GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

2026

10831

LIFE SCIENCES

(PAPER 1)

LIFE SCIENCES: Paper 1

10831E

TIME: 2½ hours

MARKS: 150

16 pages

X10

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, flow charts or tables 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 may use a non-programmable calculator, a 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 – D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

1.1.1 A structure in the ear that absorbs excess pressure waves from the cochlea is the …

A Eustachian tube.
B pinna.
C tympanic membrane.
D round window.

1.1.2 The central nervous system is made up of:

A Cranial nerves and spinal nerves
B Brain and spinal cord
C Brain and cranial nerves
D Autonomic nervous system and peripheral nervous system

1.1.3 Learners are asked to plan an investigation to determine how different external factors affect body temperature.

Which of the following are planning steps for the investigation?

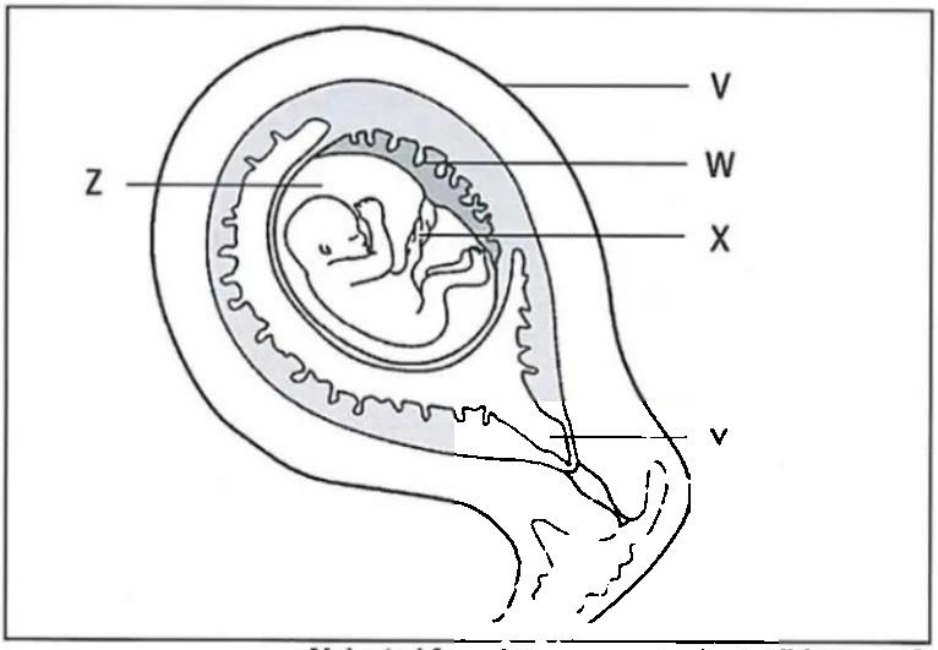
(i) Choose the independent variable.
(ii) Decide which apparatus to use.
(iii) Analyse the results after collecting the data.
(iv) Decide which variables must be controlled.

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

1.1.4 Which hormone is involved in the reabsorption of some salts by the kidneys?

A Testosterone
B Oestrogen
C Aldosterone
D TSH

QUESTIONS 1.1.5 AND 1.1.6 ARE BASED ON THE DIAGRAM BELOW.



[Adapted from https:www.stanfordchildrens.org]

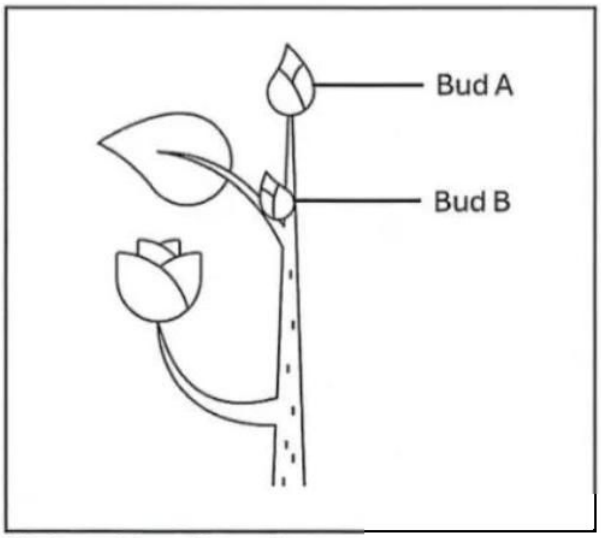
1.1.5 Which part protects the foetus from desiccation and temperature changes?

