



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

**NASIONALE
SENIOR SERTIFIKAAT**

GRAAD 12

LIFE SCIENCES PAPER 1

SEPTEMBER 2020

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 pages

INSTRUCTIONS AND INFORMATION

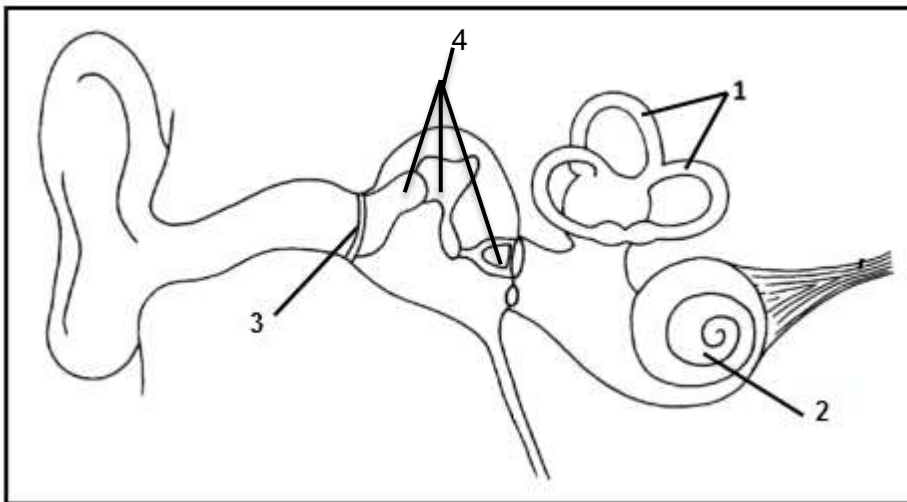
Read the following instructions carefully before answering the questions.

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 given 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**.

QUESTIONS 1.1.1 AND 1.1.2 ARE BASED ON THE DIAGRAM OF THE HUMAN EAR BELOW.



- 1.1.1 Which part is responsible for amplification of vibrations?
- A. 1
 - B. 2
 - C. 3
 - D. 4
- 1.1.2 In which part of the ear are drainage tubes (grommets) inserted
- A. 1
 - B. 2
 - C. 3
 - D. 4
- 1.1.3 A gardener removes the apical buds from a flowering shrub in her garden regularly. As a result the shrub will ...
- A. produce more lateral branches.
 - B. grow taller.
 - C. remain the same size.
 - D. produce fewer flowers.

1.1.4 Which plant hormone promotes seed dormancy?

- A. Auxin
- B. Gibberellin
- C. Abscisic acid
- D. Growth hormone

1.1.5 One of the functions of the amnion in an amniotic egg is to:

- A. form the placenta
- B. enclose the fluid that protects the embryo against injury
- C. provide nourishment for the embryo
- D. store waste produced by the embryo

1.1.6 The type of reproduction in which young develop from the eggs that are kept in the mother's body but do not receive nutrition from the mother:

