education

MPUMALANGA PROVINCE

REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

SEPTEMBER 2024

MARKS: 150

TIME: 2½ HOURS

This question paper consists of 20 pages.

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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.

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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.

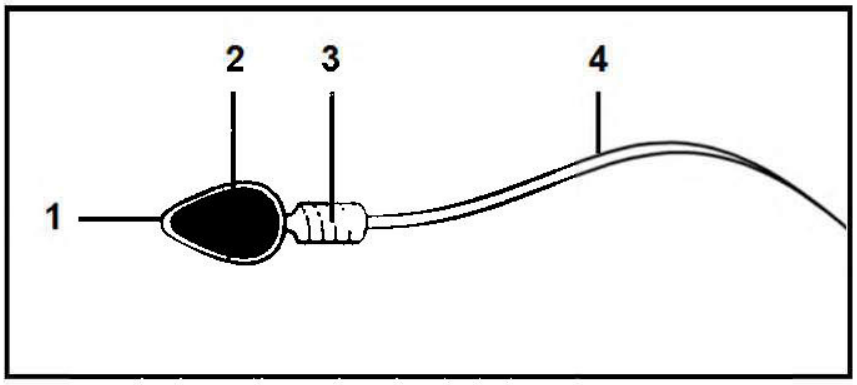
1.1.1 The structure in the amniotic egg that provides nutrients:

A Allantois
B Yolk sac
C Amnion
D Chorion

1.1.2 Which ONE of the following is the correct sequence of events during human reproduction?

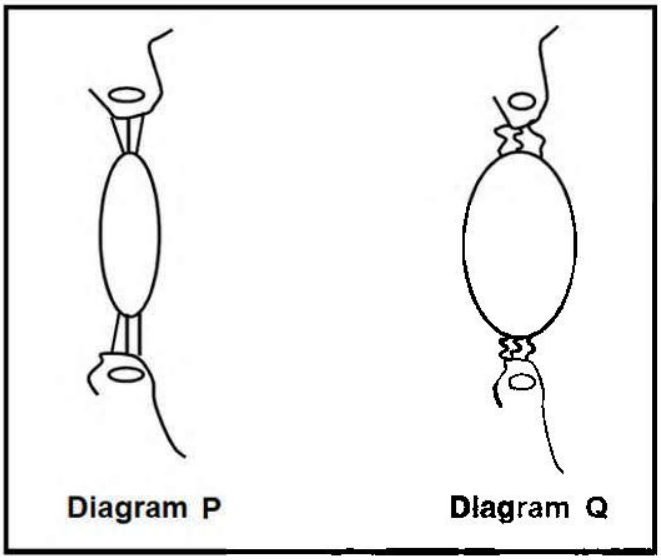
A Ovulation - oogenesis – implantation – fertilisation
B Ovulation – oogenesis - fertilisation – implantation
C Oogenesis - ovulation - fertilisation – implantation
D Oogenesis - ovulation - implantation - fertilisation

1.1.3 Which ONE of the following parts in the diagram of a sperm cell contains a haploid number of chromosomes?



A 1
B 2
C 3
D 4

1.1.4 The diagrams below represent part of the human eye when looking at an object.



Which diagram, with a corresponding reason, represents a person looking at an object 10 metres away?

A Diagram **Q** because the suspensory ligaments are taut and the lens is less convex
B Diagram **Q** because the lens is more convex and the suspensory ligaments are slack
C Diagram **P** because the lens is more convex and the suspensory ligaments are slack
D Diagram **P** because the suspensory ligaments are taut and the lens is less convex