A Part **V**
B Part **X**
C Part **Y**
D Part **Z**

1.1.6 What is the importance of organ **W** during pregnancy?

A It acts as an organ for gaseous exchange and excretion for the foetus.
B It serves as a microfilter which allows all pathogens from the maternal blood to enter the foetal blood.
C It secretes FSH to maintain pregnancy.
D It protects the foetus from damage due to mechanical shock.

1.1.7 What is the phenomenon where hormones from bud **A** inhibit the growth of bud **B**?



[Adapted from *https://www.studyclix.ie/leaving-certificate/biology/*]

A Lateral growth
B Seed dormancy
C Abscission
D Apical dominance

1.1.8 A professional male wrestler wears a tight-fitting wrestling suit that compresses his reproductive organs. He has been wearing the suit for 6 hours a day, seven days a week, for over ten years.

After 10 years, the wrestler is diagnosed with low fertility.

Which cause-and-effect relationship could explain this diagnosis?

	CAUSE	EFFECT
A	Continuous pressure increases testosterone secretion	Decreased sperm production
B	Constant compression increases scrotal temperature	Decreased sperm production
C	Restricted blood flow lowers oxygen supply to the penis	Erectile dysfunction directly prevents sperm production
D	Tight clothing stimulates the accessory glands	Excess seminal fluid lowers sperm motility

1.1.9 If ciliary muscles are permanently contracted, which of the following will be MOST likely to occur?

A Both near and distant vision would be clear.
B The person would see near objects clearly, but distant objects would appear blurry.
C The person would see distant objects clearly, but objects nearby would appear blurry.
D Both near and distant vision would be blurry.

1.1.10 Which combination CORRECTLY represents the events involved in the secretion and action of ADH?

	WATER LEVEL IN THE BLOOD RELATIVE TO NORMAL	AMOUNT OF ADH PRODUCED RELATIVE TO NORMAL	AMOUNT OF WATER REABSORBED BY THE KIDNEYS
A	Decrease	Increase	Increase
B	Increase	Increase	Decrease
C	Increase	Increase	Increase
D	Decrease	Decrease	Decrease

(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 numbers (1.2.1 to 1.2.8) in the ANSWER BOOK.

1.2.1 Part of a neuron that conducts an impulse towards the cell body

1.2.2 The hormone responsible for milk production in females

1.2.3 Tubules lined with germinal epithelium, which produces sperm

1.2.4 A blood vessel that is responsible for transporting nutrients and oxygen to the foetus during gestation

1.2.5 The process of maintaining a constant internal environment in the body

1.2.6 A vision disorder in which the lens becomes cloudy

1.2.7 The stage in a human life cycle where sexual maturity is reached

1.2.8 A tube in the male reproductive system that is used for the passage of both urine and semen

(8 x 1) **(8)**

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 numbers (1.3.1 to 1.3.3) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Gland(s) that produce the substance(s) which make up semen	A: Cowper's B: Prostate
1.3.2	Thermoregulation by the skin on a hot day	A: Inactive sweat glands B: Vasodilation in the skin
1.3.3	The gland that secretes adrenalin	A: Pituitary B: Adrenal

(3 x 2) **(6)**

1.4 The extract below describes the reproductive strategies of the common garter snake.

The Common Garter Snake (*Thamnophis sirtalis*) is found in the dry coastal dunes of North America.

