



**GAUTENG DEPARTMENT OF EDUCATION  
PREPARATORY EXAMINATION**

**2014**

**10831  
LIFE SCIENCES  
FIRST PAPER**

**MARKS: 150  
TIME: 2½ hours**

**Pages 16**

LIFE SCIENCES: Paper 1  
1083E



10831E

**X10**



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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 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 or flow charts ONLY when asked to do so.
  8. The diagrams in this question paper are NOT necessarily all 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.
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**SECTION A****QUESTION 1**

- 1.1 Various options are given as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.8) in your ANSWER BOOK, for example 1.1.9 D.

1.1.1 Food security is NOT threatened by ...

- A human exponential population growth.
- B wastage.
- C climate change.
- D birth control.

1.1.2 Which of the following hormones play an important role in the control of blood glucose level in humans?

- (1) Glycogen
- (2) Insulin
- (3) TSH
- (4) Glucagon
- (5) Growth hormone

- A 1, 2 and 5
- B 2, 4 and 5
- C 2 and 4
- D 1 and 3

1.1.3 Negative feedback control involves the following four stages:

- 1. Effectors bring about corrective responses.
- 2. A receptor detects a change in the internal environment.
- 3. Factor brought back to normal levels.
- 4. Nervous or hormonal messages are sent to effectors.

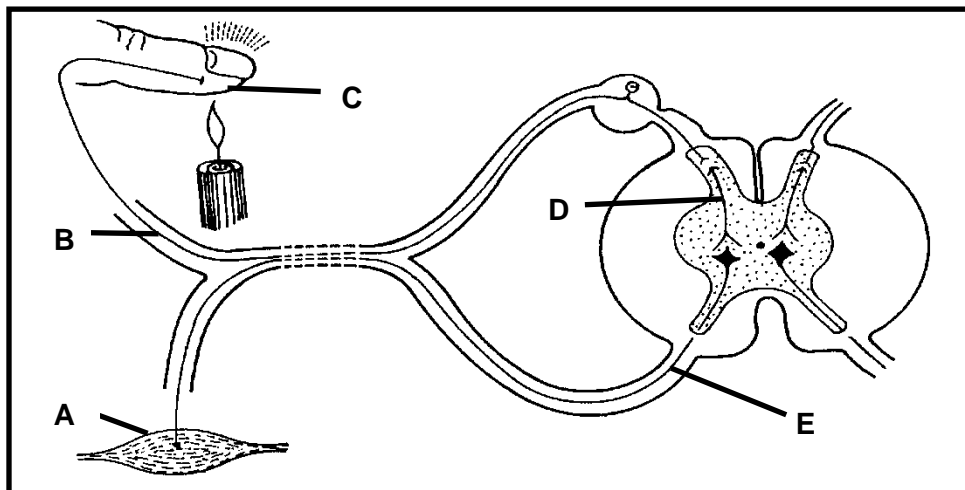
The order in which these occur is ...

- A 2, 4, 1, 3
- B 2, 4, 3, 1
- C 4, 2, 1, 3
- D 4, 2, 3, 1

- 1.1.4 Which ONE of the following combinations contains a factor that increases the greenhouse effect and a consequence of it respectively?

	<b>Factor contributing to increases in the greenhouse effect</b>	<b>Consequence of the increased greenhouse effect</b>
A	Increasing global temperatures	Rising sea levels
B	Rising sea levels	Increasing global temperatures
C	Increasing global temperatures	Burning fossil fuels to run air conditioning
D	Increasing global temperatures	Increases in air travel

QUESTIONS 1.1.5 and 1.1.6 are based on the following diagram.



