Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

JUNE 2018

LIFE SCIENCES MARKING GUIDELINE

MARKS: **150**

This marking guideline consists of 9 pages.

SECTION A

QUESTION 1

1.1	1.1.1	B ✓✓		
	1.1.2	C ✓✓		
	1.1.3	B ✓✓		
	1.1.4	C ✓✓		
	1.1.5	D ✓✓		
	1.1.6	A ✓✓		
	1.1.7	A ✓✓		
	1.1.8	C ✓✓		
	1.1.9	B ✓✓		
	1.1.10	C ✓✓	(10 x 2)	(20)
1.2	1.2.1	Eustachian tube ✓		
	1.2.2	Retina ✓		
	1.2.3	Ganglion ✓/Ganglia		
	1.2.4	Homozygous ✓/Homozygote		
	1.2.5	Chiasma ✓/ Chiasmata		
	1.2.6	Metaphase 1 ✓		
	1.2.7	Chromatids ✓		
	1.2.8	Semen ✓		
	1.2.9	DNA profiling ✓		
	1.2.10	Centromere ✓	(10 x 1)	(10)
1.3	1.3.1	A only ✓✓		
	1.3.2	B only ✓✓		
	1.3.3	None ✓✓	(3 x 2)	(6)

1.4	1.4.1	(a)	Receptors ✓	(1)
		(b)	Grey matter ✓	(1)
	1.4.2		C ✓ – Central canal ✓	(2)
	1.4.3		E ✓/ motor neuron	(1)
1.5	1.5.1	(a)	Gamete **A/B** ✓	(1)
		(b)	Gamete **B** ✓	(1)
	1.5.2	(a)	F ✓ – Acrosome ✓	(2)
		(b)	H ✓ – Middle piece ✓/ Neck	(2)
	1.5.3	(a)	Zygote ✓	(1)
		(b)	Fertilisation ✓	(1)
	1.5.4		Gamete **A** ✓	(1)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 Anaphase 1 ✓ (1)

2.1.2 Migration of full chromosomes to opposite poles. ✓ (1)

2.1.3 (a) Homologous pair of chromosomes ✓/bivalent (1)

(b) Crossing over ✓ (1)

2.1.4 - Homologous pair separate ✓ and
- full chromosomes migrate to the opposite poles. ✓
- In this way, the halving effect of meiosis ✓
- overcomes the doubling effect of fertilisation ✓/ chromosome number is reduced to half ✓
- Thus, maintaining a constant chromosome number from generation to generation. ✓ (Max. 3) (3)

2.2 2.2.1 (a) Plant **A** – Genotype: DdEe ✓; Phenotype: Long purple ✓ (2)

(b) Plant **B** – Genotype: ddee ✓; Phenotype: Round red ✓ (2)

2.2.2 (a) Plant **A** – 4 ✓ types (1)

(b) Plant **B** – 1 ✓ type (1)

2.2.3 (a) DE; De; dE; de ✓✓ (2)

(b) de ✓ (1)

2.3 2.3.1 Short-sightedness ✓/ Myopia (1)

2.3.2 The image falls in front of the retina. ✓ (1)

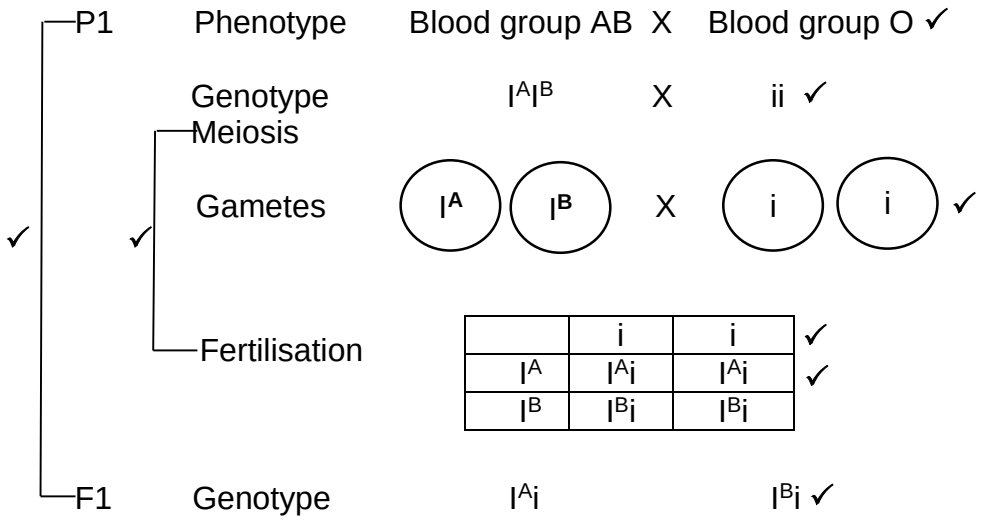
2.3.3
- The eyeball being too long ✓
- The inability of the lens of the eye to become flat enough ✓ (less convex)
- Hence, the image of distant object is not clearly focused on the retina ✓ / The best image is formed in front of the retina. (3)

