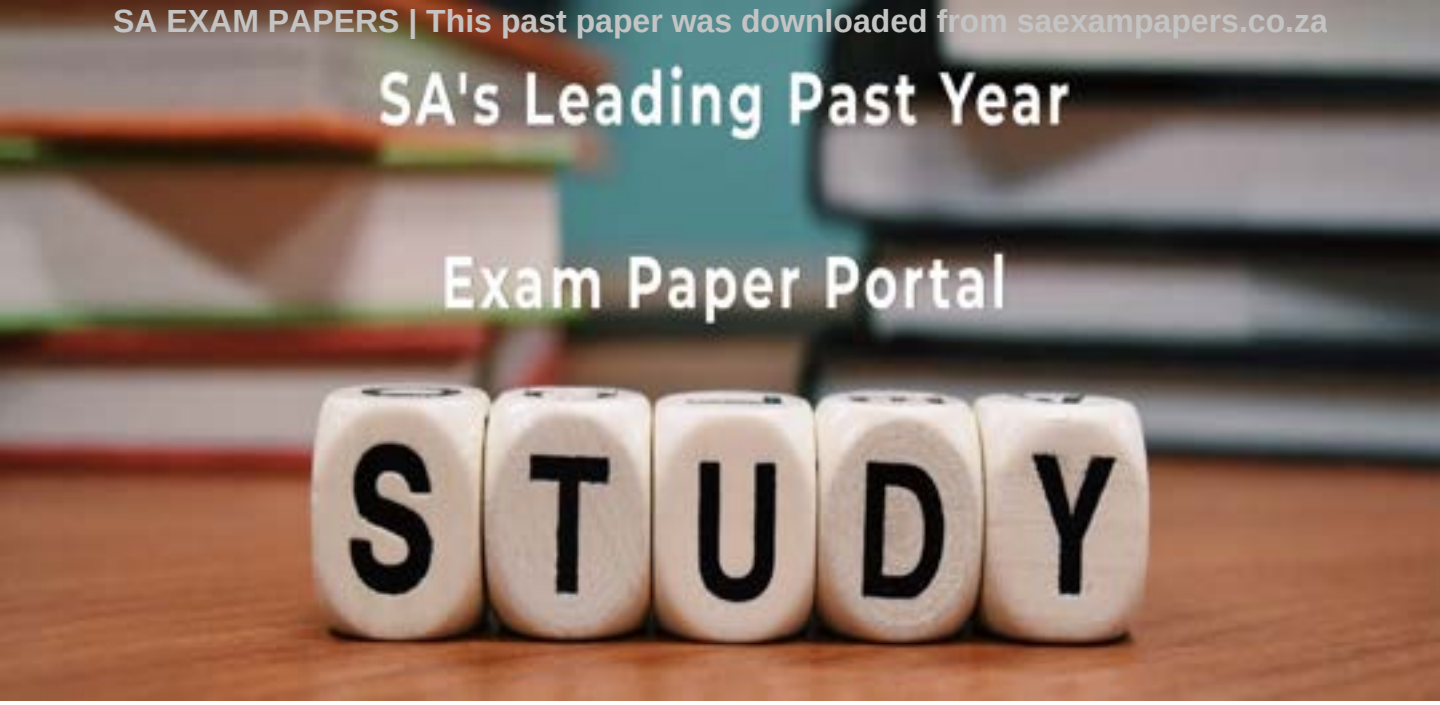

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SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

LIFE SCIENCES P1

MAY/JUNE 2025

MARKS: 150

TIME: 2½ hours

This question paper consists of 17 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. 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–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 The part in the amniotic egg that provides nutrients to the developing embryo:

