



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

**LIFE SCIENCES P2
FEBRUARY/MARCH 2018**

MARKS: 150

TIME: 2½ hours

This question paper consists of 16 pages.

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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. Do ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables or flow charts 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.

SECTION A**QUESTION 1**

1.1 Various options are provided 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 1.1.9) in the ANSWER BOOK, for example 1.1.10 D.

1.1.1 A molecule of RNA is copied from DNA by the process of ...

- A transcription.
- B mitosis.
- C mutation.
- D translation.

1.1.2 Evidence supporting the evolution theory is obtained by studying the structure of vertebrate forelimbs.

This type of evidence for evolution is best described as ...

- A biogeography.
- B modification by descent.
- C DNA evidence.
- D genetic evidence.

1.1.3 What is the percentage chance of a woman having a female child?

- A 25%
- B 100%
- C 50%
- D 75%

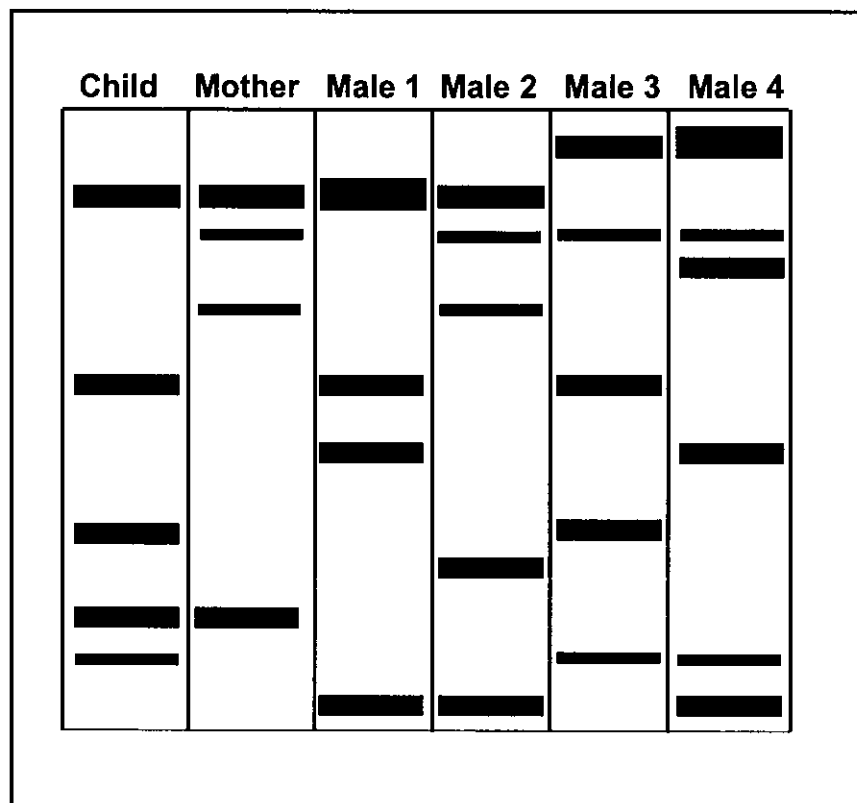
1.1.4 A small section of mRNA has the following sequence of bases that codes for different amino acids:

G C U C G U U A A

Which ONE of the following is the CORRECT representation of the anticodons and number of amino acids coded for by this section?