1.1.5 Which ONE of the following is a consequence if the round window in the middle ear hardens?

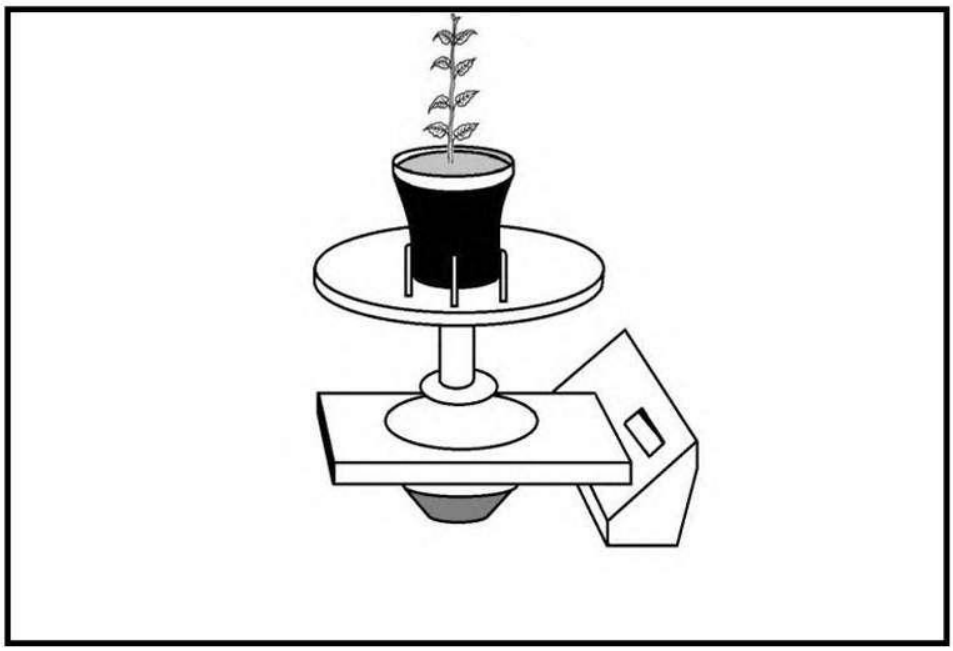
A Impulses will not be transmitted to the brain.
B Pressure between the outer and the middle ear will not be equalised.
C An echo will occur and the sound will be distorted.
D Pressure waves will not be created.

1.1.6 Which ONE of the following plant hormones is responsible for the germination of seeds?

A Auxin
B Growth hormone
C Gibberellin
D Abscisic acid

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1.1.7 An investigation was conducted in which a potted plant was placed vertically on a clinostat, as shown in the diagram. The plant was exposed to light from all directions.



The stem grew vertically upwards, which indicates that the clinostat was …

A rotating and the stem showed positive phototropism.
B stationary and the stem showed negative phototropism.
C rotating and the stem showed positive geotropism.
D stationary and the stem showed negative geotropism.

1.1.8 The level of aldosterone will most likely to increase after …

A sweating excessively.
B consuming food with a high salt content.
C the constriction of blood vessels to the skin.
D consuming food with a high glucose content.

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1.1.9 Which ONE of the following is **not** regulated by homeostatic mechanisms?

A pH of tissue fluid
B Concentration of respiratory gases in the blood
C Surface area to body ratio
D Temperature of the body

1.1.10 The part of the brain that receives nerve impulses from the semi-circular canals is the …

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

(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 blood vessel that transports deoxygenated blood from the foetus towards the placenta