- A. Altricial
- B. Precocial
- C. Ovipary
- D. Ovovivipary

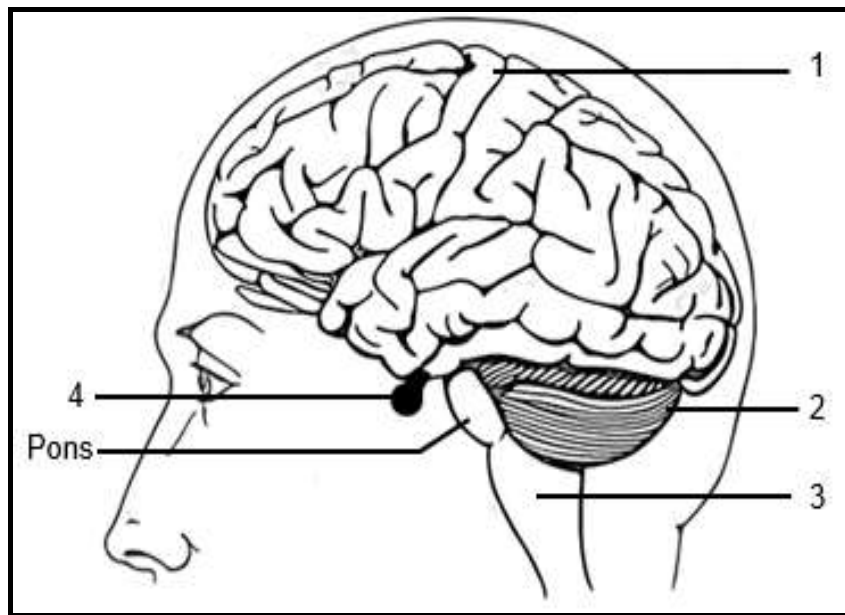
1.1.7 A light stimulus is converted into a nerve impulse in the ...

- A. Lens
- B. Cornea
- C. Retina
- D. Utriculus

1.1.8 Meiosis in a diploid cell results in:

- A. Four identical gametes.
- B. Four haploid gametes.
- C. Two identical diploid gametes.
- D. Four gametes having the same chromosome number as the parent cell.

QUESTIONS 1.1.9 AND 1.1.10 REFER TO THE DIAGRAM BELOW WHICH REPRESENTS THE HUMAN BRAIN AND PART OF THE SPINAL CORD



1.1.9 Which part of the brain is associated with balance and coordinating muscle movement?

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

1.1.10 Which part controls rate of breathing and heartbeat?

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

(10x2)

(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 condition caused by an under-secretion of growth hormone in children.

1.2.2 The tube that connects the pharynx and the middle ear.

1.2.3 The structure that provides nutrients to the developing embryo in oviparous organisms

- 1.2.4 The structure at the tip of a sperm cell containing enzymes and which makes contact with the egg cell during fertilisation.
- 1.2.5 The watery fluid that supports the cornea and the front chamber of the eye
- 1.2.6 The system of the body composed of glands that secrete hormones responsible for chemical co-ordination.
- 1.2.7 The hormone that prepares the body for action in an emergency.
- 1.2.8 The maintenance of a constant internal environment in living organisms.
- 1.2.9 The series of changes that take place in the shape of the lens and the eyeball in response to the distance of an object from the eye.
- 1.2.10 The gland that synthesizes and secretes prolactin.

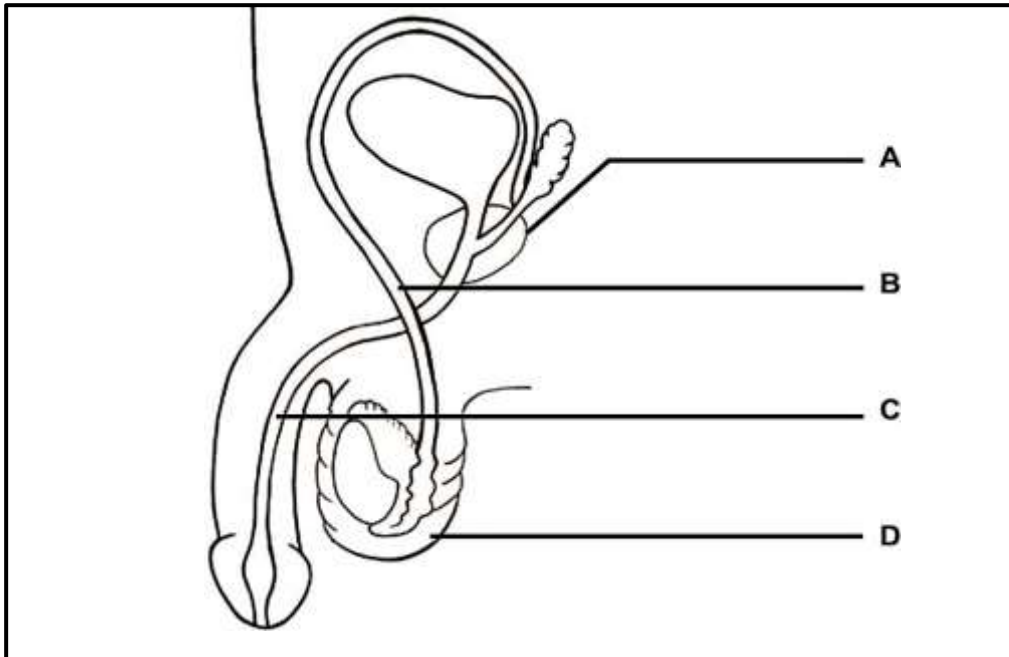
(10x1) (10)