	ANTICODONS	NUMBER OF AMINO ACIDS
A	CGA GCA AUU	9
B	CGA GCA AUU	3
C	CGA GCA ATT	9
D	CGA GCA ATT	3

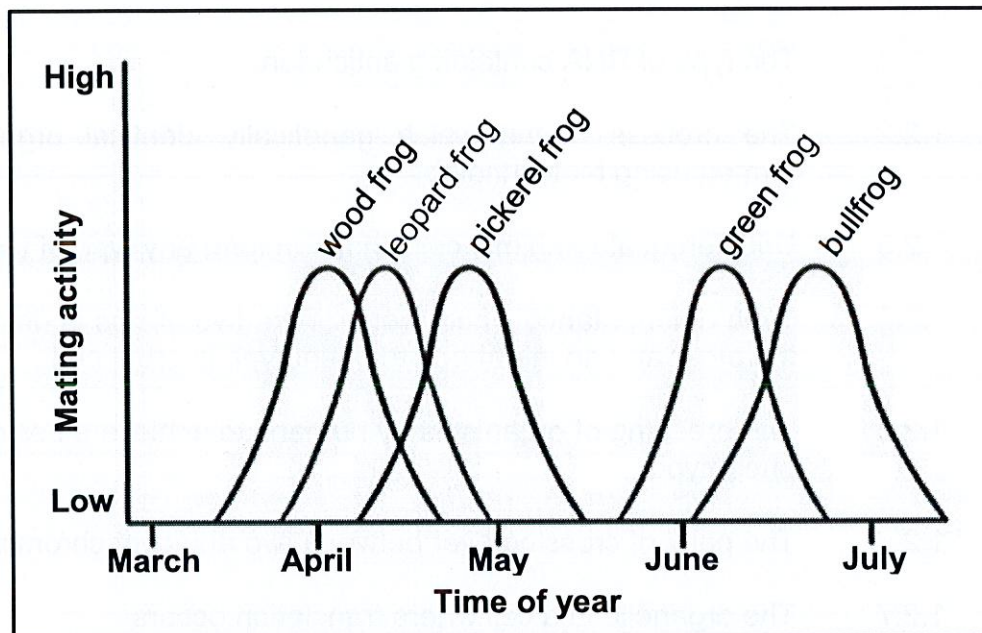
- 1.1.5 If a recessive allele on the X-chromosome is passed on to the offspring it is an example of ...
- A sex-linked inheritance.
B incomplete dominance.
C multiple alleles.
D co-dominance.
- 1.1.6 The diagram below shows the DNA profiles of a child, her mother and four males. There is uncertainty about who the biological father is. To establish paternity, DNA profiling was conducted.



Which male is the biological father of this child?

- A Male 1
B Male 2
C Male 3
D Male 4
- 1.1.7 Which ONE of the following is the correct genus and scientist for the discovery of the 'Taung Child' fossil?
- A *Ardipithecus*; Raymond Dart
B *Ardipithecus*; Tim White
C *Australopithecus*; Raymond Dart
D *Australopithecus*; Tim White

- 1.1.8 Different frogs, which all belong to the genus *Lithobates*, are found in the same forest. The graph below shows their mating activity.



Based on the information, what kind of isolating mechanism is most likely keeping the bullfrogs and wood frogs as separate species?

- A Geographic isolation through the presence of geographic barriers
 - B Reproductive isolation through species-specific courtship behaviour
 - C Reproductive isolation through breeding at different times of the year
 - D Reproductive isolation through the production of infertile offspring
- 1.1.9 Which ONE of the following statements is CORRECT for the 'Out of Africa' hypothesis?
- A All modern humans originated in Africa and migrated to other parts of the world.
 - B All modern humans evolved from African apes and then migrated to other parts of the world.
 - C The most developed artefacts (tools; cutlery; art) were found in Africa.
 - D An analysis of mutations on the mitochondrial DNA shows that the oldest male ancestors were located in Africa. (9 x 2)

(18)

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 1.2.8) in the ANSWER BOOK.

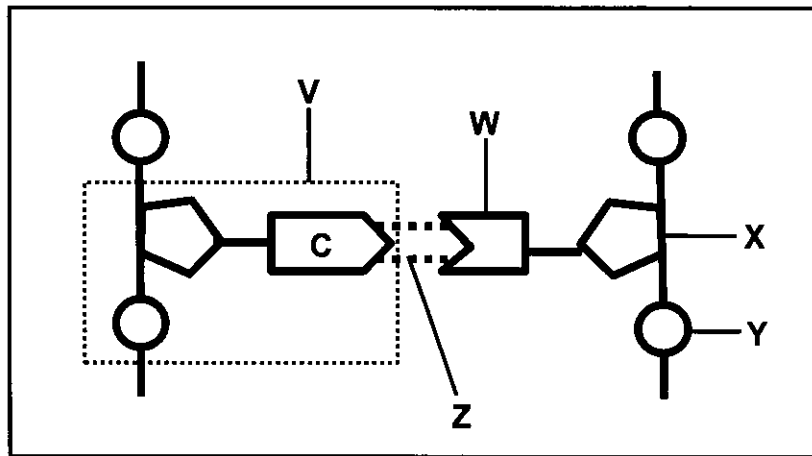
- 1.2.1 The type of RNA containing anticodons
- 1.2.2 The process during which genetically identical organisms are formed using biotechnology
- 1.2.3 Undifferentiated animal cells that can form any type of tissue
- 1.2.4 Type of inheritance where none of the two alleles is dominant over the other and an intermediate phenotype is produced
- 1.2.5 The breeding of organisms by humans to achieve a desirable phenotype
- 1.2.6 The point of crossing over between two adjacent chromosomes
- 1.2.7 The organelle in a cell where translation occurs
- 1.2.8 The variety of living organisms on Earth (8 x 1) **(8)**

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 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	Contains the sugar ribose	A:	DNA
		B:	RNA
1.3.2	Chromosomes align at the equator	A:	Metaphase I
		B:	Metaphase II
1.3.3	Produced the first X-ray image of the DNA molecule	A:	Rosalind Franklin
		B:	Watson and Crick

