



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

JUNE EXAMINATION 2016

**LIFE SCIENCES
MEMORANDUM**

MARKS: 150

This memorandum consists 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 write '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 provincial 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 learners' 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 without consulting the provincial internal moderator.

SECTION A**QUESTION 1**

- 1.1 1.1.1 A ✓✓
 1.1.2 D ✓✓
 1.1.3 C ✓✓
 1.1.4 B ✓✓
 1.1.5 C ✓✓
 1.1.6 C ✓✓
 1.1.7 D ✓✓
 1.1.8 B ✓✓
 1.1.9 B ✓✓ (9 x 2) (18)
- 1.2 1.2.1 Cataract ✓
 1.2.2 Cristae ✓
 1.2.3 Alleles ✓
 1.2.4 Stem cells ✓
 1.2.5 Auxin ✓
 1.2.6 Pituitary gland / Hypophysis ✓
 1.2.7 Leydig cells ✓ / Interstitial cells (7 x 1) (7)
- 1.3 1.3.1 A only ✓✓
 1.3.2 A only ✓✓
 1.3.3 None ✓✓
 1.3.4 A only ✓✓
 1.3.5 B only ✓✓
 1.3.6 A only ✓✓ (6 x 2) (12)
- 1.4 1.4.1 (a) Grey hair with red eyes ✓
 (b) White hair with black eyes ✓
 (c) White hair with red eyes ✓
 (d) Grey hair with black eyes ✓ (4)
- 1.4.2 (a) 8 ✓
 (b) 8 ✓
 (c) 0 ✓
 (d) 0 ✓ (4)
- 1.5 1.5.1 (a) Increases ✓
 (b) Pituitary gland/Hypophysis ✓
 (c) Anti-diuretic hormone (ADH) ✓
 (d) The collecting duct ✓
 (e) More ✓ (5)

TOTAL SECTION A: 50

SECTION B**QUESTION 2**

- 2.1 2.1.1 Figure 1 – DNA replication ✓
Figure 2 – Transcription ✓ (2)
- 2.1.2 DNA replication ✓ (1)
- 2.1.3
- The genetic material in the mother cell ✓
 - will not be equally distributed between daughter cells ✓
 - this will lead to the formation of abnormal cells ✓
 - causing physiological disorders such as cancer ✓
- (Any 2 x 1) (2)
- 2.1.4 Mutation ✓ (1)
- 2.1.5
- Continuous exposure to X-rays ✓ / Cosmic rays ✓ / UV rays ✓
 - Consumption of carcinogenic food ✓
 - Exposure to radio-active materials ✓
- (Any 2 x 1) (2)
- 2.1.6
- 1 – GTC ✓
 - 2 – GTG ✓
 - 3 – CAC ✓
 - 4 – CAG ✓
 - 5 – CAC ✓
 - 6 – GUG ✓
- (6)
- 2.1.7
- Since only a small piece of DNA is analysed, a DNA profile may not be unique to an individual ✓
 - DNA profiling performed in private laboratories may not follow uniform testing standards and quality controls ✓
 - Since human beings must interpret the test, human error could lead to false results ✓
- (Any 2 x 1) (2)
- 2.1.8 Human hair, ✓ nail, blood, ✓ semen, ✓ skin or human flesh ✓
(Any 2 x 1) (2)
- 2.2 2.2.1 Cloning (1)
- 2.2.2
- Remove an ovum from sheep B ✓
 - Remove the haploid ✓ nucleus ✓ of this ovum in the laboratory using micro-surgery
 - Remove an actively dividing somatic ✓ cell from sheep A of the same species ✓
 - Extract the diploid ✓ nucleus from the somatic cell using micro-surgery
 - The diploid nucleus of sheep A is inserted into the ovum of sheep B ✓
 - The ovum behaves like a fertilised egg ✓
 - The manipulated or 'fertilised ovum' is then placed in the uterus of sheep C for further development ✓
 - A new individual is born (x) and is called a clone of sheep A ✓
- (Any 5 x 1) (5)

