



# **basic education**

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Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS**

**LIFE SCIENCES P1**

**2019**

**MARKS: 150**

**TIME: 2½ hours**

**This question paper consists of 18 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 to D) next to the question numbers (1.1.1 to 1.1.9) in the ANSWER BOOK, e.g. 1.1.10 D.

1.1.1 Which ONE of the following involves the development of the young inside the uterus of the mother and where it receives nutrients through the placenta?

- A Ovipary
- B Vivipary
- C Ovovivipary
- D Amniotic egg

1.1.2 Below is a list of terms relating to reproduction:

- (i) Precocial development
- (ii) Altricial development
- (iii) Amniotic egg
- (iv) Parental care

Which of the terms above refer to strategies used by birds that incubate their eggs in a nest and feed their young until they are able to fly?

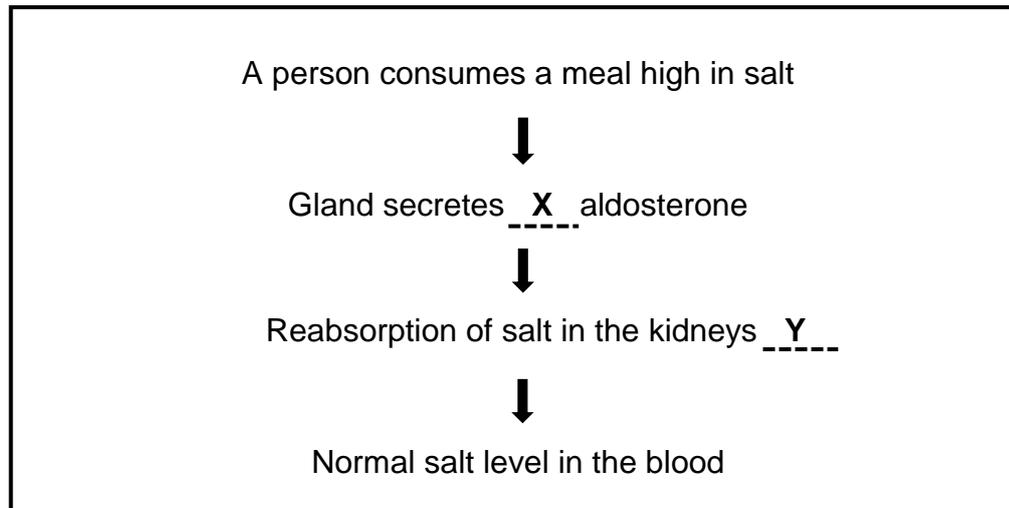
- A (i), (ii), (iii) and (iv)
- B (i), (iii) and (iv) only
- C (ii), (iii) and (iv) only
- D (i), (ii) and (iii) only

1.1.3 Which part of the eye absorbs excess light?

- A Retina
- B Blind spot
- C Choroid
- D Optic nerve

1.1.4 Which ONE of the following activities will help to maintain biodiversity in a country?

- A Habitat destruction
- B Poaching
- C The introduction of alien plants
- D Sustainable use of plant and animal resources

**QUESTIONS 1.1.5 AND 1.1.6 ARE BASED ON THE FLOW DIAGRAM BELOW.**

1.1.5 Which gland secretes aldosterone?

- A Adrenal
- B Pituitary
- C Thyroid
- D Pancreas

1.1.6 Which ONE of the following is CORRECT with regard to **X** and **Y** in the flow diagram?

|   | <b>X</b> | <b>Y</b>  |
|---|----------|-----------|
| A | More     | Increases |
| B | Less     | Increases |
| C | More     | Decreases |
| D | Less     | Decreases |

1.1.7 During an investigation a man was placed in an airtight room. Sensors were used to monitor his breathing and heart rate. The investigators were able to change the environmental conditions in the room.

After 30 minutes the man's breathing and heart rate had increased.

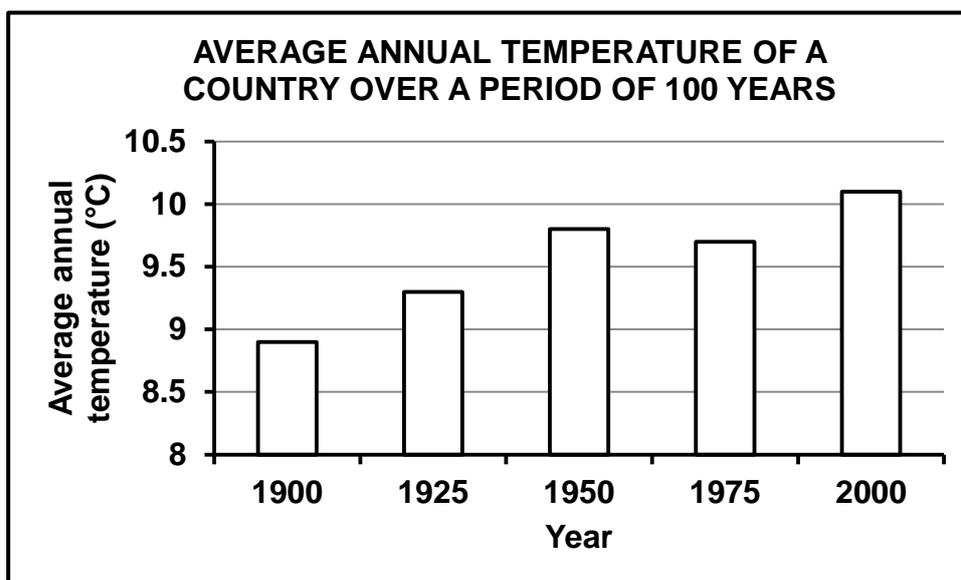
The investigators changed the environmental conditions in the room by ...

