



education

GREENBURY

Department:
Education
PROVINCE OF KWAZULU-NATAL

ENQUIRIES: MR D.A. SEWLALL

DATE: 11 SEPTEMBER 2017

**NATIONAL SENIOR CERTIFICATE: PREPARATORY EXAMINATION
SEPTEMBER 2017: GRADE 12**

TO: THE CHIEF INVIGILATOR OF ALL SCHOOLS OFFERING

ERRATA: LIFE SCIENCES P1

Please take note of the following change:

PAGE(S)	ERROR	CORRECTION
2-15 (Header)	Life Sciences/P2	Life Sciences/P1

Kindly ensure that candidates are informed of the Errata.

MS N.V. MCAMBI
DEPUTY MANAGER
PROVINCIAL EXAMINATIONS SERVICES

11/9/2017
DATE

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GREENHURST



Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

**LIFE SCIENCES P1
PREPARATORY EXAMINATION
SEPTEMBER 2017**

MARKS: 150

TIME: 2½ Hours

N.B. This question paper consists of 15 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Make ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

SECTION A**QUESTION 1**

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.10) in your ANSWER BOOK, for example 1.1.11 D.

1.1.1 The developing foetus is well protected from mechanical damage in the mother's uterus by the ...

- A amniotic fluid.
- B placenta.
- C umbilical cord.
- D chorionic villi.

1.1.2 Which ONE of the following represents correct functions of the cerebrum and medulla oblongata?

	CEREBRUM	MEDULLA OBLONGATA
A	Controls involuntary actions	Controls voluntary actions
B	Controls voluntary actions	Controls involuntary actions
C	Controls and co-ordinates voluntary actions	Co-ordinates voluntary actions
D	Controls involuntary actions	Co-ordinates voluntary actions

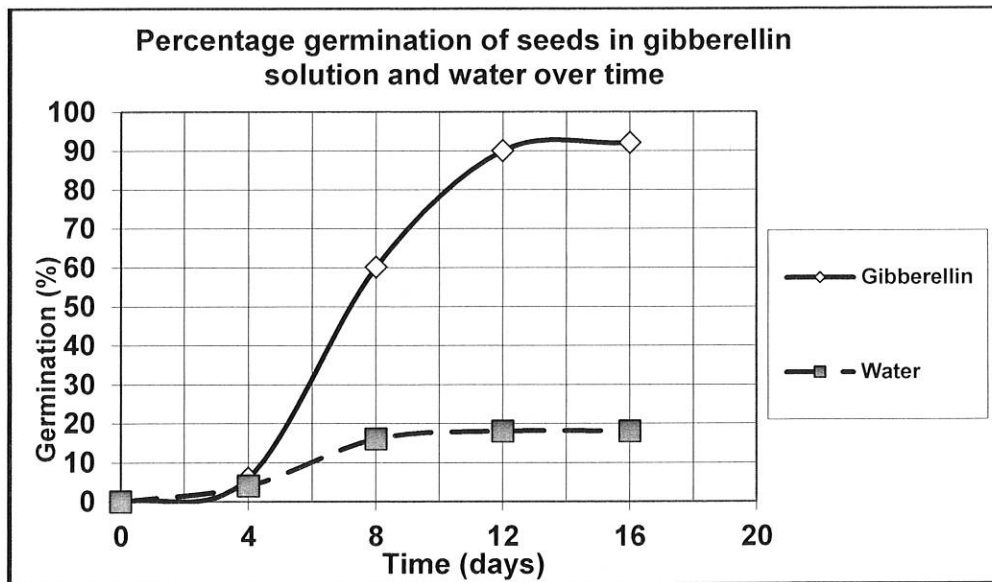
1.1.3 In altricial development, young hatchlings are ...

- A unable to feed themselves soon after hatching.
- B able to move around freely soon after hatching.
- C completely independent of their parents after hatching.
- D well developed when they hatch.

1.1.4 A function of the tympanic membrane and the oval window is to ...

- A equalize pressure between the outer and middle ear.
- B concentrate sound waves onto a smaller surface area to amplify sound.
- C transmit sound impulses to the brain to maintain balance.
- D convert sound waves into nervous impulses.

- 1.1.5 A group of Grade 12 learners carried out an investigation to determine the effect of gibberellins on the germination of seeds.