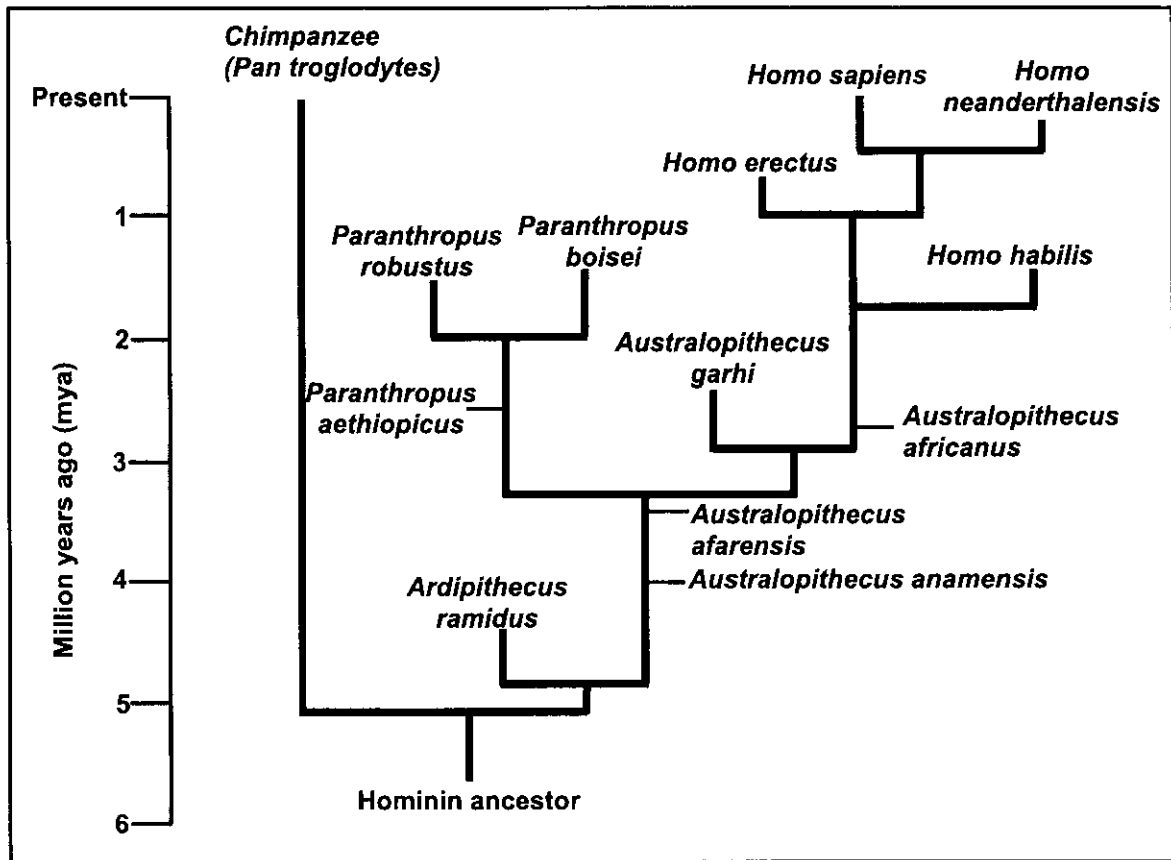
(3 x 2) **(6)**

1.4 The diagram represents a portion of a nucleic acid.



- 1.4.1 Name the nucleic acid. (1)
- 1.4.2 Name TWO places in animal cells where this nucleic acid may be found. (2)
- 1.4.3 Identify:
- (a) Portion **V** (1)
- (b) Nitrogenous base **W** (1)
- (c) Molecule **Y** (1)
- (d) Bond **Z** (1)
- 1.4.4 What is the natural shape of this molecule? (1)
- 1.4.5 Name the process during which this molecule makes a copy of itself. (1)
- (9)

