



education

Department:
Education
PROVINCE OF KWAZULU-NATAL



**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

**LIFE SCIENCES P1
PREPARATORY EXAMINATION
SEPTEMBER 2021**

MARKS: 150

TIME: 2½ hours

N.B. This question paper consists of 16 pages including this page.

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 part of the brain that controls thirst is the ...

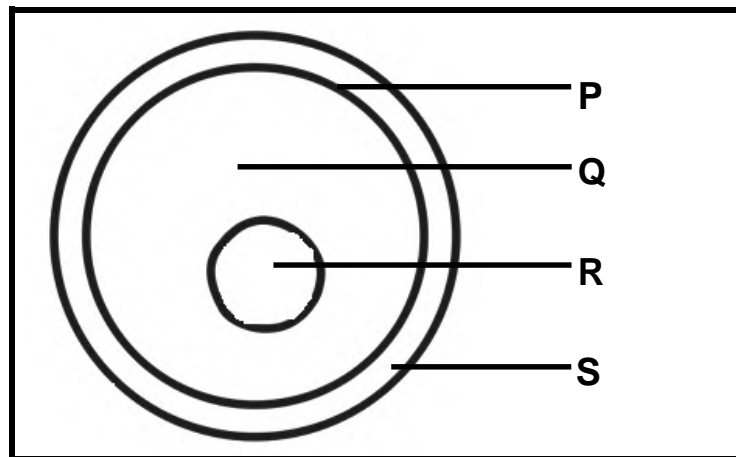
- A cerebellum.
- B medulla oblongata.
- C hypothalamus.
- D cerebrum.



1.1.2 Which ONE of the following will produce healthy sperms?

- A prostate glands at a temperature of about 35°C.
- B prostate glands at a temperature of about 37°C.
- C testis at a temperature of about 35°C.
- D testis at a temperature of about 37°C.

1.1.3 The diagram below represents an egg cell.



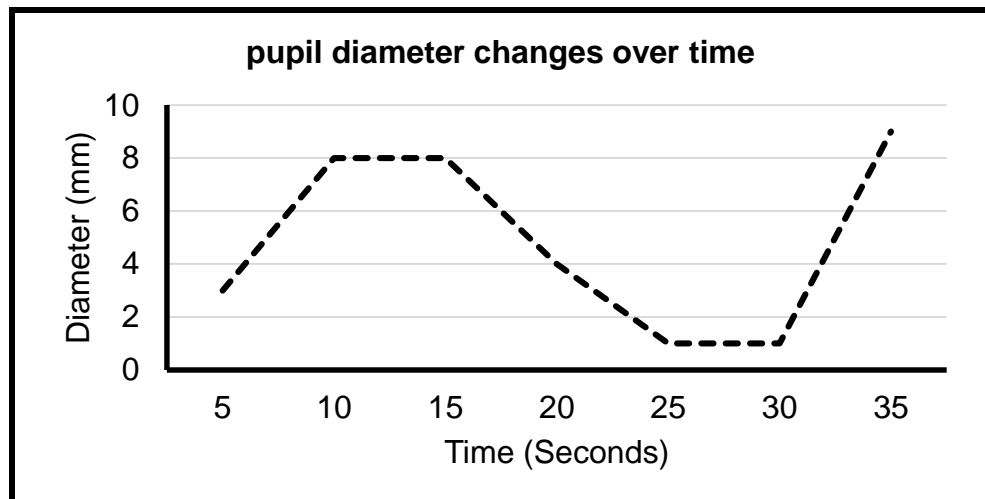
Which ONE of the following contains mitochondria, DNA and have a protective function respectively?

	MITOCHONDRIA	DNA	PROTECTION
A	P	Q	R
B	Q	R	S
C	Q	P	R
D	R	S	Q

1.1.4 The tube in the male reproductive system that is most likely blocked if the ejaculated fluid contains no sperm cells is the...

- A urethra.
- B vas deferens.
- C ureter.
- D seminal vesicle.

1.1.5 The diagram below shows the changes in the diameter of the pupil of the eye as a person sat in a room with changing light intensities.



During which period of time did the light intensity increase the fastest?

- A 5 – 10s
- B 15 – 25s
- C 15 – 35s
- D 30 – 35s

1.1.6 A person cannot maintain balance. Which ONE of the following parts is most likely affected?

- A Cerebrum
- B Cerebellum
- C Hypothalamus
- D Medula oblongata



QUESTION 1.1.7 AND 1.1.8 ARE BASED ON THE FOLLOWING DIAGRAM.

In an investigation to determine the effect of salt on urine production, a group of learners carried out the following steps.

They:

- (i) Asked 20 girls to participate in the investigation.
- (ii) Measured the urine produced at the start of the investigation
- (iii) Divided the girls into 2 groups, **A** and **B**
- (iv) The girls in group **A** (10 girls) were each given 100ml of pure water to drink
- (v) The girls in group **B** (10 girls) were each given 100ml of a concentrated salt solution to drink
- (vi) The same instrument was used to measure urine production

1.1.7 Which ONE of the following combinations is considered as planning step(s) for the investigation?

- A (i), (iii) and (iv)
- B (i) and (v)
- C (i) only
- D (i), (ii), (iii) and (v)

1.1.8 Which ONE of the following combinations correctly represents a control?

- A (iii) only
- B (i) and (iii)
- C (ii) only (v)
- D (iv) only

1.1.9 One of the functions of the amnion in an amniotic egg is to ...

- A form the placenta.
- B enclose the fluid that protects the embryo against injury.
- C provide nourishment for the embryo.
- D store waste produced by the embryo.

