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# basic education

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Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## SENIOR CERTIFICATE EXAMINATIONS

**LIFE SCIENCES P1**

**2016**

**MEMORANDUM**

**MARKS: 150**

**This memorandum consists of 12 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 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 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.

**SECTION A****QUESTION 1**

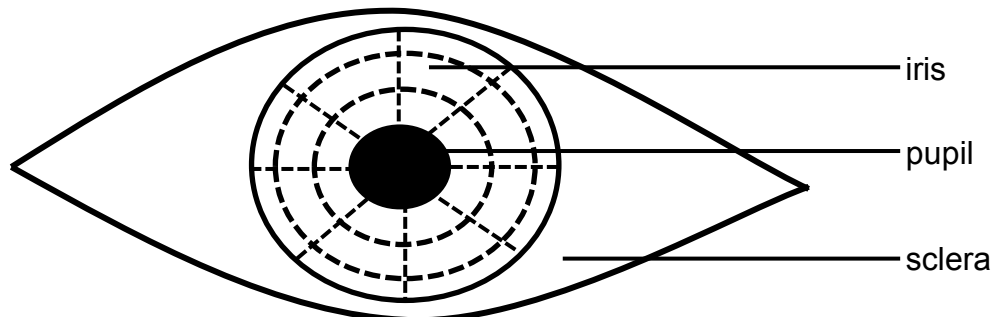
1.1	1.1.1	C✓✓		
	1.1.2	B✓✓		
	1.1.3	B✓✓		
	1.1.4	D✓✓		
	1.1.5	D✓✓		
	1.1.6	C✓✓		
	1.1.7	A✓✓		
	1.1.8	B✓✓		
	1.1.9	C✓✓		
	1.1.10	D✓✓	(10 x 2)	<b>(20)</b>
1.2	1.2.1	External✓ fertilisation		
	1.2.2	Geotropism✓/gravitropism		
	1.2.3	Vasoconstriction✓		
	1.2.4	Precocial✓		
	1.2.5	Cristae✓		
	1.2.6	Thermal✓ pollution		
	1.2.7	Choroid✓	(7 x 1)	<b>(7)</b>
1.3	1.3.1	(a) Tympanic✓membrane/tympanum/(eardrum)		(1)
		(b) Incus✓/Anvil		(1)
		(c) Oval window✓		(1)
	1.3.2	D✓		(1)
	1.3.3	E✓ – Eustachian tube✓		(2)
				<b>(6)</b>
1.4	1.4.1	(a) Hypophysis✓/Pituitary gland		(1)
		(b) Adrenal✓ gland		(1)
	1.4.2	(a) D✓ – Testis✓		(2)
		(b) C✓ – Pancreas✓/Islets of Langerhans		(2)
		(c) A✓ – Hypophysis✓/Pituitary gland		(2)
				<b>(8)</b>
1.5	1.5.1	(a) Grey matter✓/Spinal cord		(1)
		(b) Cerebrum✓		(1)
	1.5.2	(a) D✓ - Cerebrum✓		(2)
		(b) F✓ - Medulla oblongata✓		(2)
	1.5.3	Reflex action✓		(1)
	1.5.4	A✓ – Motor✓neuron /(efferent neuron)		(2)
				<b>(9)</b>
<b>TOTAL SECTION A:</b>				<b>50</b>

**SECTION B**

**QUESTION 2**

- 2.1 2.1.1 (a) Nucleus✓ (1)
- (b) Tail✓ (1)
- 2.1.2 - C/ middle piece contains mitochondria✓  
that provides energy for movement✓  
- Has a tail✓  
for swimming✓  
- Torpedo shape✓  
reducing friction✓ Any (1 x 2) (2)
- (Mark first ONE only)**
- 2.1.3 - No acrosome✓ will be present in the sperm cell  
- therefore no enzymes present✓  
- Sperm cell will be unable to penetrate the ovum✓  
- \*therefore no fertilisation will occur✓  
\*compulsory mark + any other 2 (3)
- (7)**
- 2.2 - Pinna traps the sound waves✓  
- and directs it into the ear canal✓/meatus  
- This causes the tympanic membrane to vibrate✓  
- The vibration is transmitted to the ossicles✓/names of all 3 ossicles  
- The ossicles amplify the vibration✓  
- and transmit it to the oval window✓  
- The oval window vibrates✓  
- creating pressure waves in the perilymph/endolymph✓(fluid)  
- which stimulates the Organ of Corti✓ Any (6)
- 2.3 2.3.1 Iris✓/radial and circular muscles (1)
- 2.3.2 (20 – 30)✓s (1)
- 2.3.3 - Radial muscles contract✓  
- Circular muscles relax✓  
- Pupil increases in diameter✓/dilates (3)

