education
MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

GRADE 12

LIFE SCIENCES P1

SEPTEMBER 2022

MARKS: 150

TIME: 2½ HOURS

This question paper consists of 20 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 to the numbering system used in the question paper.
5. Present your answers according to the instructions of each question.
6. Do 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 answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.10) in the ANSWER BOOK, for example 1.1.11 - D.

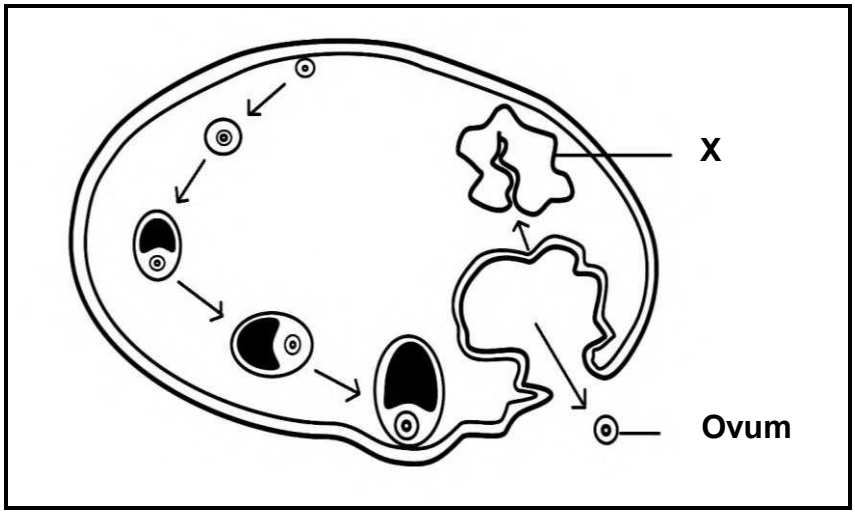
1.1.1 Which ONE of the following structures in an amniotic egg protects the developing embryo from physical injury?

A Allantois
B Shell
C Chorion
D Yolk sac

1.1.2 One of the functions of the hormone progesterone is to …

A bring about the formation of the corpus luteum.
B promote the development of secondary characteristics in both males and females
C promote the maturation of ovarian follicles.
D prepare the uterine wall for implantation of the embryo.

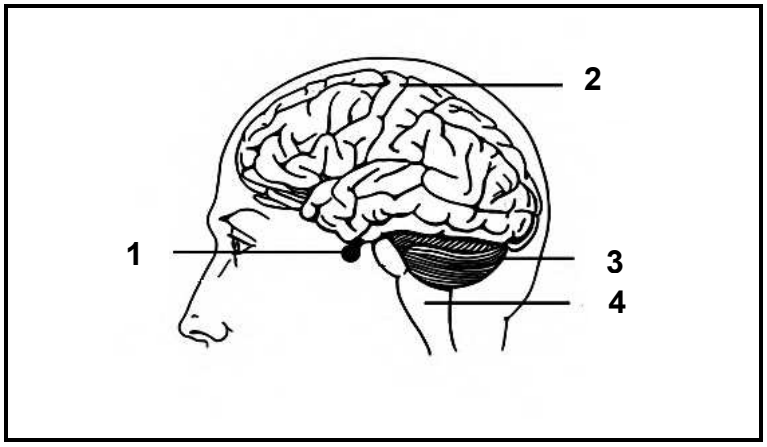
1.1.3 The diagram below represents a part of the female reproductive cycle.



The main function of part **X** is to secrete …

A LH.
B FSH.
C progesterone.
D oestrogen.

1.1.4 The diagram below represents the human brain and part of the spinal cord.



A patient experiences slight visual and speech disturbance after a serious head injury. Which section of the brain has possibly been damaged?

A 1
B 2
C 3
D 4

1.1.5 Which ONE of the following is the function of gibberellins?

A Bring about dormancy of seeds by slowing down germination, and dormancy of apical buds
B Bring about tropism in plants
C Promote development of flowers in plants
D Promote the growth of lateral buds