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

TIME (Minutes)	INSULIN CONCENTRATION (mg/ml)
0	85
30	81
60	79
90	129
120	109
150	102
180	90

The changes in the level of hormones indicate that the person ate a meal rich in carbohydrate between ...

- A 150 and 180 minutes
- B 120 and 150 minutes
- C 0 and 30 minutes
- D 60 and 90 minutes



(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 1.2.9) in the ANSWER BOOK.

- 1.2.1 The type of development in birds where the young offspring can move and feed themselves right after hatching
- 1.2.2 The hormone that regulates the water levels in the human body
- 1.2.3 The branch of the autonomic nervous system that decreases the heartbeat back to normal
- 1.2.4 A nervous disorder characterised by the degeneration of dendrites resulting in memory loss and confusion
- 1.2.5 A disorder caused by the lack of iodine in a person's diet
- 1.2.6 A nervous disorder characterised by the degeneration of the myelin sheath
- 1.2.7 The layer in the eye that absorbs excess light
- 1.2.8 The maintenance of constant water levels in the body
- 1.2.9 The hormone secreted by pancreas when blood glucose level is low

(9 x 1) (9)

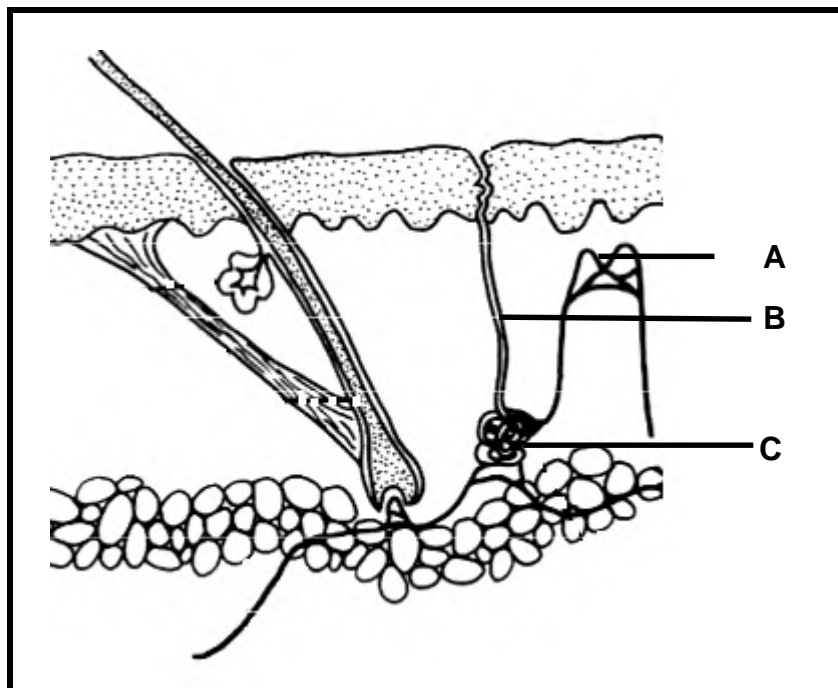
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	Produces a fluid that forms part of the semen	A:	Cowper's gland
		B:	Seminal vesicle
1.3.2	Produces adrenalin	A:	Thyroid gland
		B:	Pituitary gland
1.3.3	Maintaining a constant internal environment	A:	Homeostasis
		B:	Negative feedback

(4 x 2)

(6)

1.4 The diagram below shows part of the human skin.



1.4.1 Write down the LETTER and the NAME of the part that:

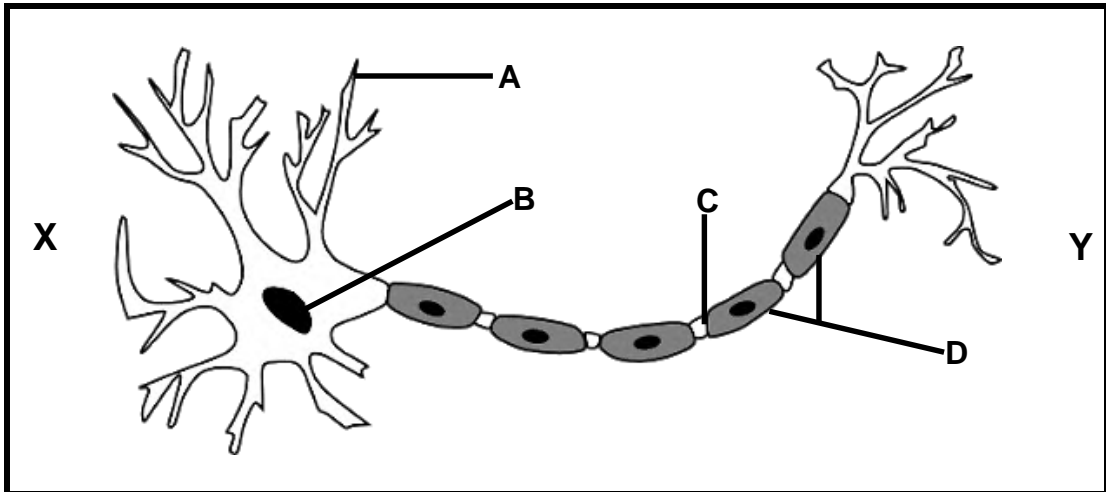
(a) Produces sweat. (2)