1.2.2 A structure in the female reproductive system where semen is deposited during copulation.

1.2.3 The liquid that protects the embryo against mechanical injury and dehydration.

1.2.4 The part of the nervous system outside the brain and spinal cord

1.2.5 A plant hormone that causes leaves to fall off trees in autumn.

1.2.6 The hormone that controls the concentration of water in the blood.

1.2.7 Neurons that carry impulses from receptors.

1.2.8 The structure, within the cochlea, responsible for the conversion of a sound stimulus into an impulse.

1.2.9 The maintenance of a constant internal environment in the body within certain limits.

1.2.10 Defect of the eye due to a clouding of the eye's normal, clear, transparent lens, affecting acuity of vision.

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

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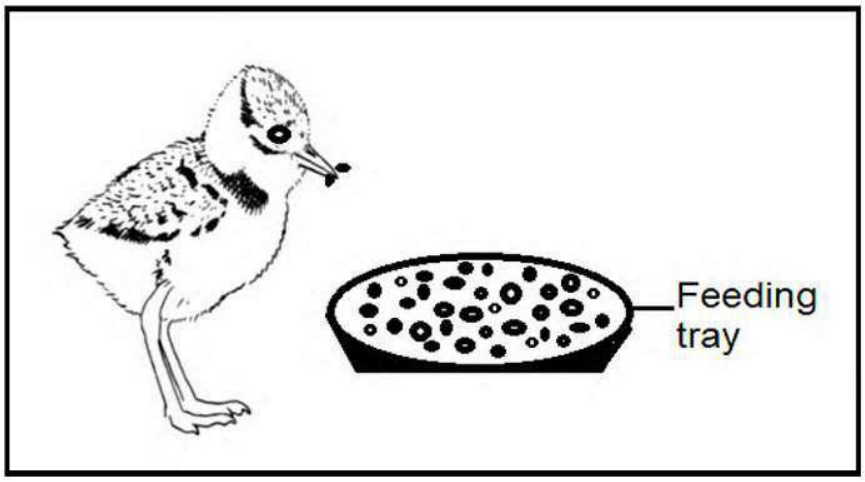
1.3 Indicate whether each of the statements in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.4) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	The tough, non-elastic tissue covering the outer portion of the eye ball	A: conjuctiva B: choroid
1.3.2	The disease characterised by the degeneration of brain tissue, leading to memory loss	A: Alzheimer's disease B: Multiple sclerosis
1.3.3	The period during which the embryo develops within the uterus of the mother up to the time the baby is born.	A: Pregnancy B: Gestation
1.3.4	Plant defence mechanism	A: Chemicals B: Thorns

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

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1.4 Study the diagram and answer the questions that follow.



1.4.1 Name the reproductive strategy that is carried out by the organism in the diagram above. (1)

1.4.2 Name the type of development shown in the diagram above. (1)

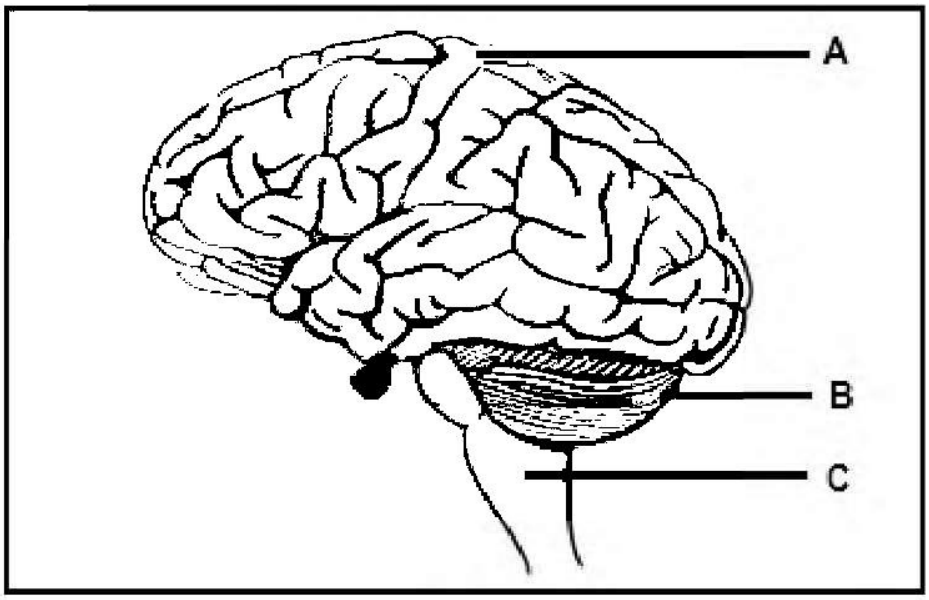
1.4.3 Give THREE visible reasons for your answer in QUESTION 1.4.2. (3)

1.4.4 Name the type of fertilization that occurs in the organism on the diagram above. (1)

(6)

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1.5 The diagram below represents parts of a human brain