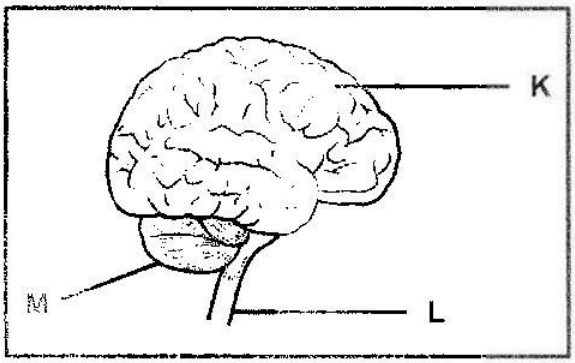
A Yolk
B Chorion
C Amnion
D Shell

1.1.2 Which gland is responsible for the secretion of prolactin?

A Thyroid gland
B Adrenal gland
C Ovary
D Pituitary gland

1.1.3 After an accident, a person can still walk, but has poor control and coordination of the skeletal muscles.

The diagram below represents part of the central nervous system of this person.



Which parts of the central nervous system are probably damaged?

A **K**, **L** and **M**
B **K** and **L**
C **K** and **M**
D **L** and **M**

1.1.4 The cranial and spinal nerves are part of the ... nervous system.

A central
B peripheral
C sympathetic
D parasympathetic

1.1.5 The following changes occur at puberty:

(i) Growth of facial hair
(ii) Deepening of the voice
(iii) Onset of menstruation
(iv) Oily skin

Which combination of characteristics occurs due to the secretion of testosterone?

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

1.1.6 A man is fertile if his semen contains a minimum of 20 million sperm per cm^3 and at least 75% of the sperm cells are active.

The table below shows the results of a sperm analysis of four semen samples.

Identify the sample that was obtained from an infertile man.

	NUMBER OF SPERM IN SAMPLE (million/cm^3)	INACTIVE SPERM (%)
A	23	30
B	25	20
C	22	25
D	20	15

1.1.7 Which ONE of the following is a cause of short-sightedness?

A The eyeball is too short.
B The lens is unable to become less convex.
C The lens is opaque.
D The surface of the eye is uneven.

1.1.8 A person has a disorder where she is unable to secrete ADH.

It is most likely that ...

A the renal tubules will become more permeable to water.
B the blood will have a higher volume of water.
C large volumes of urine will be produced.
D more water is reabsorbed by the renal tubules.

1.1.9 Eagles are birds that lay their eggs high up on mountain cliffs and feed their young once they hatch.

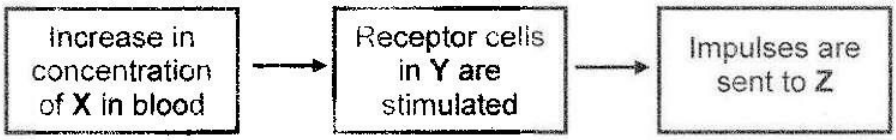
The following is a list of reproductive strategies in vertebrates:

(i) Internal fertilisation
(ii) External fertilisation
(iii) Precocial development
(iv) Parental care
(v) Ovipary

Which combination of strategies applies to eagles?

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

1.1.10 The flow diagram below represents a part of the homeostasis of compound **X**.



Which ONE of the following combinations is CORRECT?

	X	Y	Z
A	Carbon dioxide	Hypothalamus	Pituitary gland
B	Water	Hypothalamus	Medulla oblongata
C	Carbon dioxide	Carotid artery	Medulla oblongata
D	Water	Carotid artery	Pituitary gland

(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 The inner lining of the uterus