(b) Dilates when body temperature increases. (2)

1.4.2 State what happens to part C on a cold day. (1)

(5)

1.5 The following diagram represent a neuron.



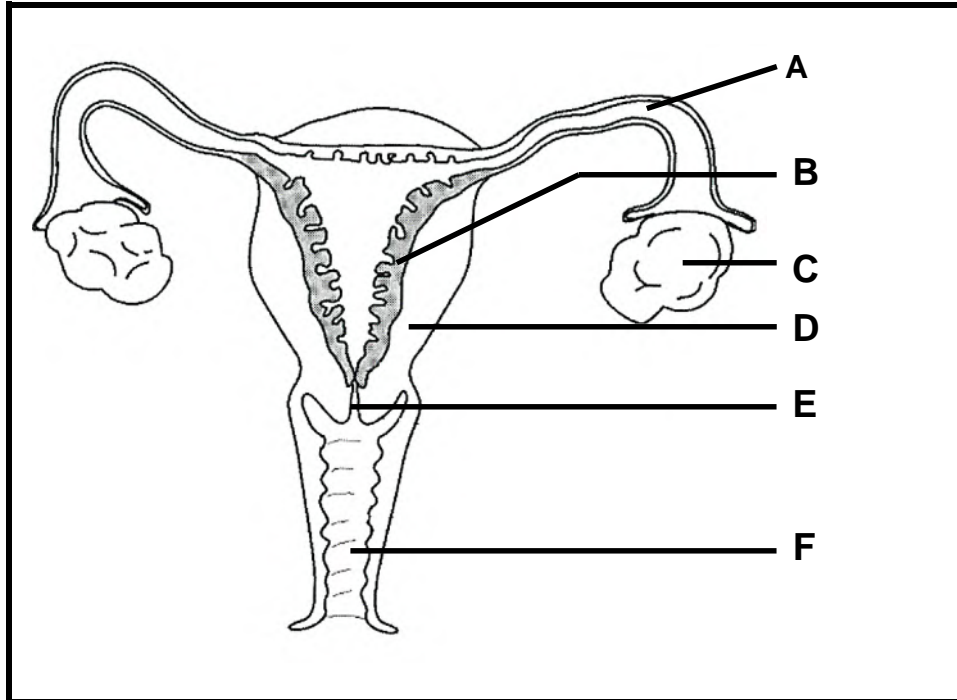
- 1.5.1 Give the LETTER and NAME of the part:
- (a) That transmit impulses towards the cell body (2)
 - (b) Speeds up transmission of nerve impulses (2)
 - (c) Transmit impulses away from the cell body (2)
 - (d) Controls the functioning of the neuron (2)
- 1.5.2 Identify the type of neuron shown in the diagram. (1)
- 1.5.3 State whether the impulse travels from X to Y or from Y to X. (1)
- (10)**

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below shows the human female reproductive system.



2.1.1 Identify parts:

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

2.1.2 State TWO functions of part **F**. (2)

2.1.3 A woman had a tumour growing at **A**, which resulted in a complete blockage but she continued with her normal menstrual cycles.

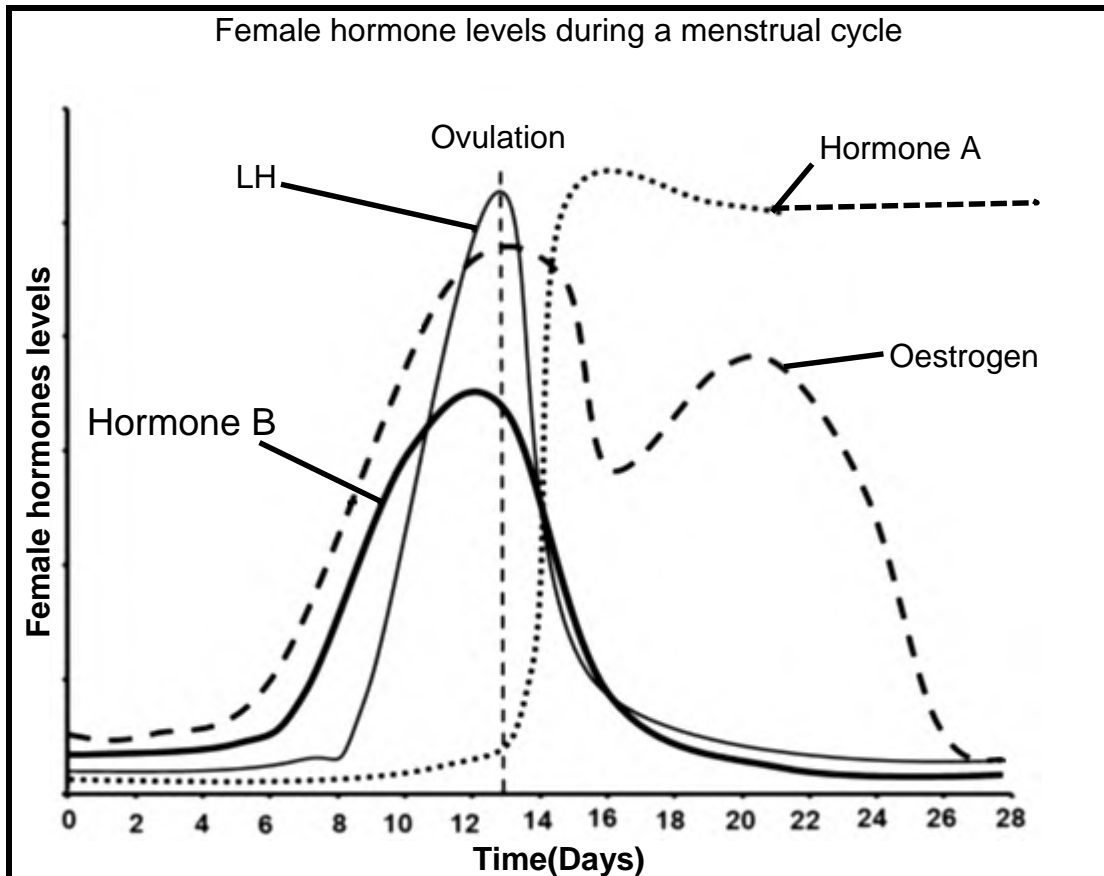
Explain why her menstrual cycles continued to be normal. (3)