Which ONE of the following is a CORRECT conclusion for the above investigation?

- A Gibberellins show a greater increase in the rate of germination of seeds than water
- B Water shows a greater increase in the rate of germination of seeds than gibberellins
- C There is no difference in the rate of germination of seeds placed in gibberellins and water
- D Gibberellins decrease the rate of germination of seeds

- 1.1.6 The table below provides the insulin and glucagon levels in the blood of a person over a period of three hours.

TIME (mins)	GLUCAGON CONCENTRATION (mg/ml)	INSULIN CONCENTRATION (mg/ml)
0	115	84
30	113	81
60	125	80
90	100	129
120	90	110
150	93	104
180	89	92

The changes in the level of hormones indicate that the person ate a meal in the period ...

- A 0 - 60 mins.
- B 60 - 90 mins.
- C 90 - 120 mins.
- D 120 - 150 mins.

QUESTIONS 1.1.7 AND 1.1.8 REFER TO THE GRAPH AND THE TABLE BELOW.

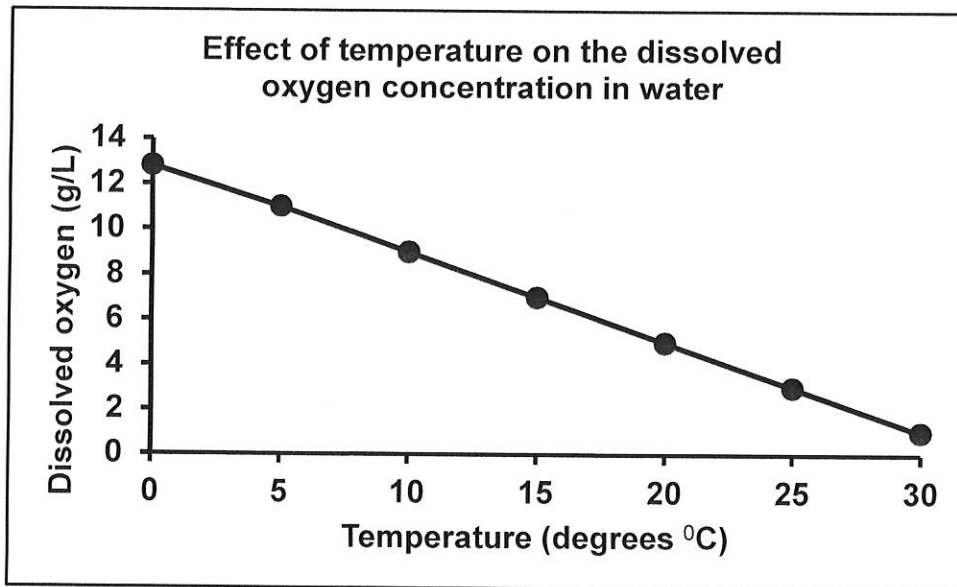
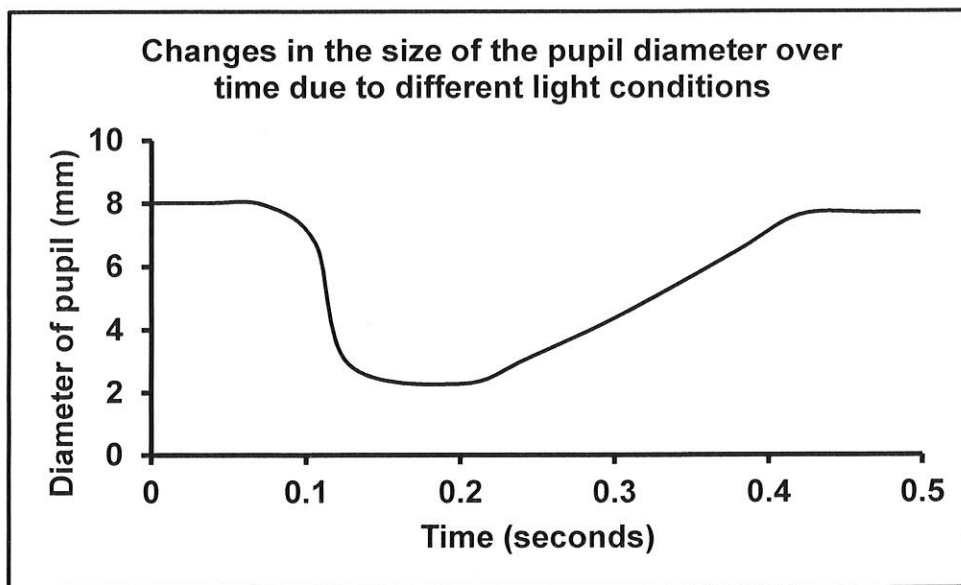