1.5 The diagram below shows possible evolutionary relationships among some hominids.



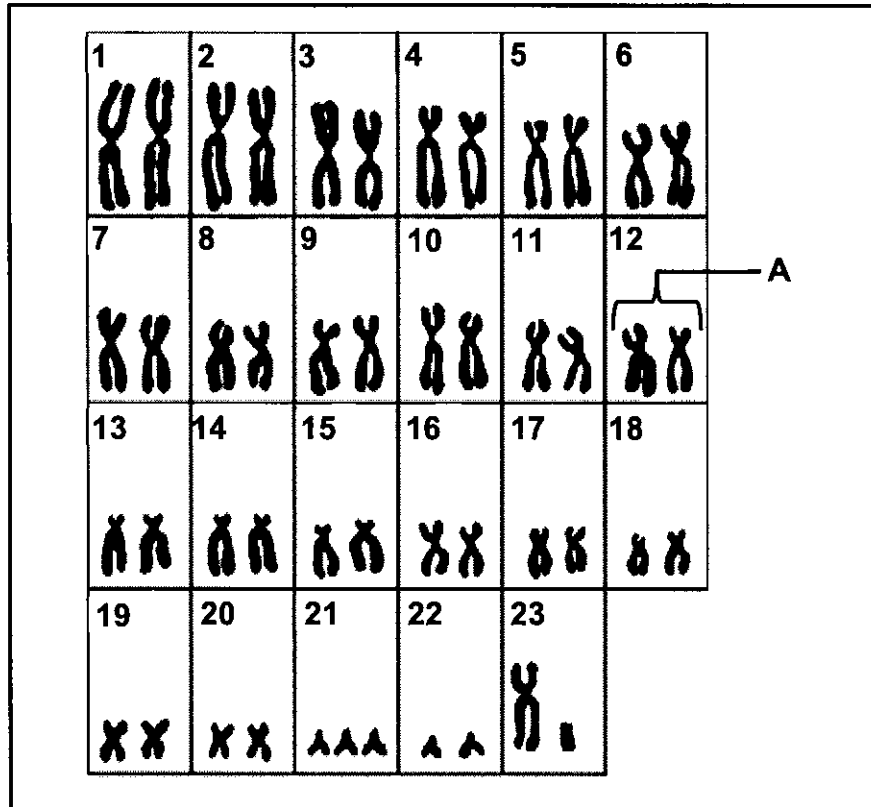
- 1.5.1 What is this type of diagram called? (1)
- 1.5.2 How many of EACH of the following are represented in the diagram:
- (a) Genera (1)
 - (b) *Homo* species (1)
- 1.5.3 Name the species that have *Paranthropus aethiopicus* as a common ancestor. (2)
- 1.5.4 When did:
- (a) *Ardipithecus ramidus* become extinct (1)
 - (b) *Homo erectus* first appear (1)
- 1.5.5 Name the:
- (a) Hominid species that existed at the same time as *Homo sapiens* (1)
 - (b) First *Homo* species to use tools (1)

(9)

TOTAL SECTION A: 50

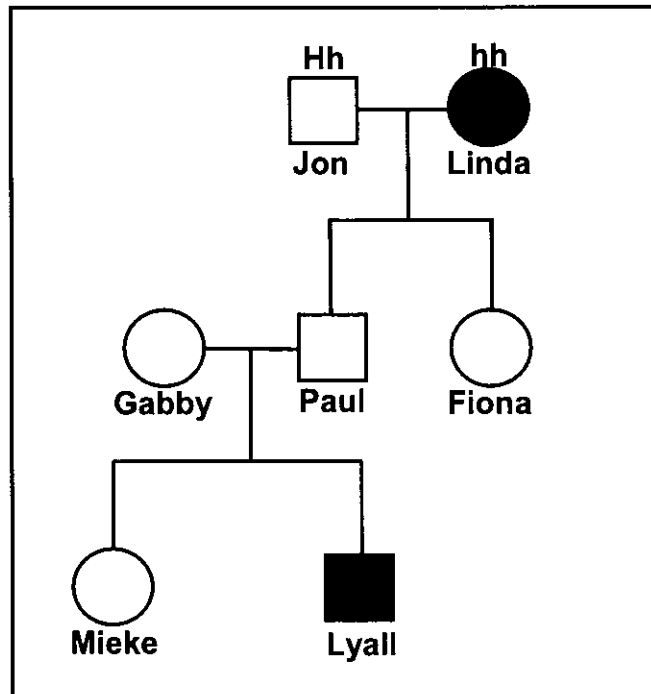
SECTION B**QUESTION 2**

- 2.1 The karyotype below shows the chromosomes of a person with Down syndrome.



- 2.1.1 Give the label for A. (1)
- 2.1.2 How many autosomes are there in a nucleus of this cell? (1)
- 2.1.3 Name the type of chromosomes at position 23. (1)
- 2.1.4 What evidence suggests that this is a karyotype of a male? (1)
- 2.1.5 Name the type of mutation represented in the diagram. (1)
- 2.1.6 Describe the events that led to Down syndrome. (6)
(11)

2.2 The diagram below shows the pattern of inheritance of deafness in a family. The letter **H** represents the allele for hearing and **h** represents the allele for deafness.



2.2.1 How many of EACH of the following are represented in this diagram?

- (a) Males (1)
- (b) Generations (1)

2.2.2 Give the:

- (a) Phenotype of Jon (1)
- (b) Genotype of Paul (1)

2.2.3 Both Lyall's parents can hear, yet he is deaf.

Explain how he inherited deafness. (2)

2.2.4 Lyall marries a woman who is homozygous dominant for hearing. Use a genetic cross to show the percentage chance of them having a deaf child.