1.1.6 The picture below shows the world's shortest woman.

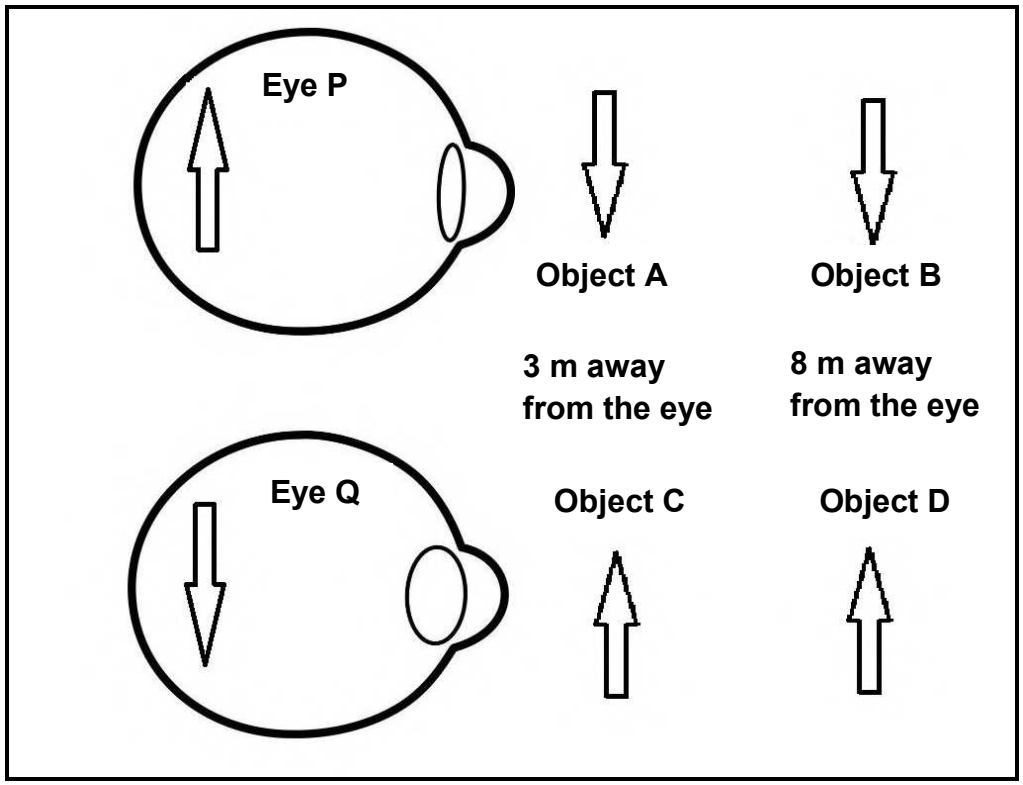
[Jyoti Amge, The world's shortest woman. (62,8 cm) Lauche Guinnes World Records 2014.www.huffingtonpost.com/2013/09/11jyoti-amge_n_3907742-html]

Which ONE of the following endocrine glands plays a role in the physiological condition shown in the picture?

A Ovary
B Adrenal gland
C Pancreas
D Pituitary gland

1.1.7 The diagram below shows two eyes (**P** and **Q**) focused on objects represented by arrows at different distances from the eye.

Objects **A** and **C** are 3 metres away from the eye and objects **B** and **D** are 8 metres away from the eye.

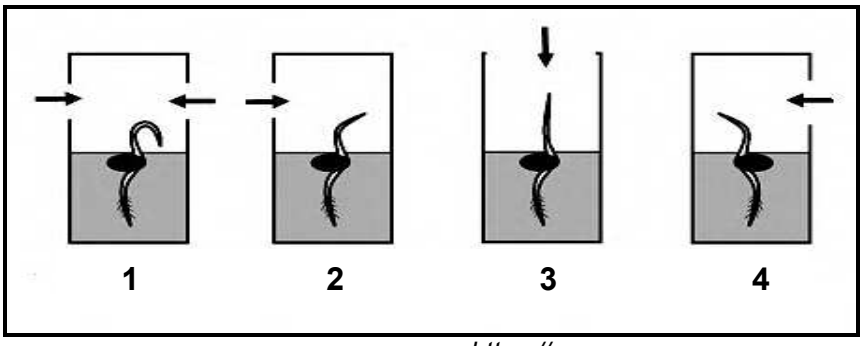


Which ONE of the following represents the objects focussed on by **P and Q**?

	Eye **P**	Eye **Q**
A	Object **A**	Object **C**
B	Object **A**	Object **D**
C	Object **B**	Object **D**
D	Object **B**	Object **C**

1.1.8 The diagram below shows the direction of the plumule growth in various seedlings 1, 2, 3 and 4 placed in cardboard boxes.

The arrows indicate the direction of light.



https://www.saexampapers.co.za

Which ONE of the above seedlings shows the correct response to light?