Table of oxygen requirements of different organisms in a river

Animal	Striped Bass	Shad	Yellow perch	Clams	Blue Crab	Spot fish	Worms
Minimum oxygen requirements (mg/L)	6	5	5	4	3	2	1

- 1.1.7 Thermal pollution causes the level of dissolved oxygen in the water to ...
- A remain unchanged.
 - B increase and then decrease.
 - C increase.
 - D decrease.
- 1.1.8 Due to the release of water from a factory, the temperature of the water in a nearby stream is 30°C.
- Two organisms that are likely to be found living in the stream are ...
- A striped bass and blue crab.
 - B worms and hard clam.
 - C worms and spot fish.
 - D yellow perch and spot fish.

- 1.1.9 The diagram below shows the changes in the diameter of the pupil over time while exposed to different light conditions.



During which period of time was the person exposed to bright light?

- A 0,1 to 0,4 sec
 - B 0,1 to 0,2 sec
 - C 0.2 to 0,4 sec
 - D 0,4 to 0,5 sec
- 1.1.10 An example of geotropism is the growth of the ...

- A stem towards gravity.
- B root away from light.
- C stem towards light.
- D root towards gravity .

10 x 2 (20)

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.2.1 to 1.2.8) in the ANSWER BOOK.

- 1.2.1 Failure of chromosomes to separate during meiosis
- 1.2.2 The structure that provides nutrients to the developing embryo in oviparous organisms
- 1.2.3 A growth response to gravity in plants
- 1.2.4 An egg in which the embryo is protected by a shell
- 1.2.5 The blood vessel that transports oxygen and dissolved food to the foetus
- 1.2.6 Temporary storage site in a male for sperm cells
- 1.2.7 The gland that secretes prolactin
- 1.2.8 The system of the body composed of glands that secrete hormones responsible for chemical co-ordination

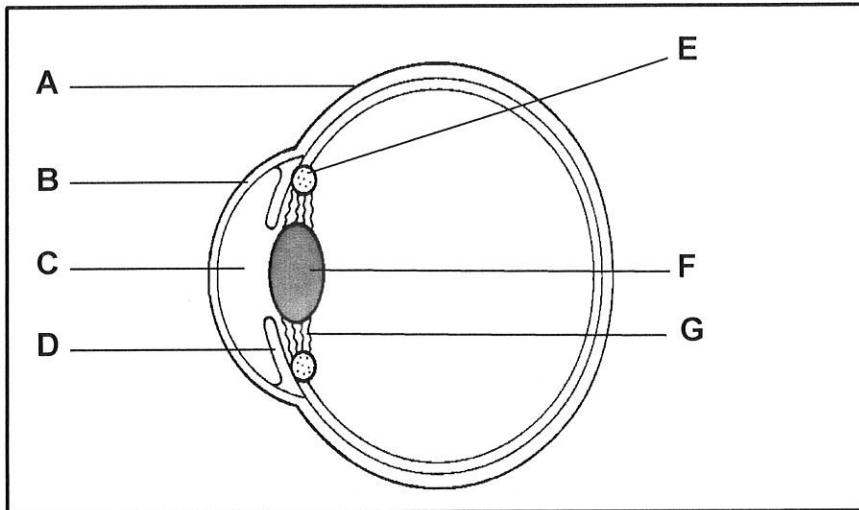
(8)

1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	Used to correct hearing problems caused by accumulated fluid in the middle ear	A:	Cochlear implant
		B:	Grommet
1.3.2	Receptors for hearing	A:	Rods
		B:	Cones
1.3.3	The young develop inside the mothers body and are then born 'alive'	A:	Ovoviviparous
		B:	Viviparous

(3 x 2) (6)