1.2.2 A brain disorder that results in confusion and memory loss

1.2.3 The plant hormone that plays a role in the falling of leaves from trees

1.2.4 A reproductive strategy where the foetus develops inside the uterus

1.2.5 The type of vision in which both eyes are used to see one image

1.2.6 The part of the brain that joins the left and the right hemispheres of the cerebrum

1.2.7 The membrane in the amniotic egg that collects nitrogenous waste

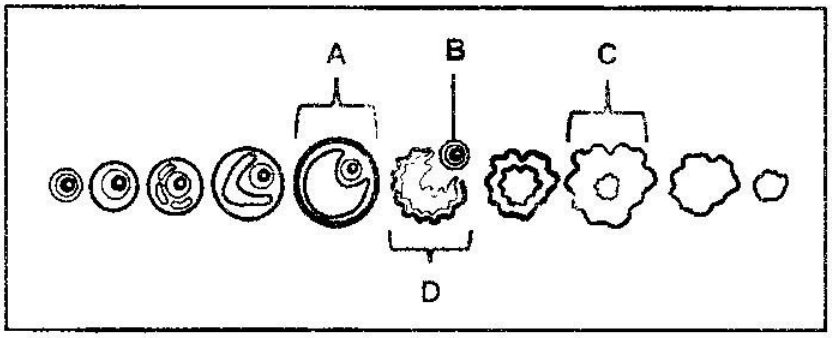
1.2.8 The plant hormone used to control the growth of weeds (8 x 1) **(8)**

1.3 Indicate whether each of the descriptions in COLUMN I apply 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	A larger number of male and female gametes are produced	A: External fertilisation B: Internal fertilisation
1.3.2	A plant defence mechanism	A: Thorns B: Chemicals
1.3.3	Contributes to the movement of sperm	A: Mitochondria B: Tail

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

1.4 The diagram below represents a part of the menstrual cycle that occurs in the human ovary.



1.4.1 Name the **part of** the menstrual cycle represented by the diagram. (1)

1.4.2 Identify **structure**:

(a) **A** (1)

(b) **B** (1)

(c) **C** (1)

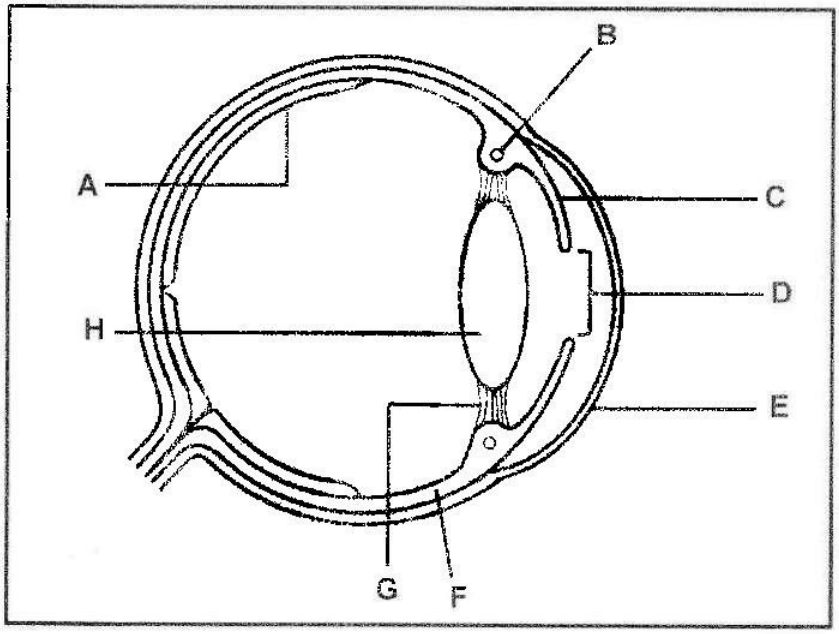
1.4.3 Name the hormone that:

(a) Controls the development of structure **A** (1)

(b) Is secreted by structure **A** (1)

(c) Stimulates the process occurring at structure **D** (1)
(7)

1.5 The diagram below represents the human eye.



1.5.1 Identify part:

(a) **D** (1)

(b) **E** (1)

1.5.2 Give the LETTER of the:

(a) Choroid (1)

(b) Iris (1)