2.3.4



Correct drawing of the front view of an eye✓  
Pupil = 6 mm✓  
Any 2 correct labels✓✓

(4)  
**(9)**

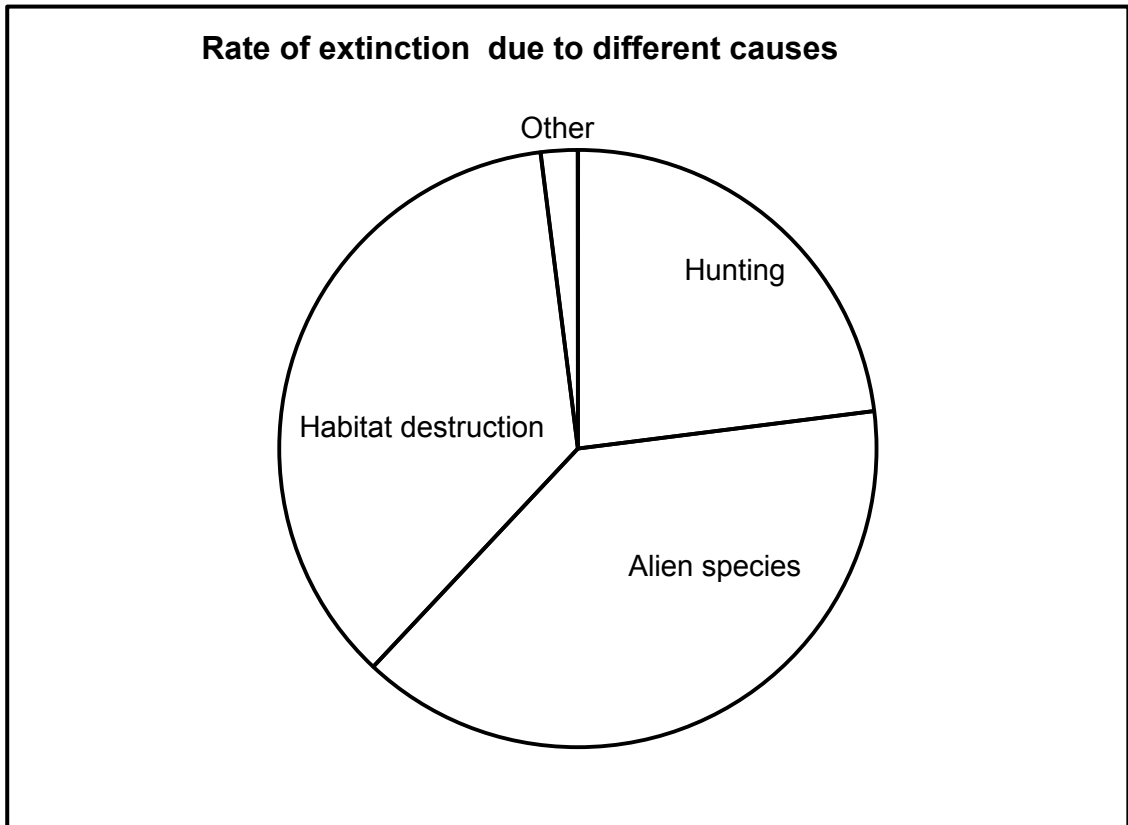
- 2.4 2.4.1 To maintain an internal balance✓/set point/homeostasis/regulate metabolism (1)
- 2.4.2 TSH✓/thyroid-stimulating hormone (1)
- 2.4.3 When Y/thyroxin is released at higher levels than normal:  
 - Metabolism will be higher than normal✓/cellular respiration increases  
 - Heart rate increases✓  
 - thus all the energy from food eaten will be used✓  
 - leaving nothing to be utilised for storage✓/therefore could lead to a person being underweight  
 - can also lead to anxiety✓ (Any 3) (3)  
**(5)**
- 2.5 2.5.1 (a) Time✓ (1)
- (b) Average age of first menstruation✓ (1)
- 2.5.2 - Decide on sample size✓  
 - Decide on proportion from racial groups✓  
 - Decide on the age range of participants✓  
 - Decide on proportions from socio-economic status of sample✓  
 - Decide on the recording tool✓/ instrument /method  
 - Ask permission ✓from participants Any (3)  
**(Mark first THREE only)**
- 2.5.3 - The hypothesis will be rejected✓/not accepted  
 - and therefore needs to be reformulated✓ (2)
- 2.5.4 - Breast development✓  
 - Widening of hips✓  
 - Development of pubic hair✓/(body hair) Any (2)  
**(Mark first TWO only)** **(9)**
- 2.6 - High levels of progesterone✓  
 - Inhibits secretion of FSH✓  
 - There is no development of a follicle✓  
 - Therefore no ovum released/ovulation✓  
 - Thus there will be no fertilisation✓ Any **(4)**  
**[40]**