Key findings from a 3-year study:

- Each female produces 3 – 10 young per breeding season.
- The embryos develop entirely inside the mother, but do not receive nutrients from the mother's blood supply.
- Females give birth to live young that are enclosed in a thin, transparent membrane inside the uterus. Young garter snakes hatch in the uterus just before birth.
- The young are fully mobile and independent from the mother within an hour of birth.
- Predation rates are low because the young can quickly escape and hunt for themselves.

[Adapted from *The Garter Snakes – Evolution and Ecology*. University of Oklahoma Press]

1.4.1 State the reproductive strategy used by the Common Garter Snake for development of the young before they are born. (1)

1.4.2 Give the type of fertilisation used by the Common Garter Snake. (1)

1.4.3 Provide the type of development displayed by the Common Garter Snake offspring after birth. (1)

1.4.4 Using evidence from the case study, provide TWO statements to support your answer to QUESTION 1.4.3. (2)

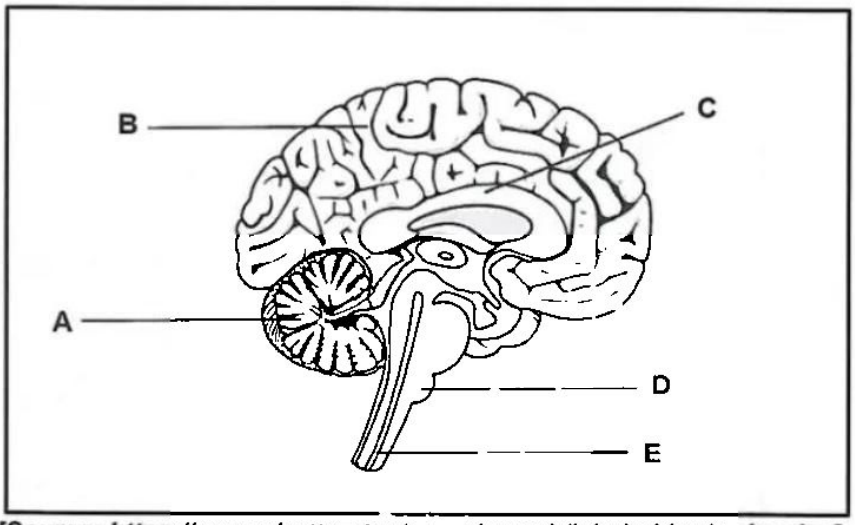
1.4.5 State the NAME of the extra-embryonic membrane that:

(a) Contains nutrients for the developing embryo (1)

(b) Removes waste products from the embryo (1)

(c) Allows gaseous exchange for the embryo (1)
(8)

1.5 The diagram below shows part of the human brain.



[Source: *https://www.shutterstock.com/search/labeled-brain-drawing*]

1.5.1 Provide the LETTER and NAME of the structure that:

(a) Coordinates all voluntary movements (2)

(b) Allows communication between the two hemispheres of the brain (2)

(c) Has possibly been damaged when a patient experiences visual and speech disturbances after a serious head injury. (2)