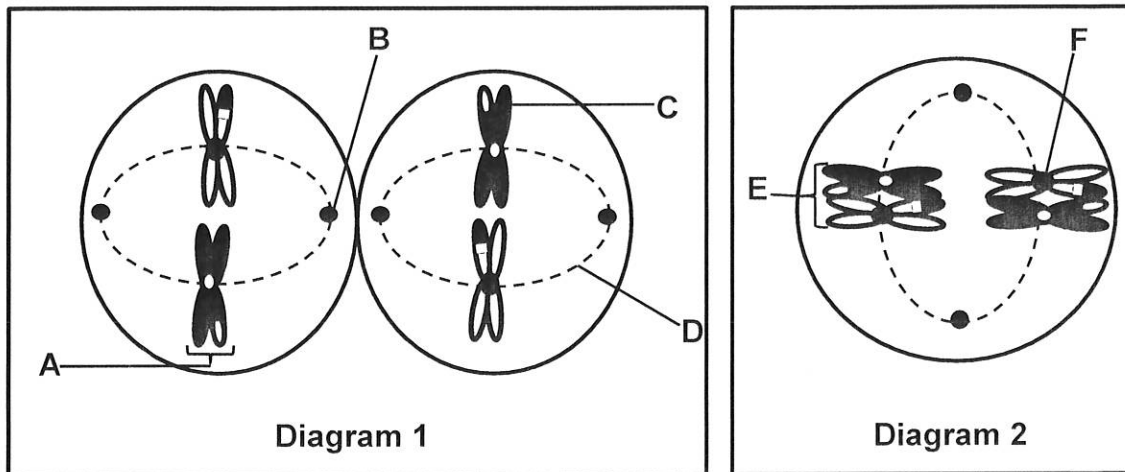
1.4 The diagram below shows some parts of the eye.



Give the LETTER and NAME of the part that:

- | | | |
|-------|---|------------|
| 1.4.1 | Contracts when looking at an object that is moving closer | (2) |
| 1.4.2 | Is affected when a person has cataracts | (2) |
| 1.4.3 | Regulates the size of the pupil | (2) |
| | | (6) |

1.5 The diagrams below show phases of meiosis in an animal cell.



1.5.1 Identify part:

- (a) **A** (1)
- (b) **C** (1)
- (c) **E** (1)

1.5.2 Give the FUNCTION of:

- (a) **B** (1)
- (b) **D** (1)
- (c) **F** (1)