- 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 1.3.3) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 A plant defence mechanism against pathogens	A. Thorns B. Chemicals
1.3.2 Type of development resulting in offspring that are capable of moving around soon after hatching	A. Altricial B. Precocial
1.3.3 Used by plants to reduce the chances of being eaten by herbivores	A. Thorns B. Chemicals

(3x2) (6)

- 1.4 Study the diagram of the male reproductive organs below and answer the questions that follow:



- 1.4.1 Give the **LETTER** and the **NAME** of the part that:

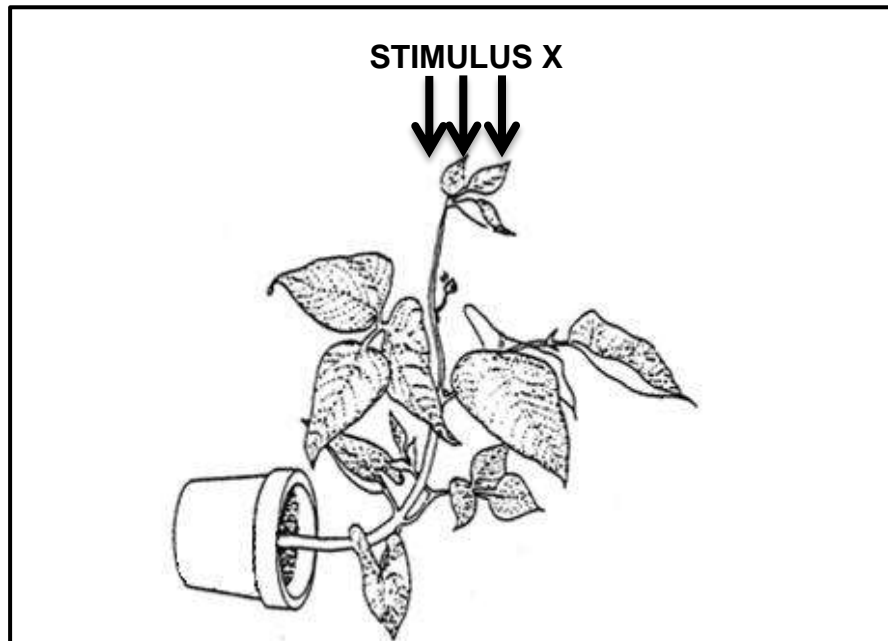
- (a) Regulates the temperature of the testes. (2)
- (b) Secretes alkaline secretion that neutralises acidity of the vagina. (2)

- 1.4.2 Name **TWO** accessory glands that are not labelled in the diagram. (2)

- 1.4.3 Name **ONE** corresponding function of parts **B** and **C** (2)

(8)

- 1.5 The diagram below shows the growth movement of a part of a plant towards a stimulus.