A 3
B 4
C 2
D 1

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

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

1.1.10 A high concentration of adrenalin in the blood leads to an increase in blood glucose levels, because …

A there is a decrease in metabolic rate.
B glycogen in the liver and muscles is converted to glucose.
C there is an increase in the digestion of carbohydrates.
D proteins are broken down to release more glucose.

(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 1.2.10) in the ANSWER BOOK.

1.2.1 The hormone secretion from the islets of Langerhans that lowers the glucose level of blood

1.2.2 Glands located on top of the kidney consisting of a cortex and medulla

1.2.3 The homeostatic control of water balance in the blood

1.2.4 The fluid that supports the cornea in the front chamber of the eye

1.2.5 A plant growth substance that causes leaves to fall off trees in autumn

1.2.6 The system in the body that regulates processes by secreting hormones directly into the blood

1.2.7 The gland responsible for the production of ADH

1.2.8 The proteins secreted into the blood that act as chemical messengers

1.2.9 The hormone secreted by the adrenal glands that regulates the sodium concentration of the blood

1.2.10 The part of the human ear that directs sound waves into the auditory canal

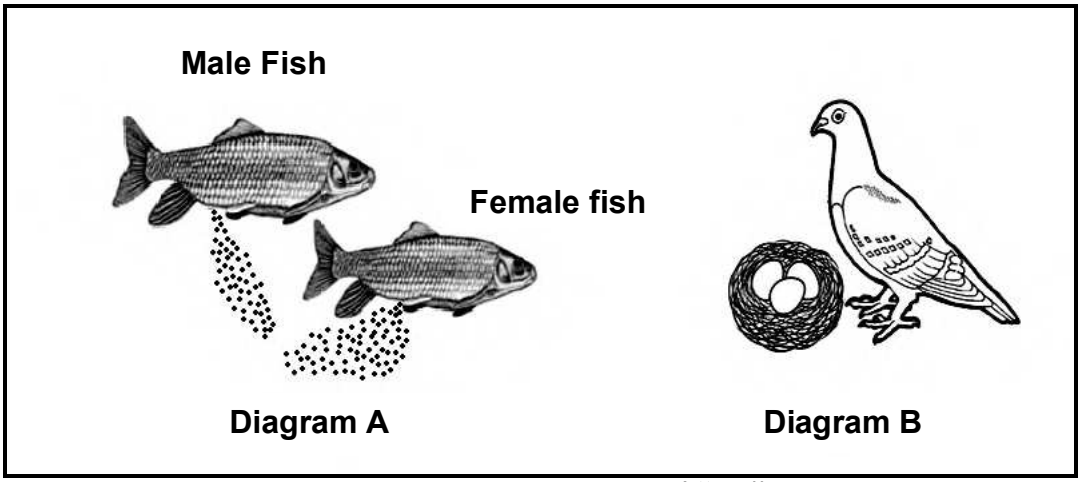
(10 x 1) **(10)**

1.3 Indicate whether each of the statements 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 1.3.4) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	The layer in the eye that contains receptors sensitive to light	A: Choroid B: Retina
1.3.2	Converts sound stimuli to nerve impulses	A: Oval window B: Semi-circular canals
1.3.3	The hormone that is in excess in a person that grows abnormally tall	A: Growth hormone B: ADH
1.3.4	Plant hormone that helps plant seeds to survive unfavourable conditions	A: Auxins B: Abscisic acid

(4 x 2) **(8)**

1.4 The diagrams below represent organisms with different reproductive strategies.



https://www.saexampapers.co.za

1.4.1 Identify the type of fertilisation displayed in:

(a) Diagram **A** (1)