1.5.1 Give the LETTER and the NAME of the part that coordinates voluntary movement. (2)

1.5.2 State TWO functions of part **B**. (2)

1.5.3 Give two involuntary actions that are controlled by part C. (2)

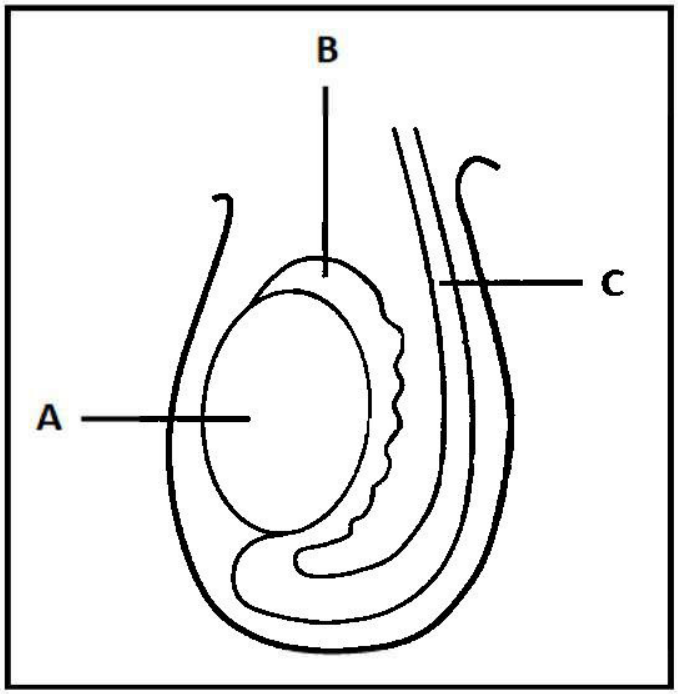
(6)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Study the diagram and answer the questions below.



2.1.1 Identify parts **A**, **B** and **C** respectively. (3)

2.1.2 Describe the process of spermatogenesis in part **A**. (4)

2.1.3 Test results show that a man has a low sperm count.

Explain why a doctor would advise the man to wear underwear that is not tight. (2)

2.1.4 During a vasectomy the vas deferens from both testes is cut.

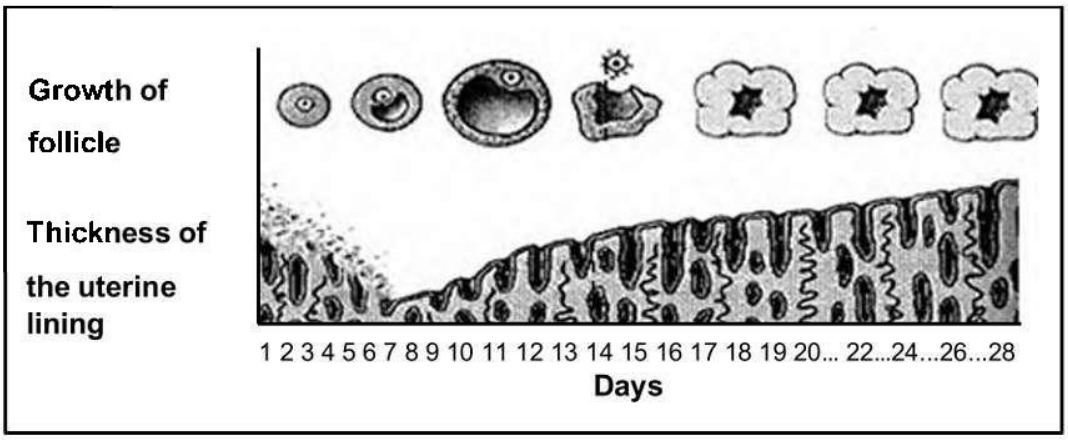
Explain ONE reason why a man who:

(a) Does not want to have children will choose to have a vasectomy (2)

(b) Has had a vasectomy is still capable of ejaculation (2)
(13)

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2.2 The diagram below shows some of the changes that take place during the menstrual cycle.



2.2.1 On which day did ovulation take place? (1)

2.2.2 Name TWO hormones which will increase in level between day 2 and day 10. (2)

2.2.3 Give TWO observable reasons for your answer to QUESTION 2.2.2. (2)

2.2.4 Provide evidence from the diagram which indicates that fertilisation took place. (2)

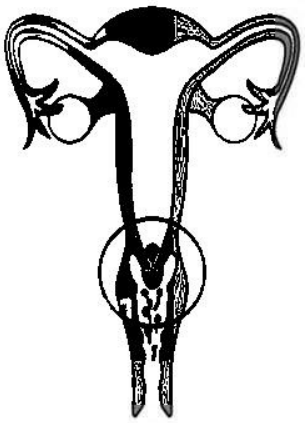
2.2.5 Describe the role of LH and Progesterone during the menstrual cycle. (6)
(13)

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2.3 Read the extract below about infertility problems with cervical mucus and answer the questions below.

Abnormal cervical mucus can prevent sperm from entering the uterus, but this problem is rarely a major cause of infertility.