- 1.5.1 Identify the stimulus labelled **X**. (1)
- 1.5.2 What growth movement is represented in the diagram? (1)
- 1.5.3 Define the growth movement mentioned in QUESTION 1.5.2. (2)
- 1.5.4 Explain why the hormone that causes the growth movement in QUESTION 1.5.2 is used specifically on leafy weeds as a herbicide /weed killer? (2)

TOTAL SECTION A: 50

SECTION B**QUESTION 2**

2.1 A scientist conducted an investigation on three people selected randomly, to determine the effect of different amounts of whole wheat bread and sugar-rich soft drink on blood glucose level after eating and drinking. The participants were requested to **fast** (not to eat or drink) for nine hours before the investigation began. The duration of the investigation was a period of 24 hours.

The procedure was as follows:

- At 5 am, the participants were given 400g whole-wheat bread and 300ml cola to drink.
- At 11 am, the participants were given 200g whole wheat bread and no cola to drink.
- At 5 pm, the participants were given 800g whole wheat bread and 1000ml of cola to drink.

The blood glucose levels of the three participants were measured each time before and 2 hours after eating and drinking; and the results were recorded.

A **fasting blood glucose level** less than 5,6mmol/L or 100mg/dL is normal, 5,6mmol/L to 6,9mmol/L or 100mg/dL to 125mg/dL is considered **prediabetic**, while 7mmol/L or 126mg/dL and higher means the person has **diabetes**. Normal glucose level after a meal should be less than 140mg/dL.

The results were recorded in the table below:

Time	Blood glucose levels in mg/dL					
	5:00am		11:00am		5:00pm	
	Before	After	Before	After	Before	After
Participant 1	126	150	128	142	128	220
Participant 2	90	110	91	108	92	138
Participant 3	88	100	88	100	89	130

2.1.1 For this investigation, state the dependent variable. (1)

2.1.2 Based on the data given in the table, which participant is suffering from diabetes mellitus? (1)

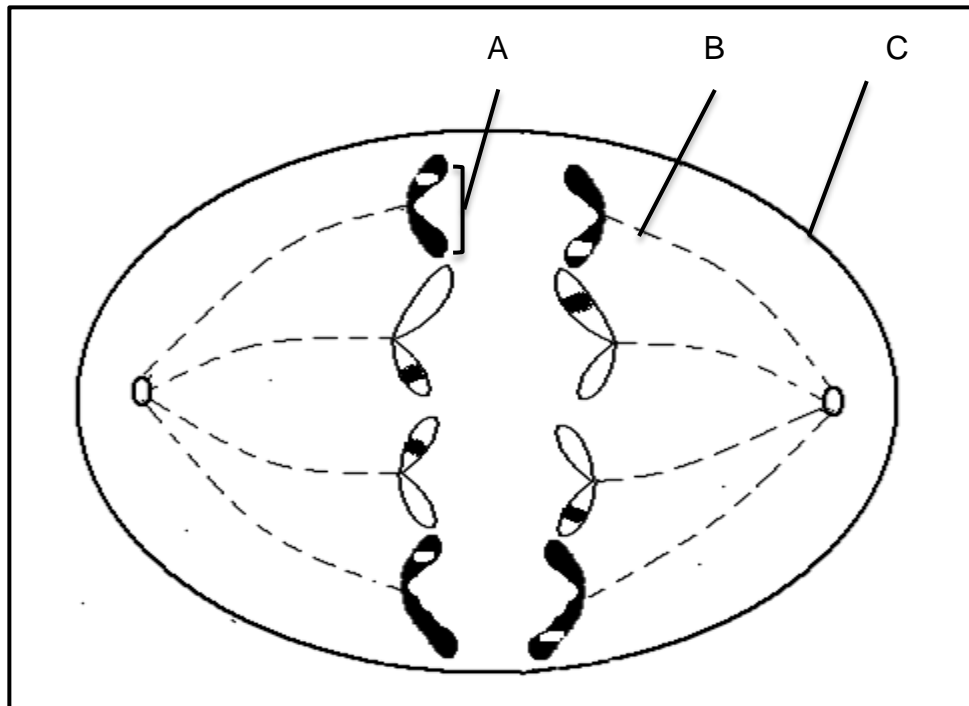
2.1.3 State the reason for your answer in QUESTION 2.1.2. (2)

