenkce anokonakalisa ukutya.

Abaphandi (investigators) sebephumelele ukufaka iifish antifreeze proteins kwiyeast nakwibacteria ngendlela ebizwa recombinant DNA technology. Bangazisebenzisa ezi bacteria neyeast ukuvelisa iiantifrezee ezininzi kakhulu.

2.3.1 Chaza ukuba iintlanzi zase Antarctica zayisebenzisa njani inatural selection ukudivelopha iiprotein. (5)

2.3.2 Xela iprocess apho igenetic makeup yeorganism ithi itshintshwe ngokufaka icharacteristic entsha emzimbeni weorganism leyo. (1)

2.3.3 Nika zibeMBINI iindlela ezisetyenziswe ngayo ezi antifreeze proteins kushishino ukwenza inzuzo ebantwini (2)

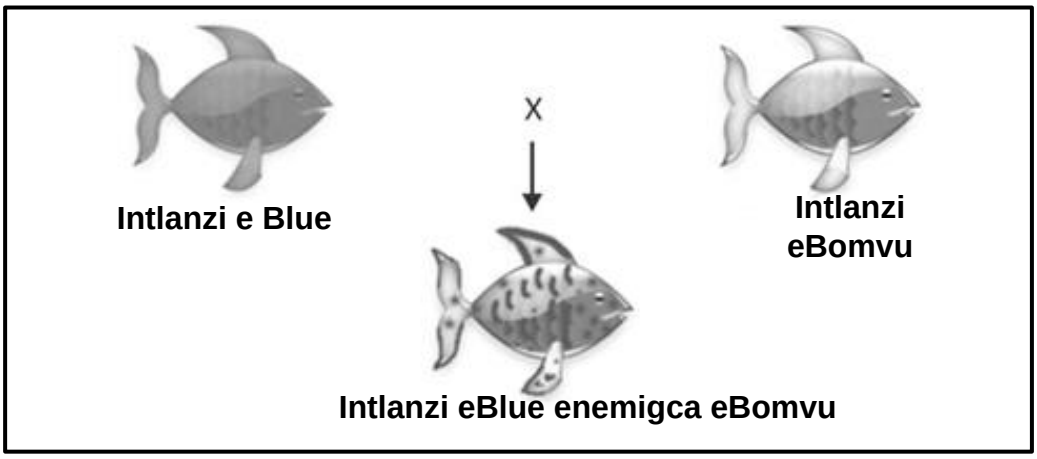
2.3.4 Ngokufutshane chaza ukuba iantifreeze protein iveliswa njani nge recommombinant DNA technology kusetyenziswa ibacteria. (5)

2.3.5 Nika isizathu sibeSINYE kutheni ukusetyenziswa kwee antifreeze protein ezityalweni sinokungamkeleki ngokwenkcubeko (ethically). (1)

[40]

UMBUZO 3

3.1 IZebra fish ineendidi zemibala. UEmihle uthenge inkunzi eblue (BB) nethokazi/ imazi ebomvu yezebra **(RR)** fish ukuze azifake kwitanki lakhe leentlanzi. Ioffspring eyazalwayo yaba blue yonke yabanemigca ebomvu.



Ethubeni, uEmihle ugqibe ekubeni abenentanki lesibini leentlanzi, apho anike iintlanzi ezimbini ezinemigca eblue nebomvu ithuba lokuba zizale (breed). Zazala iioffspring eziyi 20 zizonke ezinemibala emithathu eyahlukeneyo: blue, red no blue and red striped (imigca ebomvu).