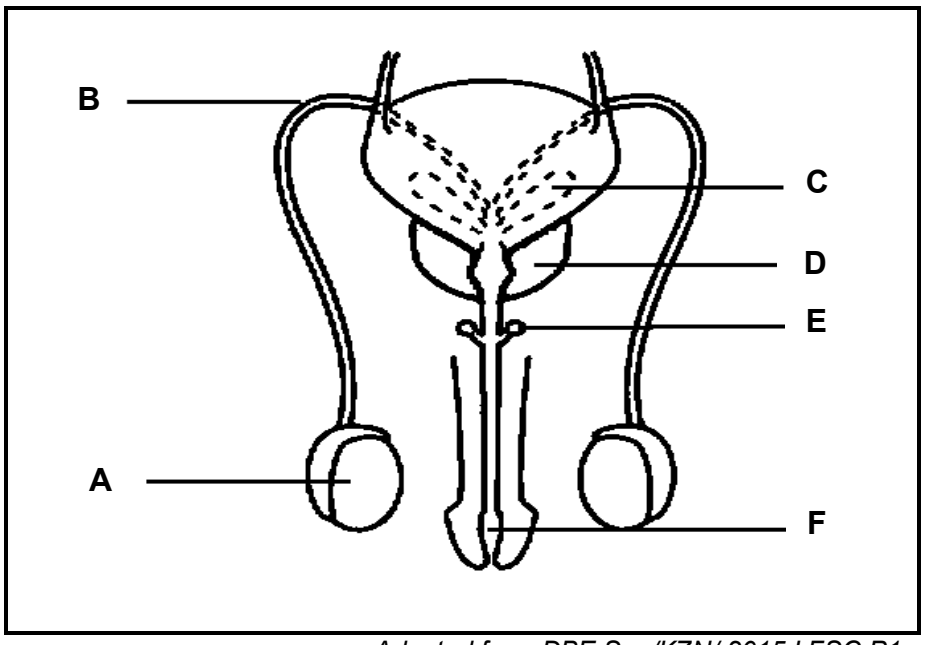
(b) Diagram **B** (1)

1.4.2 Provide the name of the reproductive strategy represented in the diagrams above. (1)

1.4.3 Name the type of egg produced by the organism represented in Diagram **B**. (1)

1.4.4 Give the names of TWO extra-embryonic membranes that function in gaseous exchange in the egg mentioned in QUESTION 1.4.3 (2)
(6)

1.5 The diagram below represents the human male reproductive system



Adapted from DBE Sep/KZN/ 2015 LFSC P1

1.5.1 Identify structures:

(a) **C** (1)

(b) **E** (1)

(c) **F** (1)

1.5.2 Give the LETTER of the part that is associated with each of the following statements:

(a) When cut, results in the production of semen that does not contain sperm cells. (1)

(b) The secretion of an alkaline fluid which neutralises the acidity of the vagina. (1)

(c) The production of testosterone. (1)

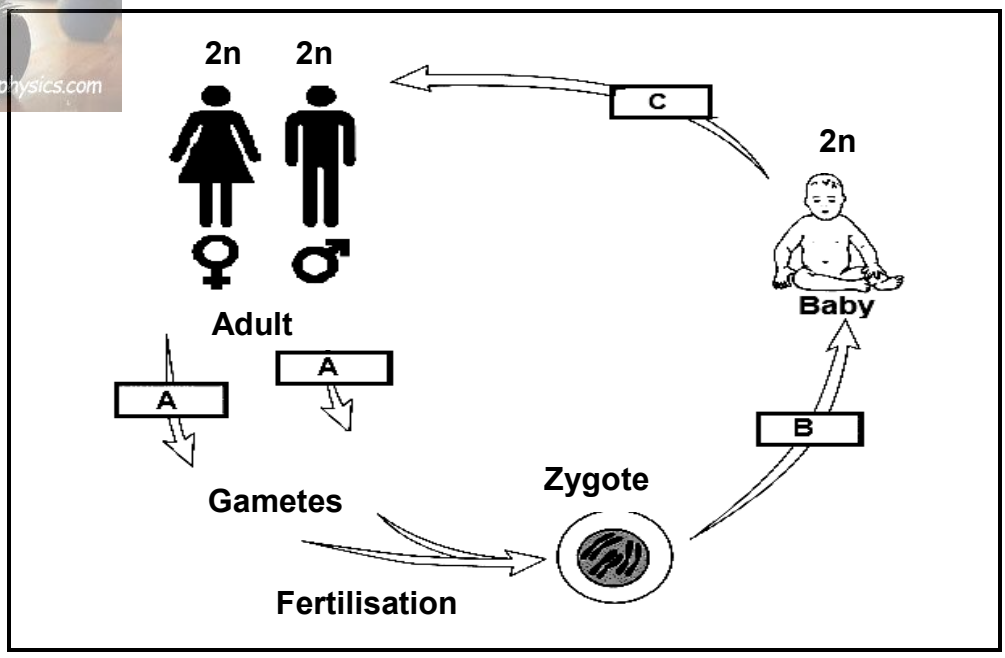
(6)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below represents the human life cycle.



http://zivichristian.blogspot.com/2012/11/cycles-of-life.html

2.1.1 Name the type of cell division responsible for the process taking place at:

(a) **A** (1)