1.5.3 Name the TWO different receptors found in part **A**. (2)

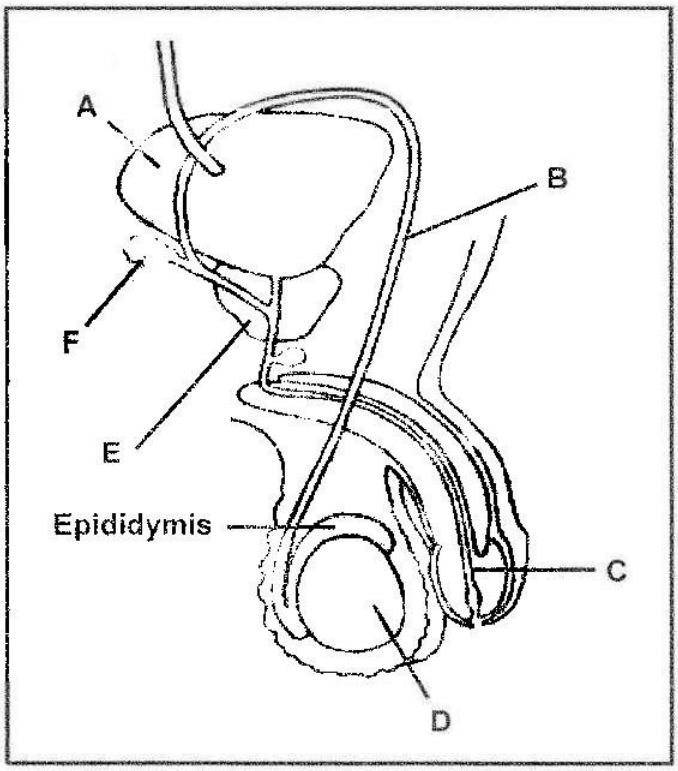
1.5.4 Give only the LETTERS of THREE parts that are involved in accommodation of the eye. (3)
(9)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below shows the male reproductive system.



2.1.1 Identify part:

(a) **E** (1)

(b) **F** (1)

(c) **C** (1)

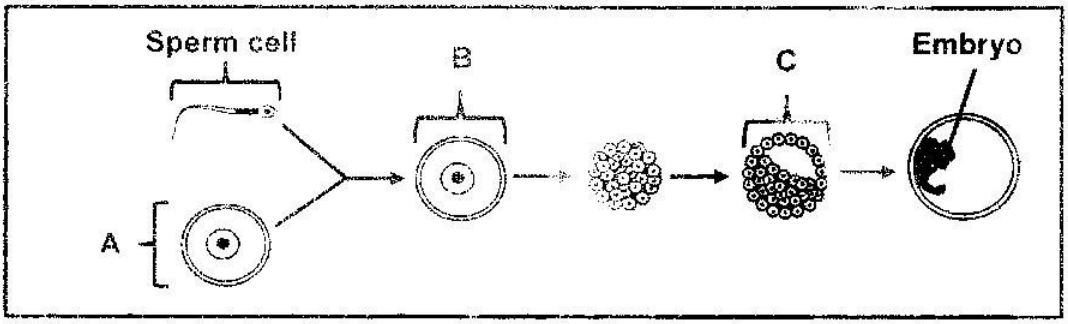
2.1.2 Name the type of gametogenesis that occurs in part **D**. (1)

2.1.3 Describe the process named in QUESTION 2.1.2. (4)

2.1.4 Epididymitis is a condition that causes inflammation in the epididymis. This can cause a blockage between the testes and part **B**.

Explain how this affects the composition of semen. (2)
(10)

2.2 The diagram below represents human embryonic development.



2.2.1 Identify:

(a) Cell **B** (1)

(b) Structure **C** (1)