(7)
(13)

2.3 The extract below is about human evolution.

In 2004 scientists in Indonesia discovered the first fossil of the species *Homo floresiensis* along with stone tools and animal remains. The fossil was made up of a nearly complete skull and skeleton, including hand and foot bones and a pelvis.

Dating of the tools suggests that *H. floresiensis* may have lived from as early as 95 000 years ago until about 12 000 years ago.

Researchers closely analysed three wrist bones and found that they more closely resembled those of apes than modern humans. This finding implied that *H. floresiensis* was indeed a separate species from modern humans.

They had skulls that resembled early *Homo* species. This included a flat forehead and a short, flat face; however, their teeth and jaws more closely resembled *Australopithecus*.

The scans of the skull suggested that the brain volume of *H. floresiensis* was about 426 cm³; around one-third the size of the modern human brain which has an average volume of about 1 300 cm³. The findings suggested that *H. erectus* may be the ancestor of *H. floresiensis*, as *H. erectus* had brains about 860 cm³ in size or, alternatively, it may have evolved from *H. habilis*, whose brains were about 600 cm³ in size.

- 2.3.1 Name the TWO lines of evidence for human evolution that is referred to in the extract above. (2)
- 2.3.2 How long did *Homo floresiensis* exist on Earth? (1)
- 2.3.3 Name ONE *Homo* ancestor mentioned in the extract. (1)
- 2.3.4 State THREE features of the jaw of *H. floresiensis* that might have led scientists to believe that it resembled that of *Australopithecus*, rather than of a *Homo* species. (3)
- 2.3.5 Describe ONE feature of the skull that can be used as evidence for bipedalism. (2)
- 2.3.6 State TWO similarities between the hands of African apes and modern humans. (2)
- 2.3.7 Draw a table to show the brain volumes of the different *Homo* species, using information from the extract. (5)
- (16)**
[40]

QUESTION 3

- 3.1 The table below shows the percentage of the populations with different blood groups for two countries.

BLOOD GROUP	PERCENTAGE OF POPULATION	
	COUNTRY Q	COUNTRY R
O	40	20
A	10	35
B	45	40
AB	5	5

- 3.1.1 Which blood group shows the greatest percentage difference between the two countries? (1)
- 3.1.2 The population size of country **Q** is 5 million people.
Calculate the number of people who have blood group **O**. Show ALL your working. (3)
- 3.1.3 Explain how the inheritance of blood group **AB** is an example of co-dominance. (2)
- 3.1.4 Explain why blood groups are considered an example of discontinuous variation. (2)
- 3.1.5 In the inheritance of blood groups, give the:
- (a) Recessive allele (1)
 - (b) Phenotype of an individual who is homozygous recessive (1)
- (10)**

3.2 Read the extract below.

The red-bellied black snake (*Pseudechis porphyriacus*) and the green tree snake (*Denderelaphis punctulatus*) are predators that sometimes feed on cane toads (*Bufo marinus*) that contain a toxin that may kill them.

The snakes consume the toads by swallowing them whole. A decrease in the average jaw size of the snakes has been observed over a period of 70 years. Some scientists believe that this may be an example of punctuated equilibrium. With this change it was also noted that the snakes could no longer swallow the large cane toads. This has resulted in an increase in the survival of the snakes.

- 3.2.1 Define *punctuated equilibrium*. (3)
- 3.2.2 What characteristic of the toad species protects it from predation? (1)
- 3.2.3 Explain how the change in jaw size helped the snakes to survive. (3)
- 3.2.4 How would Lamarck have explained the development of a small jaw size in the snakes? (4)
- (11)

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- 3.3 In a plant species two characteristics, flower colour and plant height, were studied. Each of these characteristics has two variations: flowers may be red or white in colour and the plants may be tall or short.

Plants that are heterozygous for flower colour have red flowers and plants that are homozygous recessive for plant height are short.

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

CHARACTERISTIC	DOMINANT ALLELE	RECESSIVE ALLELE
Flower colour	F	f
Plant height	H	h

- 3.3.1 What is the term given for a genetic cross involving two characteristics? (1)
- 3.3.2 Give the:
- (a) Dominant phenotype for flower colour (1)
 - (b) Recessive phenotype for plant height (1)
 - (c) Phenotype of a plant that is heterozygous for flower colour and homozygous dominant for plant height (2)
 - (d) Genotype of a white flowering, short plant (2)
- 3.3.3 State Mendel's Law of Dominance. (3)
- (10)**

3.4 Study the extract and the information provided.

An insecticide is used by farmers to control insect populations of *Plodia interpunctella* which feeds on stored grain. Farmers treat the grain with the insecticide to prevent an insect infestation.