- 1.1.5 Which of the following regarding part **E** is CORRECT?
- A It is located in the grey matter.
  - B It is part of the peripheral nervous system.
  - C It is part of the central nervous system.
  - D It makes synaptic contact with motor neurons.
- 1.1.6 The correct sequence in which impulses move from the receptor to the effector in the reflex arc above, is ...
- A  $A \rightarrow B \rightarrow C \rightarrow E \rightarrow D$
  - B  $C \rightarrow A \rightarrow B \rightarrow D \rightarrow E$
  - C  $C \rightarrow B \rightarrow D \rightarrow E \rightarrow A$
  - D  $A \rightarrow E \rightarrow D \rightarrow B \rightarrow C$

1.1.7 Ovovivipary and vivipary are similar in that ...

- A internal fertilisation is a pre-requisite for both.
- B external fertilisation is a pre-requisite for both.
- C in both cases the egg is protected by a shell.
- D in both cases the egg has no covering.

1.1.8 Menstruation starts when the production of ...

- A progesterone is at its maximum.
- B oestrogen is at its maximum.
- C oestrogen and progesterone decreases.
- D luteinising hormone is at its maximum.

8x2=(16)

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 1.2.8) in the ANSWER BOOK.

1.2.1 The receptor in the ear that converts vibrations into a nervous impulse

1.2.2 The visual disorder caused by an uneven curvature of the cornea

1.2.3 The permanent destruction of forests

1.2.4 Manufacturing products from waste materials

1.2.5 The attachment of the blastocyst to the wall of the endometrium

1.2.6 The use of living organisms to control alien plant invasion

1.2.7 Waste material that consists mainly of unstable elements that emit (give off) radioactive rays

1.2.8 The production of ova through meiosis

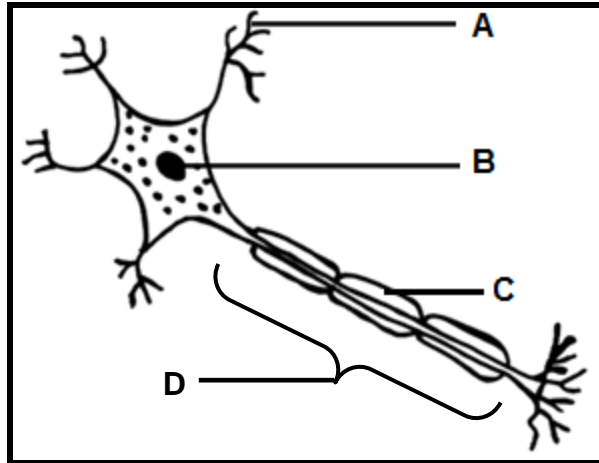
**(8)**

- 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 number (1.3.1 to 1.3.8) in the ANSWER BOOK.

<b>COLUMN I</b>		<b>COLUMN II</b>
1.3.1	Functions of the cerebrum	A: Control of voluntary actions B: Co-ordination of voluntary actions
1.3.2	Parts involved in accommodation	A: Ciliary muscles B: Circular muscles
1.3.3	A tube that transports sperm cells from the testes to the ejaculatory duct	A: Seminiferous tubules B: Epididymis
1.3.4	A mature follicle in the ovary that contains the ovum	A: Secondary follicle B: Corpus Luteum
1.3.5	Forms an amniotic egg	A: Reptiles B: Birds
1.3.6	Secreted when there are high levels of thyroxine in the blood	A: TSH B: FSH
1.3.7	The development in some birds where the young that hatch are mobile and independent	A: Precocial B: Altricial
1.3.8	The storage form of glucose in animals	A: Glucagon B: Glycogen

8x2=(16)

1.4 Study the diagram illustrating a neuron and answer the questions that follow.



- 1.4.1 What type of neuron is represented here? (1)
- 1.4.2 Provide labels for structures A, B and D. (3)
- 1.4.3 Provide the LETTER and NAME of the structure that:
- (a) transmits the impulse to the cell body.
  - (b) transmits the impulse away from the cell body
  - (c) degenerates when a person has multiple sclerosis

(6)  
(10)  
[50]

