



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

**LIFE SCIENCES PAPER 1
SEPTEMBER EXAMINATION
2021**

MARKS: 150

DURATION: 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, flow charts or tables 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 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 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

1.1.1 The seminal vesicle in humans...

- A. produces sperms
- B. produces fluid to nourish sperms
- C. discharges sperms
- D. stores sperms

1.1.2 The medulla oblongata is responsible for...

- A. sensation of sight and hearing
- B. control of heartbeat and breathing
- C. muscle co-ordination and balance
- D. control of movement of body parts

1.1.3 Which part of the brain is possibly damaged if a person experiences speech and visual disturbances?

- A. Cerebellum
- B. Hypothalamus
- C. Medulla oblongata
- D. Cerebrum

1.1.4 Older people are often seen to hold books at arm's length when they are reading, what could be the cause?

- A. The eyeball has become larger with age
- B. The refractive power of the lens has increased with age
- C. The refractive power of the lens has decreased with age
- D. The lens has become less transparent with age

- 1.1.5 The following parts of the ear give information about the position of the head
- A. Ampulla and utriculus
 - B. Organ of corti and cochlea
 - C. Utriculus and sacculus
 - D. Oval window and ossicles
- 1.1.6 Organic chemical substances released directly into the blood stream and transported to target organs
- A. Enzymes
 - B. Hormones
 - C. Vitamins
 - D. Proteins
- 1.1.7 Which ONE of the following is not regulated by homeostatic mechanisms?
- A. pH of tissue fluid
 - B. Concentration of gases in the blood
 - C. Surface to body ratio
 - D. Temperature of the body
- 1.1.8 Which ONE of the following hormones is responsible for the growth of muscles and skeleton?
- A. TSH
 - B. ADH
 - C. GH
 - D. Adrenalin
- 1.1.9 Defence mechanisms by plants against insects
- A. Presence of internal vascular system
 - B. Cellulose cell walls
 - C. Production of toxic chemicals
 - D. Ability of stomata to close

1.1.10 The part of the eye that does not play a role in the refraction of light

- A. Sclera
- B. Cornea
- C. Aqueous humour
- D. Lens

(10x 2) **(20)**

1.2 Give the correct **biological term** for each of the following description
Write only the term next to the question numbers (1.2.1 to 1.2.10) in the
ANSWER BOOK.

- 1.2.1 Part of the nervous system that increases the heartbeat
- 1.2.2 The nerve fibres that joins the two cerebral hemispheres together
- 1.2.3 The hormone that regulates the water concentration in the body
- 1.2.4 The fluid that protects the developing embryo against dehydration
- 1.2.5 A tiny plastic tube with a hole in the middle inserted in the eardrum
to drain fluid from the middle ear.
- 1.2.6 The tip of the sperm containing enzymes.
- 1.2.7 The structural unit of the nervous system
- 1.2.8 A defect in the eye where the lens is irregularly curved
- 1.2.9 The narrow passage forming the lower end of the uterus
- 1.2.10 The structure within the ovary that is responsible for the formation of
progesterone