2.1.4 Name the hormone that the participant mentioned in QUESTION 2.1.2 will need to lower blood glucose level. (1)

2.1.5 Why is each participants' blood glucose level measured before the investigation? (1)

(6)

2.2 The diagram below represents an animal cell in a phase of meiosis.



2.2.1 State which phase of meiosis is represented in the diagram above. (1)

2.2.2 Give a reason for your answer to QUESTION 2.2.1. (2)

2.2.3 Identify parts B and C. (2)

2.2.4 How many chromosomes ...

(a) will be present in each cell at the end of the meiotic division? (1)

(b) were present in the parent cell before it underwent meiosis? (1)

2.2.5 State ONE place in the body of a human female where meiosis would take place. (1)

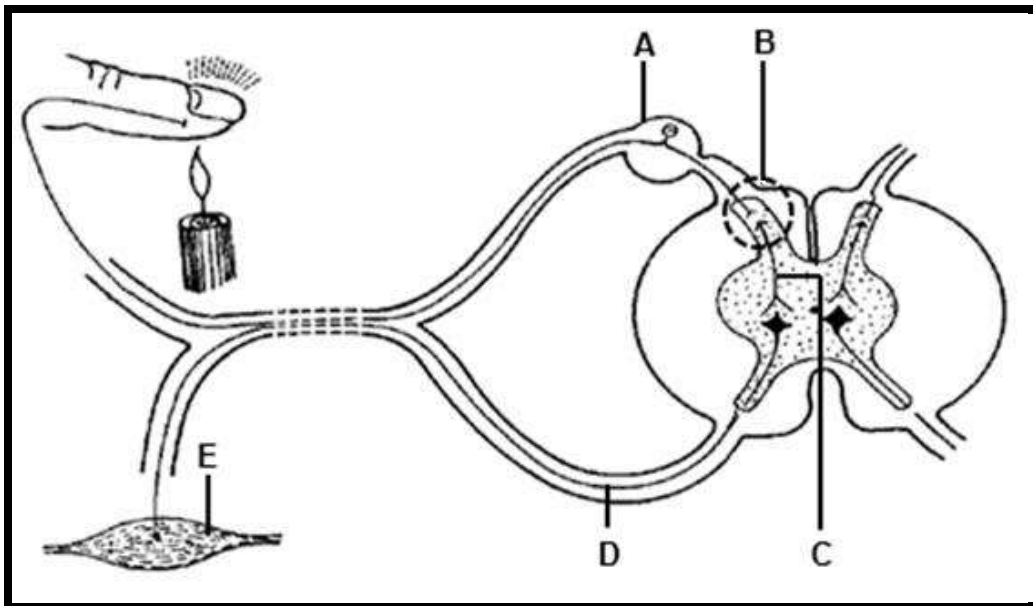
2.2.6 Could the cell represented in the diagram be that of a human? (1)

2.2.7 Explain your answer to QUESTION 2.2.6. (2)

2.2.8 Identify **ONE** observable feature which indicates that crossing over has occurred. (1)

(12)

- 2.3 Study the diagram of a reflex action below and answer the questions that follow.



- 2.3.1 Identify the parts **A**, **D** and **E**. (3)
- 2.3.2 Which part of the central nervous system is responsible for the action illustrated above? (1)
- 2.3.3 State ONE function of each of the following parts:
- (a) **B** (1)
- (b) **C** (1)
- 2.3.4 Explain what the effect will be, in the action shown in the diagram above, if a person is suffering from multiple sclerosis. (2)
- 2.3.5 Explain why the brain is not initially involved in a reflex action as shown above. (3)
- 2.3.6 Explain the effect on the body if the part labelled **D** is cut/severed. (4)
- (15)**

- 2.4 The placenta serves as a barrier preventing infections and harmful substances from reaching the developing foetus. However, some drugs and viruses cannot be filtered and put the developing foetus' health at risk. Recent study in a certain country with a population of 38 million women, gathered information on the number of women who miscarried as a result of pathogens, alcohol, smoking and other factors.