This insecticide is extremely poisonous to certain insects, yet causes little or no harm to humans and beneficial insects.

In recent years it has been noticed that this insecticide is no longer effective in controlling insect populations of *Plodia interpunctella*.

Scientists hypothesised that insect populations that had previously been exposed to the insecticide had a higher survival rate when the grain was treated again.

In an investigation to test this hypothesis, they:

- Identified storage bins that had previously been treated with the insecticide and bins that had never been treated with the insecticide
- Collected a sample of 300 insects from each bin
- Kept each sample in a separate container of equal size and the same conditions
- Sprayed the same concentration and volume of insecticide over both containers
- Allowed 24 hours for the insecticide to take effect
- Counted the number of insects that survived in each container

The results are given in the table below:

PREVIOUS EXPOSURE TO INSECTICIDE	NUMBER OF INSECTS THAT SURVIVED
With previous exposure to insecticide	182
No previous exposure to insecticide	66

- 3.4.1 Give the:
- (a) Independent variable (1)
 - (b) Dependent variable (1)
- 3.4.2 State THREE factors that were kept constant in this investigation. (3)
- 3.4.3 Give TWO reasons why the scientists' results may not be reliable. (2)
- 3.4.4 State a conclusion for this investigation. (2)

(9)
[40]

TOTAL SECTION B: 80

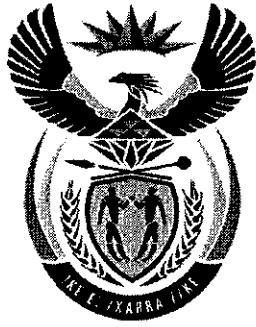
SECTION C**QUESTION 4**

Describe how a gene mutation may influence the structure of a protein. Also use ONE example to describe the role of mutations in evolution in present times.

Content: (17)
Synthesis: (3)

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

TOTAL SECTION C: 20
GRAND TOTAL: 150



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REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

**LIFE SCIENCES P2
FEBRUARY/MARCH 2018
MARKING GUIDELINES**

MARKS: 150

These marking guidelines consist of 11 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
Stop marking when maximum marks is reached and put a wavy line and 'max' in the right-hand margin.
2. **If, for example, three reasons are required and five are given**
Mark the first three irrespective of whether all or some are correct/incorrect.
3. **If whole process is given when only a part of it is required**
Read all and credit the relevant part.
4. **If comparisons are asked for, but descriptions are given**
Accept if the differences/similarities are clear.
5. **If tabulation is required, but paragraphs are given**
Candidates will lose marks for not tabulating.
6. **If diagrams are given with annotations when descriptions are required**
Candidates will lose marks.
7. **If flow charts are given instead of descriptions**
Candidates will lose marks.
8. **If sequence is muddled and links do not make sense**
Where sequence and links are correct, credit. Where sequence and links are incorrect, do not credit. If sequence and links become correct again, resume credit.
9. **Non-recognised abbreviations**
Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation, but credit the rest of the answer if correct.
10. **Wrong numbering**
If answer fits into the correct sequence of questions, but the wrong number is given, it is acceptable.
11. **If language used changes the intended meaning**
Do not accept.
12. **Spelling errors**
If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.
13. **If common names are given in terminology**
Accept, provided it was accepted at the national memo discussion meeting.
14. **If only the letter is asked for, but only the name is given (and vice versa)**
Do not credit.

15. **If units are not given in measurements**
Candidates will lose marks. Memorandum will allocate marks for units separately.
16. **Be sensitive to the sense of an answer, which may be stated in a different way.**
17. **Caption**
All illustrations (diagrams, graphs, tables, etc.) must have a caption.
18. **Code-switching of official languages (terms and concepts)**
A single word or two that appear(s) in any official language other than the learner's assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.
19. **Changes to the memorandum**
No changes must be made to the memoranda. The provincial internal moderator must be consulted, who in turn will consult with the national internal moderator (and the Umalusi moderators where necessary).
20. **Official memoranda**
Only memoranda bearing the signatures of the national internal moderator and the Umalusi moderators and distributed by the National Department of Basic Education via the provinces must be used.