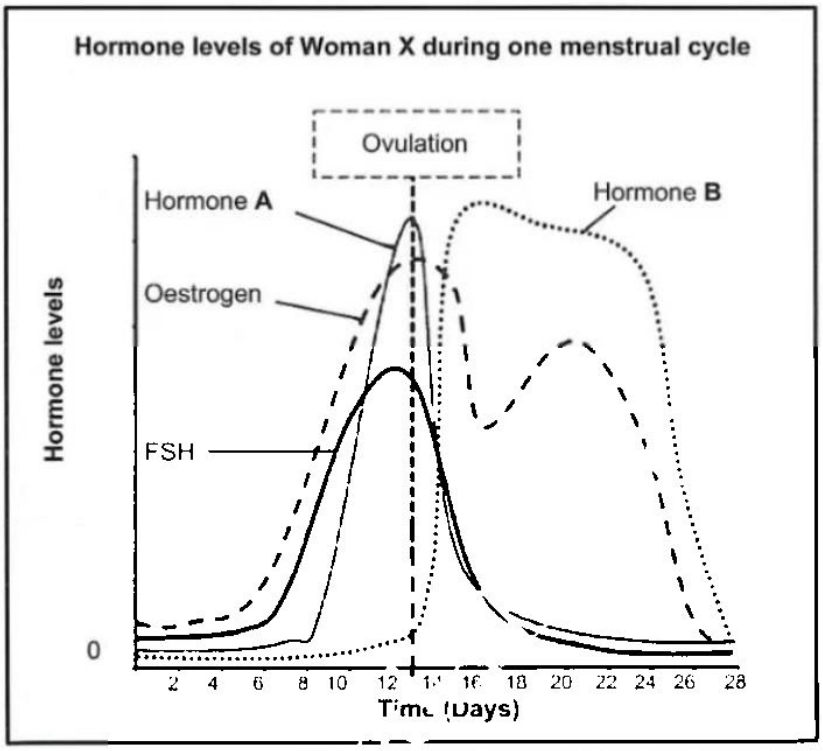
1.5.2 Name TWO ways in which part **E** is protected from mechanical injury. (2)
(8)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The graphs below show the fluctuation of the hormones of Woman **X** during one menstrual cycle.



[Adapted from Limpopo pre-trial 2021, P1]

2.1.1 Provide the name of:

(a) The gland that produces hormone **A** (1)

(b) Hormone **B** (1)

2.1.2 On which day did Woman **X** ovulate? (1)

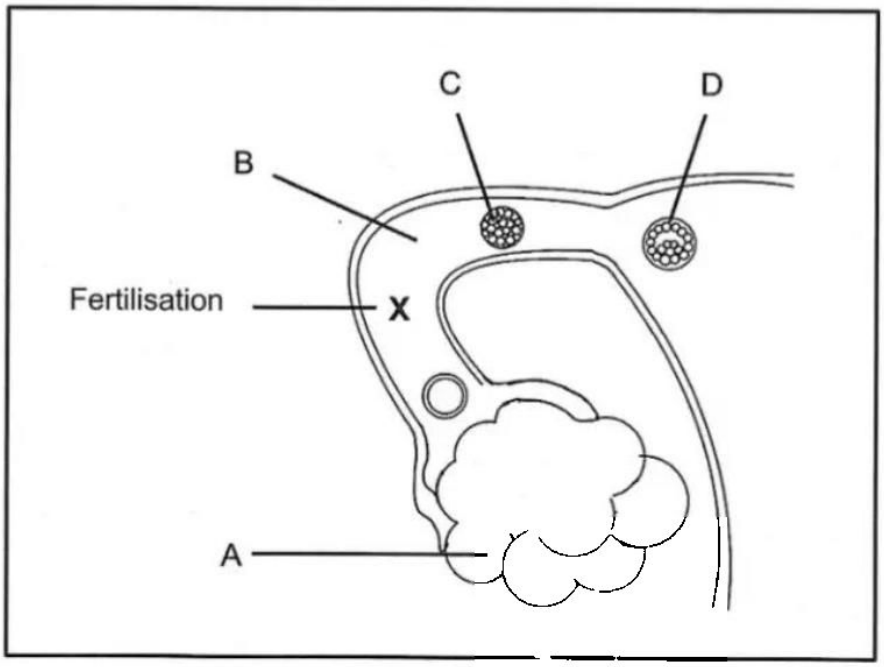
2.1.3 Which hormone is responsible for the development of breasts during puberty? (1)

2.1.4 Is Woman **X** pregnant? Answer only YES or NO. (1)

2.1.5 Based on the information from the graphs, explain your answer to QUESTION 2.1.4. (2)

2.1.6 Explain how the duration of the menstrual cycle will be affected if hormone **A** is not secreted. (4)
(11)

2.2 The diagram below shows the different stages of embryo development in the female reproductive system.



[Source: Examiner's own diagram]