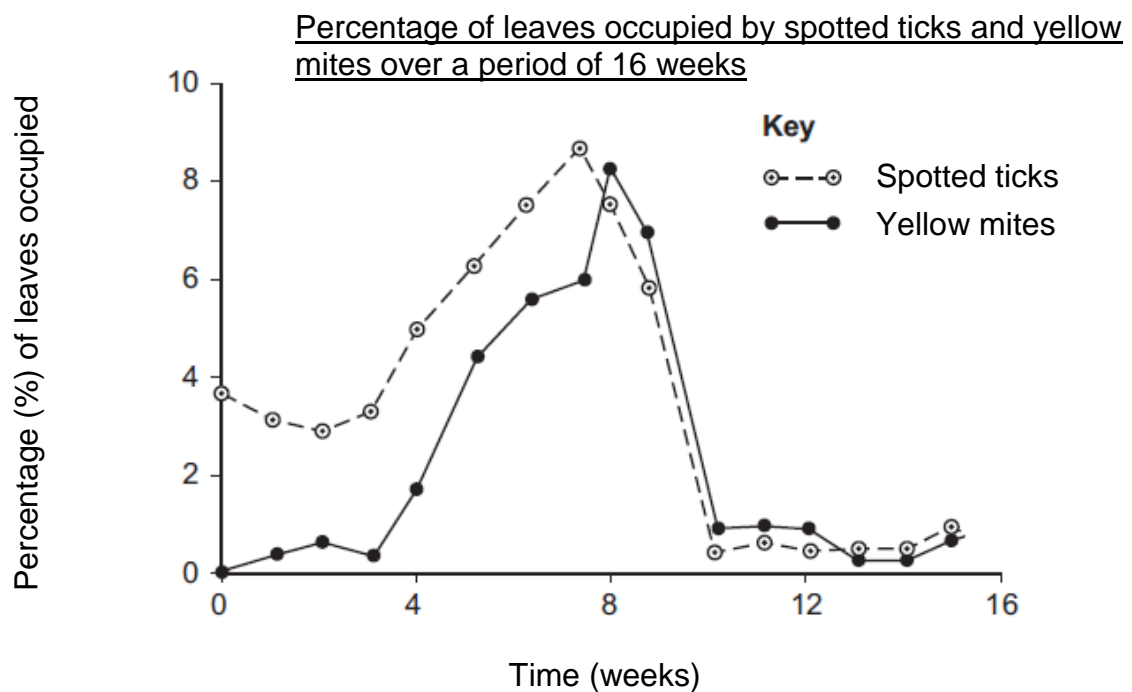
**TOTAL FOR SECTION A: 50**

## SECTION B

## QUESTION 2

2.1 Spotted ticks are pests of strawberry plants. Yellow mites feed on the spotted ticks. Ecologists investigated the use of yellow mites to control the spotted tick population.

- They released yellow mites on strawberry plants infested with the spotted ticks
- Ecologists then recorded the percentage of strawberry leaves occupied by the spotted ticks and by yellow mites over a 16-week period.
- The results are shown on the graph below.