(b) **B** (1)

2.1.2 How many pairs of chromosomes are present in the zygote? (1)

2.1.3 Name the hormone responsible for the secondary sexual changes during process **C** in females. (1)

2.1.4 Name and describe the process **A** as it occurs in males. (4)

2.1.5 Name the developmental structures, between zygote formation and birth that:

(a) Comprise a ball of cells (1)

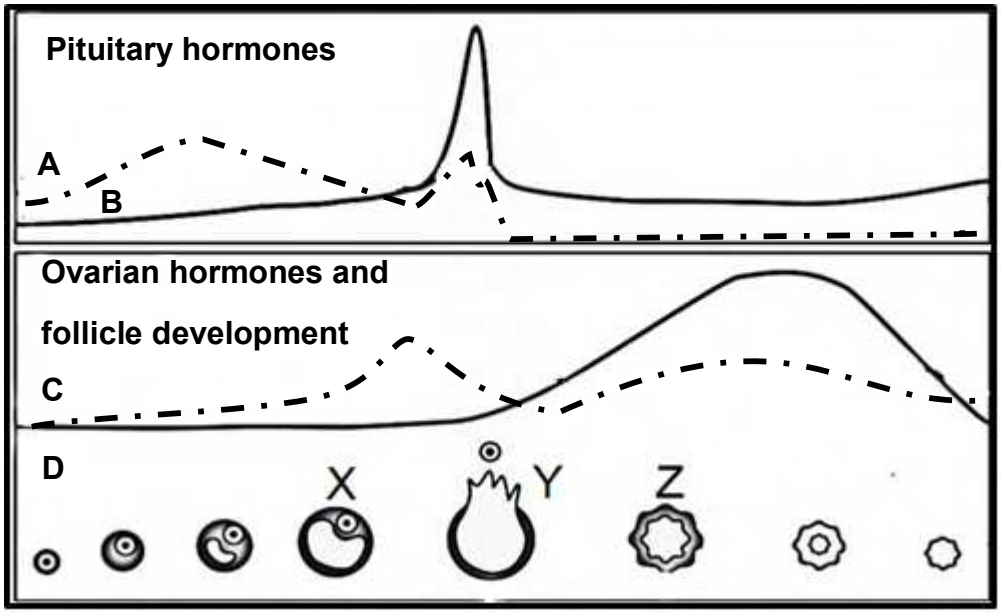
(b) Is a hollow ball of cells (1)

(c) Is formed after implantation (1)

(d) Is formed after organ formation (1)

(12)

2.2 The chart below represents the hormonal control of the ovarian cycle in a female.



2.2.1 Identify:

(a) Structure **X** (1)

(b) Process **Y** (1)

2.2.2 Explain the effect on pregnancy if structure **Z** disintegrates directly after implantation. (3)

2.2.3 Describe the development of structure **X**. (4)

2.2.4 Describe ovulation and the resulting formation of structure **Z**. (4)
(13)

2.3 Read the extract below.

> Placenta encapsulation is a process where the human placenta is processed and transformed into pills that can be taken by the new mother after birth. This is a new trend among various celebrities who claims that it speeds up recovery after giving birth and also enhances milk production in the female.

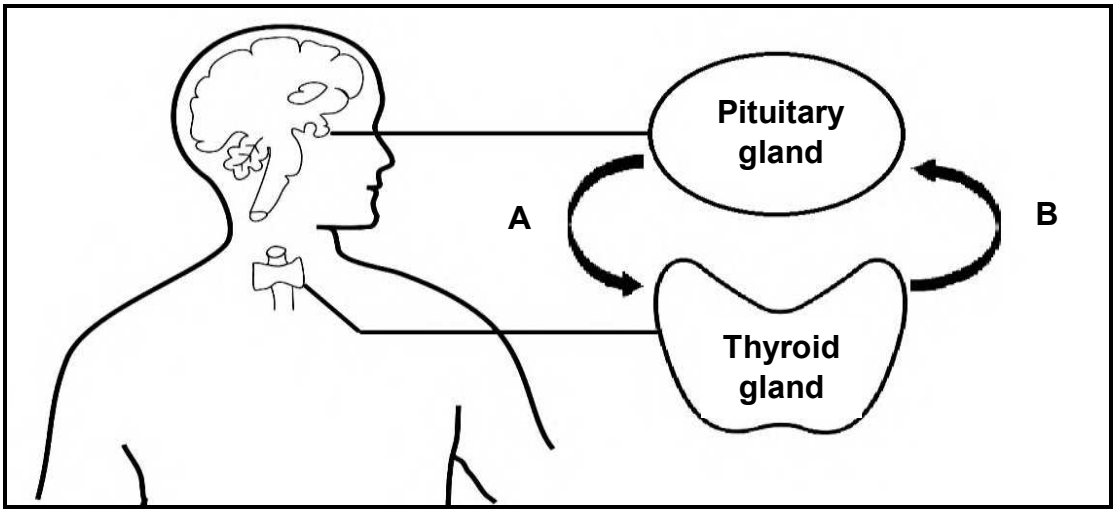
https://health.clevelandclinic.org/placenta-pills-why-some-new-moms-take-them-and-what-doctors-say-about-the-risks/

