



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

SEPTEMBER 2014

**LIFE SCIENCES P1
MEMORANDUM**

MARKS: 150

This memorandum consists of 10 pages.

SECTION A**QUESTION 1**

1.1 1.1.1 C ✓✓

1.1.2 B ✓✓

1.1.3 B ✓✓

1.1.4 C ✓✓

1.1.5 B ✓✓

1.1.6 C ✓✓

1.1.7 C ✓✓

1.1.8 B ✓✓

1.1.9 C ✓✓

1.1.10 C ✓✓

(10 x 2) (20)

1.2 1.2.1 Umbilical vein ✓

1.2.2 Gestation ✓

1.2.3 Multiple Sclerosis ✓

1.2.4 Foetus ✓

1.2.5 Chorion ✓

1.2.6 Alien species ✓

(6 x 1) (6)

1.3 1.3.1 A only ✓✓

1.3.2 B only ✓✓

1.3.3 None ✓✓

1.3.4 A only ✓✓

1.3.5 Both A and B (Both) ✓✓

1.3.6 Both A and B (Both) ✓✓

(6 x 2) (12)

1.4 1.4.1 A – Anaphase 1 ✓

B – Anaphase 2 ✓

(2)

| | | | |
|------------------|-------|--|-----|
| | 1.4.2 | Stage A ✓ | (1) |
| | 1.4.3 | <ul style="list-style-type: none">• Crossing over ✓• Independent assortment of chromosomes ✓ during metaphase | (2) |
| | 1.4.4 | 4 ✓ | (1) |
| | 1.4.5 | 4 ✓ | (1) |
| 1.5 | 1.5.1 | Pancreas ✓ | (1) |
| | 1.5.2 | Insulin ✓ | (1) |
| | 1.5.3 | 4% ✓ | (1) |
| | 1.5.4 | Females ✓ | (1) |
| | 1.5.5 | 35–37 ✓ | (1) |
| TOTAL SECTION A: | | | 50 |

SECTION B**QUESTION 2**

- 2.1 2.1.1 A – Seminal vesicle ✓
C – Cowper's gland ✓ (2)
- 2.1.2 • Serves as a medium of sperm mobility ✓
• As a source of nutrients ✓
• Prevents the dehydration of sperms ✓
• Neutralises the acidity of vaginal tract ✓ (Any 1) (1)
- 2.1.3 (a) Part D ✓ (1)
(b) Part E ✓ (1)
- 2.1.4 Testes/part E ✓ (1)
(6)
- 2.2 2.2.1 (a) To make the endometrium wall thicker/more vascular ✓ (Any 1) (1)
(b) Stimulates ovulation/convert the empty follicle into a *corpus luteum* ✓ (Any 1) (1)
- 2.2.2 Day 14 ✓ (13–15) (1)
- 2.2.3 The level of oestrogen decrease sharply ✓/ The level of luteinising hormone increases ✓ (1)
- 2.2.4 (a) Graffian follicle ✓ (1)
(b) *Corpus luteum* ✓ (1)
- 2.2.5 (a) Pregnancy has resulted ✓ (1)
(b) No pregnancy ✓/ leads to menstruation (1)
- 2.3 2.3.1 The further from the light source, ✓ the wider the diameter of the pupil ✓

OR

The further the light source, ✓ the diameter of the pupil becomes shorter ✓

OR

The closer the light source, ✓ the narrower diameter of the pupil ✓

OR

The closer the light source, ✓ the wider the diameter of the pupil. ✓

OR

As light intensity increases/decreases ✓ the diameter of the pupil increases/decreases. ✓ (2)

- 2.3.2
- Position of the face/person ✓
 - The intensity of light ✓
 - Time allocated for the light source at each distance ✓ (Any 2) (2)

- 2.3.3
- (a) Independent factor – The position of the lamp/light source ✓
- (b) Dependent factor – Diameter of the pupil ✓ (2)

- 2.3.4
- Accept ✓ /Reject✓ (Mark the response in correspondence with hypothesis given by the learner in QUESTION 2.3.1.) (1)

- 2.3.5
- The size (diameter) of the pupil increases ✓ when the light intensity decreases ✓

OR

The size of the pupil (diameter) of pupil decrease ✓ when the light intensity increases. ✓