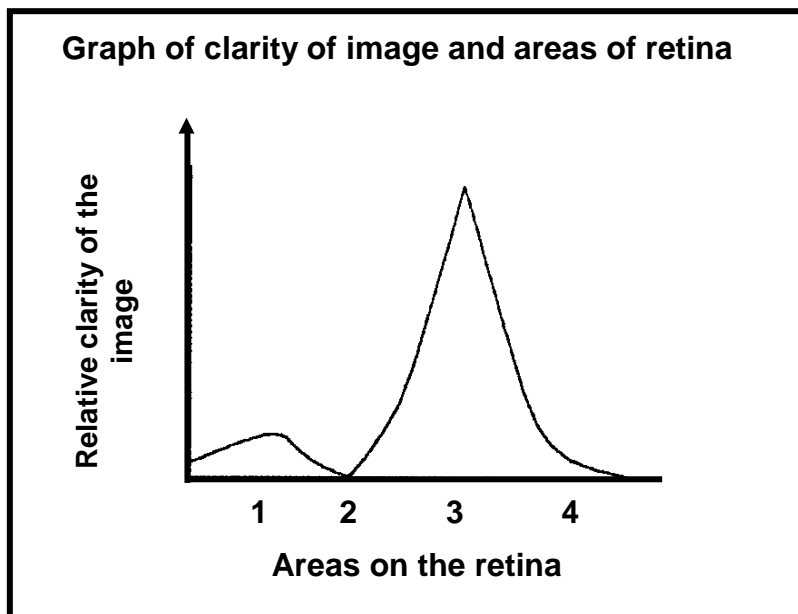
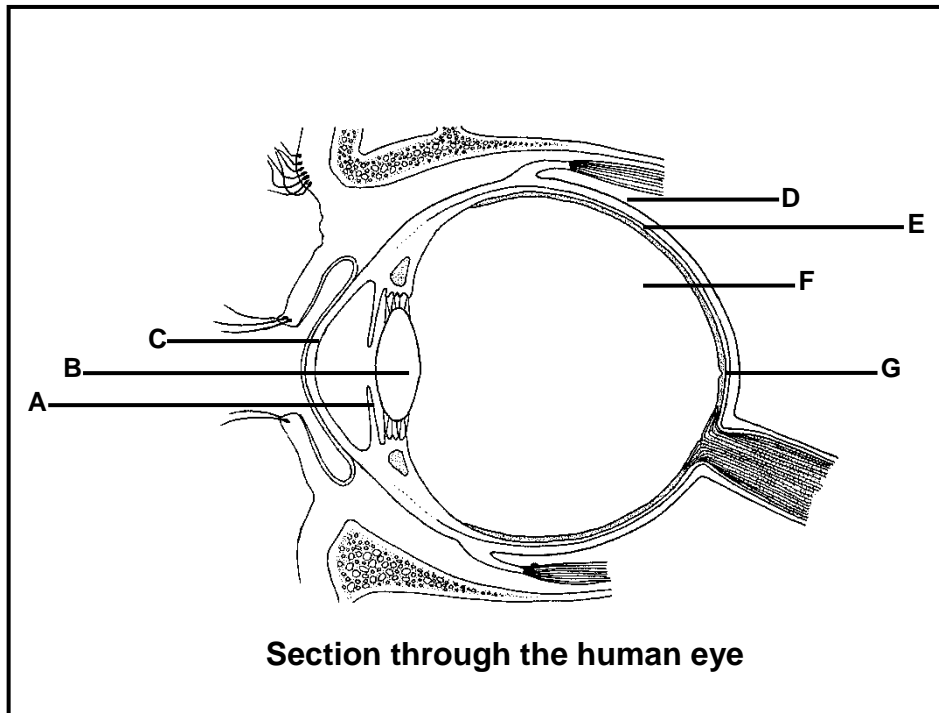


- 2.1.1 Name the method of controlling pests used in this investigation. (1)
- 2.1.2 Give TWO advantages of using the method of pest control mentioned in QUESTION 2.1.1 above. (2)
- 2.1.3 Identify the dependent variable in this investigation. (1)
- 2.1.4 What is the percentage of leaves occupied by the spotted ticks at two weeks? (2)



- 2.1.5 Describe how the percentage of leaves occupied by yellow mites changed between weeks 3 and 12 of this investigation. (3)
- 2.1.6 The ecologists concluded that the method of pest control used in this investigation was effective. Explain how the results support this conclusion. (2)
- 2.1.7 Suggest TWO reasons why farmers who grow strawberry plants and read about this investigation might decide **not** to use these yellow mites. (2)
- (13)**