(10x1) **(10)**

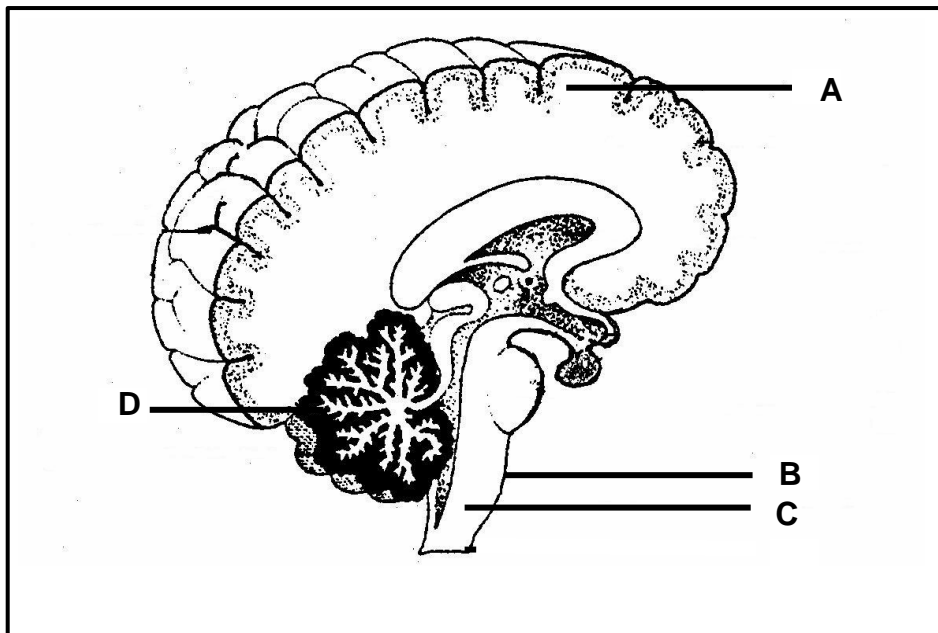
- 1.3 Indicate whether each of the statement in COLUMN I applies to **A ONLY, B ONLY, BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only, B only, Both A and B or None** next to the question number (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 When the thyroid gland produces more thyroxin hormone	A. Hyperthyroidism B. Hypothyroidism
1.3.2 The part of the brain involved in picking up a pencil	A. Cerebellum B. Cerebrum
1.3.3 Has an exocrine as well as an endocrine function	A. Pituitary gland B. Pancreas

(3x2)

(6)

- 1.4 The diagram below represents a section through the central nervous system



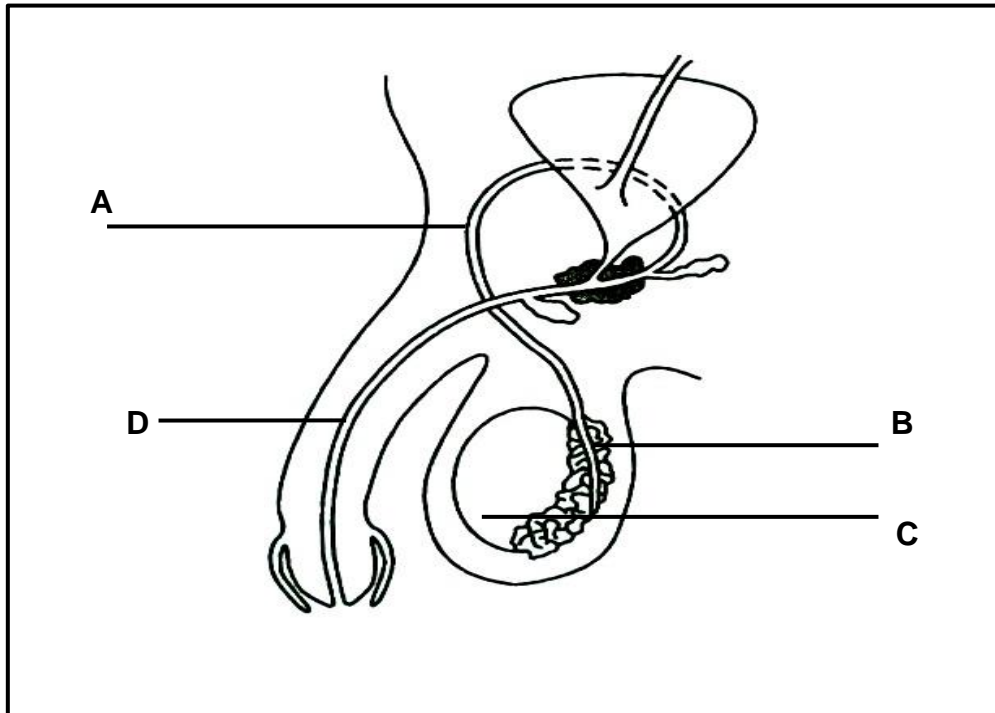
- 1.4.1 Give the LETTER and the NAME of the part that:

- (a) Serves as a pathway for nerve impulses to and from the brain (2)
 (b) Is responsible for the ability to play chess (2)
 (c) Is sensitive to the carbon dioxide concentration of the body (2)

- 1.4.2 State TWO ways in which the brain is protected (2)

(8)