- A decreasing the light intensity.
- B increasing the amount of carbon dioxide in the air.
- C decreasing the humidity.
- D increasing the amount of oxygen in the air.

1.1.8 Which ONE of the following is a consequence of the destruction of wetlands?

- A Increased run-off of rainwater
- B Increased biodiversity
- C Increase in water availability
- D Increase of water quality

1.1.9 The annual average temperature of a country was recorded over the past 100 years. The information is represented in the graph below.



Which ONE of the following is a possible inference that can be made from the information in the graph?

- A Global warming has caused habitat destruction
- B Ozone depletion has occurred
- C Carbon dioxide levels in the atmosphere are increasing
- D Desertification has occurred as a result of global warming

(9 x 2)

**(18)**

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 1.2.9) in the ANSWER BOOK.

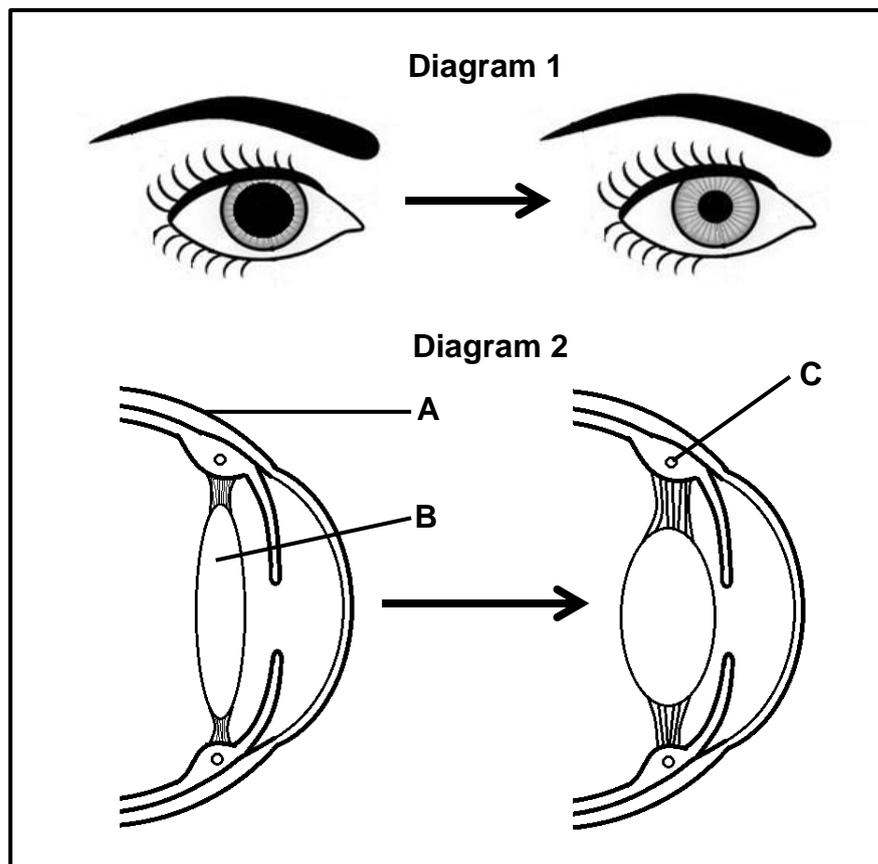
- 1.2.1 The structures formed by the centrioles during cell division
- 1.2.2 Receptors that provide information about the position of the head
- 1.2.3 A hormone that regulates the water balance in the body
- 1.2.4 A flammable gas produced in landfills
- 1.2.5 Areas with porous rock that store water
- 1.2.6 The part of the brain that regulates breathing
- 1.2.7 The process of maintaining a constant internal environment in the human body
- 1.2.8 The membrane that, together with the endometrium, forms the placenta
- 1.2.9 The structure in the head of a sperm containing digestive enzymes **(9)**

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    | Unfertilised eggs are released from the female's body                                  | A:        | Asexual reproduction   |
|          |  | B:        | External fertilisation |
| 1.3.2    | Plant hormone that helps plant seeds to survive unfavourable conditions, e.g. droughts | A:        | Gibberellins           |
|          |  | B:        | Abscisic acid          |
| 1.3.3    | Hormones secreted by the pituitary gland   | A:        | Prolactin              |
|          |  | B:        | Growth hormone         |