- 2.2.3 Sheep A ✓ (1)
- 2.2.4
- This technique involves no natural fusion of male and female gametes ✓
 - Therefore there is no variation in the offspring ✓
 - The offspring **X** receives its genetic material only from sheep A ✓
 - Therefore, the new offspring (**X**) will be phenotypically and genotypically identical to sheep A ✓ (Any 2 x 1) (2)
- 2.3 2.3.1 Blood alcohol concentration ✓/ alcohol level (1)
- 2.3.2 Reaction time of a person measured when the blood has no alcohol content. ✓ (1)
- 2.3.3 (a)
- Use same type/same strength/brand of alcohol ✓
 - Same type of food consumed before the test ✓
 - Same amount of food/no food consumed before the test ✓
 - Same age group ✓
 - People with the same body mass/size ✓
 - Same gender (any other relevant answers) ✓ (Any 2 x 1) (2)
- (b)
- Repeat the experiment several times and take the average ✓
 - Use larger sample size ✓ (2)
- 2.3.4 A – Cerebrum ✓
B – Cerebellum ✓ (2)
- 2.3.5
- Consumption of alcohol slows down one's reflexes ✓ and ability in decision making ✓
 - The more you drink, the higher your alcohol level in the blood and the stronger the effect of alcohol, hence:
 - Slowing down the transmission of impulses from the eye to the cerebrum ✓ therefore, the ability to see fine details in object is hampered
 - Slowing down the transmission of impulses from the vision centre to the decision making centre of the cerebrum ✓ resulting in a delay in the decision making process ✓
 - Slowing down the transmission of impulses from the decision making centre to the effector ✓ causing a delay in the application of the braking system ✓
 - The proper functioning of cerebellum is also affected ✓ and therefore, the ability to balance the body is adversely affected ✓

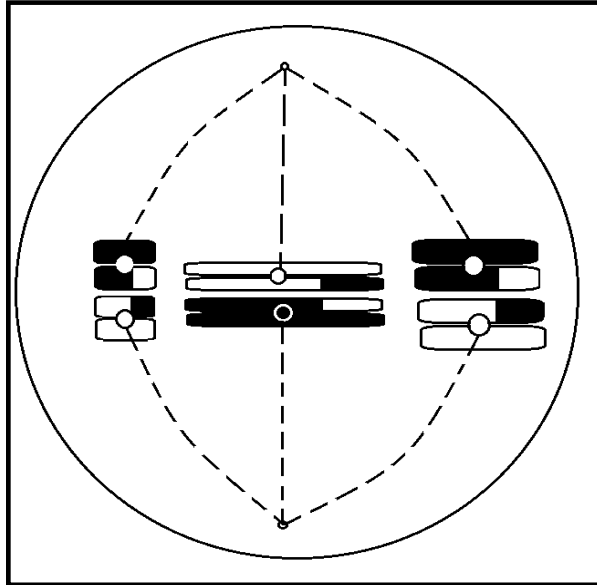
(5)
[40]

QUESTION 3

- 3.1 3.1.1 (a) Graaffian follicle ✓
(b) Corpus luteum ✓ (2)
- 3.1.2 (a) As the level of oestrogen rises the endometrium of the uterus becomes more vascular ✓ and thicker ✓ (2)
(b) A drop in the level of progesterone leads to the degeneration ✓ of the endometrium and eventually causes menstruation ✓ (2)
- 3.1.3 Confirmation of pregnancy or conception ✓ (implantation of fertilised egg) (1)
- 3.1.4 • The insertion of IUD in the uterus only prevents the implantation and further development of fertilised egg. (it is used as a contraceptive device) ✓
• It does not prevent the secretion and functioning of female hormones and subsequent processes ✓ (2)
- 3.2 3.2.1 (a) Placenta ✓
(b) Umbilical cord ✓
(c) Amniotic fluid ✓ (3)
- 3.2.2 • The premature breaking of amnion causes drainage of amniotic fluid causing:
➤ Quicker dehydration of the foetus ✓
➤ Temperature variations ✓
➤ No free foetal movement ✓
➤ No protection from mechanical injury due to shock or turbulence ✓ (Any 3 x 1) (3)
- 3.2.3 Placenta ✓ / A (1)
- 3.2.4 • As the foetus develops, blood filled spaces called maternal sinuses develop ✓
• The chorionic villi extend into these sinuses ✓
• The blood of foetus and that of the mother are very close to each other but do not mix because they are separated by the walls of the chorionic villi ✓
• The umbilical cord attaches the foetus to the placenta and it contains the umbilical artery and umbilical vein ✓
• The umbilical artery carries deoxygenated blood with nitrogenous waste from the embryo to the placenta ✓
• The umbilical vein carries oxygenated blood with nutrients from the placenta to the foetus ✓ (Any 4 x 1) (4)

- 3.3 3.3.1 Anaphase 2 ✓ (1)
- 3.3.2 Single chromatids (daughter chromosomes) are pulled towards the opposite poles by spindle fibres ✓ (2)
- 3.3.3 Chromosomal non-disjunction ✓ (1)

3.3.4



Mark allocation:

C – Shows **3 homologous chromosome** pairs/
6 chromosomes (not chromatids) ✓✓

P – Shows **alignment** at the equatorial plate ✓

V – Correct **variation** shown in the chromosomes. ✓ (shading on the chromosomes must be complementary)

(Use the letters for marking process.)