The results are shown in the table below.

CAUSE OF FOETAL DEATH	PERCENTAGE OF WOMEN WHO HAD MISCARRIAGE
HIV	5
SARS-CoV-2	3
Alcohol	35
Nicotine	40
Other factors	17

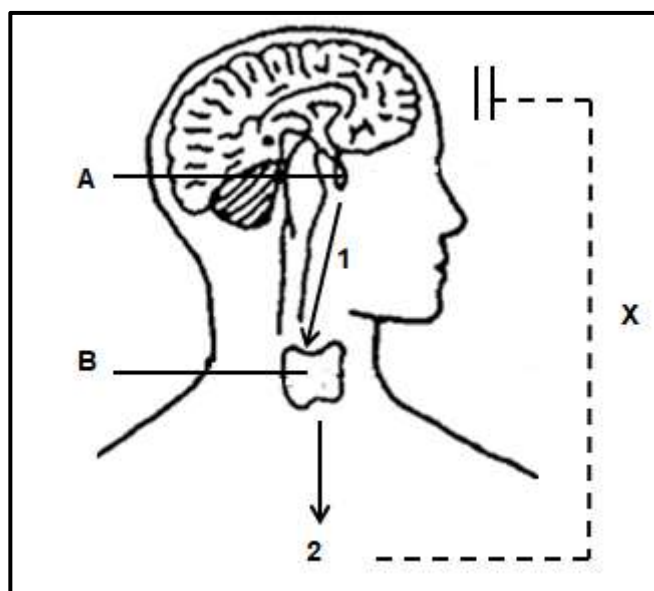
- 2.4.1 Draw a pie chart representing the results as indicated in the table above. (6)
- 2.4.2 Name **ONE** other function of the placenta not mentioned in 2.4. (1)
(7)

TOTAL QUESTION 2: [40]

QUESTION 3

3.1 Describe how the human body regulates the salt level in blood when it decreases below normal. (5)

3.2 The diagram below is of a feedback mechanism between two endocrine glands in the human body.



3.2.1 Mention the TWO hormones involved in this feedback mechanism. (2)

3.2.2 Name the type of feedback mechanism between the two hormones in QUESTION 3.2.1. (1)

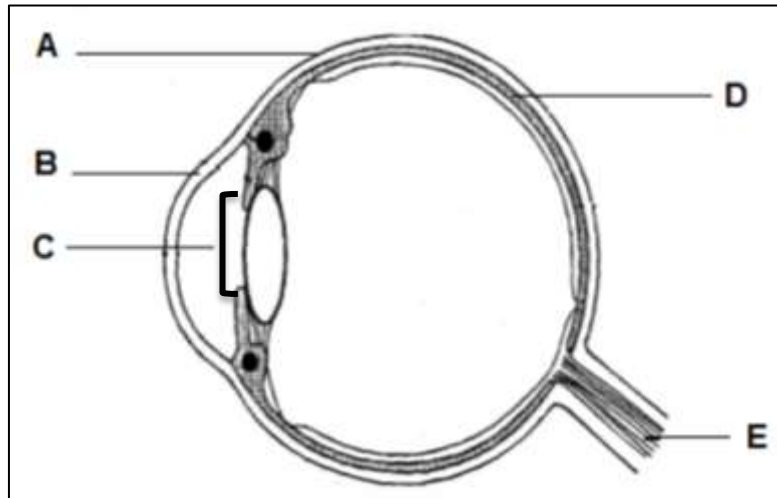
3.2.3 Identify the two glands A and B. (2)