1.5.3 Name TWO processes that are visible in the diagrams that result in genetic variation. (2)

1.5.4 How many chromatids will be present in each cell formed at the end of meiosis I? (1)

1.5.5 Name the phase shown in Diagram 1. (1)
(10)

TOTAL SECTION A: 50

SECTION B

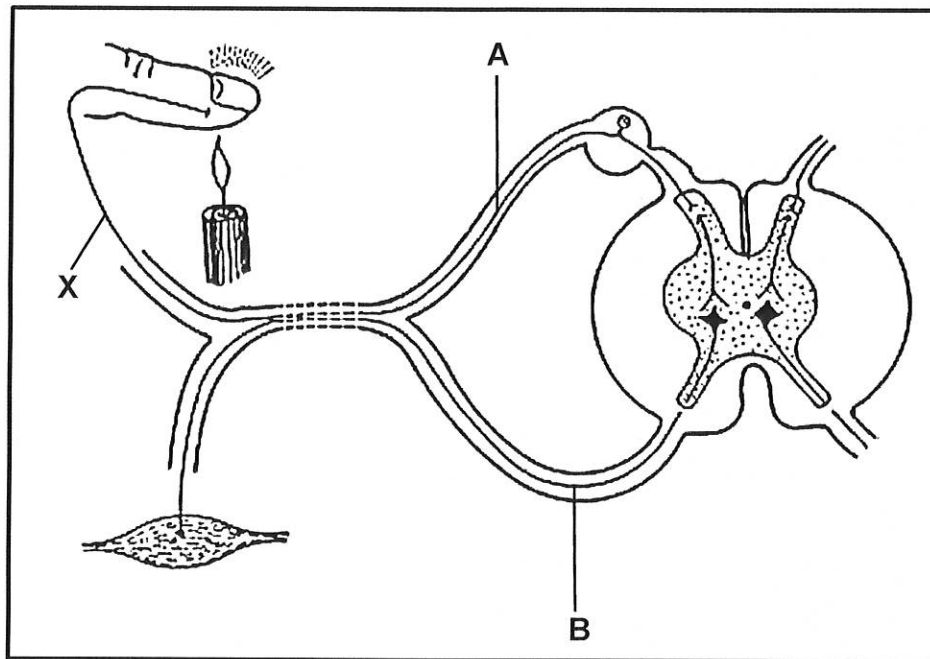
QUESTION 2

2.1 Water shortages in Cape Town have reached crisis levels.

If you were the Minister of Water Affairs, explain THREE strategies you could use to ensure that the city of Cape Town copes with the water crisis.

(6)

2.2 The diagram below represents a human reflex arc.



2.2.1 Differentiate between a *reflex action* and a *reflex arc*. (2)

2.2.2 Tabulate TWO differences in structure between neuron **A** and **B**. (5)

2.2.3 Describe the reflex action that occurs as represented in the diagram. (5)

2.2.4 Explain what would happen if neuron **A** was damaged at point **X**. (2)

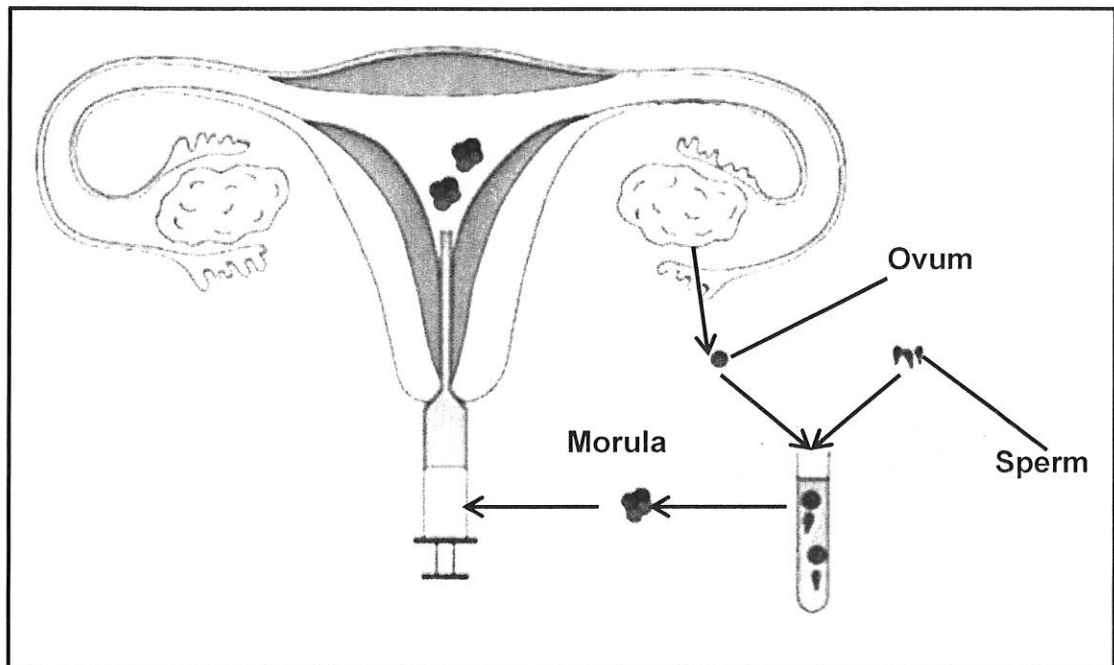
2.2.5 Explain how multiple sclerosis may result in the poor functioning of reflex arcs. (2)

(16)

2.3. A tubal ligation is a surgical procedure in which a woman's Fallopian tubes are clamped and blocked. Mpume underwent this procedure to prevent pregnancy.

After many years, Mpume decided to have children but was advised that it was dangerous to reverse the tubal ligation. It was recommended that she try in vitro fertilisation (IVF) instead. She was given hormone supplements before the IVF was performed.

The diagram below is a representation of how the IVF procedure was done.