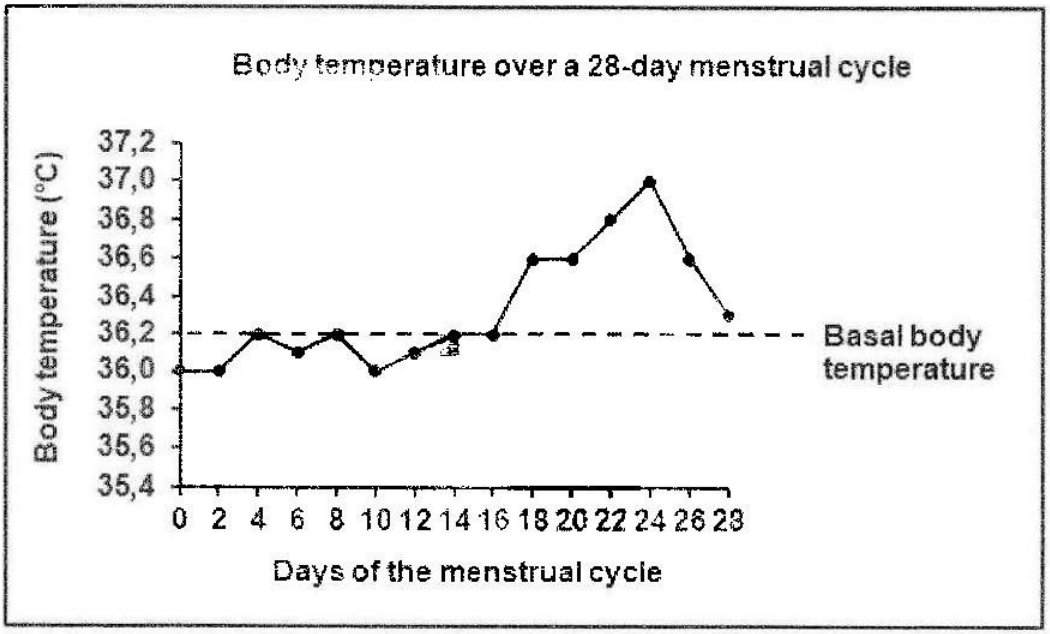
2.2.2 Explain the difference between cell **A** and cell **B**. (3)

2.2.3 Name the fluid surrounding the embryo. (1)

2.2.4 State THREE functions of the fluid named in QUESTION 2.2.3. (3)
(9)

2.3 Basal body temperature is the body temperature while a person is at rest. An increase above the basal body temperature occurs immediately after the day of ovulation. The basal body temperature method can be used by women who want to fall pregnant.

The graph below represents the body temperature chart of a woman with a 28-day menstrual cycle.



2.3.1 Use the graph to identify the following for this woman:

(a) Basal body temperature (1)

(b) Day of ovulation (1)

2.3.2 Using evidence in the graph, give a reason for your answer to QUESTION 2.3.1(b). (2)

2.3.3 Progesterone is the hormone that causes an increase in the basal body temperature.

Explain why the increase in basal body temperature occurs only after ovulation. (2)

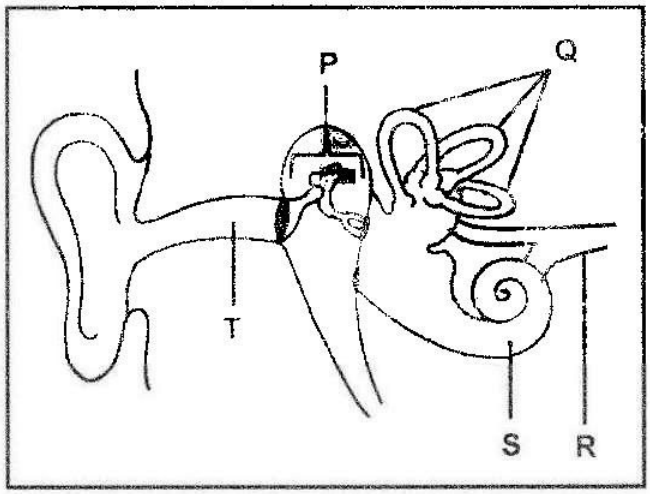
2.3.4 Explain why the basal body temperature is measured when a person is at rest. (2)
(8)

2.4 Read the extract below.

HEARING LOSS

There are two main types of hearing loss. Type **A** hearing loss occurs when there is a blockage in the transmission of sound waves and vibrations through the outer and middle ear. Type **B** hearing loss is caused by damage to the hearing receptors of the inner ear or to the nerves that carry sound impulses to the brain.

The diagram below represents the human ear.



2.4.1 Write down only the LETTERS of TWO parts EACH that may be damaged when a person suffers from:

(a) Type **A** hearing loss (2)

(b) Type **B** hearing loss (2)

2.4.2 Identify part **S**. (1)

2.4.3 Describe the role of the hearing receptors when they are stimulated by pressure waves. (2)

2.4.4 Explain why a person will suffer from hearing loss if the bones at **P** are fused. (4)
(11)

2.5 Scientists investigated the effect of different doses of alcohol on reaction time in humans.

- A dose is the amount of alcohol given per kilogram of body mass.
- Reaction time is the time it takes a person to react once a stimulus is received.