2.1.4 Name the structure formed by **B** with the chorion of the embryo during gestation and state TWO functions of this structure. (3)

2.1.5 Describe the process of fertilisation. (5)

(16)

2.2 The graphs below show hormone levels during a menstrual cycle.



2.2.1 Identify hormone **B**. (1)

2.2.2 Describe the effect of changes in oestrogen levels on the endometrium from the 7th to the 13th day of the cycle. (2)

2.2.3 Explain why hormone **A** remained high beyond the 28 days of the cycle. (4)

2.2.4 Explain the consequence in reproduction if LH was not produced. (2)

(9)

2.3 Males and females produce gametes for reproduction.

2.3.1 What is *spermatogenesis*? (1)

2.3.2 Name the part in a male reproductive system where spermatogenesis occurs. (1)

2.3.3 Describe the process of oogenesis. (5)

(7)

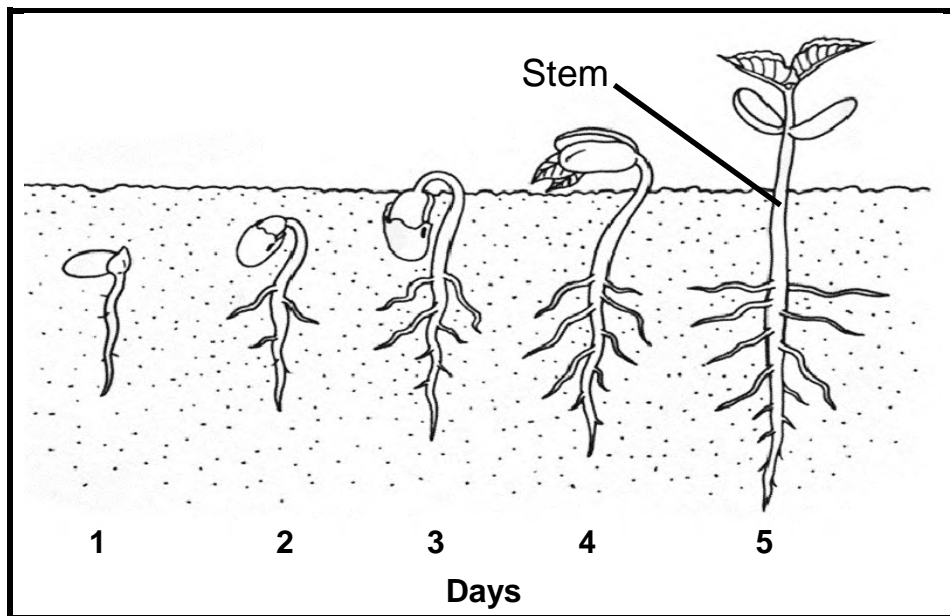
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2.4 An investigation was conducted to determine the relationship between seed germination and the amount of abscisic acid found in the seed.

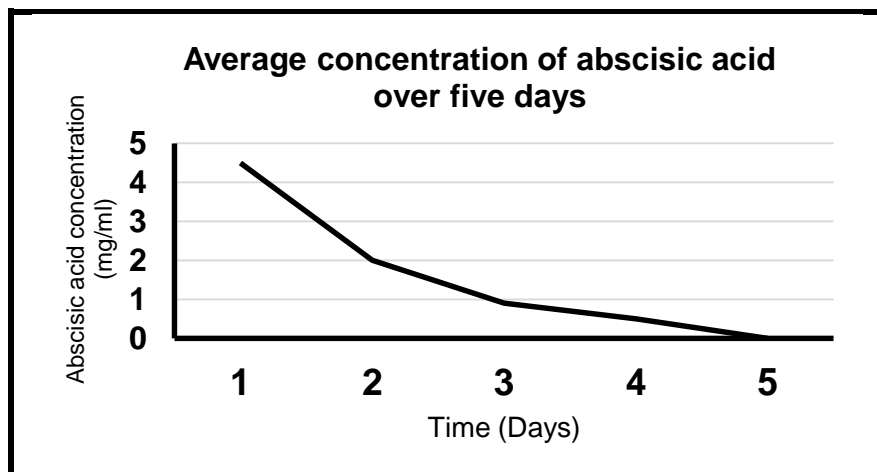
The procedure was as follows:

- 10 seeds were placed on damp cotton wool on a tray
- The tray was placed in a dark cupboard
- The abscisic acid concentration in the seeds was measured in the laboratory every day for five days.