- 2.3.1 Identify TWO hormones that were likely to be present in the hormone supplement given to Mpume. (2)
- 2.3.2 Why is it not necessary for the hormone supplement to contain progesterone? (2)
- 2.3.3 How does a tubal ligation prevent a pregnancy? (3)
- 2.3.4 Describe the events that take place after fertilisation in the test tube until implantation occurs in the uterus. (6)
- 2.3.5 Describe the negative feedback mechanism between FSH and progesterone as it would occur in Mpume's body during pregnancy. (3)
- 2.3.6 When Mpume falls pregnant, what will happen to the:
 - (a) Corpus luteum (1)
 - (b) Endometrium (1)

(18)
[40]

QUESTION 3

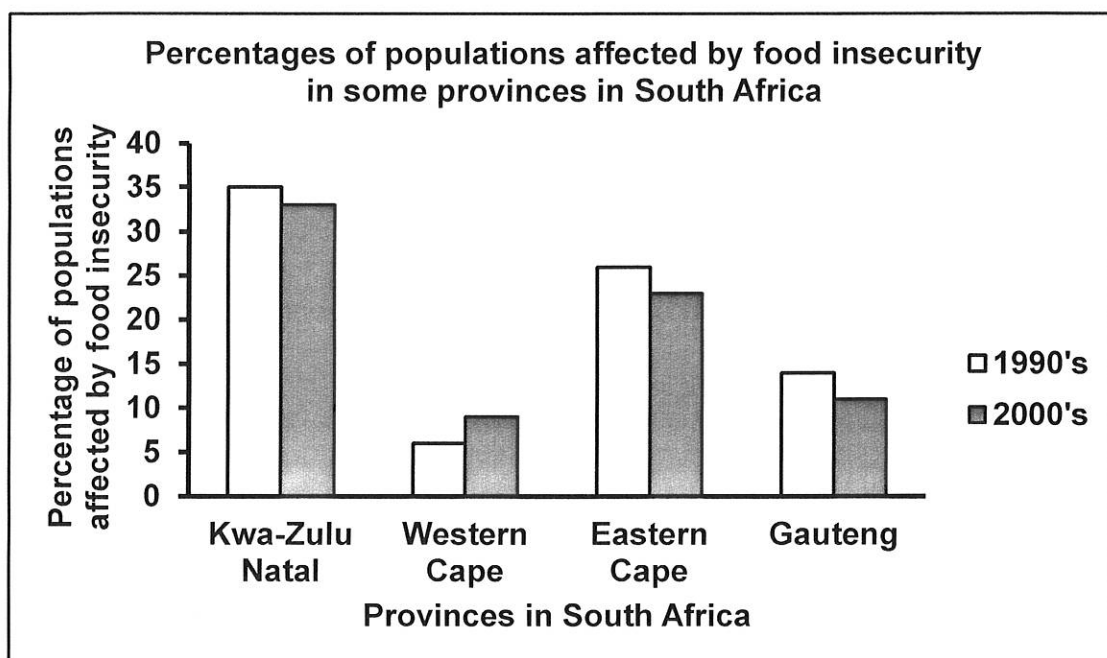
3.1 Gametogenesis occurs in males and females.

3.1.1 Describe the process of spermatogenesis. (4)

3.1.2 State ONE way in which the process of oogenesis is different from spermatogenesis. (2)

3.1.3 Explain why the testes in males are situated outside the body cavity. (2)
(8)

3.2 The graph below shows the percentage of populations affected by food insecurity in some provinces in South Africa.



3.2.1 Define *food security*. (2)

3.2.2 Name ONE province in which food insecurity has increased. (1)

3.2.3 List TWO factors that could have CAUSED the increase in food insecurity in the province named in QUESTION 3.2.2. (2)

3.2.4 What percentage of the population in the Eastern Cape was food secure in the 1990's? Show ALL working. (2)

3.2.5 Explain ONE way in which pesticides could decrease food security. (2)

3.2.6 Explain TWO ways in which genetically modified foods could increase food security. (4)

3.2.7 What conclusion can be made about the food security in Kwa-Zulu Natal from the graph provided. (2)

(15)

3.3 An investigation was carried out as to determine the effect of adrenalin on heart rate.

The procedure was as follows:

- The resting heart rate of three different men (**A**, **B** and **C**) was determined.
- Each man was injected with the same amount of adrenalin.
- After the injection each man's heart rate was measured after 5 minutes.