2.3.1 Give ONE advantage of placenta encapsulation. (1)

2.3.2 Provide THREE functions of the human placenta. (3)

2.3.3 Refer to the role of the placenta during pregnancy and explain ONE possible damaging side-effect of the re-ingestion of the placenta in the practice of placenta encapsulation. (2)
(6)

2.4 The diagram below represents a negative feedback mechanism where **A** and **B** represent hormones secreted by the respective glands.



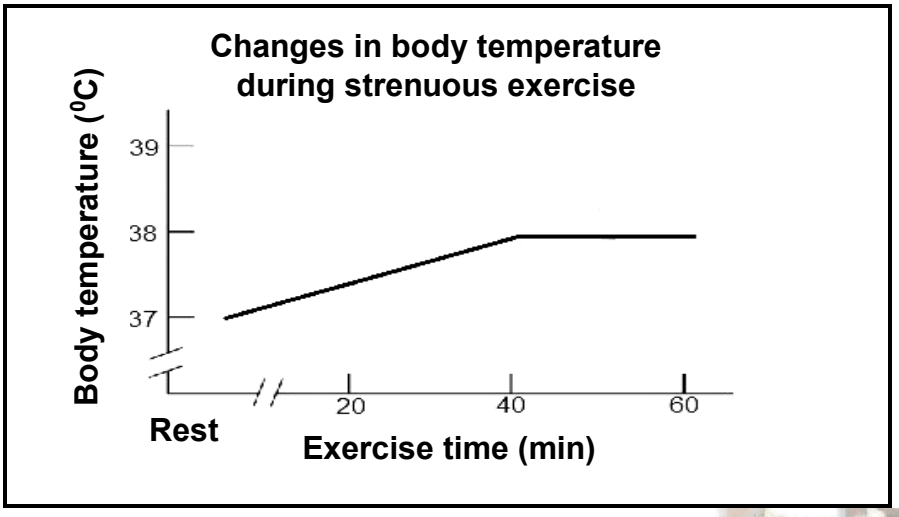
2.4.1 Identify hormone **A**. (1)

2.4.2 What is the role of any negative feedback mechanism in the human body? (1)

2.4.3 Describe the negative feedback mechanism that occurs when the level of hormone **B** is higher than normal in the blood. (5)

2.4.4 Explain the consequences for a person if hormone **B** remained abnormally low for extended periods of time. (4)
(11)

2.5 The graph below shows the results of an investigation regarding the changes in body temperature during strenuous exercise.



Adapted from: *https://slidetodoc.com/scott-k-powers-edward-t-howley-theory-and-2/*

2.5.1 Draw a table to represent the data in the graph above. (5)

2.5.2 If body temperature is not effectively regulated during exercise a person can develop heat stroke which can be deadly if not treated. The first aid treatment is to cover the person with damp towels/sheets and then placed in front of a fan or other wind source.