The diagram below shows one of the seeds that germinated.



The graph below shows the average concentration of abscisic acid in the 10 seeds



2.4.1 Identify the:

- (a) Independent variable (1)
- (b) Dependent variable (1)

- 2.4.2 State the function of abscisic acid. (1)
- 2.4.3 Describe the trend of the hormone concentration as shown in the graph. (2)
- 2.4.4 Explain the effect of the trend described in QUESTION 2.4.3 on the seed germination. (2)
- 2.4.5 State TWO ways to increase the validity of this investigation. (2)
- 2.4.6 Explain the plant growth response shown by the stem of the seedling on days 4 to 5. (4)
- (13)**

2.5 Read the extract below.

REPRODUCTION IN THE SAND SCORPION

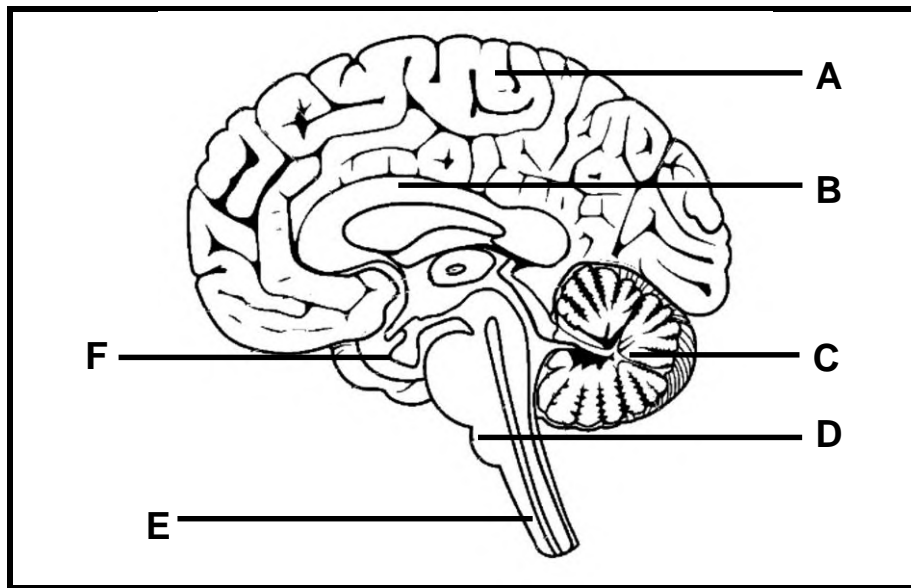
During the mating season, males grasp the females by their pincers, and move them around in circles. After dancing for a while, the male deposits a packet of sperm on a stick or other surface. Then he moves the female until she is on top of the sperm and her sex organs touches the sperm. She takes in the sperm, which fertilise her eggs.

Young Sand Scorpions spend about 12 months developing in the eggs retained inside their mother before they are born alive. After they are born, they quickly crawl onto their mother's back where they stay until they are big enough to leave the burrow.

- 2.5.1 What type of fertilisation occurs in the sand scorpion? (1)
- 2.5.2 Give a reason for your answer in QUESTION 2.5.1. (1)
- 2.5.3 From the extract, identify ONE other reproductive strategy apart from your answer to QUESTION 2.5.1 that is used by the scorpion. (1)
- 2.5.4 Explain the role of the reproductive strategy mentioned in QUESTION 2.5.3 in maximising reproductive success in sand scorpions. (2)
- (5)**
[50]

QUESTION 3

3.1 The following diagram shows a section through the human brain.

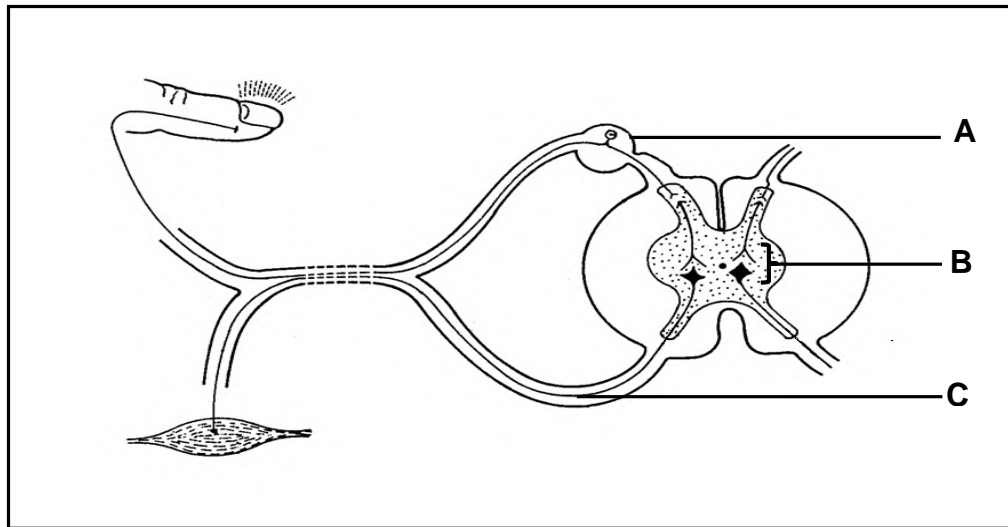


- 3.1.1 Give the collective name of the membranes that protect the brain and spinal cord. (1)
- 3.1.2 Identify part:
- (a) **B** (1)
- (b) **D** (1)
- (c) **E** (1)
- 3.1.3 Give TWO functions of part **A**. (2)
- 3.1.4 Explain why damage to part **D** can lead to immediate death. (2)
- (8)**