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

2.2.2 Name and describe the process of gametogenesis that occurs in organ **A**. (5)

2.2.3 Tabulate ONE structural difference between the embryos at stage **C** and stage **D**. (3)

2.2.4 Name the type of cell division that will take place to produce:

(a) The cells of the embryo at stage **C** (1)

(b) The gametes involved in fertilisation at point **X** (1)

2.2.5 Describe the process of fertilisation as it occurs at point **X**. (2)

2.2.6 Draw a diagram to show a human male gamete. (5)
(18)

2.3 An investigation was conducted to determine the effect of sleep duration on reaction time in males.

Seventy-four healthy males aged 20 – 25 years participated in the study.

Method:

- Reaction time was measured using the Reaction Time Test App, in which participants tapped a screen when they saw the display change from red to green.
- Each participant completed three attempts each time, in which their reaction time was measured. The average reaction time was calculated and recorded in a table.
- During each sleep cycle, reaction time was measured at the same time each day.
- The reaction time of all participants was measured at the beginning of each sleep cycle.
- Each participant completed two sleep cycles.

Sleep Cycle 1: Full Sleep

The participants maintained a full sleep cycle for five nights, with sufficient sleep (8 hours per night).

Sleep Cycle 2: Partial Sleep Deprivation

The participants maintained a partial sleep-deprivation cycle of five nights with limited sleep (3 hours per night).

The results from each sleep cycle are shown in the table below.

DAY	AVERAGE REACTION TIME (MILLISECONDS)	
	FULL SLEEP	PARTIAL SLEEP DEPRIVATION
0	230	230
1	230	255
2	235	300
3	230	365
4	225	505
5	230	825

[Adapted from *https://pmc.ncbi.nlm.nih.gov/articles/PMC7261660/*]

2.3.1 For this investigation, state the:

(a) Independent variable (1)

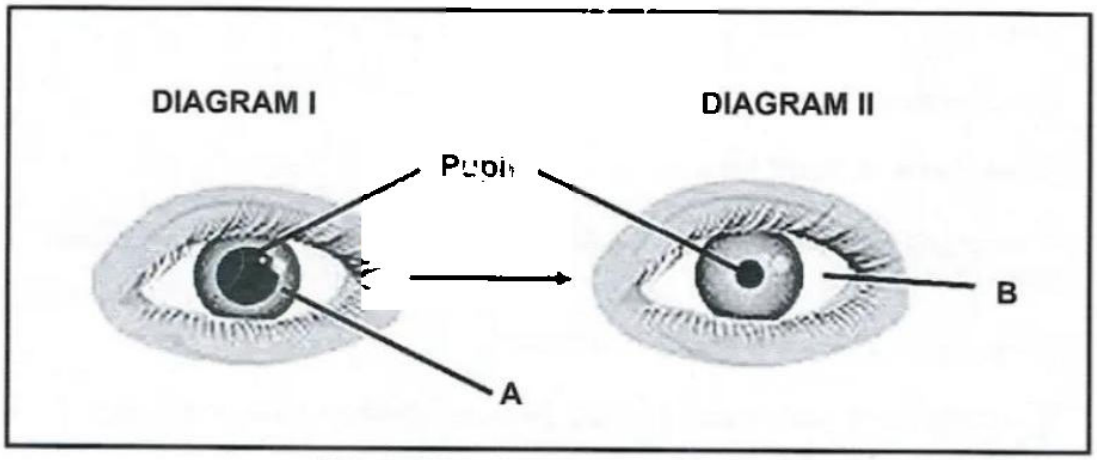
(b) Dependent variable (1)

2.3.2 State TWO ways in which the validity of the investigation has been ensured. (2)

2.3.3 Provide ONE way in which the investigator ensured the reliability of the results. (1)

2.3.4 Plot a line graph to show the results of partial sleep deprivation. (6)
(11)

2.4 The diagram below shows the change in the pupil diameter of a human eye due to the pupillary mechanism.



[Adapted from *https:www.shutterstock.com/image 774787261*]