The procedure was as follows:

- Two 30-year-old male volunteers participated in the investigation which was conducted for a period of 7 days.
- They did not drink alcohol for a period of 24 hours prior to testing.
- They were given different amounts of alcohol on 4 different days.
- Their reaction times were determined 30 minutes after consuming the alcohol.

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

DAY OF INVESTIGATION	ALCOHOL DOSE (mg/kg body mass)	REACTION TIME (seconds)	
		MALE 1	MALE 2
1	0	1,86	1,82
3	200	1,91	1,94
5	400	2,02	2,06
7	600	2,11	2.15

2.5.1 For this investigation, state the:

(a) Independent variable (1)

(b) Dependent variable (1)

2.5.2 Name TWO variables that were controlled during the investigation. (2)

2.5.3 State TWO ways in which the reliability of the results can be improved. (2)

2.5.4 Explain why the participants only received alcohol every second day. (2)

2.5.5 Male 1 has a body mass of 93 kg. Calculate the amount of alcohol (in mg) that he consumed on day 7 of the investigation. Show ALL your working. (2)

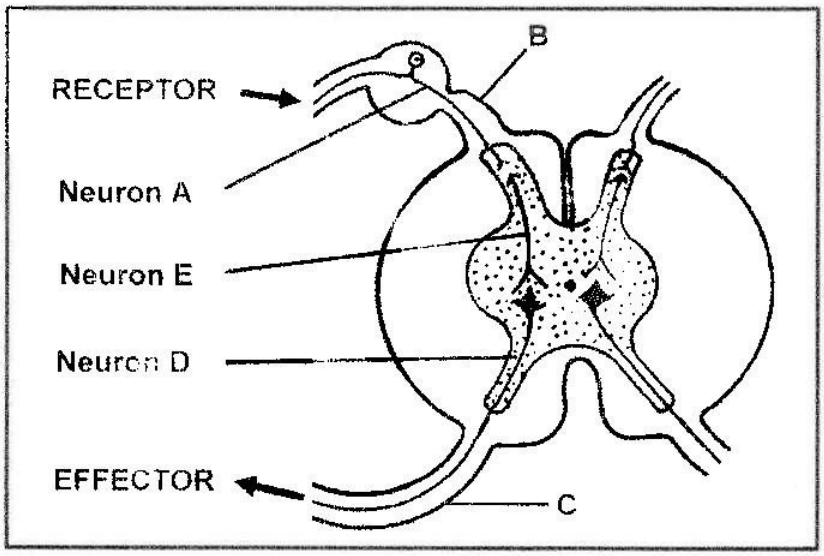
2.5.6 State a conclusion for this investigation. (2)

(12)

[50]

QUESTION 3

3.1 The diagram below represents part of a reflex arc.



3.1.1 Give the LETTER of the part that represents the:

(a) Dorsal root (1)

(b) Sensory neuron (1)

3.1.2 State the significance of a synapse. (1)

3.1.3 Explain the:

(a) Significance of a reflex action (2)

(b) Effect on the reflex arc if neuron **A** is cut (3)

3.1.4 Draw a labelled diagram to show the detailed structure of neuron **D**. (5)
(13)

3.2 Read the extract below.

INSULIN PUMPS

In people with diabetes mellitus, the beta cells in the pancreas are unable to secrete sufficient amounts of insulin. These people are treated with regular injections of insulin.

Electronic pumps have been developed as an alternative to injections. They pump insulin into the blood according to different blood glucose concentrations. The pump can be clipped to a piece of clothing or fastened to the skin with an adhesive patch. These pumps then infuse insulin through the skin into the blood.