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3.2 Describe the location and functioning of the autonomic nervous system. (5)

3.3 The diagram below represents a reflex arc.

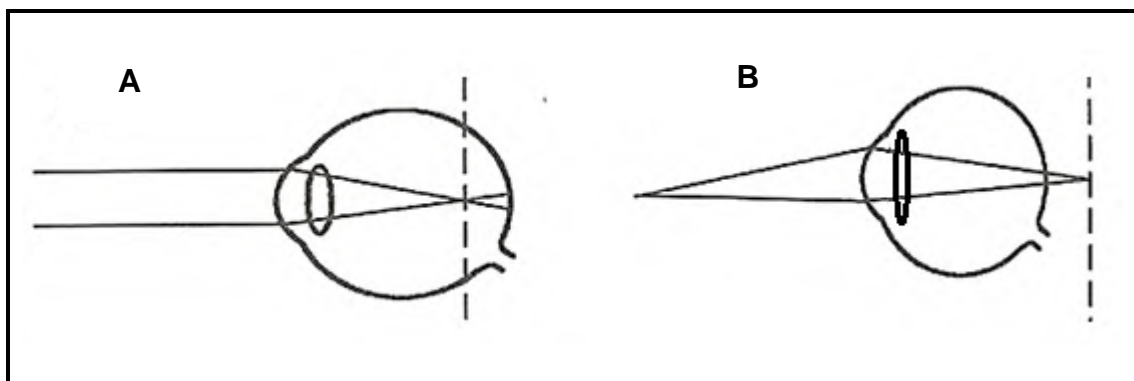


3.3.1 What is a *reflex arc*? (3)

3.3.2 Give the LETTER and the NAME of the part that ensures the one-directional transmission of impulses (2)

3.3.3 Explain the result if a chef, who has damaged his part C, accidentally places his finger on a hot plate. (4)
(9)

3.4 The diagram below shows some visual defects in the human eye.

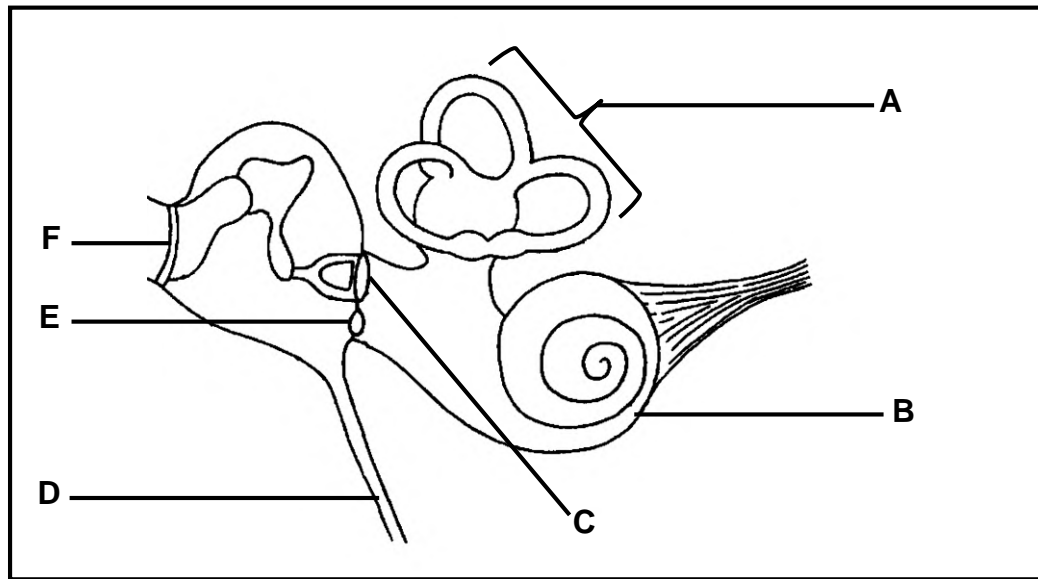


3.4.1 Identify the visual defect shown in diagram B. (1)

3.4.2 Give TWO visible reasons for your answer in QUESTION 3.4.1. (2)

3.4.3 Describe the nature and treatment of the visual defect shown in diagram A. (2)
(5)

3.5 The diagram below shows part of the human ear.



3.5.1 Identify part:

(a) **C** (1)

(b) **F** (1)

3.5.2 Give the LETTER of the part of the ear that absorbs excess pressure waves in the inner ear. (1)

3.5.3 Name the receptors that are found in part **B**. (1)

3.5.4 Explain the significance of the arrangement of the structures labelled **A**. (3)

3.5.5 Explain the results for people who have their part **D** blocked. (3)

(10)

- 3.6 The table below shows the amount of blood flow to the heart muscles of a man after taking an injection of adrenalin.

Time(minutes)	Blood flow (ml/min.)
0	25
15	56
30	60
45	50
60	45

- 3.6.1 Name:
- (a) The gland that produces adrenalin. (1)
- (b) The hormone that has similar effect on blood flow to the heart (1)
- 3.6.2 State whether the gland named in QUESTION 3.6.1(a) is endocrine or exocrine. (1)
- 3.6.3 Draw a line graph to represent the information from the table. (6)
- 3.6.4 Explain the significance of the change in blood flow observed on the table. (4)

(13)

TOTAL SECTION B: 100
GRAND TOTAL: 150



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LIFE SCIENCES P1
PREPARATORY EXAMINATION
MARKING GUIDELINE - SEPTEMBER 2021

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

MARKS: 150

This memorandum consists of 8 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.

