

Education

KwaZulu-Natal Department of Education REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12



MARKS: 150

This marking guideline consists of 10 pages.

Please turn over

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.

SECTION A

QUESTION 1

1.1	1.1.1 1.1.2 1.1.3 1.1.4 1.1.5 1.1.6 1.1.7 1.1.8	$ \begin{array}{l} A\checkmark\checkmark\\ B\checkmark\checkmark\\ A\checkmark\checkmark\\ B\checkmark\checkmark\\ B\checkmark\checkmark\\ D\checkmark\checkmark\\ D\checkmark\checkmark\\ D\checkmark\checkmark \end{array} $		
	1.1.9	D√√	(10 x 2)	(20)
1.2	1.2.1 1.2.2 1.2.3 1.2.4 1.2.5 1.2.6 1.2.7	Non-disjunction√ Yolk sac√ Geotropism√ Amniotic√/amniote Umbilical vein√ Epididymis√ Pituitary√/hypophysis		<i>(</i> -),
	1.2.8	Endocrine√	(8 x 1)	(8)
1.3	1.3.1 1.3.2 1.3.3	B only√√ None√√ Both√√	(3 x 2)	(6)
1.4	1.4.1 1.4.2 1.4.3	E√ - Ciliary muscle√ F√ - Lens√ D√ - Iris√		(2) (2) (2) (6)
1.5	1.5.1	 (a) Chromosome√ (b) Chromatid√ (c) Homologous chromosomes√/bivalent 		(1) (1) (1)
	1.5.2	(a) Forms the spindle \checkmark	r	(1)
		 (c) Holds two chromatids together√ 		(1) (1)
	1.5.3	Crossing over√ Random arrangement of chromosomes√ (Mark first TWO only)		(2)
	1.5.4	Four√/4		(1)
	1.5.5	Metaphase II√		(1)
		TOTAL	SECTION A:	(1) (10) 50

QUESTION 2

2.1

- Prevent destruction of wetlands√
- to improve the availability and quality of water \checkmark
- Fix leaking pipes√/toilets/taps
- to reduce the wastage of water \checkmark
- Provide incentives for families who save water \checkmark
- to encourage sustained use of water√
- Reduce pressure in water pipes√
- to reduce the wastage of water√
- Provide education ✓ to people
- on the wise use of water√
- Encourage good farming practices√
- to prevent contamination of water sources by fertilizers and pesticides ✓
- Use boreholes√/ aquifers / tanks
- to increase water availability√
- Desalinate sea water√
- to make more water available \checkmark

(Mark first THREE only)

Any 3 x 2 (6)

2.2

2.2.1

2.2.2

- A reflex action is the response to the stimulus \checkmark
- whereas a reflex arc is the path taken by an impulse during a reflex action ✓

(2)

NEURON A/SENSORY	NEURON B/MOTOR
Has one dendrite√/unipolar	Has many
	dendrites√/multipolar
Cell body in the centre of the	Cell body at the end of the
ell√/centrally located	cell√/terminally located
/lark first TWO only)	1 + Any 2 x 2

1

- 2.2.3 The receptor/finger receives the stimulus of heat \checkmark
 - and converts it into an impulse√
 - The sensory neuron carries the impulse from the receptor \checkmark
 - to the interneuron√/connector neuron
 - The connector neuron transmits the impulse to the motor neuron \checkmark
 - The impulse is conducted from one neuron to the next across a synapse√
 - The motor neuron carries the impulse to the effector √/muscle
 - to move the finger away ✓

(5)

Any

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2.2.4	 No impulses will pass from the receptor to the spinal cord√ and no reflex action will occur√/the finger will not move 	(2)	
2.2.5	 The myelin sheath breaks down√ and this slows transmission of impulses√ so that it takes a longer time for reflexes to occur√ OR 		
	 The myelin sheath breaks down√ resulting in a short circuit√ so that impulses do not reach the correct effector√ Any 	(2) (16)	
2.3			
2.3.1	FSH✓ LH ✓ (Mark first TWO only)	(2)	
2.3.2	 LH stimulates development of the corpus luteum ✓ which will produce the progesterone ✓ 		
	 Progesterone is not needed for either the formation of ova√ or the release of ova√ 	(2)	
2.3.3	 As a result of the blocked Fallopian tubes√ sperm cannot reach the ovum√ and hence fertilisation cannot take place√ 	(3)	
2.3.4	 The zygote√ undergoes mitosis√ until a ball of cells is formed√ called a morula√ The morula continues to divide and forms a mass of cells with a hollow cavity√ called a blastocyst√/blastula which forms chorionic villi√ which attaches it to the endometrium√ Any 	(6)	
2.3.5	 High progesterone levels√ will inhibit FSH√ so that no new follicle/ovum develops√ 	(3)	
2.3.6	(a) Remains large/√increases in size	(1)	
	(b) Becomes thicker ✓ /thickness maintained	(1) (18)	
		[40]	