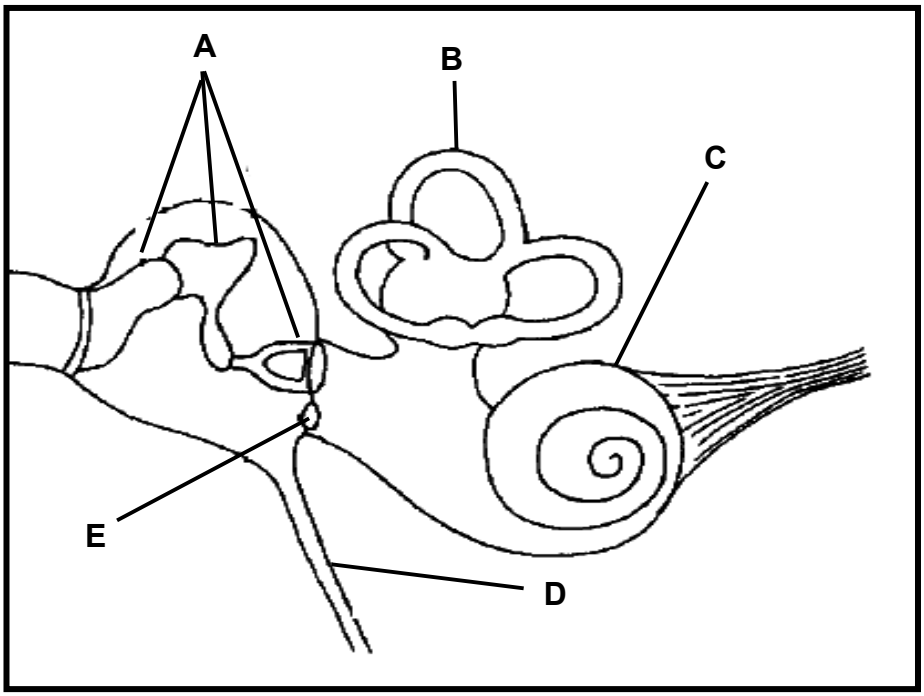
Explain how this treatment is similar to the body's own strategy for lowering body temperature. (3)

(8)

TOTAL QUESTION 2 [50]

QUESTION 3

3.1 The diagram below represents part of the human ear.



3.1.1 Identify parts:

a) **B** (1)

b) **C** (1)

3.1.2 Give the LETTERS only of the part where the following receptors are found:

a) Organ of Corti (1)

b) Ampulla (1)

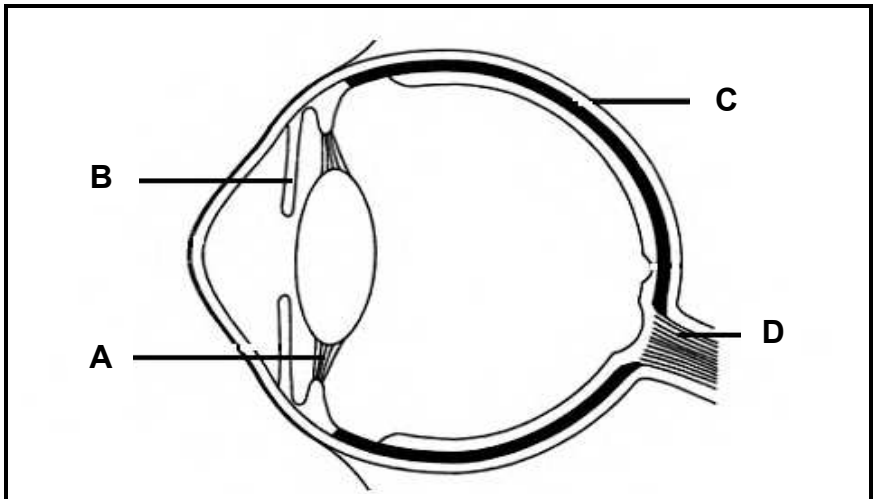
3.1.3 Explain, using LETTERS **D** and **E**, why a sensation in the throat is experienced when one stands very close to a loud speaker playing music. (3)

3.1.4 Young children love to spin around with outstretched arms.
Explain how they manage to maintain balance while spinning. (4)

3.1.5 The children mentioned in QUESTION 3.1.4 suddenly stop spinning and they still continue to feel as though they are moving.

Explain why this happens. (2)
(13)

3.2 The diagram below shows a side view of the human eye.



Structure of the human eye

https://za.pinterest.com/pin/523121312948640509/

3.2.1 Provide labels for parts numbered:

(a) **A** (1)

(b) **B** (1)

3.2.2 State ONE function of part **C**. (1)

3.2.3 Explain the consequence if part **D** is damaged during an accident. (3)

3.2.4 Explain TWO ways in which the lens is structurally suited to perform its function. (4)
(10)

3.3 Read the extract below.

> Playing a musical instrument has been shown to increase intelligence through improved communication between the left and right hemispheres of the brain. This results in positive effects on learning, memory, fine motor skills, verbal and non-verbal reasoning which leads to better brain functioning.
>
> *Anne R. Stoklosa, 2016 Instruments of Knowledge: Music and the Brain. The Review A Journal of Undergraduate Student Research*