(4)

- 3.4 3.4.1
- To generate additional funds towards improving the quality of health care ✓
 - To reduce the consumption of sugars per day through price increase ✓
 - To generate funds to support programs and research designed to reduce the human and economic costs of diabetics ✓
- (Any 2 x 1) (2)

3.4.2 **Productivity of labour** is significantly reduced because:

- Employers do not assign risky tasks to diabetes sufferers due to possible hypoglycemia ✓
 - A general slowness and impaired vision caused by the condition ✓
 - Loss of working hours due to sick leave ✓
 - Shortage of skilled workers due to early retirement, disability and mortality ✓
- (Any 1 x 1)

The impact on the economy:

- Increasing medical costs ✓
- Loss of wages and benefits due to extended sick leave ✓

(Any 1 x 1) (1)

3.5	3.5.1	A ✓		(1)
	3.5.2	2 ✓		(1)
	3.5.3	Retina ✓/ cornea ✓/ lens ✓	(Any 1 x 1)	(1)
	3.5.4	<ul style="list-style-type: none">• The ciliary muscle contracts and moves closer to the lens ✓• the ciliary body moves forward ✓• the tension on the suspensory ligament decreases ✓ and• the tension on the lens is released ✓• the elastic lens now bulges and becomes more convex ✓• the refractive power of the lens is increased ✓• a clear image of the object is now formed on the retina ✓	(Any 5 x 1)	(5)
				[40]

TOTAL SECTION B: 80

SECTION C**QUESTION 4****4.1 Hearing (process)**

- Sound waves are directed by the pinna ✓
- through the auditory canal ✓
- to the tympanic membrane ✓
- causing the eardrum to vibrate ✓
- The vibrations of the tympanic membrane are transferred to the ossicles ✓ of the middle ear
- The footplate of the stirrup causes the membrane of the oval window to vibrate ✓
- This sets up pressure waves in the perilymph of the vestibular canal ✓
- The pressure waves are transferred to the endolymph of the cochlea canal ✓
- The pressure waves stimulate the hair cells in the organ of corti ✓
- The hair cells convert the stimulus to an impulse ✓
- The impulse is transmitted along the auditory nerve ✓ to the cerebrum ✓ of the brain where the sound is interpreted
- The pressure waves pass into the tympanic canal where they are finally absorbed by the round window ✓ (Max. 7) (7)

Turning of head to inspect the source of sound (response)

- The interpretation of sound leads to an investigative reaction ✓
- The cerebrum send impulses ✓ (instruction)
- to the neck muscles (effector) ✓
- through the motor nerves ✓
- resulting in an antagonistic action ✓ of neck muscles
- enabling the head to turn towards the source of sound ✓
- so that eyes can gather further information regarding the nature and source of sound (Max. 4) (4)

Plant response to unilateral light stimulus

- The tip of the plant stem ✓
- has the ability to respond to unilateral light stimulus
- by growth movements ✓
- This is called phototropism ✓
- When stems are exposed to unilateral light
- the plant hormone called auxins ✓ are produced at the growing tip of the stem
- the brightly-lit side suffers from a shortage of auxins ✓
- because auxins move to the darker sides of the stem / are destroyed by the light ✓
- A high concentration of auxins promotes elongation of plant cells ✓
- thus uneven distribution of auxins ✓
- causes uneven growth of the stem with the darker side growing faster ✓
- The stem thus bends towards the light ✓ (Max. 6) (6)

Content: 17
Synthesis: 3

ASSESSING THE PRESENTATION OF ESSAY

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
In this essay	All information provided is relevant to the topic.	Ideas arranged in a logical/cause-effect sequence	Answered all aspects required by the essay.
	Only information relating to the hearing, subsequent response and plant response to unilateral light stimulus is included. (There is no irrelevant information.)	Logical sequence of events in hearing, subsequent response as well as the plant response to unilateral stimulus provided.	Includes sufficient information on all processes. i.e., hearing (4), subsequent response (2) and plant response to unilateral light stimulus (4).
Mark	1	1	1

Synthesis (3)

TOTAL SECTION C: 20

GRAND TOTAL: 150