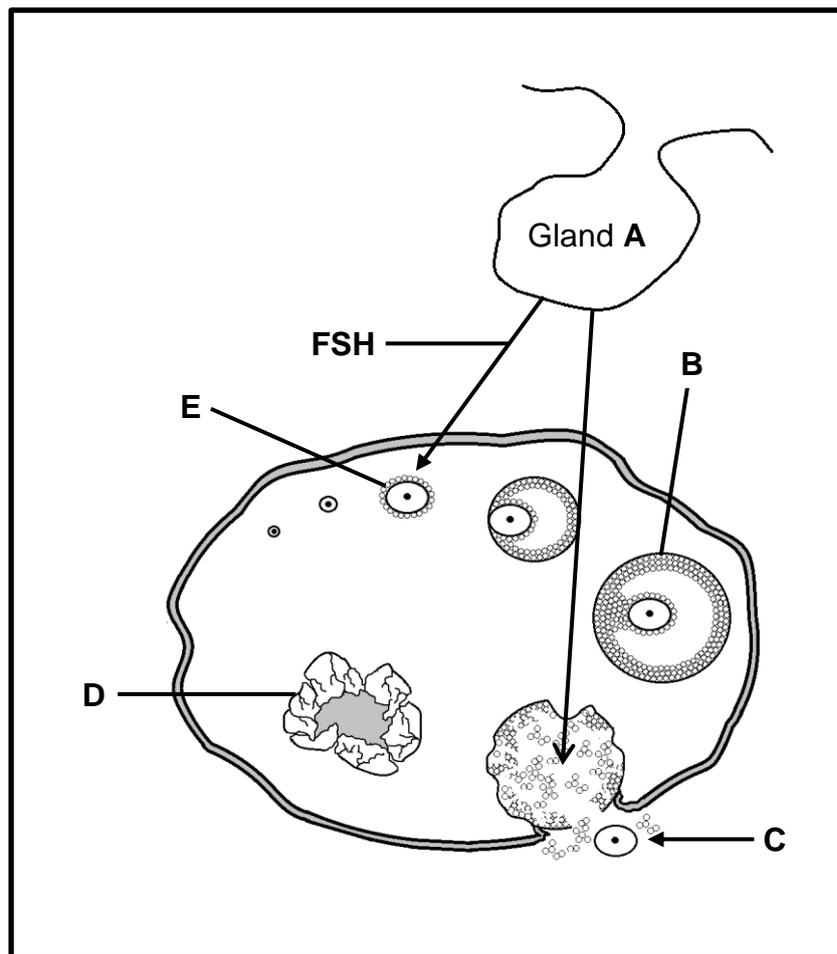
(3 x 2) **(6)**

- 1.4 The diagrams below show the response of the human eye to two different conditions.



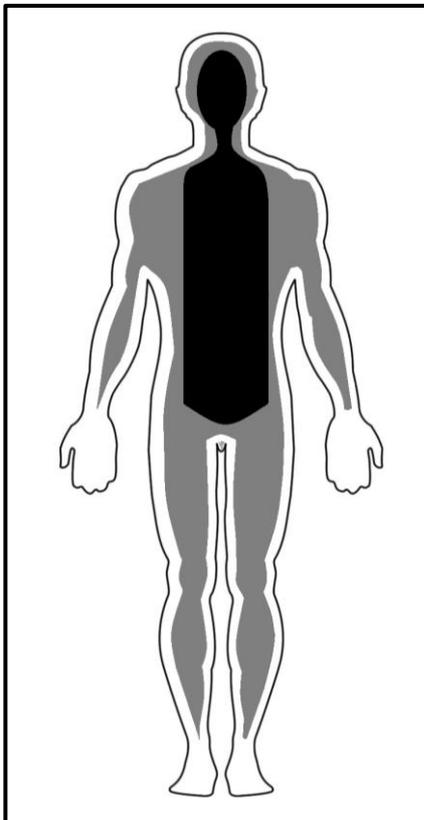
- 1.4.1 Identify part:
- (a) **A** (1)
- (b) **B** (1)
- (c) **C** (1)
- 1.4.2 Identify the process in Diagram 1. (1)
- 1.4.3 Name the part of the eye that is responsible for the response in Diagram 1. (1)
- 1.4.4 State the consequence to the person's vision if the process in Diagram 2 does not occur. (1)
- (6)**

- 1.5 The diagram below represents an endocrine gland **A** and the events that take place in the ovary during the menstrual cycle in humans.



- 1.5.1 Identify:
- (a) Gland **A** (1)
  - (b) Structure **B** (1)
  - (c) Process **C** (1)
  - (d) Structure **D** (1)
- 1.5.2 State the effect on the oestrogen levels in the blood if gland **A** stops secreting FSH. (1)
- 1.5.3 State ONE function of LH. (1)
- (6)**

- 1.6 A normal, healthy person was placed in a cold room. After 30 minutes the thermal image shown below was produced. This thermal image indicates the temperature of different parts of the body. Lighter colours on the scan indicate temperatures lower than normal body temperature.