1.5 Study the diagram that follows



1.5.1 Identify part:

- (a) A (1)
 (b) B (1)
 (c) D (1)

1.5.2 Give the NAME of the part that protects the sperm against the low acidity in the urethra and vagina (2)

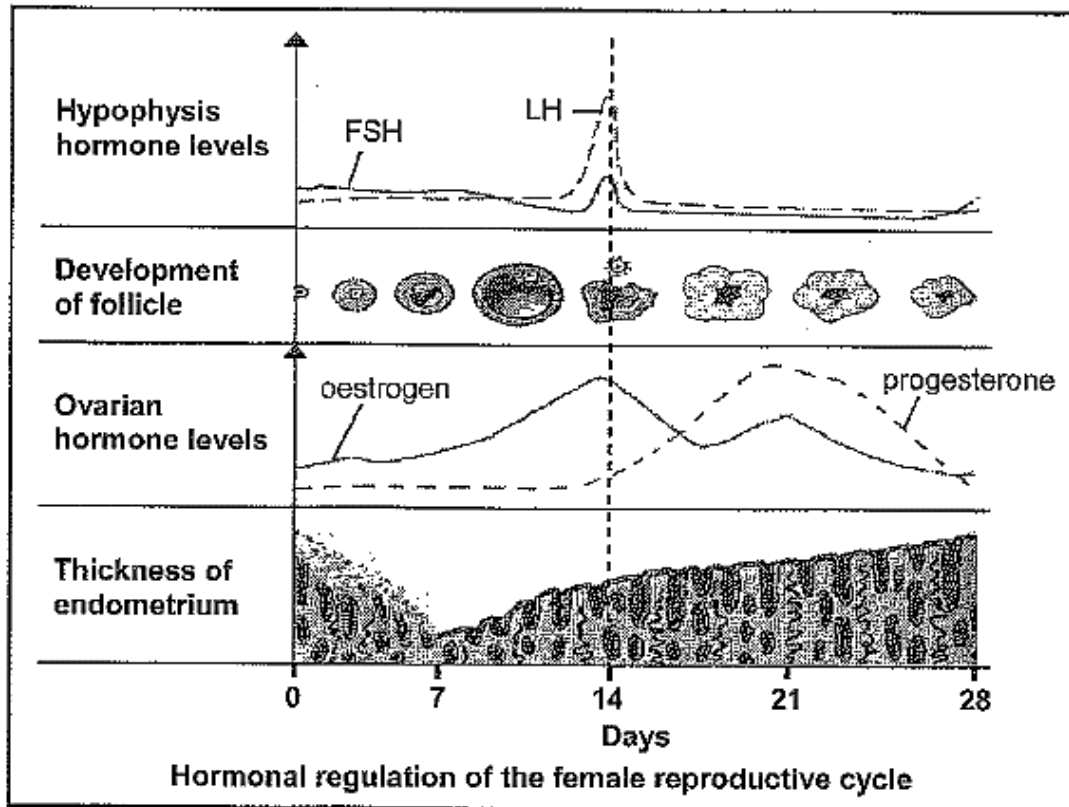
1.5.3 State ONE function of part B (1)

(6)