The results of the investigation are provided in the table below.

CONDITION	MAN A	MAN B	MAN C
Resting heart rate	80	85	92
Heart rate after the injection was given	115	98	120

3.3.1 State TWO ways in which the investigators increased the validity of the investigation. (2)

3.3.2 What served as a 'control' in this investigation? (1)

3.3.3 Explain how the effect of adrenalin on heart rate shown in the results is of benefit to a person in a dangerous situation. (3)
(6)

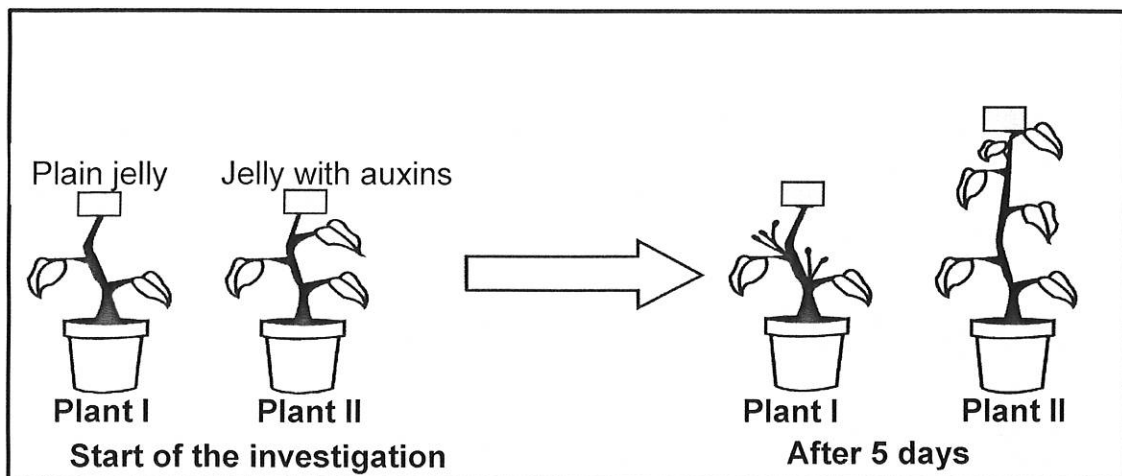
3.4 Describe how the human body regulates the salt level in blood when it decreases below normal. (5)

3.5 The following investigation was performed to demonstrate one of the effects of auxins.

- Plant I had the top removed and replaced with a block of plain jelly.
- Plant II had the top removed and replaced with a block of jelly containing auxins.
- Both plants were watered well and left in sunlight.

The jelly is able to allow auxins in it to diffuse into the plant.

The results of the experiment are shown below.



- 3.5.1 State which phenomenon is being investigated. (1)
- 3.5.2 Describe ONE change in appearance of Plant I after five days. (1)
- 3.5.3 Explain how the change in Plant I was brought about. (3)
- 3.5.4 State ONE way in which the reliability of the above investigation can be improved. (1)

(6)

[40]

TOTAL SECTION B: 80

SECTION C**QUESTION 4**

Kagiso Rabada, a South African cricket player, bowls during a cricket match on a hot day.

Describe how Rabada's temperature was lowered on the hot day, how he maintained his balance and equilibrium during his bowling and the role of hormones in maintaining his energy levels.

Content: (17)
Synthesis (3)
(20)

NOTE: NO marks will be awarded for answers in the form of tables, flow charts or diagrams.

TOTAL SECTION C: 20
RAND TOTAL: 15



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**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

LIFE SCIENCES P1

PREPARATORY EXAMINATION

SEPTEMBER 2017

MARKING GUIDELINE

MARKS: 150

This marking guideline consists of 10 pages.

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Please turn over

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

- 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.
- If, for example, three reasons are required and five are given**
Mark the first three irrespective of whether all or some are correct/incorrect.
- If whole process is given when only a part of it is required**
Read all and credit the relevant part.
- If comparisons are asked for but descriptions are given**
Accept if the differences/similarities are clear.
- If tabulation is required but paragraphs are given**
Candidates will lose marks for not tabulating.
- If diagrams are given with annotations when descriptions are required**
Candidates will lose marks.
- If flow charts are given instead of descriptions**
Candidates will lose marks.
- 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.
- 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.
- Wrong numbering**
If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable.
- If language used changes the intended meaning**
Do not accept.
- Spelling errors**
If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.
- If common names are given in terminology**
Accept, provided it was accepted at the national memo discussion meeting.
- If only the letter is asked for but only the name is given (and vice versa)**
Do not credit.