SECTION A**QUESTION 1**

1.1	1.1.1	C✓✓		
	1.1.2	C✓✓		
	1.1.3	B✓✓		
	1.1.4	B✓✓		
	1.1.5	B✓✓		
	1.1.6	B✓✓		
	1.1.7	C✓✓		
	1.1.8	D✓✓		
	1.1.9	B✓✓		
	1.1.10	D✓✓	(10 x 2)	(20)
1.2	1.2.1	Precocial✓		
	1.2.2	ADH✓/antidiuretic hormone		
	1.2.3	Parasympathetic✓		
	1.2.4	Alzheimer's disease✓		
	1.2.5	Goitre✓		
	1.2.6	Multiple sclerosis✓		
	1.2.7	Choroid✓		
	1.2.8	Osmoregulation✓		
	1.2.9	Glucagon✓		(9)
1.3	1.3.1	Both A and B✓✓		(2)
	1.3.2	None✓✓		(2)
	1.3.3	A only✓✓		(2)
				(6)
1.4	1.4.1	(a) C✓ - Sweat gland✓		(2)
		(b) A✓ - Capillary/blood vessel✓.		(2)
	1.4.2	It becomes less active✓/produces less sweat		(1)
				(6)
1.5	1.5.1	(a) A✓ – Dendrite✓		(2)
		(b) D✓ – myelin sheath✓		(2)
		(c) C✓ – Axon✓		(2)
		(d) B✓ - Nucleus✓		(2)
	1.5.2	Motor neuron✓		(1)
	1.5.3	X to Y✓		(1)
				(10)

50

SECTION B**QUESTION 2**

- 2.1 2.1.1 (a) Ovary✓ (1)
- (b) Uterus✓/uterine wall (1)
- (c) Cervix✓ (1)
- 2.1.2 Receives the penis✓ during sexual intercourse
Serves as a birth canal✓ (2)
- 2.1.3 A only allows the passage of an ovum✓
Which has no effect✓ on the menstrual cycle
Since it is controlled by hormones✓
Which are transported by blood✓ Any 3 (3)
- 2.1.4 Placenta✓*
- Micro-filters pathogens not to enter the foetus from the mother✓
- Links the foetus and the mother✓
- Produces antibodies that provide passive immunity to the baby✓
- Filters waste from the baby to the mother for excretion✓/gas exchange
- Sends nutrients from the mother to the baby✓
- Foetal protection
- Hormone secretion 1 compulsory mark + any 2 (3)
(Mark FIRST TWO ONLY)
- 2.1.5 - In the fallopian tubes✓
- One sperm cell makes contact with the ovum's membrane✓
- The nucleus of the sperm enters the ovum✓
- Then the ovum membrane cannot be penetrated by other sperms✓
- The nucleus of the sperm fuses✓
- With the nucleus on the ovum✓
- To form a diploid zygote✓. (Any 5) (5)
- 2.2 2.2.1 FSH✓ (1)
- 2.2.2 - Oestrogen levels increased✓
- causing the endometrium to thicken✓. (2)
- 2.2.3 - Corpus luteum remained intact✓
- therefore continued to produce progesterone✓/hormone A.
- to further thicken the endometrium✓
- for implantation to occur✓
- and maintenance of pregnancy✓. Any 4 (4)



- 2.2.4 - Ovulation will not occur✓
- Therefore no fertilisation will take place✓ (2)
- 2.3 2.3.1 - The formation of male gametes/sperms✓. (1)
- 2.3.2 Testis✓ (1)
- 2.3.3 - Under THE influence of FSH✓
- diploid cells in the ovary undergo mitosis✓
- to form numerous follicles✓
- One cell inside a follicle enlarges and undergo meiosis✓ (5)
- Of the four cells that are produced only one survives to form a mature haploid ovum✓ (7)
- 2.4 2.4.1 (a) Amount of abscisic acid✓ (1)
(b) Seed germination✓ (1)
- 2.4.2 Promotes seed dormancy✓/inhibits growth (1)
- 2.4.3 As the days increase the hormone concentration decreases✓✓ (2)
- 2.4.4 - Decrease in abscisic concentration✓
- which allows seed germination✓/growth. (2)
- 2.4.5 - Same type of seeds✓.
- Same age of seeds✓.
- Same measuring instrument✓.
- Same person taking measurements✓. (2)
- (Mark the FIRST TWO only)**
- 2.4.6 - As the setup was placed in the dark cupboard✓
- there was no effect of light✓
- Force of gravity✓ acts on the seedlings
- the stem is negatively geotropic✓
- hence it grows straight upwards✓. (Any 4) (4)
- 2.5 2.5.1 Internal fertilisation✓ (1)
- 2.5.2 Female takes in the sperms and fertilisation occurs inside her body✓. (1)
- 2.5.3 Ovovivipary (1)
- 2.5.4 - Fertilised egg/zygote is kept within the body of the female✓
- therefore protecting them from harsh environmental conditions✓/predators
- which increases the chances. (2)