TOTAL SECTION A: 50

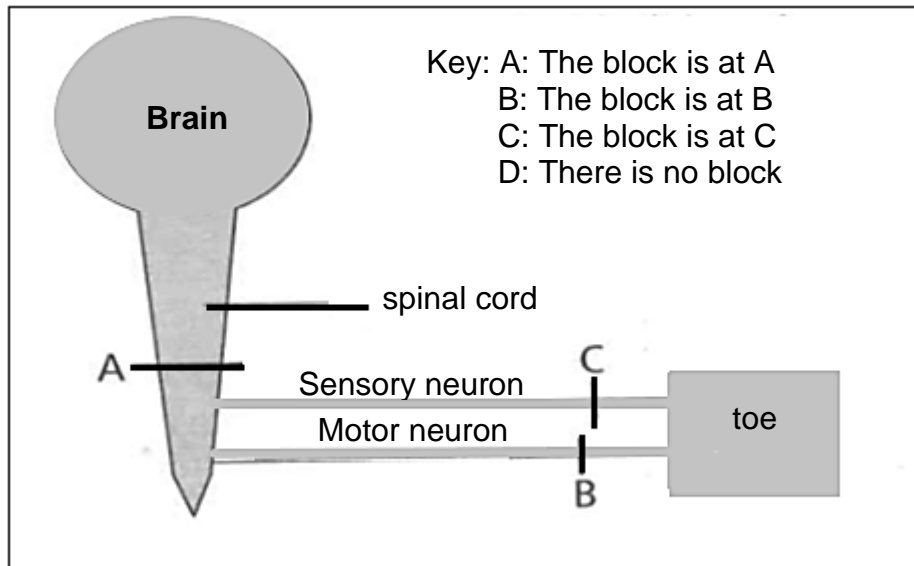
SECTION B**QUESTION 2**

2.1 Study the graph below of the menstrual cycle and answer the questions that follow.



- 2.1.1 On which day does ovulation take place? (1)
- 2.1.2 State TWO functions of Luteinising hormone (2)
- 2.1.3 Describe the changes in the levels of LH shown in the graph (3)
- 2.1.4 Explain the negative feedback mechanism that exists between progesterone and FSH (3)
- 2.1.5 Explain why it can be deduced that fertilisation did not take place in the 28 day cycle illustrated in the graph (4)
- 2.1.6 Describe the development of the zygote until it is ready for implantation (5)
- (18)**

- 2.2 In the diagram below, the letters A, B and C represent regions of the human nervous system that can be blocked by chemicals to make medical research. Using the key to the diagram, write down only the LETTER that indicates the following



- (a) The patient can move the toe but cannot feel the stimulus (1)
- (b) If the skin of the toe is stimulated, the toe moves and the patient knows that it is moving (1)
- (c) When the skin of the toe is stimulated the toe and foot move involuntarily but the patient cannot move the toe voluntarily or feel that it is moving (1)
- (d) The patient can feel the toe being touched but cannot move the toe (1)
- (4)**

- 2.3 Sipho is pricked by a thorn while playing soccer on the recently levelled school ground with his friends. He immediately stops kicking the ball and start jumping around with the pricked foot up.

Describe what happens the moment Sipho stops kicking the ball and jumps around with the pricked foot up.

(6)

(10)

2.4 Mary did an investigation in the laboratory to look at the effect of different concentrations of auxin on cell elongation in coleoptiles (young stems). She used the following procedure.

- 15 coleoptiles from one species of oat plants were used
- All the coleoptiles used were of the same length
- The tips of 12 coleoptiles were cut off
- These coleoptiles were put in four groups (A, B, C and D). Each group of three coleoptiles was injected with a different concentration of auxin as shown in the table below.
- The last group E was used as a control in which the coleoptiles were not injected with auxin and tips were not cut
- After four days the length of coleoptiles in each group were measured and the average was calculated.

Group	Treatment		Average length of coleoptiles(mm)
	Tip (present/absent)	Concentration of auxin injected (arbitrary units)	
A	Absent	1	36
B	Absent	2	60
C	Absent	3	32
D	Absent	4	24
E	Present	0	30

2.4.1 Formulate a hypothesis for the investigation above (3)

2.4.2 Identify the:

(a) Dependent variable (1)

(b) Independent variable (1)