3.2.1 Identify the:

(a) Groups of cells in the pancreas that contain the beta cells (1)

(b) Signal for the pump to turn on and start pumping insulin (1)

3.2.2 State why the cells identified in QUESTION 3.2.1(a) have endocrine characteristics. (2)

3.2.3 Describe the effect of insulin on the liver and the muscles. (2)

3.2.4 Explain why electronic pumps are more effective in controlling blood glucose levels than insulin injections. (2)
(8)

3.3 Describe the role of the human skin in the regulation of body temperature on a cold day. **(6)**

3.4 Knowing the salt level in the blood of humans can provide information on their health and lifestyle. The normal salt level in the blood is between 136 mmol/ℓ and 145 mmol/ℓ. Salt levels in the blood below 136 mmol/ℓ are an indication of hyponatremia, and salt levels in the blood higher than 145 mmol/ℓ are an indication of hypernatremia.

A group of people with the same diet had their blood salt levels tested.

The table below shows the results.

SALT LEVELS IN THE BLOOD (mmol/ℓ)	NUMBER OF PEOPLE
Lower than 136	5
136 to 140	15
141 to 145	21
Higher than 145	4

3.4.1 Use data in the table to determine how many people have:

(a) Hypernatremia (1)

(b) Normal blood salt levels (1)

3.4.2 Describe how the human body increases a salt level lower than 136 mmol/ℓ to the normal level. (6)

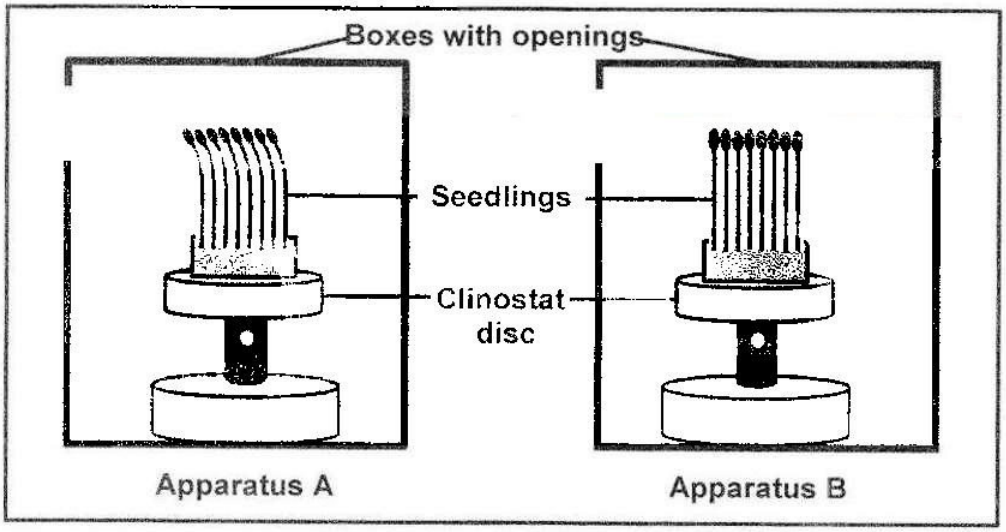
3.4.3 Draw a histogram to show the results in the table. (6)
(14)

3.5 An investigation was conducted to determine the response of plant seedlings to light.

The procedure was as follows:

- Grain seeds were allowed to germinate into seedlings.
- One half of the seedlings were planted in one small pot and the other half in another small pot.
- When the stems reached a height of approximately 1 cm, the pots were placed on the discs of two clinostats. A clinostat is an apparatus consisting of a slowly rotating disc when switched on.
- Both sets of apparatus (**A** and **B**) were placed inside boxes with openings on one side only for light to enter (unilateral light).
- One clinostat was switched on and the other one was switched off.
- The apparatus was left for two weeks.

The results after two weeks are represented in the diagram below.



3.5.1 Identify the plant growth response demonstrated by the results. (1)

3.5.2 In which apparatus (**A** or **B**) was the clinostat switched on and the disc rotating slowly? (1)

3.5.3 Explain your answer to QUESTION 3.5.2. (2)

3.5.4 Explain the growth response of the seedlings in apparatus **A**. (5)
(9)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150