- Problems with cervical mucus are not usually a major cause of infertility, but they may be a factor in women who have a cervical infection or scar tissue in the cervix (cervical stenosis).
- Doctors do a pelvic examination to check for infection and a cervical canal that is narrowed or closed because of scar tissue
- If a cervical infection is diagnosed, it is treated with antibiotics. If cervical stenosis is detected, it may be treated with a procedure to dilate (widen) the cervix.



2.3.1 State ONE function of cervix. (1)

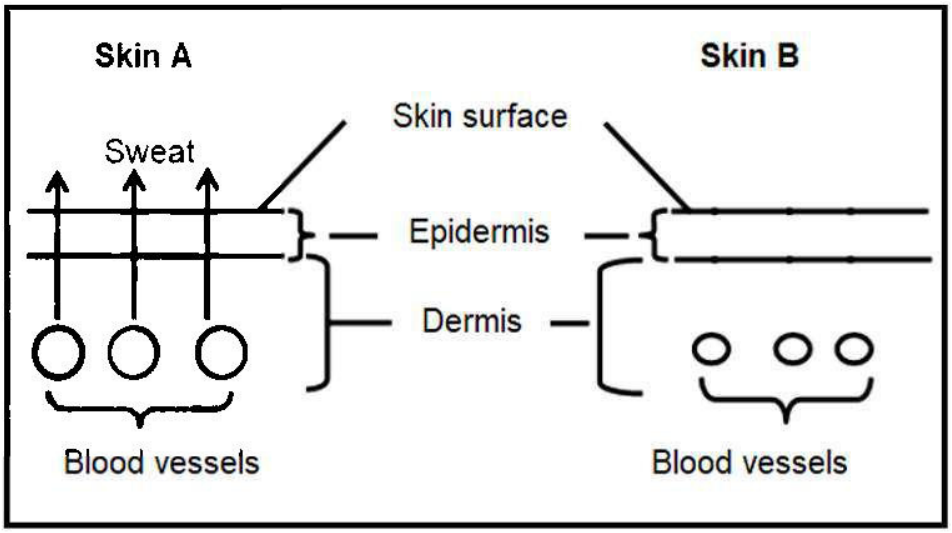
2.3.2 From the extract, state ONE way in which cervical infection is treated. (1)

2.3.3 Give a reason why cervical stenosis needs to be treated. (1)

2.3.4 Explain why cervical mucus may cause infertility if it is extreme. (3)
(6)

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2.4 Study the diagram of skin **A** and **B** showing the section through the blood vessels under different environmental conditions.



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2.4.1 Which is the environmental condition that resulted in appearance of skin **B**? (1)

2.4.2 Describe the process that is taking place in skin **A** in order to maintain a constant body temperature. (3)

2.4.3 Explain why sweating plays an important role in maintaining body temperature, when the environmental temperature increases. (3)

2.4.4 A person with skin **B** started to exercise as a way of keeping warm for a period of 20 minutes. This person's skin temperature was measured over that time period. The table below shows temperature measurements obtained.

Time (Minutes)	Temperature of person with skin B (^{0}C)
0	19 ^{0}C
5	27 ^{0}C
10	30 ^{0}C
15	35 ^{0}C
20	38 ^{0}C

Calculate the percentage increase of temperature from 10 to 20 minutes. (3)

(10)

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2.5 An investigation was conducted to determine the effect of different amounts of thyroxin on metabolic rate.

The procedure was as follows:

- Nine healthy adult male rats were used.
- They were divided into three groups of three rats each: **1**, **2** and **3**.
- All three groups were kept in the same environment in three separate cages.
- Each group received the same amount of water.
- Each group was given a different diet.
- Their initial mass was taken.
- Three weeks later the mass was taken again.
- Their oxygen consumption was also measured.

DIET **A**: Food containing all the essential nutrients without thyroxin

DIET **B**: Food containing all the essential nutrients and an extract of thyroxin

DIET **C**: Food containing all the essential nutrients, and a chemical that inhibits the effect of thyroxin

GROUP	DIET	AVERAGE MASS OF RATS (g)		AVERAGE OXYGEN CONSUMPTION (mℓ/kg/min)
		INITIAL	AFTER THREE WEEKS	
1	**A**	319	321	4,0
2	**?**	320	309	10,0
3	**?**	318	340	2,7

NOTE: Group **1** was given DIET **A**.