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QUESTION 3

3.1	3.1.1	 Under the influence of testosterone√ diploid cells√ in the seminiferous tubules√/ testes undergo meiosis√ 	
		- to form haploid sperm cells ✓ Any	(4)
	3.1.2	 Only one of the four cells forms the ovum√/the other cells disintegrate in oogenesis whereas in spermatogenesis all four cells form sperm cells√ 	
		OR	
		 Oogenesis is cyclical ✓ /once a month whereas spermatogenesis occurs all the time ✓ (Mark first ONE only) 	(2)
	3.1.3	 The temperature of the testis will be lower√ suitable for the formation of sperms√ 	(2) (8)
3.2	3.2.1	 Having access to enough food√ that is nutritious√ all the time√ Any 	(2)
	3.2.2	Western Cape✓	(1)
	3.2.3	 An increase in the population ✓ High levels of unemployment ✓ Droughts ✓ Floods ✓ 	(2)
		(Mark first TWO only)	()
	3.2.4	$100 - 25\checkmark = 75\checkmark\%$	(2)
	3.2.5	 Pesticides may kill or get into the tissue of healthy plants ✓ reducing crop production ✓ 	
		OR	
		 Pesticides are expensive ✓ which increase the cost of food ✓ reducing access to consumers (Mark first ONE only) Any 1 x 2 	(2)

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	3.2.6	 Increased resistance to cold/heat ✓ will allow the crops to grow in new areas ✓ 		
		 Increased nutrients ✓ will allow people to get their nutritional requirements from le food ✓ 	ess	
		 Higher yields will provide more food from the same farm 		
		 Increased resistance to pests ✓ will increase crop yield ✓ (Mark first TWO only) Any 	2 x 2	(4)
	3.2.7	Food security in Kwa-Zulu Natal is increasing $\checkmark \checkmark$		(2) (15)
3.3	3.3.1	 All participants were men√ The amount of adrenalin injected into each man was the same√ The heart rates were measured at the same time intervals Mark first TWO only 	Any	(2)
	3.3.2	Resting heart rate√		(1)
	3.3.3	 Adrenalin increases the heart rate√ pumping more blood to the muscles√ the rate and depth of breathing increases√ The muscles are supplied with more glucose√ /oxygen by increasing conversion of glycogen into glucose√ to allow the person to respond faster√/with more strength 	Any	(3) (6)
3.4	 Recept detect The atomic to section which into th The s and th 	otor cells in the kidney t the low salt level drenal gland is stimulated crete more aldosterone increases the re-absorption of sodium ions from the renal tubu ne surrounding blood vessels alt level in the blood vessels increases ne salt levels in the blood return to normal	ules Any	(5)
3.5	3.5.1	Apical dominance√		(1)
	3.5.2	The plant has developed lateral branches✓		
	3.5.3	 There were no auxins present in the tip of the stem√ therefore apical dominance was removed√ and lateral branches grow√ 		(1)
	3.5.4	- Repeat the investigation \checkmark		(3)
		- Use a larger sample of plants√ for each treatment (Mark first ONE only)	Any	(1) (6) [40]

SECTION C

QUESTION 4

Regulation of body temperature on a hot day

- - -	His hypothalamus ✓ was stimulated to send an impulse to the blood vessels of the skin ✓ causing them to dilate ✓/vasodilation occurs More blood flowed to the skin ✓ More heat was lost from the skin ✓				
- - -	More blood flowed to the sweat glands✓ More sweat was produced✓ The sweat evaporated✓ causing cooling✓ The body temperature decreased back to normal✓				
Ba	Balance and equilibrium				
- - -	The maculae ✓ in the sacculus and utriculus and the cristae ✓ in the semi-circular canals/ampullae were stimulated ✓ Stimuli were converted into impulses ✓				

- Impulses were transmitted through the auditory nerve√
- to the cerebellum ✓ where it was interpreted
- Impulses sent to the skeletal muscles v to maintain balance and equilibrium Max 5

High energy levels

- More TSH was secreted√
- which increased the production of thyroxin√
- Thyroxin increases metabolism✓
- A higher metabolic rate required more glucose√
- Under the influence of adrenalin√
- the pancreas secreted more glucagon√
- which caused the liver √/muscles
- to convert glycogen into glucose ✓ to provide the energy required

Max 5

Max 7

Synthesis: 3 Content: 17 (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	 Provided information relevant only to Temperature regulation on a hot day Balance and equilibrium Maintaining high energy levels No irrelevant information included. 	 The description of Temperature regulation on a hot day Balance and equilibrium Maintaining high energy levels are presented in a logical and sequential manner. 	At least the following marks should be obtained: - Temperature regulation on a hot day 5/7 - Balance and equilibrium 3/5 - Maintaining high energy levels 3/5
Mark	1	1	1

TOTAL SECTION C: 20

GRAND TOTAL: 150