2.2 Study the following diagram and graph on the human eye and answer the questions that follow.

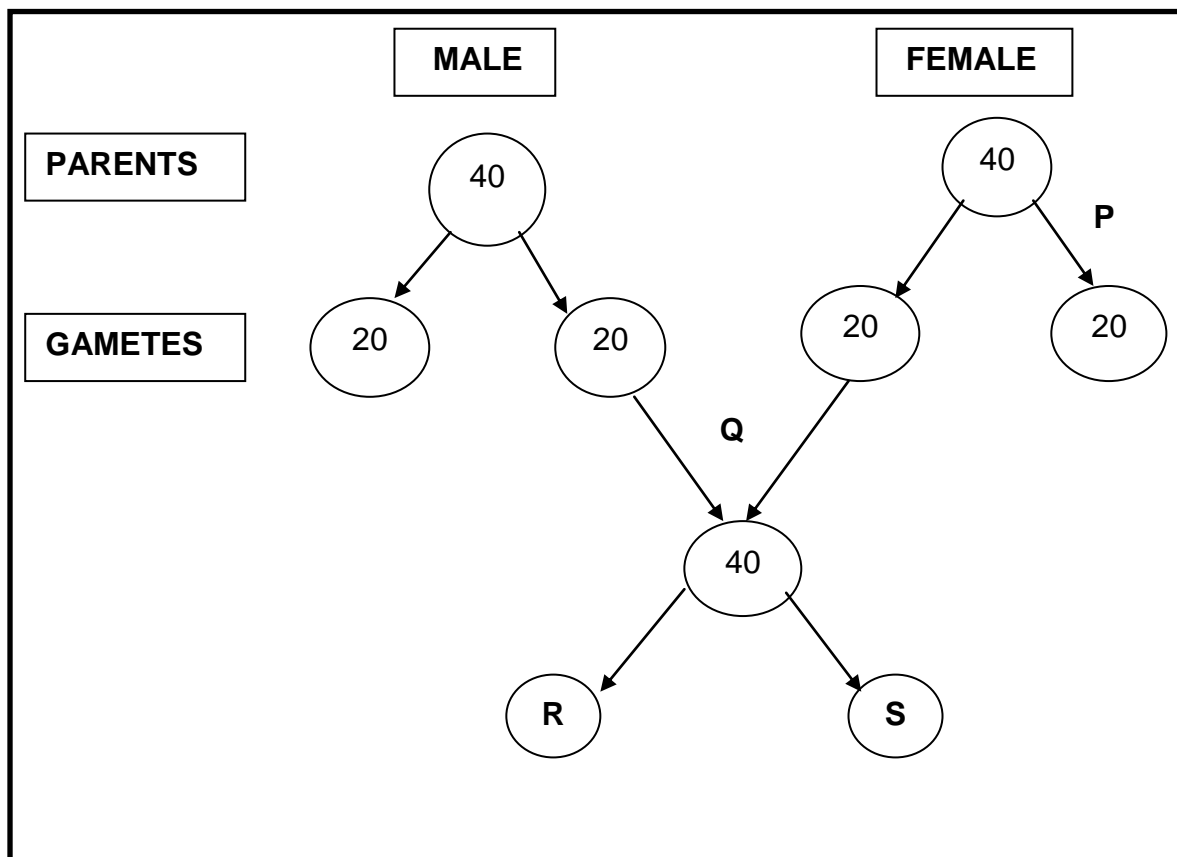


2.2.1 Provide the LETTER and NAME of the structure represented above that is

- (a) transparent and elastic. (2)
- (b) responsible for controlling the amount of light entering the eye. (2)

- 2.2.2 (a) Which number (1 to 4) on the graph represents G on the diagram? (1)
- (b) Explain your answer to QUESTION 2.2.2(a) above. (3)
- 2.2.3 Explain how structure F is suited to its function. (2)
- 2.2.4 Give the number (from the graph) and name of the area on the retina that has no rods and cones. (2)
- (12)**

- 2.3 The following diagram represents the stages in the life cycle of a mammal. The numbers of chromosomes in cells at different stages in the life cycle are shown. Study the diagram and answer the questions that follow.