2.5.1 Identify the:

(a) Independent variable (1)

(b) Dependent variable (1)

2.5.2 Name the group(s) (**1**, **2** or **3**) in which the average mass of the rats increased. (2)

2.5.3 Which factors were kept constant in this investigation? (2)

2.5.4 Refer to changes in mass and oxygen consumption of the rats in the table above, provide a conclusion thereof. (2)

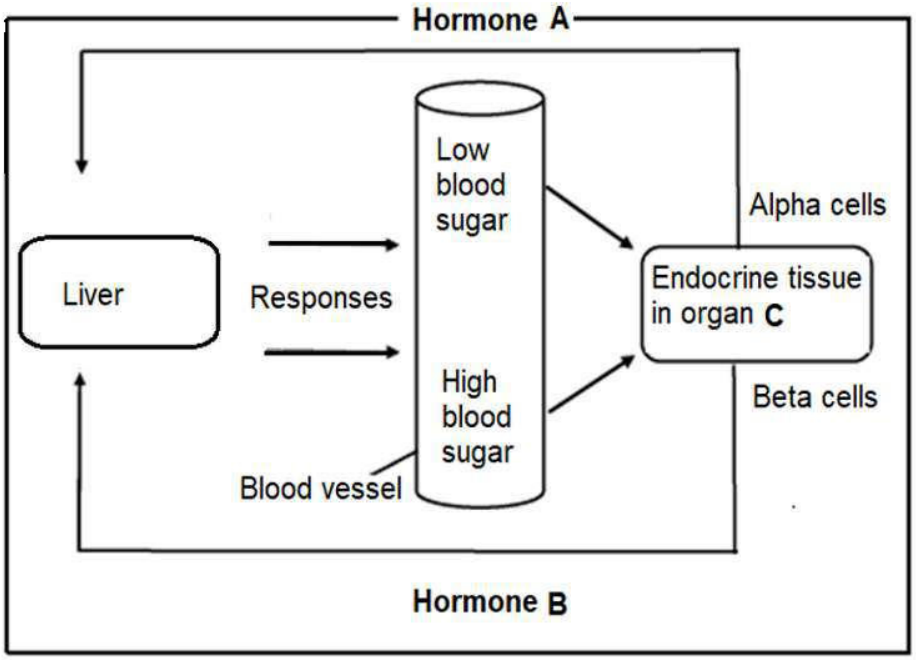
(8)

TOTAL QUESTION 2 [50]

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QUESTION 3

3.1 The diagram below represents the homeostasis of blood glucose in the human body.



3.1.1 Identify hormone **A** and **B** (2)

3.1.2 Name:

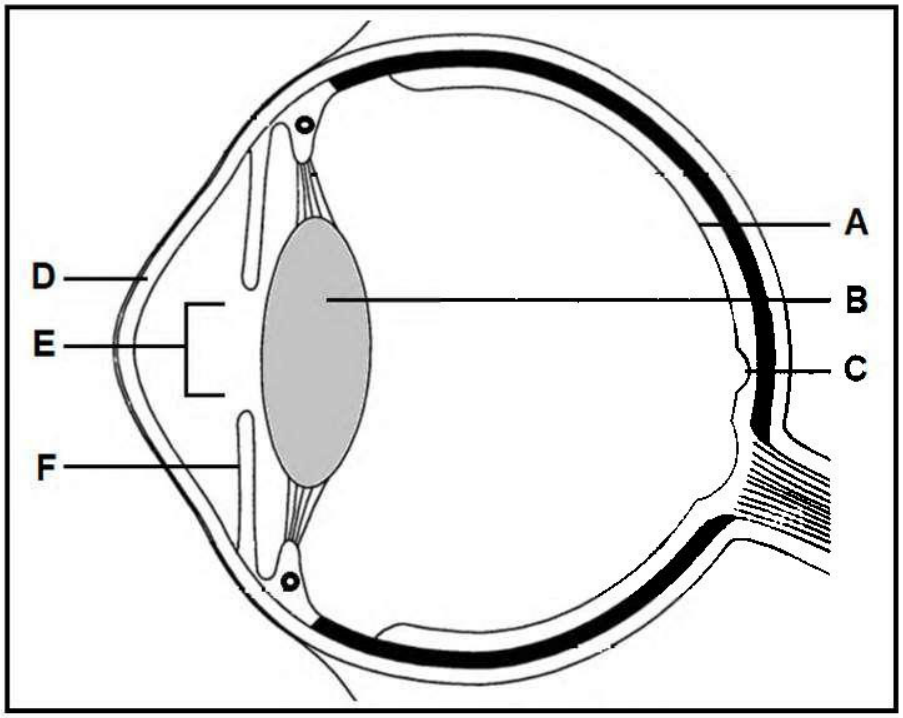
(a) Organ **C** (1)