OR

The further from the light source, ✓ the wider the diameter of the pupil ✓

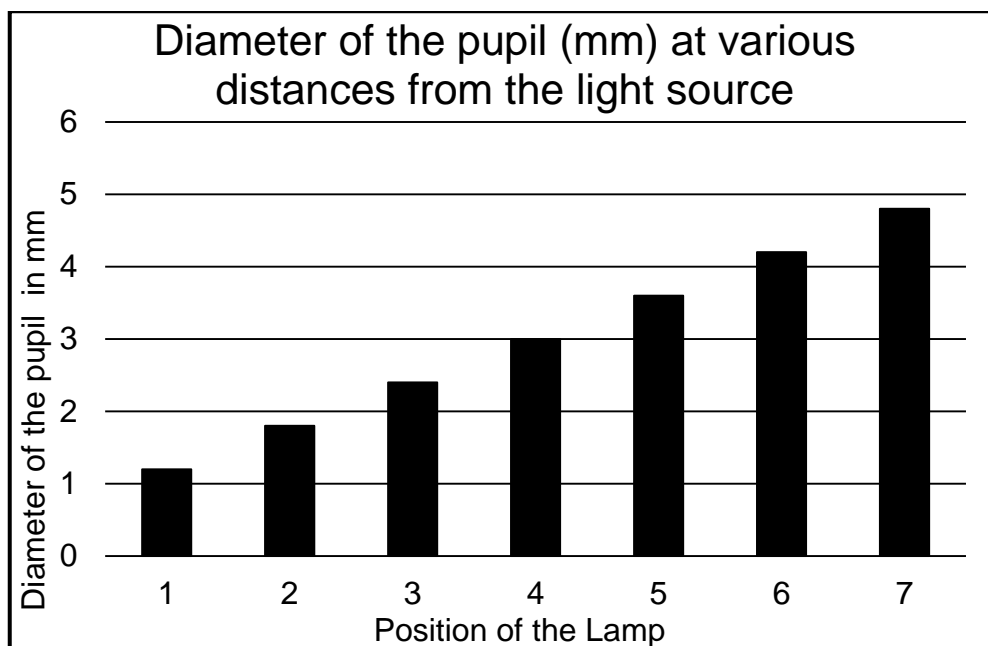
OR

The closer the light source, ✓ the diameter of the pupil becomes smaller ✓ (2)

- 2.3.6
- The circular muscles ✓ will contract ✓ while the radial muscles ✓ relax. ✓
 - As a result the diameter of the pupil will decrease, ✓ restricting the high intensity light entering the eye. (Max 4) (4)

- 2.3.7
- Pupillary mechanism ✓ (1)

2.3.8

**Criteria for marking the graph**

| | |
|--|--|
| Title of the graph (both Dependent and Independent variables are included) | 2 |
| Correct type of graph | 1 |
| Appropriate scale and label for X-axes | 1 |
| Appropriate scale and label for Y-axes | 1 |
| | |
| Number of bars | 1 : 1 to 3 bars drawn correctly 2 : 4 to 6 bars drawn correctly 3 : All bars correctly drawn |

NOTE:

If the wrong type of graph is drawn, 3 marks will be lost for:

- Correct type of graph
- Plotting number of bars

If the labels of the axes are transposed then 2 marks will be lost for:

- Correct label and scale for X and Y-axes.

(8)

- 2.4 (a) Growing different crops on the same piece of land ✓✓ in different seasons so as to give the soil time to recover/replenish nutrients. (2)
- (b) A process by which nutrients, especially phosphorus and nitrogen become highly concentrated in a body of water, ✓ leading to increased growth of organisms such as algae. ✓ (2)

[40]

QUESTION 3

- 3.1 3.1.1 Phototropism ✓ (1)
- 3.1.2 Growth movement ✓ of plant organs in response to light stimulus. ✓ (2)
- 3.1.3 To provide unilateral light stimulus for the seedlings inside the box. ✓ (1)
- 3.1.4 Auxins ✓ (1)
- 3.1.5 When unilateral (one-sided) light rays fall on the growing tip of a seedling, ✓ the hormone auxin ✓ begin to move from brighter side to the darker side of the growing tip. ✓
The accumulation of auxin in the darker side causes cells in that region to grow longer than the one in the brighter side ✓ and leading to the bending of growing tip towards the direction of unilateral light source ✓ (5)
- 3.1.6 A spontaneous upward growth of seedlings can be expected. ✓ (1)
- 3.2 3.2.1 Poaching ✓ (1)
- 3.2.2 The unprecedented rise in the poaching ✓ of rhinoceros would lead to the extinction of this species ✓ in the near future and therefore, one has to travel abroad to see the rhinoceros in captivity. ✓
The cartoon depicts the magnitude of this illegal activity in South Africa. ✓ The cartoon also captures our inability to control poaching effectively ✓ and prioritise the significance of conservation. ✓ (Any 3) (3)
- 3.2.3 Horn of rhinoceros ✓ (1)
- 3.2.4
- Safe dehorning ✓
 - Harsher prison sentences ✓
 - Educating people ✓
 - Rhino horn poisoning so that it becomes less palatable to users
 - Introduce "Rhino protect treatment" ✓ where rhino horn is made valueless for the poachers as it gets injected with dye where x-ray scanners will be able detect the horn
 - Selling off horns from rhino who died of natural causes ✓
 - Introduce a ban on rhino horn sale ✓
 - Legalise international trade of the rhino horn ✓ (Any 2) (2)
- 3.2.5 $668 - 448 = 220$ ✓ OR $\frac{668 - 448}{448} \times 100 = 49,10\%$ ✓
- $\frac{220}{448} \times 100 = 49,10\%$ ✓ (3)