2.4.1 Provide the label for part **A**. (1)

2.4.2 Explain ONE way in which part **B** is structurally suited for its function. (2)

2.4.3 Describe the environmental stimulus that would cause the pupil to change diameter size from diagram **I** to diagram **II**. (1)

2.4.4 Describe the mechanism that brought about the change in the pupil diameter from diagram **I** to diagram **II**. (4)

2.4.5 State the names of TWO photoreceptors found in the retina. (2)
(10)
[50]

QUESTION 3

3.1 Explain the significance of the arrangement of the semicircular canals in the inner ear of a human, for balance and coordination of movement. **(4)**

3.2 The following infographic shows ear and hearing care statistics.

WHO: World Health Organisation



[Adapted from *https://www.who.int/multi-media/details/ear-and-hearing-care---afro*]

3.2.1 Name the part of the inner ear that contains the receptors for hearing. (1)

3.2.2 According to the infographic above, how many people currently have hearing loss? (1)

3.2.3 State TWO reasons why hearing problems may be more common in low and middle-income countries, according to the infographic. (2)

3.2.4 Calculate the percentage increase in the number of people predicted to have hearing problems by 2050.

Show ALL working to ONE decimal place. (3)

3.2.5 Various disorders may affect hearing. An example of such a disorder is otosclerosis – a degenerative condition in which the stapes (stirrup) gradually loses its ability to vibrate.

Describe how hearing will be affected if a person has this disorder. (4)
(11)

3.3 The Cape Town Cycle Tour is a 109-kilometre cycling race held annually around the Cape Peninsula. Cyclists from all over the world participate, with some riding competitively and others for charity. On the race day, temperatures can exceed 30°C, and cyclists ride for several hours without breaks.

Participants prepare by eating high-energy meals rich in carbohydrates before the race and training for months in advance. During the event, riders face intense physical effort, dehydration risks, and increased breathing rates due to the challenging terrain, environmental conditions and the length of the race.

[Adapted from *https://www.capetowncycletour.com/*]

3.3.1 Using the information given in the source, identify TWO ways in which a cyclist will prepare for the race. (2)

3.3.2 During the race, a cyclist's muscles uses large amounts of glucose to produce energy.

(a) Provide the name of the organ responsible for detecting a change in the blood glucose level. (1

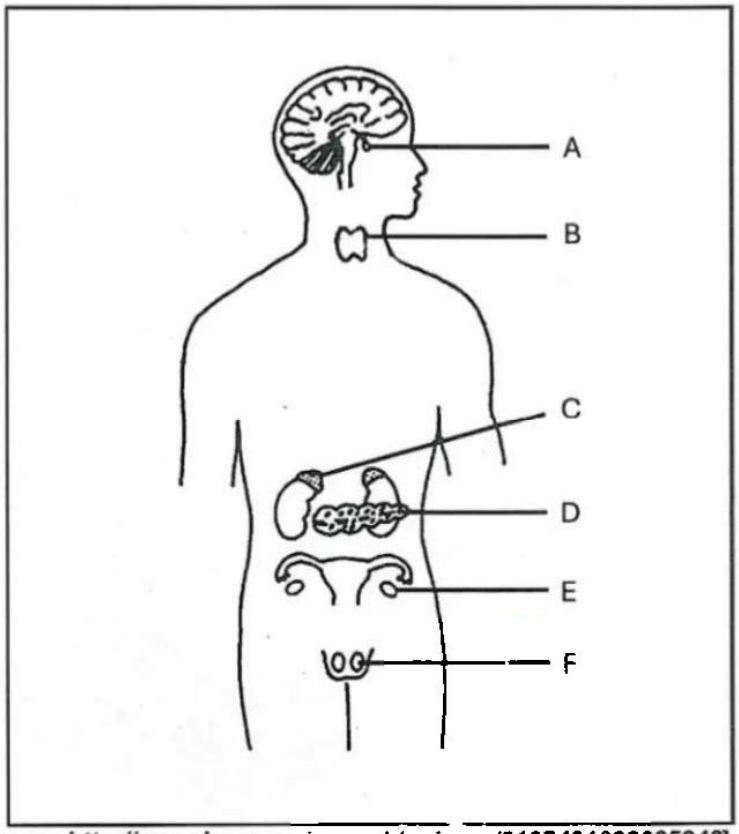
(b) Which hormone will be secreted from the gland in QUESTION 3.3.2(a) when there is a decrease in blood glucose level? (1