3.1.1 Xela udidi lwedominance olubonisiwe kulo mzekelo ungasentla. (1)

3.1.2 Cacisa impendulo oyinike kumbuzo 3.1.1. (2)

3.1.3 Zoba itheybhile ebonisa inani leeoffspring zeegenotype ezahlukeneyo ezizelwe kwitanki lesibini likaEmihle. (5)

3.1.4 Zoba itheybhile ebonisa inani leeoffspring zeegenotype ezahlukeneyo ezizelwe kwitanki lesibini likaEmihle. (2)

3.2 Funda lo mhlathi ulandelayo.

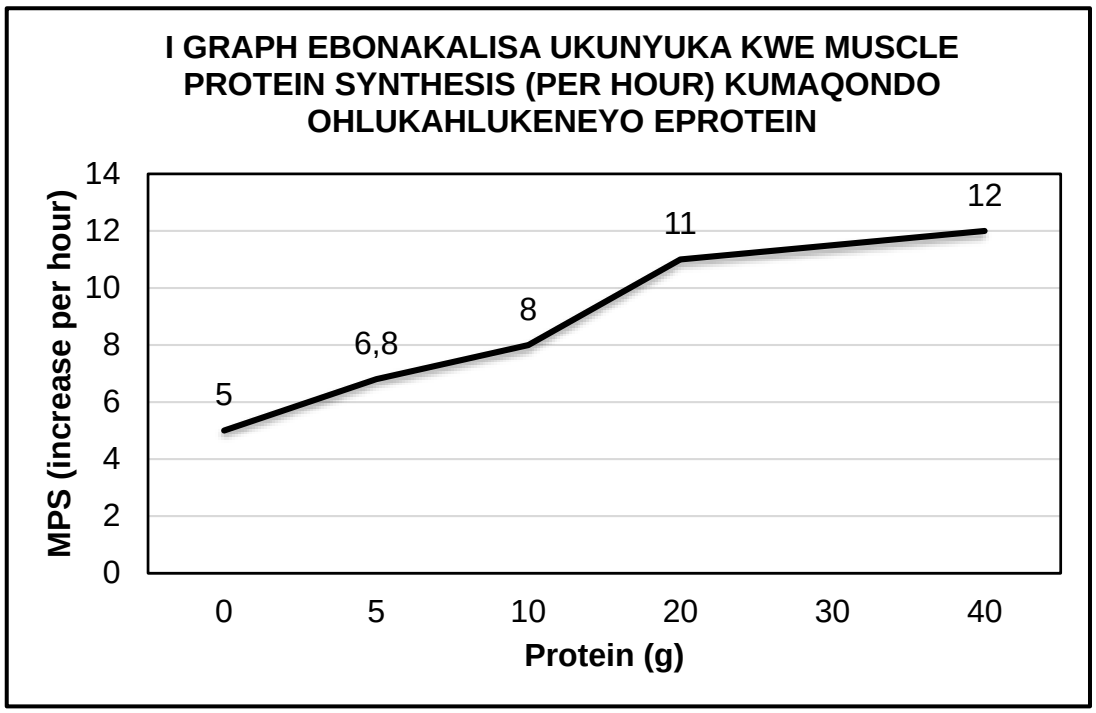
Iimbaleki ezininzi kumele ziziqeqeshe kanzima ukwakha izihlunu (muscles). Isihlunu yiprotein, ngako oko zenziwa ngenkqubo ebizwa ngokuba yi protein synthesis. Iimbaleki kufanele ukuba zitye, ziziqeqeshe, ukuqinisekisa amaqondo aphezulu eMuscle Protein Synthesis (MPS). Zisoloko zifuna ukwazi ukuba ingakanani iprotein emaziyitye ukwakha izihlunu.

Iingcali ziqhube uphando ukuqonda ukuba lingakanani iqondo le protein (ngee gram) emayityiwe imihla ngemihla ukuqinisekisa iqondo eliphezulu le Muscle Protein Synthesis.

Uphando luqhutywe ngolu hlobo:

- Basebenzise iibodybuilder eziyi 100 ukuqhuba uphando.
- Zonke iibodybuilder zinikwe i weightlifting exercise programme efanayo yemihla ngemihla.
- Zonke iimbhaleki zityiswe ukutya okunomlinganiselo weprotein ngoko nangoko xa zigqiba kuziqeqesha.
- I MPS yazo irhekhodishiwe (recorded) emva kweeyure eziyi 4 beziqeqeshile.

I graph engezantsi ibonisa iziphumo zophando. Iziphumo bezifana nezinye ezimbini ezifumaneke kuphando obeluqhutywa zezinye iingcali.



Isigqibo ezifikelele kuso iingcali simi ngolu hlobo:
I 20 g lelona qondo liphezulu leprotein elifunekayo ukunyusa i Muscle Protein Synthesis ibekwiqondo eliphezulu.

3.2.1 Xela:

(a) I dependent variable (1)

(b) I independent variable (1)

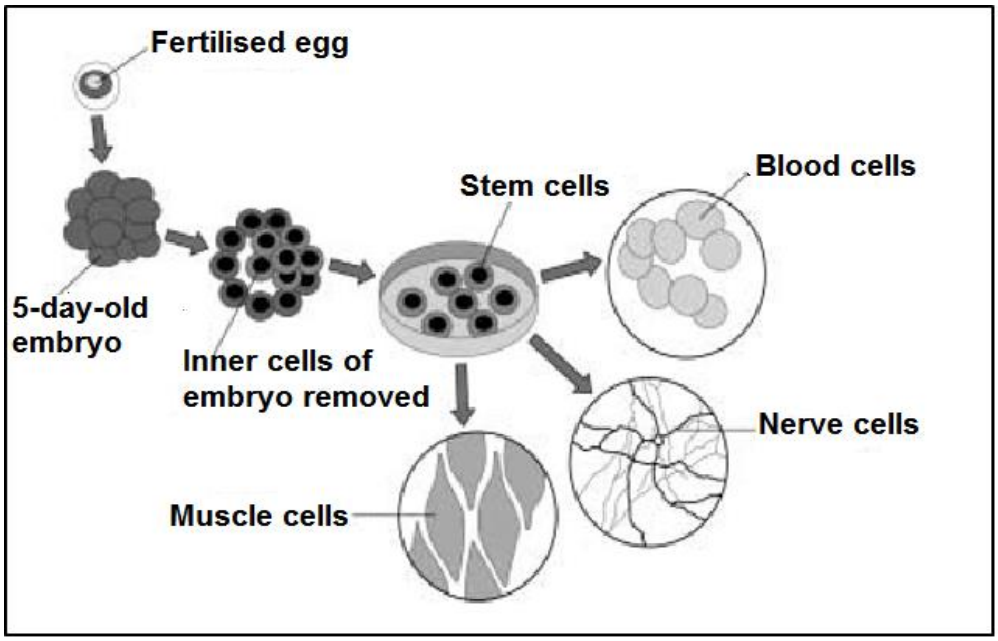
3.2.2 Nika amanqanaba ezicwangciso (planning steps) amaBINI ebekufanele ukuba abantu abaqhuba olu phando bawalandele. (2)