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SECTION A**QUESTION 1**

1.1	1.1.1	A✓✓		
	1.1.2	B✓✓		
	1.1.3	C✓✓		
	1.1.4	B✓✓		
	1.1.5	A✓✓		
	1.1.6	C✓✓		
	1.1.7	C✓✓		
	1.1.8	C✓✓		
	1.1.9	A✓✓	(9 x 2)	(18)
1.2	1.2.1	tRNA✓/transfer RNA		
	1.2.2	Cloning✓		
	1.2.3	Stem✓cells		
	1.2.4	Incomplete dominance✓		
	1.2.5	Artificial selection✓/selective breeding		
	1.2.6	Chiasma✓		
	1.2.7	Ribosome✓		
	1.2.8	Biodiversity✓	(8 x 1)	(8)
1.3	1.3.1	B only✓✓		
	1.3.2	Both A and B✓✓		
	1.3.3	A only✓✓	(3 x 2)	(6)
1.4	1.4.1	DNA✓/Deoxyribonucleic acid		(1)
	1.4.2	Nucleus✓/chromosome Mitochondria✓		(2)
		(Mark first TWO only)		
	1.4.3	(a) Nucleotide✓		(1)
		(b) Guanine✓		(1)
		(c) Phosphate✓		(1)
		(d) Hydrogen✓ bond		(1)
	1.4.4	Double helix✓		(1)
	1.4.5	DNA replication✓		(1)
				(9)

1.5	1.5.1	Phylogenetic✓	(1)
	1.5.2	(a) 5✓ (b) 4✓	(1) (1)
	1.5.3	<i>(Paranthropus) robustus</i> ✓ and <i>(Paranthropus) boisei</i> ✓	(2)
	1.5.4	(a) Accept any value in the range 4,3 to 4,5 million years ago✓/mya (b) 1 mya✓	(1) (1)
	1.5.5	(a) <i>Homo neanderthalensis</i> ✓ (b) <i>Homo habilis</i> ✓	(1) (1) (9)

TOTAL SECTION A: 50

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SECTION B**QUESTION 2**

2.1	2.1.1	Homologous chromosomes✓	(1)
	2.1.2	45✓	(1)
	2.1.3	Gonosomes✓	(1)
	2.1.4	The presence of a Y chromosome✓/XY chromosome	(1)
	2.1.5	Chromosome✓mutation	(1)
	2.1.6	<ul style="list-style-type: none">- Non-disjunction occurred✓/A homologous pair of chromosomes failed to separate- at position 21✓- during Anaphase✓- resulting in one gamete with 24 chromosomes✓/an extra chromosome/2 chromosomes at position 21- The fertilisation of this gamete with a normal gamete✓/gamete with 23 chromosomes/1 chromosome at position 21- results in a zygote with 47 chromosomes✓- There are 3 chromosomes✓/an extra chromosome at position 21/ this is Trisomy 21	Any 6 (6) (11)

- 2.2 2.2.1 (a) 3✓ (1)
(b) 3✓ (1)
- 2.2.2 (a) Hearing✓/Normal (1)
(b) Hh✓ (1)
- 2.2.3 - Lyall inherited one recessive allele✓
- from each parent✓ (2)

2.2.4

P₁	Phenotype	Hearing	x	Deaf✓
	Genotype	HH	x	hh✓
<i>Meiosis</i>				
	G/gametes	H	x	h✓
<i>Fertilisation</i>				
F₁	Genotype	Hh	Hh	Hh
	Phenotype	All hearing✓ 0% deaf✓*		

P₁ and F₁✓
Meiosis and fertilisation✓

***1 Compulsory mark + Any 6**

OR

P₁	Phenotype	Hearing	x	Deaf ✓
	Genotype	HH	x	hh ✓

Meiosis

Fertilisation

Gametes	H	H
h	Hh	Hh
h	Hh	Hh

1 mark for correct gametes
1 mark for correct genotypes

F₁	Phenotype	All hearing✓ 0% deaf ✓*
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P₁ and F₁✓
Meiosis and fertilisation✓

***1 Compulsory mark + Any 6**

(7)
(13)

- 2.3 2.3.1 - Fossil✓/ 'the first fossil'
- Cultural✓/ 'stone tools'/'animal remains'
(Mark first TWO only) (2)
- 2.3.2 83 000 years✓ (1)
- 2.3.3 *Australopithecus*✓
(Mark first ONE only) (1)
- 2.3.4 - The jaw was more prognathous✓/protruding and
- larger✓ than in humans
- The jaw was more rectangular✓
- The palate shape was less rounded✓/U-shaped/rectangular
- The canines were larger✓
- Large spaces✓/diastema between the teeth Any 3 (3)
(Mark first THREE only)
- 2.3.5 - A more forward✓ position
- of the foramen magnum✓ (2)
(Mark first ONE only)
- 2.3.6 - Opposable thumbs✓
- Bare fingertips✓
- Nails✓ instead of claws
- Pentadactyl✓ hand Any 2 (2)
(Mark first TWO only)
- 2.3.7

HOMO SPECIES ✓	BRAIN VOLUME ✓(cm ³)
<i>H. floresiensis</i>	426
<i>H. habilis</i>	600
<i>H. erectus</i>	860
<i>H. sapiens/modern humans</i>	1300