(c) Describe how the hormone named in QUESTION 3.3.2(b) will ensure that more glucose is made available for the muscles to use. (3)

3.3.3 Explain how the intense physical effort during the cycling race causes a change in the carbon dioxide level in the blood and brings about a change in the heart rate. (5)

(12)

3.4 The diagram below represents the human endocrine system.



[Source: *http://www.imagequiz.co.uk/quizzes/5107491692085248*]

3.4.1 State TWO functions of the hormone thyroxin. (2)

3.4.2 Write down the LETTER and NAME of the gland(s) that:

(a) Produce(s) a hormone that will stimulate gland **B** (2)

(b) Are only found in males (2)

3.4.3 (a) Give the LETTER of a gland that is both an endocrine and an exocrine gland. (1)

(b) Describe ONE difference between an endocrine gland and an exocrine gland. (2)

3.4.4 Give the name of the part of the autonomic nervous system that will be stimulated during a "fight or flight" response. (1)

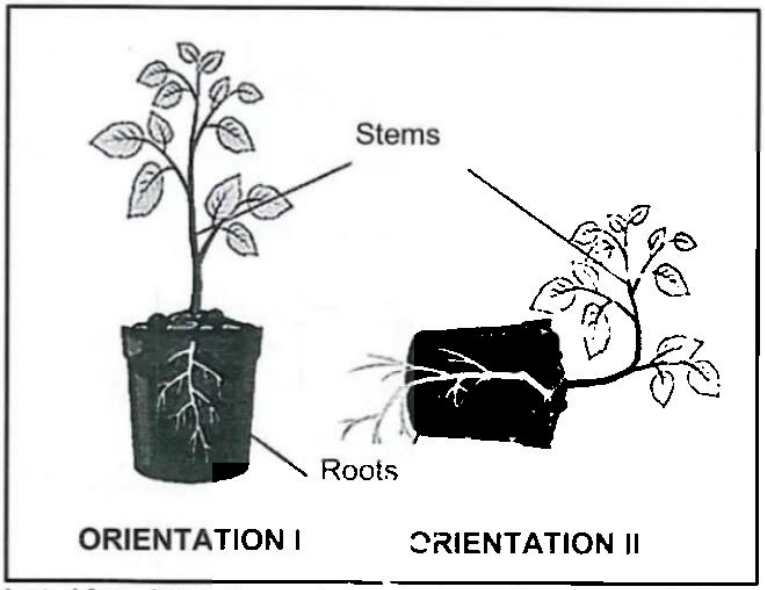
3.4.5 Give the effect that the part of the nervous system mentioned in QUESTION 3.4.4 will have on the:

(a) Blood vessels of the skin (1)

(b) Breathing rate (1)

(12)

3.5 Two plants were placed in different orientations in a dark room to investigate the effect of an external stimulus on root growth. The results are shown in the diagram below.



[Adapted from *https://www.shutterstock.com/image-vector/ plant - 2269937163*]

3.5.1 Identify the type of tropism shown by the plant roots. (1)

3.5.2 Name the hormone responsible for the tropism displayed by the roots. (1)

3.5.3 Explain the role of the hormone mentioned in QUESTION 3.5.2 in the growth direction of the roots in orientation **II**. (5)

3.5.4 Explain TWO methods used by plants as defence mechanisms to protect their leaves against attacks from different herbivores. (4)

(11)

[50]

TOTAL SECTION B: 100

TOTAL: 150

END