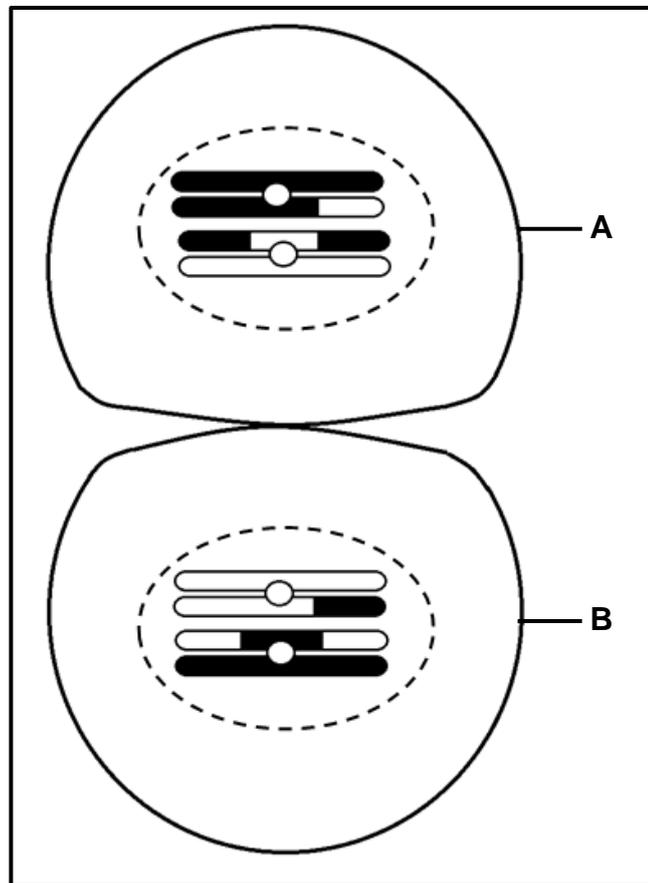


- 1.6.1 Which colour, black, grey or white, represents the normal body temperature? (1)
- 1.6.2 State what occurred in each of the following parts in this person's skin during temperature regulation:
- (a) Blood vessels (1)
  - (b) Sweat glands (1)
- 1.6.3 Name the part of the brain that is responsible for thermoregulation. (1)
- 1.6.4 State ONE way in which the thermal image would differ if the person was placed in a hot room for 30 minutes. (1)

**(5)****TOTAL SECTION A: 50**

**SECTION B****QUESTION 2**

2.1 The diagram below represents a phase of meiosis.



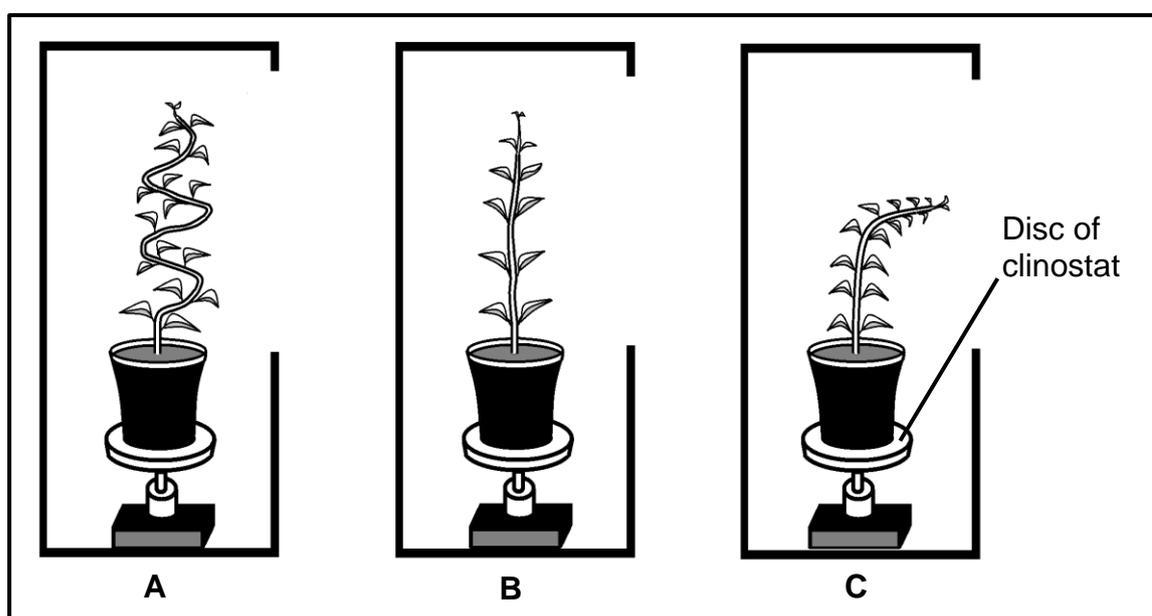
- 2.1.1 Identify the phase of meiosis in the diagram above. (1)
- 2.1.2 Draw a diagram to show only the TWO gametes formed from cell A. (NO labels required.) (4)
- 2.1.3 Tabulate TWO differences between prophase I and prophase II. (5)  
**(10)**

- 2.2 A clinostat is a device used to investigate plant growth responses. It has a disc that rotates very slowly when the clinostat is switched on.