(b) The endocrine tissue in organ **C**. (1)

3.1.3 Describe the response that is carried out when a person has not eaten any sugar-containing food for six hours. (6)

(10)

3.2 The diagram below shows a section of a human eye.



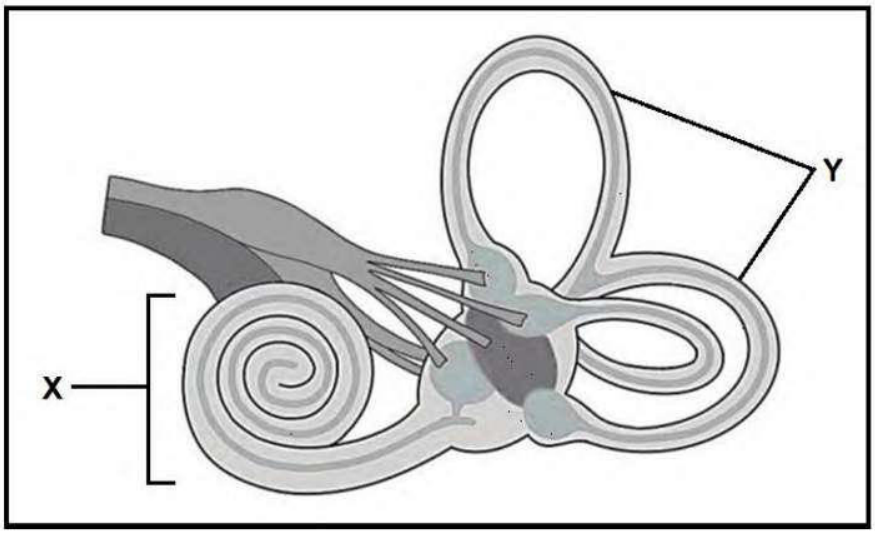
3.2.1 Give the LETTER and the NAME of the region where the clearest image is formed. (2)

3.2.2 Using the LETTER and NAME, give the correct sequence through which light travels until it reaches part **C**. (3)

3.2.3 Name and describe the changes that occur in the structures labelled **E**, and **F** when watching a movie in the cinema. (7)
(12)

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3.3 The diagram below represents part of the inner ear.



3.3.1 Identify part:

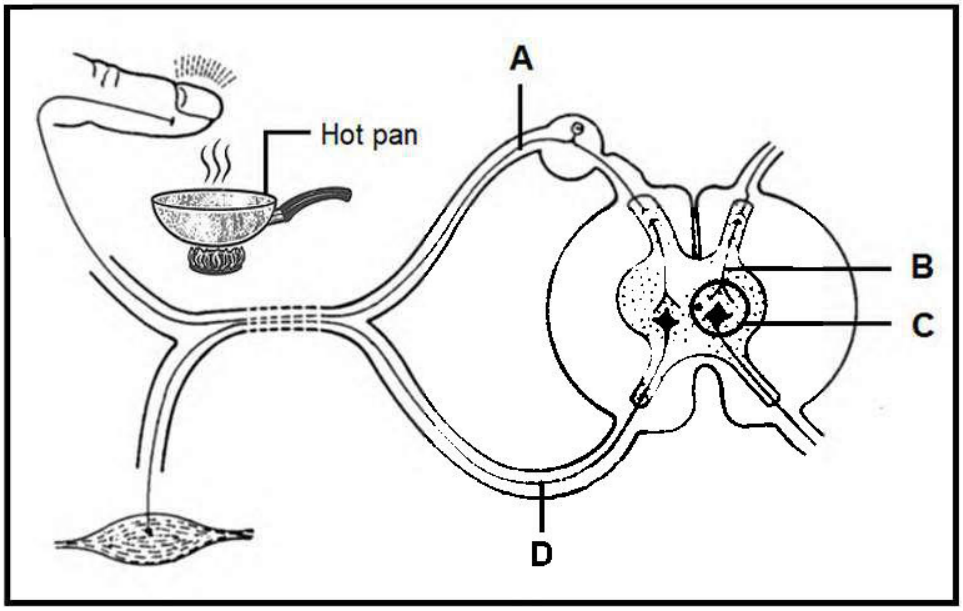
(a) X (1)