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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	A✓✓	
	1.1.2	B✓✓	
	1.1.3	A✓✓	
	1.1.4	B✓✓	
	1.1.5	A✓✓	
	1.1.6	B✓✓	
	1.1.7	D✓✓	
	1.1.8	C✓✓	
	1.1.9	B✓✓	
	1.1.10	D✓✓	(10 x 2) (20)
1.2	1.2.1	Non-disjunction✓	
	1.2.2	Yolk sac✓	
	1.2.3	Geotropism✓	
	1.2.4	Amniotic✓/lamniate	
	1.2.5	Umbilical vein✓	
	1.2.6	Epididymis✓	
	1.2.7	Pituitary✓/hypophysis	
	1.2.8	Endocrine✓	(8 x 1) (8)
1.3	1.3.1	B only✓✓	
	1.3.2	None✓✓	
	1.3.3	Both✓✓	(3 x 2) (6)
1.4	1.4.1	E✓ - Ciliary muscle✓	(2)
	1.4.2	F✓ - Lens✓	(2)
	1.4.3	D✓ - Iris✓	(2)
1.5	1.5.1	(a) Chromosome✓	(1)
		(b) Chromatid✓	(1)
		(c) Homologous chromosomes✓/bivalent	(1)
	1.5.2	(a) Forms the spindle✓	(1)
		(b) Pulls chromosomes/chromatids to opposite poles✓/for attachment of chromosomes	(1)
		(c) Holds two chromatids together✓	(1)
	1.5.3	Crossing over✓	(2)
		Random arrangement of chromosomes✓	
		(Mark first TWO only)	
	1.5.4	Four✓/4	(1)
	1.5.5	Metaphase II✓	(1)
			(10)

TOTAL SECTION A: 50

QUESTION 2

2.1

- Prevent destruction of wetlands✓
- to improve the availability and quality of water✓
- Fix leaking pipes✓/toilets/taps
- to reduce the wastage of water✓
- Provide incentives for families who save water✓
- 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✓

(Mark first THREE only)

Any 3 x 2 (6)

2.2

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

(2)

2.2.2

NEURON A/SENSORY	NEURON B/MOTOR
Has one dendrite✓/unipolar	Has many dendrites✓/multipolar
Cell body in the centre of the cell✓/centrally located	Cell body at the end of the cell✓/terminally located

(Mark first TWO only)

(5)

2.2.3

- The receptor/finger receives the stimulus of heat✓
- and converts it into an impulse✓
- The sensory neuron carries the impulse from the receptor✓
- to the interneuron✓/connector neuron
- The connector neuron transmits the impulse to the motor neuron✓
- 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)

- 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✓

OR

- 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
- (b) Becomes thicker✓/thickness maintained

(1)

(1)

(18)

[40]

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✓
(Mark first TWO only) (2)
- 3.2.4 $100 - 25\% = 75\%$ (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)

- 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 less food✓
- 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✓ (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 - Receptor cells in the kidney✓
- detect the low salt level✓
- The adrenal gland is stimulated✓
- to secrete more aldosterone✓
- which increases the re-absorption of sodium ions✓ from the renal tubules
- into the surrounding blood vessels✓
- The salt level in the blood vessels increases✓
- and the salt levels in the blood return to normal✓ Any (5)
- 3.5 3.5.1 Apical dominance✓ (1)
- 3.5.2 The plant has developed lateral branches✓ (1)
- 3.5.3 - There were no auxins present in the tip of the stem✓
- therefore apical dominance was removed✓
- and lateral branches grow✓ (3)
- 3.5.4 - Repeat the investigation✓
- Use a larger sample of plants✓ for each treatment Any (1)
(6)
(Mark first ONE only) [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✓

Max 7

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.
- to the skeletal muscles✓ 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

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 <ul style="list-style-type: none"> - Temperature regulation on a hot day - Balance and equilibrium - Maintaining high energy levels No irrelevant information included.	The description of <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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