During an investigation on plant responses to light, the procedure below was followed:

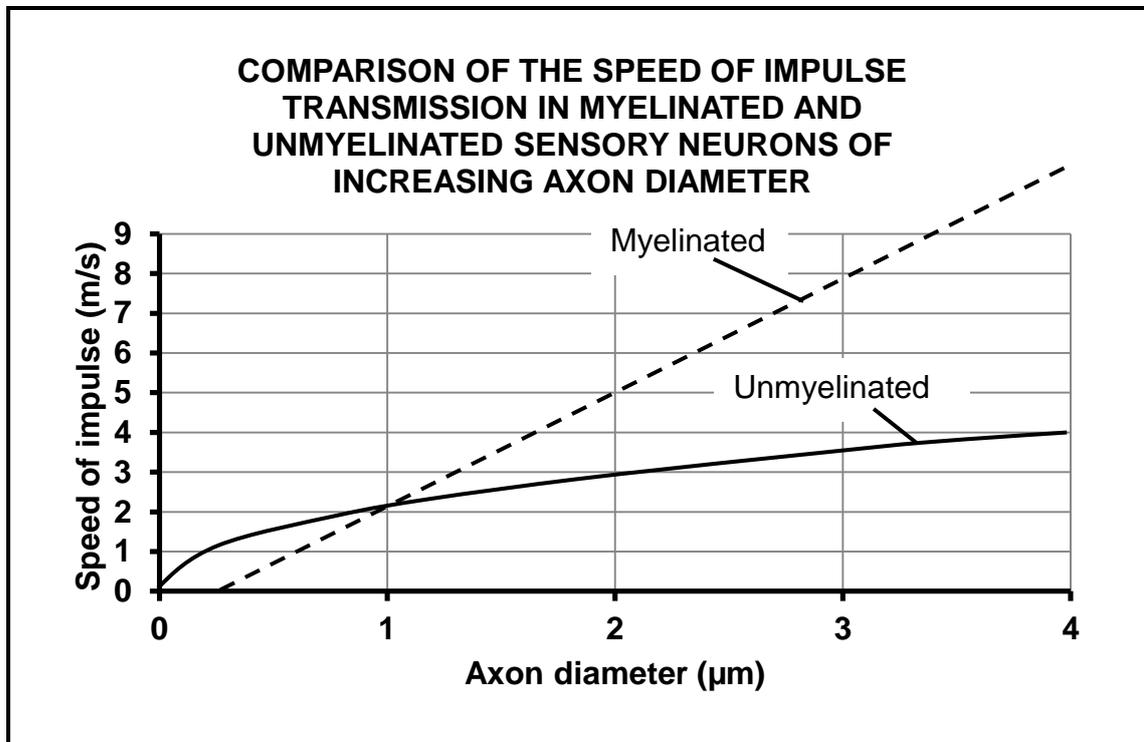
- Three pot plants of the same species were used.
- Each pot plant was placed on one of three identical clinostats.
- Each set of apparatus, A, B and C, was placed in a box with a single opening.
- Each clinostat was treated in a different way over a period of five weeks.

The results of the investigation are represented in the diagrams below.



- 2.2.1 Name the plant growth response to light. (1)
- 2.2.2 State TWO factors that were kept constant during the investigation. (2)
- 2.2.3 Give ONE reason why the results of this investigation may be considered to be unreliable. (1)
- 2.2.4 In which apparatus (**A**, **B** or **C**) was the clinostat:
- (a) Switched on and rotating slowly (1)
- (b) Switched off, but manually rotated through 180° once a week (1)
- 2.2.5 Explain the effect of the unilateral light on the distribution of auxins in the plant in apparatus **C**. (3)
- (9)**

- 2.3 The graph below shows the speed at which impulses are transmitted along sensory neuron axons of increasing diameter when the axons are myelinated (covered with myelin sheath) and unmyelinated (no myelin sheath present).