- 3.2.6 A steady increase in poaching ✓ of the rhinoceros population of South Africa since 2010. (1)
- 3.3 3.3.1 Adrenalin ✓ (1)
- 3.3.2 Adrenal gland ✓ (1)
- 3.3.3 An endocrine gland ✓ (1)
- 3.3.4
- Increases the rate and depth of breathing ✓ so that more oxygen is obtained quickly. ✓
 - Causes the liver to convert more glycogen to glucose ✓ which is then released into the blood stream as a source of energy ✓
 - Increases the rate of the heartbeat and the blood pressure ✓ so that blood can be carried quickly to the skeletal muscles and brain. ✓
 - Causes the blood vessels of the muscles, heart and brain to dilate ✓ so that more blood can be taken to these parts. ✓
 - Causes the blood vessels of the digestive system and skin to constrict ✓ so that less blood is sent to these parts and more blood becomes available for the heart, brain and skeletal Muscles. ✓
 - Increases the metabolic rate of the cells in the brain and skeletal muscles ✓ so that more energy is released for muscular activity and clear thought. ✓
 - Increases the tone of the skeletal muscles ✓ so that they can function more effectively. ✓ (Any 2 x 2) (4)
- 3.4 3.4.1 Negative feedback ✓ mechanism (1)
- 3.4.2
- 1 Thyroid gland ✓
 - 2 Thyroid Stimulating Hormone ✓
 - 3 Thyroxin ✓
 - 4 Thyroxin ✓ (4)
- 3.4.3 Iodine ✓ (1)
- 3.4.4 Goitre ✓ (1)
- (7)
- 3.5 Amount of CO₂ released = Amount of energy source used per month x Emission factor
- Petrol = $1\,200\,l \times 2,68 = 3\,216\,kg$ ✓
- Diesel = $8\,000\,l \times 2,35 = 18\,800\,kg$ ✓
- Electricity = $1\,500\,kWh \times 0,845 = 1\,267,5\,kg$ ✓
- Total carbon footprint = $3\,216 + 18\,800 + 1\,267,5 = 23\,283,5kg$ ✓ (4)
- [40]**

SECTION C**QUESTION 4****Capturing and transmission of sound waves at the outer ear**

- Sound waves which travel through the air are captured and directed by the pinna ✓
 - through the auditory canal ✓
 - to the tympanic membrane ✓
 - causing it to vibrate. ✓
- (Max 2)

Transmission of sound vibrations at the middle ear

- The vibrations are transferred to the ossicles ✓ (malleus, incus and stapes) of the middle ear.
 - The stapes transfers the sound vibrations on to the oval window ✓
- (Max 2)

Transmission of pressure waves/vibrations at the inner ear

- In the inner ear pressure waves are set up in the perilymph ✓
 - of the vestibular canal in the inner ear. ✓
 - The vibrations are transferred through the membrane of the middle canal ✓ to the endolymph. ✓
 - The pressure waves created in the endolymph stimulate the hair cells ✓
 - of the organs of Corti. ✓
 - The hair cells send impulses along the auditory nerve ✓
 - to the cerebrum. ✓
 - The signals received from ear are then processed and interpreted. ✓
 - The pressure waves are then transferred to the tympanic canal ✓
 - where they are finally absorbed by the round window. ✓
- (Max 7) (11)

Role of the ear in the maintenance of balance

- The ampullae ✓ /broader bases of semi-circular canals
 - consist of cristae. ✓
 - The three semicircular canals are positioned in three different planes ✓
 - and therefore, any sudden changes in the speed and direction of body movement, ✓
 - cause the endolymph to move ✓ at least in one of the semi-circular canals.
 - The movement of endolymph stimulates ✓
 - the cristae to generate and send impulses. ✓
 - The sacculae and utriculae ✓
 - consist of special receptor structures called maculae. ✓
 - When the direction of the head changes, ✓
 - gravitational pull stimulates ✓
 - hair cells (receptors) of maculae to generate impulses. ✓
 - the impulses generated from both cristae and maculae are send to cerebellum. ✓
 - The cerebellum sends impulses to the muscles to restore the balance. ✓
- (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. | Facts are arranged in a logical/ sequential order. | All aspects required by the essay have been sufficiently addressed. |
| In this essay | Only information relevant to the hearing and balance is given (There is no irrelevant information.) | Events of hearing and balance are provided in the correct sequence. | Learner has scored at least half of the marks of the hearing process and described the function of cristae and maculae in the maintenance of balance. |
| MARK | 1 | 1 | 1 |

Synthesis (3)

TOTAL SECTION C: 20
GRAND TOTAL: 150