2.3.4 Person affected cannot see distant objects clearly. ✓ (1)

2.3.5 By wearing glasses with concave lenses. ✓ (1)

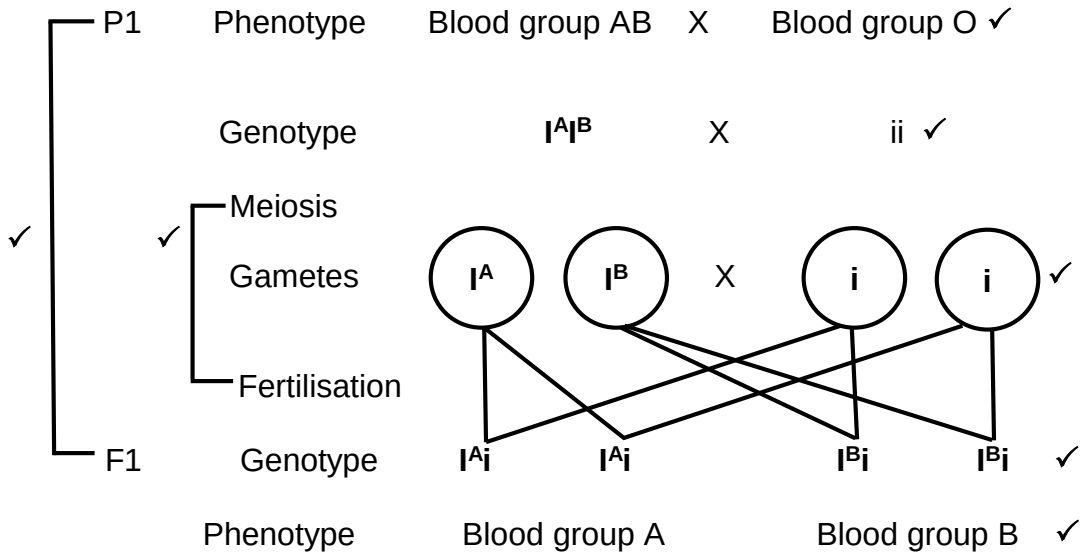
2.3.6 - When the optic nerve is damaged, the transmission of impulses ✓
- to the cerebral cortex/cerebrum ✓ is reduced or completely halted ✓
- hence, image formed on the retina is not interpreted. ✓ (Any 3) (3)

2.4



(Any 6) (6)

OR



2.5 2.5.1 27 ✓ days (1)

2.5.2 12th ✓day of the cycle. (1)

2.5.3 The concentration of LH had reached its highest level on that day. ✓ (1)

2.5.4
- The progesterone levels are very low. ✓
- Oestrogen levels are very low. ✓
- FSH is high. ✓ (3)

2.5.5
- When the concentration levels of FSH is high, ✓ the concentration of progesterone is low. ✓

OR

- When the concentration levels of progesterone is high, ✓ the concentration of FSH is low. ✓ (2)

[40]

QUESTION 3

3.1 3.1.1 100 ✓ Women (1)

3.1.2 (a) Age of women ✓ (1)

(b) Percentage / incidence of miscarriage ✓ (1)

3.1.3 The older the woman, ✓ the higher the chances of having a miscarriage. ✓ (2)

3.1.4 - By taking larger samples. ✓
- Repeat the investigation in different population areas. ✓ (2)

3.1.5 50% x 20 ✓ = 10 ✓

OR

$\frac{50}{100} \times 20$ ✓ $= 10$ ✓ (2)

3.2 3.2.1 2 ✓ (1)

3.2.2 (a) X^HX^h ✓✓ (2)