3.3.1 Name the:

a) Structural unit of the nervous system (1)

b) Path taken by an impulse from a receptor to an effector (1)

c) Structure that is responsible for the communication between the left and right hemispheres (1)

3.3.2 Name ONE indicator from the extract above that implies increased intelligence. (1)

3.3.3 According to the information in the extract, which region of the brain is mainly developed by playing a musical instrument? (1)

3.3.4 Playing a musical instrument requires the use of multiple neural pathways.

Explain the significance of a synapse between two consecutive neurons. (2)
(7)

3.4 The peripheral nervous system consists of various types of nerves.

3.4.1 Draw a labelled diagram of a sensory neuron indicating the correct direction of the transmission of nerve impulses. (5)

3.4.2 Give the function of the neuron drawn in QUESTION 3.4.1 (1)
(6)

3.5 John has to deliver a speech and he is feeling extremely nervous.
This may be due to an automatic reaction to a stressful or frightening event brought about by a branch of the nervous system.

3.5.1 Name the section of the nervous system responsible for this feeling. (1)

3.5.2 Provide FOUR symptoms that he may experience as a result of the system mentioned in QUESTION 3.5.1 (4)

3.5.3 Name the HORMONE and GLAND that work with the peripheral system during stressful situations. (2)

3.5.4 Suggest a strategy he can use to physically calm himself and reduce the symptoms mentioned in QUESTION 3.5.2 (1)
(8)

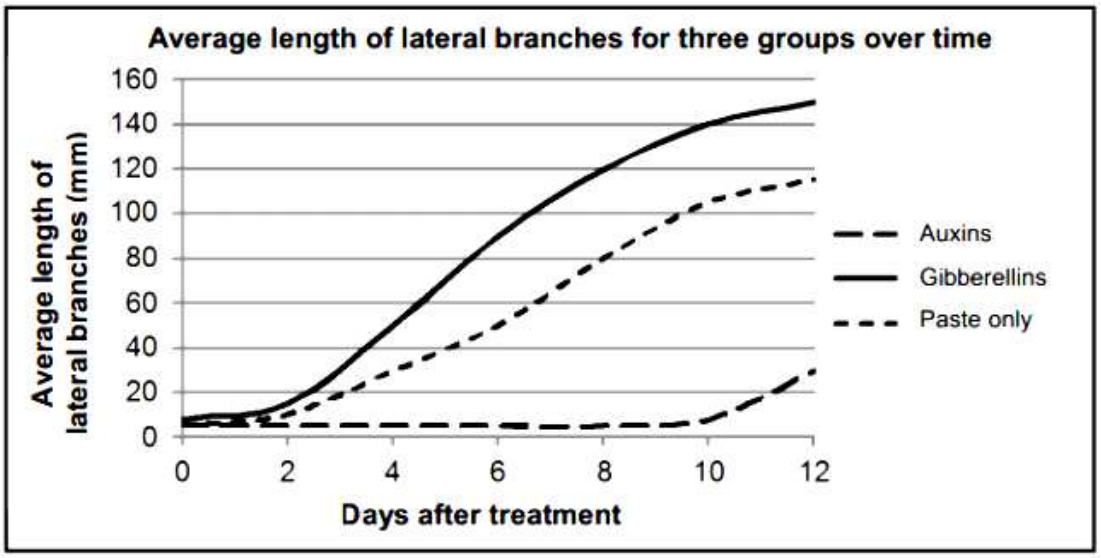
3.6 A learner investigated the effects of two plant growth substances, gibberellins and auxins, on apical dominance.

The apical buds of nine pea plants were removed. These plants were then divided equally into three groups. In each group the cut surface of the growing stems of the pea plants were treated in one of the following ways:

Group 1: Coated with a paste containing gibberellins
Group 2: Coated with a paste containing auxins
Group 3: Coated with a paste only (containing no plant growth hormones)

The length of the lateral branches of each plant was measured for a period of 12 days and the average for each group was calculated.

The results of the investigation are shown in the graph below.



3.6.1 Calculate the difference in the average length of the lateral branches between the plants treated with gibberellins and the plants treated with the paste only on the 8th day after the treatment.

Show ALL calculations. (3)

3.6.2 State TWO ways in which the reliability of the investigation could be increased. (2)

3.6.3 State the significance of more and longer lateral branches for the farming industry. (1)

(6)

TOTAL QUESTION 3 [50]

TOTAL SECTION B: 100
GRAND TOTAL: 150