**QUESTION 3**

- 3.1 3.1.1 0,50 ✓ mol/ml (1)
- 3.1.2 - To establish a baseline ✓ / minimum CO<sub>2</sub> in the blood  
To allow a comparison with results ✓  
**OR**  
- Acts as a control ✓  
To determine if the results obtained are caused by the  
exercise ✓ / independent variable Any (1 x 2) (2)
- 3.1.3 - Body's metabolic rate increases ✓  
- this means that the rate of cellular respiration increases ✓  
- to produce more energy ✓ / ATP  
and therefore releases more CO<sub>2</sub> Any (2)
- 3.1.4 CO<sub>2</sub> levels in the blood increase above normal levels:  
- Receptor cells in the carotid artery in the neck are stimulated ✓  
- To send impulses to the medulla oblongata ✓ in the brain  
- Medulla oblongata stimulates breathing muscles ✓ / (intercostal  
muscles and diaphragm)  
- and heart ✓  
- Breathing muscles contract more actively ✓  
- increasing the rate of breathing ✓  
- and depth of breathing ✓  
- The heart beats faster ✓  
- More CO<sub>2</sub> is taken to and exhaled from the lungs ✓ Any (6)  
**(11)**
- 3.2 3.2.1 Apical tips ✓ / stem tips / root tips / bud  
**(Mark first ONE only)** (1)
- 3.2.2 Promotes cell elongation ✓  
**(Mark first ONE only)** (1)
- 3.2.3 - Only kills part of a plant ✓ / leaves and stems  
leaving the chance of the roots to grow again ✓  
- Poisonous ✓  
can be harmful to other organisms ✓ Any (2 x 2) (4)  
**(Mark first TWO only)**
- 3.2.4 - It could kill the beans as well ✓  
thus reducing the yield of the crop ✓ (2)  
**(8)**



- 3.3      3.3.1       $\frac{23}{100}$        $\times 360^\circ = 82,8^\circ / 83^\circ$
- $\frac{39}{100}$        $\times 360^\circ = 140,4^\circ / 140^\circ$
- $\frac{36}{100}$        $\times 360^\circ = 129,6^\circ / 130^\circ$
- $\frac{2}{100}$        $\times 360^\circ = 7,2^\circ / 7^\circ$



**Mark allocation for the graph**

Criteria	Mark allocation
Correct type of graph ( <b>pie chart</b> ) (T)	1
Title of graph (including both variables)	1
Calculations/working to (C) determine the correct proportions	1: 1 to 3 calculations correct 2: All four calculations correct
Proportions accurate for each sector/slice labelled /key (P)	1: 1 to 3 sectors drawn correctly 2: All 4 sectors drawn correctly ( <b>use transparency template</b> )

**NOTE:**

If the wrong type of graph is drawn: marks will be lost for 'correct type of graph' as well as for 'drawing of sectors in correct proportion'.