- 2.3.1 Identify the type of cell division represented by P in the diagram. (1)
- 2.3.2 Name the process represented by Q in the diagram. (1)
- 2.3.3 How many autosomes would usually be present in one of the male gametes in this mammal? (1)
- 2.3.4 During gamete formation, homologous chromosomes pair up and exchange genetic material. Name this process where there is exchange of genetic material and explain its significance in gametogenesis. (3)

- 2.3.5 Draw and label a homologous pair of chromosomes, showing the process mentioned in QUESTION 2.3.4. (HINT: The chromosomes are similar to that of humans) (5)
- 2.3.6 Provide the number of chromosomes found in the cell labelled R that is produced during growth. (1)
- 2.3.7 Name and describe the phase that leads to the chromosome number changing from the parent cells to the gametes. (3)
- (15)**  
**[40]**

**QUESTION 3**

3.1 A botanist wanted to investigate the effect that 2 plant hormones (A and B) had on the germination of seeds. He used the following procedure:

- He allowed lettuce seeds to germinate.
- He then measured the concentration (in nanograms per gram) of each of the two hormones, A and B, in the seeds over a period of 40 days.
- His results are shown in the table below.

Time ( in days)	Concentration of hormone A (in ng/g)	Concentration of hormone B (in ng/g)	Percentage germination of seeds
0	350	5	0
10	70	20	10
20	50	45	65
30	20	70	80
40	10	55	95

3.1.1 Describe the relationship between the levels of hormone A and the percentage germination of seeds. (2)

3.1.2 (a) Use your answer in QUESTION 3.1.1 to show which hormone is represented by A. (1)

(b) Explain your answer in QUESTION 3.1.2(a). (2)

3.1.3 Plot a line graph to show the effect that hormone B has on the germination of seeds. (6)  
(11)

3.2 Read the passage below and answer the questions that follow.

About 400 million sperm cells are produced daily in the body of a healthy male. Studies have shown that the sperm count drops as a result of heated car seats, anti-sperm antibodies and the abuse of substances like marijuana and alcohol.

3.2.1 List TWO causes of male infertility mentioned in the passage above. (2)

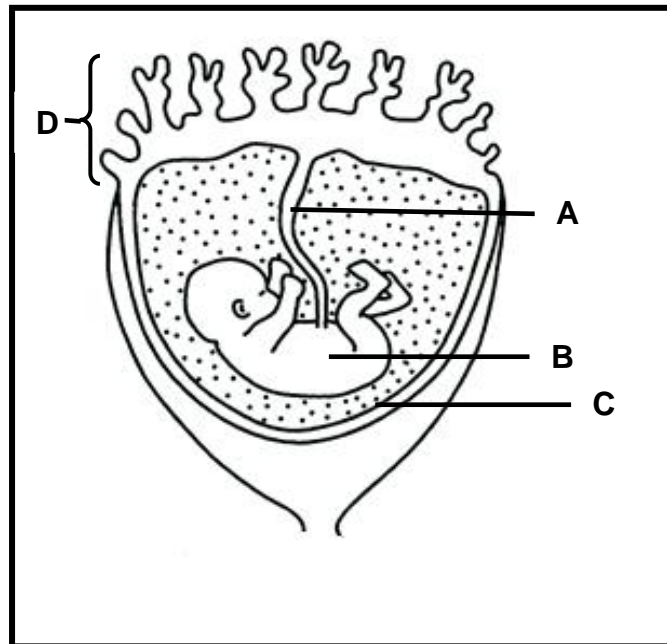
3.2.2 Describe briefly how sperm cells are produced. (3)

3.2.3 Name the structure in the sperm cells that contains the enzymes that aid fertilisation. (1)

3.2.4 Where does fertilisation occur in the female reproductive system? (1)

3.2.5 Describe the role of hormones in preparing the female body for the process mentioned in QUESTION 3.2.4. (4)  
(11)

- 3.3 The diagram below shows the structure of a developing human foetus in the uterus. Study the diagram and answer the questions that follow.