(b) X^hX^h ✓✓ (2)

3.2.3 - Since the allele is found only on the X-chromosome ✓
- a male only has one allele ✓
- that is either dominant (normal) or ✓
- recessive (colour blind) ✓
- and therefore will always be colour blind ✓ (if recessive allele inherited) (Max. 4) (4)

3.2.4 100% ✓✓ (2)

3.3 3.3.1 B – Tympanic membrane ✓
D – Semi-circular canal ✓
F – Cochlea ✓ (3)

3.3.2 C – amplifies sound vibration ✓ / transmits sound vibration from outer ear to inner ear. (1)

3.3.3 F ✓ (1)

3.3.4 - Mucus will block the opening of the eustachian tube ✓
- Air cannot enter or leave the middle ear ✓
- to equalise pressure / causing imbalance in pressure ✓

OR

- Mucus may move through the eustachian tube ✓
- causing pressure in the middle ear ✓
- pushing on the tympanic membrane / part B. ✓ (3)

3.3.5 - The sensory impulses ✓
- from the cristae and maculae ✓
- will not be transmitted to the cerebellum ✓
- and therefore, maintenance of balance will be compromised. ✓
(Max. 2)

OR

- The sensory impulses ✓
- from the organ of Corti ✓
- will not be conveyed to cerebral cortex/cerebrum ✓ for interpretation
- and therefore, no hearing is possible. ✓
(Max. 2) (2)

3.4 3.4.1 (a) **Cloning:**
- Process by which genetically identical individuals are formed.✓ (1)

(b) **Stem cells:**
- Are undifferentiated or unspecialised cells ✓ which can give rise to any of the other cells of the same organism. ✓ (Any 1) (1)

3.4.2 (a) - Molecular cloning ✓
- Cell cloning ✓
- Organism cloning ✓ (3)

(b) - Embryos ✓
- Blood from placenta and umbilical cord ✓ (Any 1) (1)

3.4.3 - In order to increase the productivity and profit ✓ animals that produce large amounts of milk are carefully selected and cloned ✓/ high yield of milk.
- Hence the quality of herd is improved faster ✓ than the traditional way of breeding. (Max. 2) (2)

3.4.4 - Embryos are cloned in order to maintain a steady supply of stem cells for research purpose. ✓
- This enables researchers and research institutions to be self-sufficient in terms of the availability of stem cells. ✓ (2)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Protein synthesis

Transcription ✓

- DNA double helix unwinds ✓
- weak hydrogen bonds of DNA break ✓
- forming two single strands of DNA ✓
- One strand acts as template ✓
- to form a complementary strand which is mRNA ✓/ (A – U; G – C)
- using free RNA nucleotides from the nucleoplasm ✓
- Three adjacent bases on mRNA make up a codon ✓
- which codes for an amino acid. ✓
- mRNA moves out of the nucleus ✓
- through the nuclear pore ✓
- into the cytoplasm ✓
- where it attaches to a ribosome ✓ (Max. 7) (7)

Translation ✓

- according to the codons of mRNA ✓
- t-RNA molecules with complementary anticodons ✓
- bring the required amino acids to the ribosome ✓
- The amino acids link together by peptide bond ✓
- to form the required proteins. ✓ (Max. 4) (4)

DNA replication ✓

- DNA double helix unwinds ✓
- weak hydrogen bonds between nitrogenous bases break ✓
- and the two DNA strands unzip/separate ✓
- Each original DNA strand serves as template to form a new strand ✓
- by attaching to free nucleotides from nucleoplasm ✓
- to form complementary strands ✓
- Each DNA molecule now consists of one original strand and one new strand. ✓
- The result is two genetically identical DNA molecules. ✓ (Max. 6) (6)

Assessing the presentation of the essay

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
Generally	All information provided is relevant to the topic.	Ideas are arranged in a logical / cause-effect sequence.	All aspects required by the essay have been sufficiently addressed.
In this essay	Only information relevant to the protein synthesis and DNA replication is provided. There is no irrelevant information.	All information regarding protein synthesis (Transcription and translation) and DNA replication described in a logical manner.	At least the following marks should be obtained for each of the following: - Transcription – **4/7** - Translation – **3/4** - DNA replication – **4/6**
Mark	**1**	**1**	**1**

Content: (17)
Synthesis: (3)

TOTAL SECTION C: 20
GRAND TOTAL: 150