(6)

- 3.3 3.3.2
- It may outcompete indigenous vegetation✓
  - thus reducing the amount of food available for herbivores✓
  - Leading to death of organisms✓
  - This will disrupt food chains✓/webs
  - and the ecosystems✓
- OR
- An excessive growth of alien water plants on the surface of the water will block out the light✓/deprive submerged plants of sunlight/limits photosynthesis
  - thus reducing the amount of food available for herbivores✓
  - Leading to death of organisms✓
  - disrupting food chains✓/webs
  - and the ecosystems✓
- Any (3)
- 3.3.3 Poaching✓/Poisoning/Trading in endangered species (1)  
**(10)**
- 3.4 3.4.1
- Wheat✓  
Rice✓  
Maize✓  
Soybeans✓  
**(Mark first ONE only)**
- Any (1)
- 3.4.2
- A single crop is repeatedly planted over a large area✓
  - This provides large amounts of food✓ for particular organisms/pests
  - Organisms/pests increase in number✓
  - Causing more damage to crops✓
- Any (3)
- 3.4.3
- Floods destroy present crops✓  
leading to decreased crop yields✓
  - Floods remove the upper fertile layers of soil✓/soil erosion  
leading to decreased fertility of soil causing decreased crop  
yield✓
  - Floods supersaturate the soil✓  
leading to rotting of crop✓/decomposition of roots
- Any (1 x 2) (2)  
**(Mark first ONE only)**
- 3.4.4
- The demand✓ for staple food is higher  
than the supply✓
  - Production/operating costs higher✓✓
- Any (1 x 2) (2)  
**(8)**

- 3.5
- Deforestation is the removal of vegetation from an area✓
  - Plants use carbon dioxide from the atmosphere for photosynthesis✓
  - Fewer trees means less photosynthesis✓
  - Therefore less CO<sub>2</sub> removed from the atmosphere✓/more CO<sub>2</sub> remains in the atmosphere
  - leading to enhanced greenhouse effect✓
  - leading to **increased** global warming✓

Any (3)  
[40]

**TOTAL SECTION B: 80**

**SECTION C****QUESTION 4**

Genetic variation is brought about in gametes through meiosis✓ in two ways:

**Crossing-over ✓**

- During Prophase I✓
- Homologous chromosomes✓/bivalents pair up
- Each chromosome has 2 chromatids✓
- Non-sister chromatids of the homologous pair overlap✓/cross over
- Points at which crossing-over takes place are referred to as chiasmata✓
- Genetic material is exchanged✓
- between non-sister chromatids✓
- After the process of crossing-over chromosomes have genes from its homologous partner✓
- This means that each gamete formed will have a mix of genes from maternal and paternal parents✓

Max (7)

**\*Random arrangement of chromosomes at the equator ✓**

- During Metaphase I✓
- Each pair of homologous chromosomes✓
- \*may line up either way✓/randomly on the equator of the spindle
- \*Independently of what the other pairs are doing✓/ independent assortment
- During Metaphase II✓
- Each individual chromosome✓
- \*may line up either way✓/flipped on the equator of the spindle
- \*This means that gametes will have differing number/mix of maternal and paternal chromosomes✓/chromatids

Max (5)

**(at least 1 of the \*compulsory and any 4 which could include compulsory points)**

**Formation of an ovum**

- During oogenesis✓
- diploid cells✓
- in the ovary✓
- undergo meiosis✓
- to form a primary oocyte✓
- consisting of haploid cells✓
- One cell✓ develops into an ovum

Max (5)  
Content: (17)  
Synthesis: (3)  
**(20)**

**ASSESSING THE PRESENTATION OF THE ESSAY**

<b>Relevance</b>	<b>Logical sequence</b>	<b>Comprehensive</b>
All information provided is relevant to the question	Ideas arranged in a logical/ cause-effect sequence	Answered all aspects required by the essay in sufficient detail
All the information provided is relevant to crossing over, random arrangement and development of an ovum.  There is no irrelevant information	All the information regarding crossing over, random arrangement and development of an ovum is arranged in a logical manner.	At least the following marks should be obtained: - Crossing over ( <b>5/7</b> ) - Random arrangement ( <b>3/5</b> ) - Development of an ovum ( <b>3/5</b> )
1 mark	1 mark	1 mark

**TOTAL SECTION C: 20**  
**GRAND TOTAL: 150**