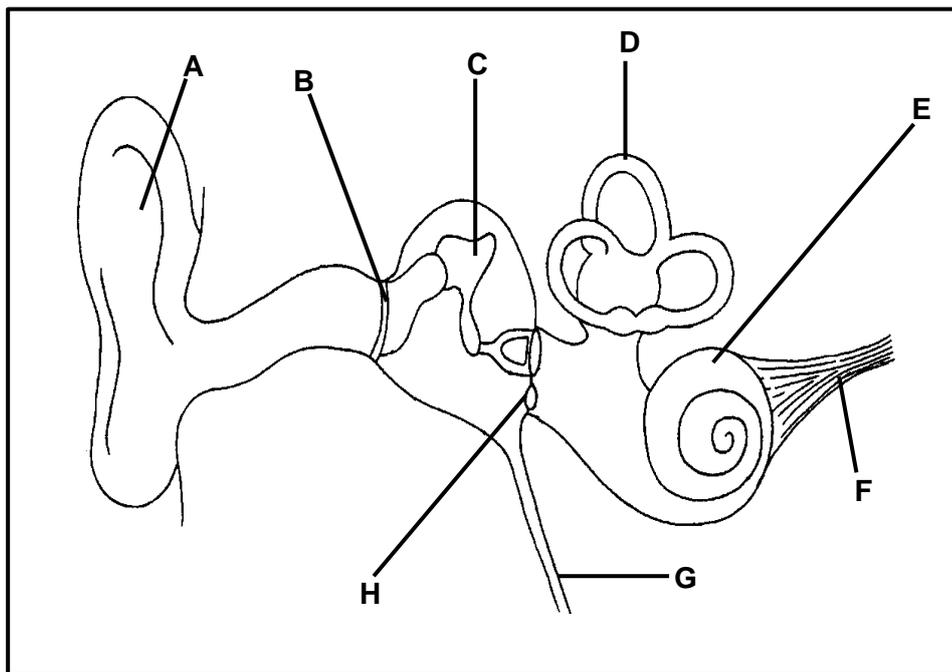


- 2.3.1 Describe the direction of the impulse within a neuron. (2)
- 2.3.2 Give the diameter range (in  $\mu\text{m}$ ) when the speed of the impulse is faster in unmyelinated axons than in myelinated axons. (2)
- 2.3.3 Describe the relationship between axon diameter and the speed of the impulse in myelinated axons. (2)
- 2.3.4 Use evidence from the graph to explain the effect of multiple sclerosis on a sufferer whose motor neuron axons are greater than  $1 \mu\text{m}$  in diameter. (3)
- (9)**

2.4 TWO types of hearing loss occur in humans:

- Conductive hearing loss – occurs when sound vibrations cannot be conducted through the outer and middle ear
- Sensorineural hearing loss – occurs when sound waves in the inner ear are not converted into nerve impulses or when the impulses cannot be transmitted to the brain

The diagram below represents the human ear.



2.4.1 Give the LETTER and NAME of the part that:

- (a) Transmits impulses to the brain (2)
- (b) Allows pressure to equalise between the outer ear and the middle ear (2)

2.4.2 Give only the LETTER of TWO structures in the diagram of the ear that, when damaged, would result in the following:

- (a) Conductive hearing loss (2)
- (b) Sensorineural hearing loss (2)

2.4.3 Middle-ear infections are a common cause of hearing loss.

State ONE way in which middle-ear infections are treated. (1)

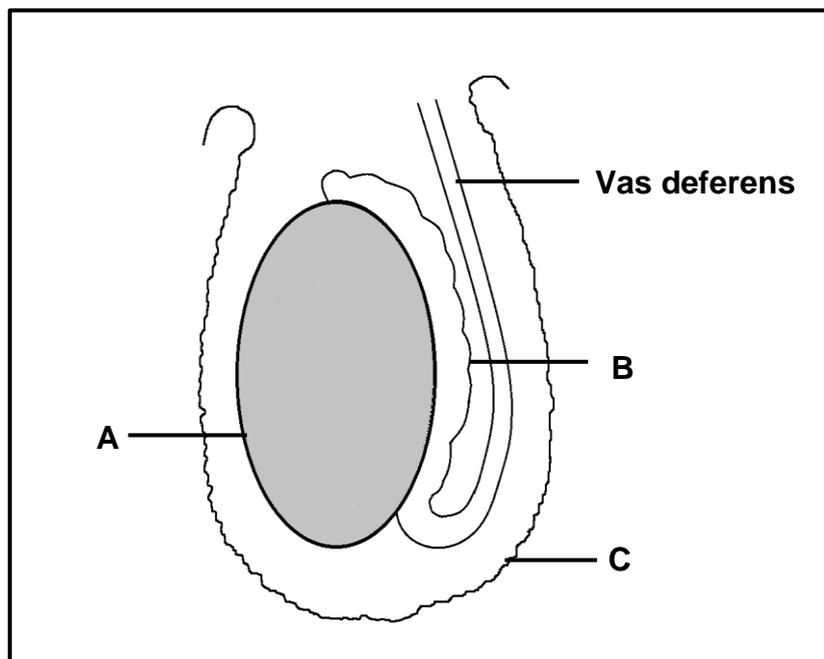
2.4.4 Name the part of the ear where ear wax is produced. (1)

2.4.5 Explain why hearing loss due to ear wax is usually temporary. (2)

**(12)**  
**[40]**

**QUESTION 3**

3.1 The diagram below represents some parts of the male reproductive system.



3.1.1 Identify parts:

- (a) **A** (1)
- (b) **B** (1)
- (b) **C** (1)

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

3.1.3 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. (3)