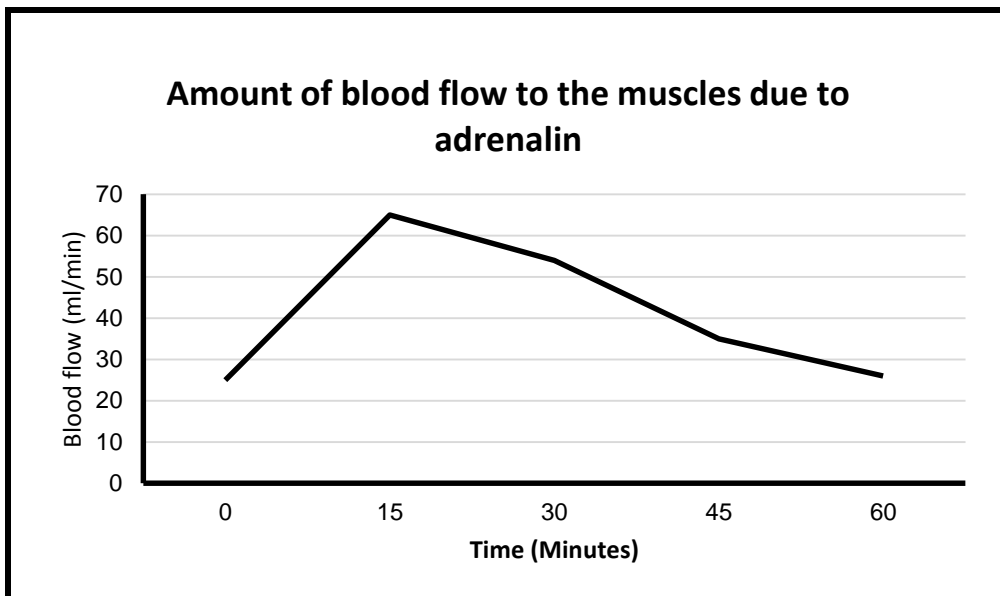
(5)
[50]

QUESTION 3

- 3.1 3.1.1 Meninges✓ (1)
- 3.1.2 (a) Corpus callosum✓ (1)
- (b) Medulla Oblongata✓ (1)
- (c) Spinal cord✓ (1)
- 3.1.3 - Interprets sensations✓
- Control voluntary actions✓/walking/running/talking etc.
- Responsible for higher thought processes✓ (2)
- (Mark FIRST TWO only)**
- 3.1.4 - Controls vital functions such as breathing✓/heart beat/blood pressure which can stop immediately✓/instantly
- which will lead to instant death. (2)
- (8)**
- 3.2 - A collection of motor neurons located in the neck, head, thorax, abdomen and pelvis✓*
- Every organ and gland are controlled by two sets of nerves✓/double innervations
- The set of nerves act antagonistically✓
- To control involuntary events✓/brings about homeostasis
- Sympathetic nerves✓
- stimulates a response✓/prepares the body system for flight/fight eg speed heartbeat
- Parasympathetic nerves✓
- inhibits a response✓/brings about the response we associate with relaxed/rest state and thus conserves energy.
1 Compulsory mark + Any 4 (5)
- 3.3.1 It is a pathway taken by impulses✓ from the receptors to the CNS✓ and to the effectors✓ to bring about a reflex action. (3)
- 3.3.2 B✓ - Synapse✓ (2)
- 3.3.3 - Sensory neuron will transmit impulses to the spinal cord✓
- And therefore, he will feel the heat✓/pain
- but impulses will not be sent to his muscles✓
- therefore, he cannot remove his finger from the burning plate✓/will burn his finger. (4)
- (9)**
- 3.4 3.4.1 Long sightedness✓ (1)
- 3.4.2 - Image falling behind the retina✓
- Lens less convex✓/more flat (2)
- (Mark the FIRST TWO)**

- 3.4.3 - Short sightedness✓
- Wearing glasses with concave lenses✓ (2)
(5)
- 3.5 3.5.1 (a) Oval window✓ (1)
(b) Tympanic membrane✓ (1)
- 3.5.2 E✓ (1)
- 3.5.3 organ of Corti✓/hair cells (1)
- 3.5.4 - They lie on three different planes✓
- to detect movement in any direction✓
- fluid moves in at least one of the semi-circular canals✓
- to stimulate receptors✓ Any 3 (3)
- 3.5.5 - Air will not be taken in✓/released
- to equalise pressure✓
- on both sides of the tympanic membrane✓
- Tympanic membrane✓/ossicles may not vibrate freely
- This may lead to the tympanic membrane bursting✓ and therefore
could lead to hearing loss✓/deafness Any 3 (3)
(10)
- 3.6 3.6.1 (a) Adrenal✓ gland (1)
(b) Thyroxin✓ (1)
- 3.6.2 Endocrine✓ (1)

3.6.3



Criteria	ELABORATION	Marks
Caption of graph (C)	Both variables included	1
Correct type of graph (T)	Line graph drawn	1
Axes labels (L)	X- and y- axis correctly labelled with units	1
Scale for x- and y- axis (S)	Correct scale for x- axis and for y-axis	1
Plotting of graph (P)	1-4 points plotted correctly. All 5 points plotted correctly	1 2

(6)

- 3.6.4
- There is an increase in blood flow to the heart✓
 - which supplies more oxygen and glucose to the cells✓
 - to increase energy production in the cells✓/increase cellular respiration
 - to deal with emergency✓

(4)

(13)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