(b) Y (1)

3.3.2 Describe the role of the parts of the ear from the time sound waves are trapped until pressure waves are set up in the inner ear. (6)
(8)

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3.4 The diagram below represents a reflex arc.



3.4.1 Define a *reflex arc* (1)

3.4.2 Identify the:

(a) Functional connection at **C** (1)

(b) Type of neuron at **B** (1)

3.4.3 State TWO significance of the connection mentioned in QUESTION 2.3.2(a). (2)

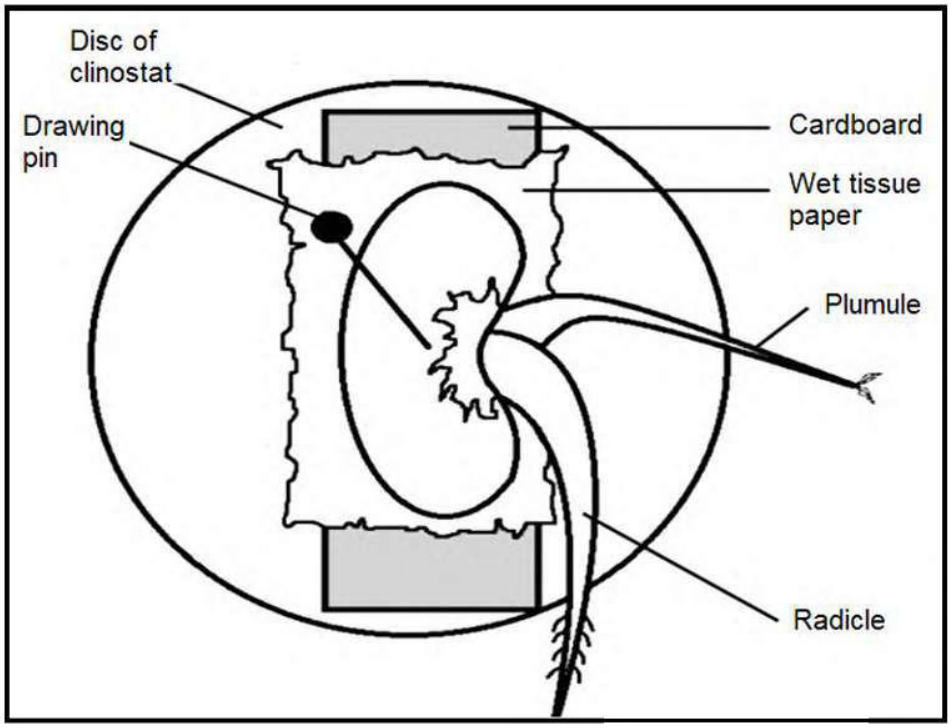
3.4.4 Name the neurons as they occur, in the correct sequence, from receptor to effector. (2)

3.4.5 Explain the consequences of a reflex action if neuron **D** is damaged. (2)

3.4.6 Draw a labelled diagram to represent the structure of neuron **A**. (5)
(14)

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3.5 An experiment was conducted to investigate the direction of plumule growth when the germinating seed was placed vertically on a stationary clinostat as shown in the diagram below. The growing tips of the germinating seed were exposed to light from all directions. The wet tissue paper was periodically sprayed with water to keep the seed moist. The seed was kept in this position for four days. The tip of plumule began to bend and grew in an upward direction after four days.



3.5.1 Name the hormone that controls the direction of plumule growth in a germinating seed. (1)

3.5.2 Give a reason for exposing the germinating seed to light from all directions. (1)

3.5.3 Explain the direction of plumule growth as observed after four days. (3)

3.5.4 How does the control differ from the experiment? (1)
(6)

TOTAL QUESTION 3 [50]
TOTAL SECTION B: 100
GRAND TOTAL: 150

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