3.2.3 Nika izizathu ezikhokelele ekubeni olu phando kuthiwe luthembekile (reliable). (2)

3.2.4 Bala ipercentage increase ye MPS ukusuka ku 20 g ukuya ku 40 g. (2)

3.2.5 Ngokusebenzisa idatha enikiweyo xela ukuba kutheni iingcali zigqibe ekubeni i 20g yeprotein lelona qondo liphezulu elifunekayo ukunyusa i Muscle Protein Synthesis imihla ngemihla. (2)

3.3 Idayagram ibonisa indlela ekhethekileyo yokuvelisa (produce) iistem cell ngokusebenzisa ii embryo zomntu.



3.3.1 Zintoni *iistem cell*? (2)

3.3.2 Nika izinto eZIMBINI ezinokuvelisa iistem cell ngaphandle kokusebenzisa ii embryo zomntu. (2)

3.3.3 Nika isigulo esiNYE esinokuyangwa ngokusebenzisa iinerve Cell ezifumaneke ngokusebenzisa iistem cell. (1)

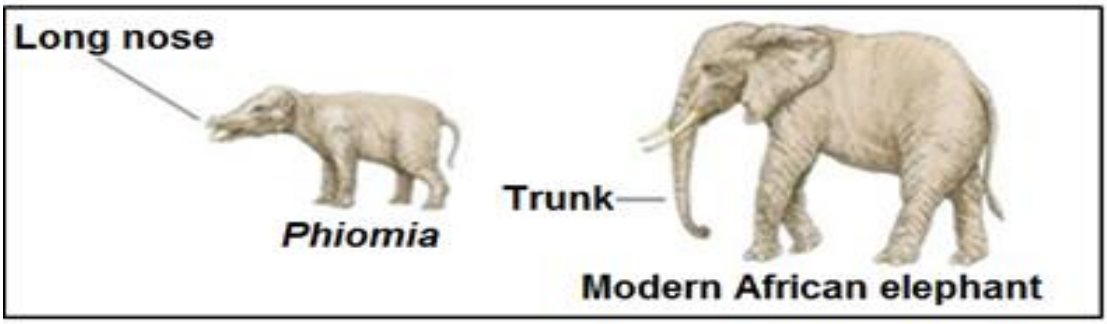
3.4 Uhlobo lwegazi (blood type) lomntu ngumzekelo we multiple alleles.

3.4.1 Kutheni iblood type ingumzekelo we multiple alleles? (2)

3.4.2 Nika igenotype yendoda engu blood type B. (2)

3.4.3 Ukuba indoda ingu blood group B aze umfazi abengu blood group A. Cacisa ukuba inokwenzeka njani into yokuba babenomntwana ongu blood type O. (UNGAYIZOBI igenetic dayagram)**.** (3)

3.5 Idiagram engezantsi ibonisa iPhiomia, ukhokho weendlovu, nendlovu yase Afrika yexesha elimiyo (modern African elephant). IPhiomia yaphila iminyaka eyi 35million eyadlulayo. Zombini iPhiomia ne morden African Elephant ziyafikelela emithini ze zifumane amagqabi zitye.



3.5.1 Cacisa kuba uJean-Baptiste Lamarck uyicacisa njani indlela owakhula ngayo umboko wemorden Africa elephant? (5)

3.5.2 Nika izizathu zibeZIBINI ukuba kutheni itheory ka Lamarck ingamkelekanga kule mihla yangoku. (2)

3.5.3 Nika into ibeNYE efanayo phakathi kwetheory kaLamarck netheory ka Darwin ye natural selection. (1)

[40]

AMANQAKU ECANDELO B: 80

ICANDELO C

UMBUZO 4

Tyatyadula uchaze i composition ye karyotype yomntu. Phinda kwakhona ucacise unika nezizathu zokuba kutheni i meiosis ibalulekile uze ucacise kananjalo ukuba i non-disjunction eyenzeka ngexesha le meiosis imchaphazela (affect) njani umntu.

Ikhontenti: (17)
Isinthesis: (3)

QAPHELA: AKUKHO manqaku ayakufumaneka xa iimpedulo ziyi flow chart, i table okanye i diagram**.**

AMANQAKU ECANDELO C: 20
EWONKE AMANQAKU: 150