Guideline for assessing the table

Correct table format (separation of columns)	1
Column headings	2
Data entered	1: 1 to 3 data sets correctly entered 2: All 4 data sets correctly entered

(5)
(16)
[40]

QUESTION 3

- 3.1 3.1.1 Blood group A✓ (1)
- 3.1.2 $\frac{40}{100} \times \frac{5\,000\,000}{1}$ ✓
= 2 000 000✓/2 million (3)
- 3.1.3 - The alleles I^A and I^B✓
- are equally dominant✓ (2)
- 3.1.4 - When phenotypes fit into separate or distinct categories✓
- with no intermediate phenotypes✓ (2)
- 3.1.5 (a) i✓ (1)
(b) Blood group O✓ (1)
(10)
- 3.2 3.2.1 - It is characterised by long periods of little or no change✓
- alternating with short periods of rapid change✓
- during which new species may form✓ (3)
- 3.2.2 They contain toxins✓ which kill the snakes
OR
Too large✓ to be swallowed Any 1 (1)
- 3.2.3 - Having a smaller jaw✓
- means cane toads cannot be consumed✓
- thereby protecting the snakes from ingesting the toxins✓ (3)
- 3.2.4 - Since the snakes' jaws were used less ✓/not used
- the snakes developed smaller jaws✓
- This characteristic (of a smaller jaw) was inherited by the offspring✓
- Over many generations the jaw of the snake became smaller✓ (4)
(11)

3.3	3.3.1	Dihybrid✓ cross		(1)
	3.3.2	(a) Red✓ (b) Short✓ (c) Red✓ and Tall✓ (d) ffhh✓✓		(1) (1) (2) (2)
	3.3.3	- When two organisms with pure breeding✓ - contrasting traits✓ are crossed - all the individuals of the F ₁ generation will display the dominant trait✓		
		OR		
		- If an organism is heterozygous✓ - the dominant allele✓ - will determine the phenotype✓		(3) (10)
3.4	3.4.1	(a) Exposure to insecticide✓ (b) Number of insects that survived✓/survival rate of insects		(1) (1)
	3.4.2	- Sample size✓/300 insects - Size of containers✓ - Conditions✓ - Concentration of insecticide✓ - Volume of insecticide✓ - Time period✓/24 hours (Mark first THREE only)	Any 3	(3)
	3.4.3	- They only conducted the investigation once✓/did not repeat - They used a small sample/only 300 insects✓ - They used only two storage bins✓ (Mark first TWO only)	Any 2	(2)
	3.4.4	Insects that were previously exposed to the insecticide had a higher survival rate✓✓		
		OR		
		Insects that were not previously exposed to the insecticide had a lower survival rate✓✓		(2) (9) [40]

TOTAL SECTION B: 80

SECTION C**QUESTION 4****MUTATIONS AND PROTEIN SYNTHESIS**

- A mutation is a change in the nucleotide/nitrogenous base sequence✓
- of a DNA molecule✓/a gene
- since mRNA is copied from the DNA molecule✓
- during transcription✓
- This will result in a change in the codons✓
- As a result, different tRNA✓ molecules
- carrying different amino acids✓ will be required
- The sequence of amino acids changes✓
- resulting in the formation of a different protein✓
- If the same amino acid ✓is coded for
- there will be no change✓in the protein structure

Any 9 (9)

MUTATIONS AND EVOLUTION IN PRESENT TIMES

- In a population of insects✓/bacteria/HI viruses/Galápagos' finches
- mutations are a source of variation✓
- which may make some organisms more resistant✓/better suited
- to insecticides✓/antibiotics/antiretroviral medication/ drought
- Those individuals that are not resistant/suited will die✓ whereas
- those that are resistant/ well suited, will survive✓
- to pass the resistant allele/resistance on to their offspring✓
- This is known as natural selection✓
- As a result, individuals of the future generations will be resistant to the
- insecticides✓/antibiotics/antiretroviral medication/adapted to drought

Any 8 (8)
Content (17)
Synthesis (3)
(20)**ASSESSING THE PRESENTATION OF THE ESSAY**

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
Generally	All information provided is relevant to the question.	Ideas are arranged in a logical sequence.	All aspects of the essay have been sufficiently addressed.
In this essay in Q4	Only provided information relevant to: - Mutations and protein synthesis - Mutations and evolution in present times. There is no irrelevant information.	Information on: - Mutations and protein synthesis - Mutations and evolution in present times is presented in a logical sequence	At least the following marks should be obtained: - Mutations and protein synthesis (7/9) - Mutations and evolution in present times (5/8)
Mark	1	1	1

TOTAL SECTION C: 20
GRAND TOTAL: 150