- 3.3.1 Identify the LETTER that represents the following:

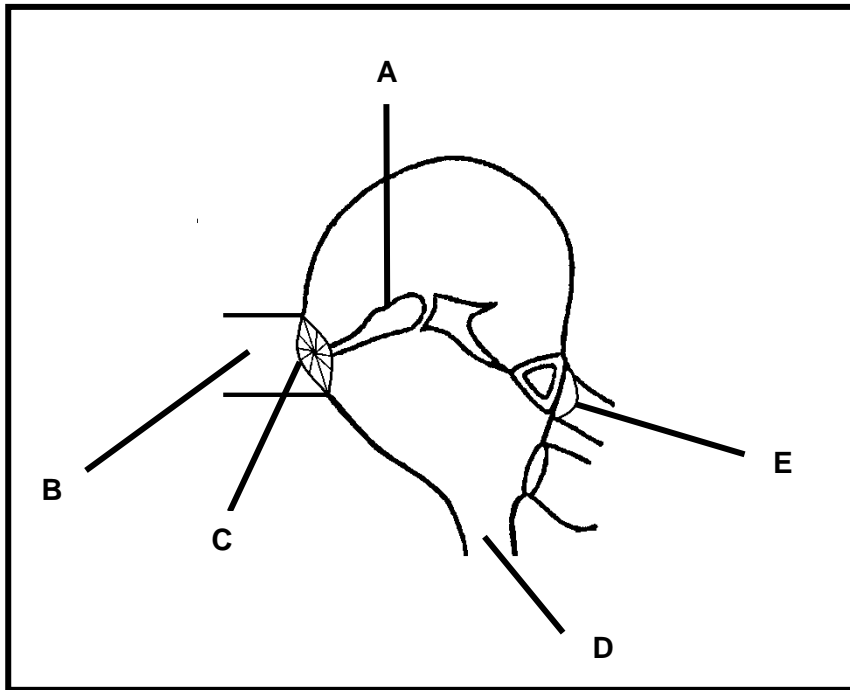
- (a) Foetus (1)  
(b) Umbilical cord (1)

- 3.3.2 Give ONE function of amniotic fluid. (1)

- 3.3.3 Region D serves as a barrier between the growing foetus and the mother. Provide TWO reasons why this barrier is necessary. (2)

- 3.3.4 Tabulate TWO differences between the blood that moves from the mother to region D and the blood that goes from region D to the mother. (5)  
**(10)**

3.4 Study the following diagram and answer the questions that follow.



- 3.4.1 Give a caption for the diagram above. (1)
- 3.4.2 Provide labels for structures A and B. (2)
- 3.4.3 Structure labelled D may become blocked when a person has a throat infection. Explain why it would be dangerous for such a person to go skydiving. (3)
- 3.4.4 Explain how structures C and E contribute to the amplification of sound. (2)
- (8)**  
**[40]**

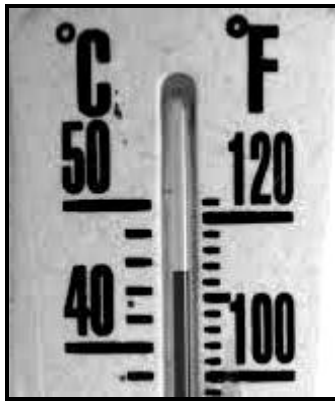
**TOTAL FOR SECTION B: 80**

**SECTION C**

**QUESTION 4**

- 4.1 “Homeostasis is the maintenance of a constant internal environment, within narrow limits, despite a changing external environment.”

Nomsa is sitting in class on a particular day and looks at the wall thermometer. What she sees is shown in the diagram of part of the thermometer below.



Discuss the processes and mechanisms that are involved in thermoregulation and osmoregulation in her body on **that particular day**.

Content: (17)  
Synthesis : (3)  
**(20)**

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

**TOTAL FOR SECTION C: 20**

**GRAND TOTAL: 150**