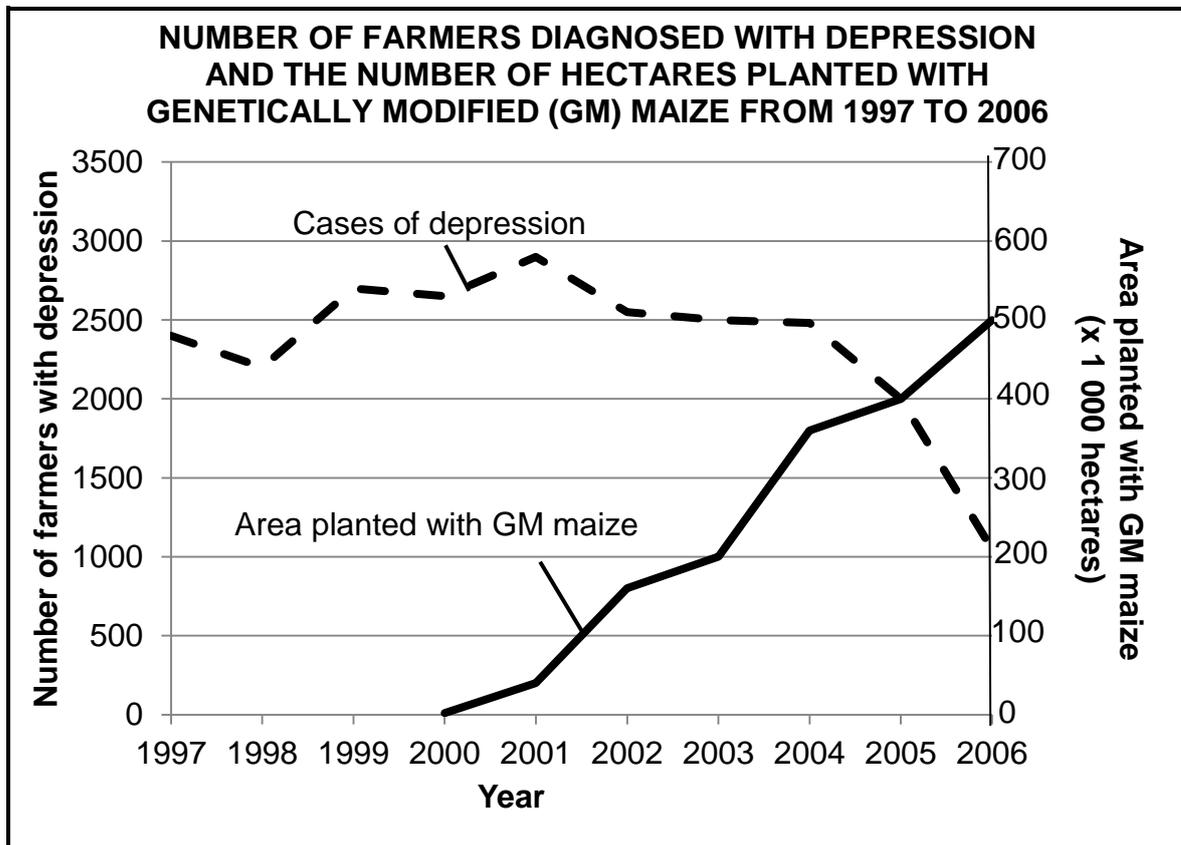
3.1.4 During a vasectomy the vas deferens from both testes is cut.

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)
- (14)**

- 3.2 Maize was genetically modified (GM) to increase its resistance to insects. This GM maize was introduced into a country to increase food security.

The graph below indicates the number of maize farmers in the country that were diagnosed with severe depression over a period of ten years. It also shows the area of agricultural land that was planted with GM maize crops.



- 3.2.1 Give a definition for *food security*. (3)
- 3.2.2 Name TWO farming practices other than growing GM foods, that the farmers may use to improve food security. (2)
- 3.2.3 From the graph, state how many farmers suffered from depression in 2003. (1)
- 3.2.4 Explain why more farmers suffered from depression before the introduction of GM maize. (3)
- (9)**

3.3 Read the extract and study the diagram below.

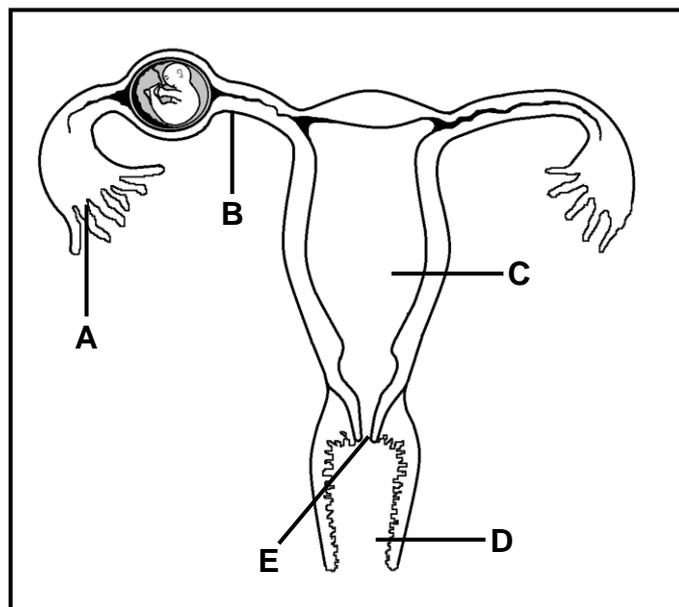
### ECTOPIC PREGNANCIES

An ectopic pregnancy is a problem in which the embryo attaches outside the uterus. In most cases the embryo implants in the Fallopian tubes but implantation can also occur on the ovaries, in the cervix or in the abdominal cavity. An ectopic pregnancy cannot proceed normally. The embryo usually cannot survive.

Ectopic pregnancies are caused by one or more of the following:

- An infection or inflammation of the Fallopian tubes
- The development of scar tissue from a previous infection or a surgical procedure in the Fallopian tubes
- Previous surgery in the pelvic area

In most cases, the Fallopian tube where the ectopic pregnancy occurs, has to be removed surgically to save the woman's life.