3.2.4 A hormone from gland **A** controls the secretion of a hormone from gland **B**. With regard to the above, explain why an under secretion of the hormone from gland **A** can lead to an increase in the weight of a person. (5)

3.2.5 Define a hormone. (2)
(12)

3.3 Describe how the different parts of the ear and brain allow for hearing to occur. (7)

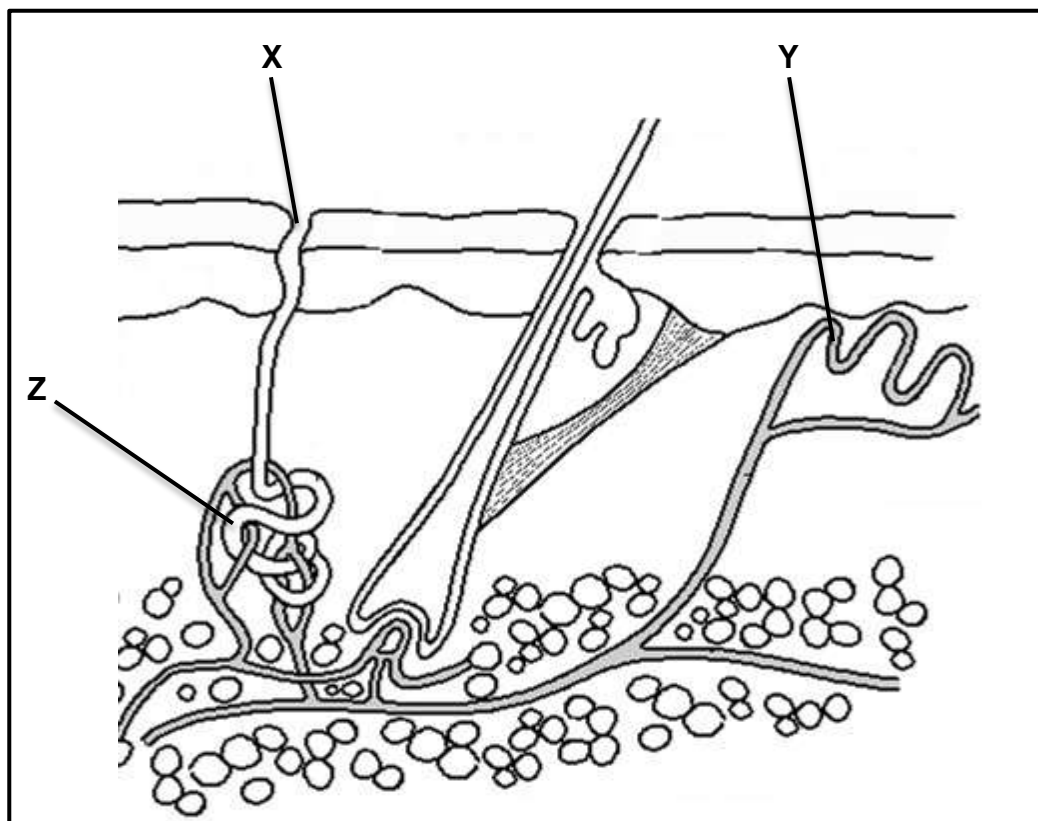
3.4 Study the diagram of a longitudinal section through a human eye below.



3.4.1 Identify parts A, D and E. (3)

3.4.2 Describe the mechanism that causes part C to change in size. (7)
(10)

3.5 The diagram below shows a section through the mammalian skin.



3.5.1 Identify part X (1)

3.5.2 Describe how part Z plays a role in regulating the body temperature on a cold day. (5)

(6)

TOTAL QUESTION 3: [40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Explain the structural suitability of the sperm cell for its function and describe its involvement in the formation of a zygote and the development of this zygote until implantation occurs.

Content: (17)
Synthesis: (3)
[20]

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

TOTAL SECTION C: 20

GRAND TOTAL: 150