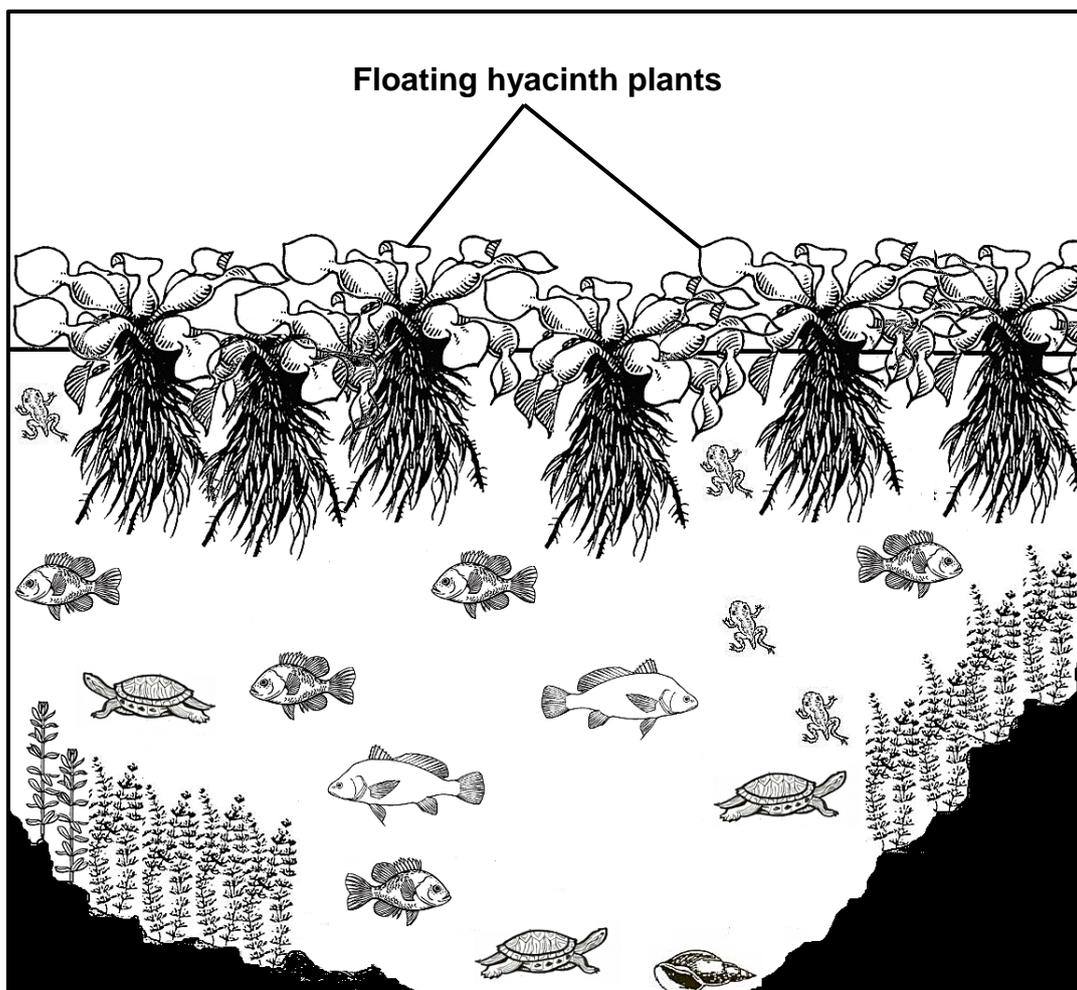
- 3.3.1 Give only the LETTERS of the TWO parts in the diagram where implantation of the embryo may occur during an ectopic pregnancy. (2)
- 3.3.2 Explain why women who have had surgery on their Fallopian tubes have a greater risk of experiencing an ectopic pregnancy. (3)
- 3.3.3 Explain why a woman who had her Fallopian tube removed after an ectopic pregnancy occurred, may still be able to fall pregnant. (2)
- 3.3.4 Give TWO reasons why the embryo may not be able to survive during an ectopic pregnancy inside the Fallopian tube. (2)

**(9)**

- 3.4 Water hyacinths are aquatic alien plants. The plants grow rapidly when introduced into a new environment.

Due to heavy rain, a few water hyacinths were washed into a natural pond from a dam further up the river.

The diagram below represents a longitudinal section through the pond two weeks later.



- 3.4.1 Name TWO methods that could be used to reduce the alien plant population. (2)
- 3.4.2 Explain how the alien plant invasion will negatively affect the availability of clean water for the surrounding community. (4)
- 3.4.3 Water hyacinths release oxygen during photosynthesis.  
Explain why this process does not increase the oxygen concentration of the water. (2)

(8)  
[40]

**TOTAL SECTION B: 80**

**SECTION C****QUESTION 4**

Both the nervous and the endocrine systems are involved when a person is in a dangerous situation.

Describe the path of an impulse in a reflex arc during a reflex action. Also describe the role of different glands of the endocrine system in providing the body with extra energy during the dangerous situation.

Content: (17)

Synthesis: (3)

**NOTE:** NO marks will be awarded for answers in the form of flow charts, tables or diagrams.

**TOTAL SECTION C: 20**  
**GRAND TOTAL: 150**