2.4.3 Why was the tip of each coleoptile cut off before they were injected with auxin (2)

2.4.4 State TWO other factors that should have been kept constant in all the groups (2)

2.4.5 What conclusion can be drawn from the results? (3)

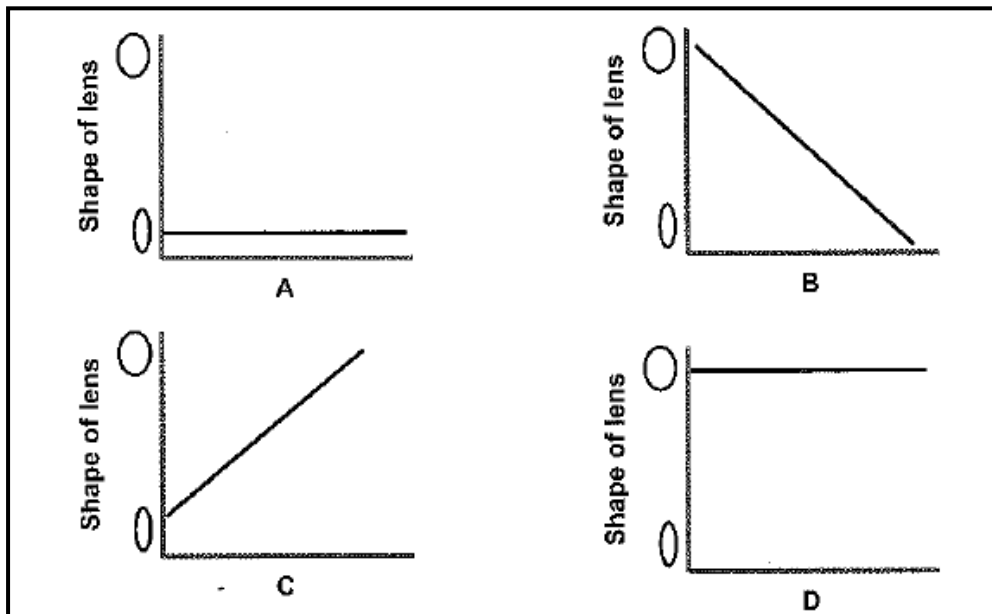
(12)

2.5.

- (a) Tabulate TWO differences between precocial and altricial development (5)
- (b) Define vivipary (2)
- (c) State THREE functions of the placenta in mammals. (3)

(10)**TOTAL QUESTION 2:****[50]****QUESTION 3**

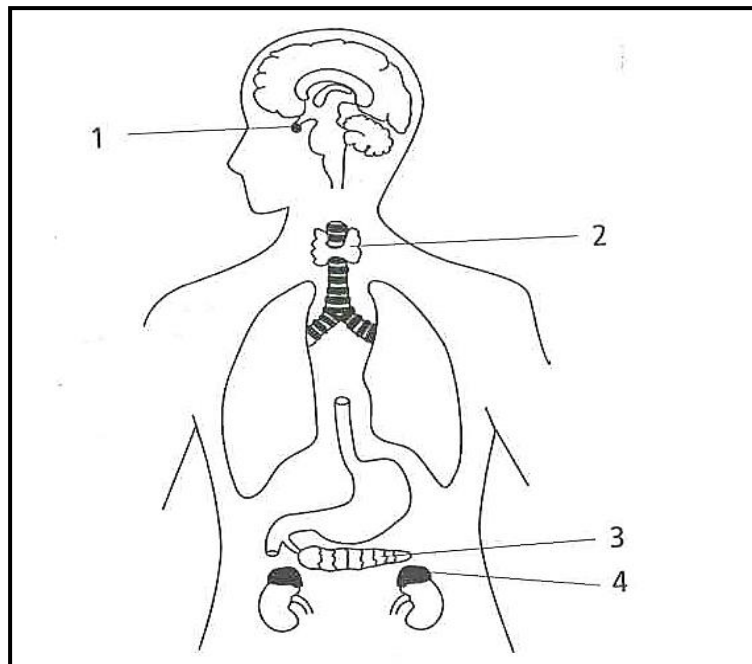
- 3.1 Study the graph below that show changes in the shape of the lens and answer the questions that follow.



Write down the LETTER only of the graph that illustrates the adaptation in each of the following cases

- 3.1.1 A mother watching a toddler riding a bicycle away from her. (1)
- 3.1.2 A cricket player watching a cricket ball being bowled to him (1)
- 3.1.3 A teacher checking a learner's homework in the book (1)
- 3.1.4 Explain your answer in question 3.1.3 above (6)
- (9)**

- 3.2 Study the diagram of the human endocrine glands and answer the questions that follow



- 3.2.1 Identify the glands numbered:

- (a) 1 (1)
 (b) 2 (1)
 (c) 3 (1)
 (d) State the function of the gland labelled 4 (1)
(4)

- 3.3 The concentration of glucose in the blood is regulated by hormones. When the concentration of glucose in the blood rises or falls to dangerous levels, several organs in the body are affected.

- 3.3.1 Name TWO organs that can be affected by the abnormal glucose level (2)

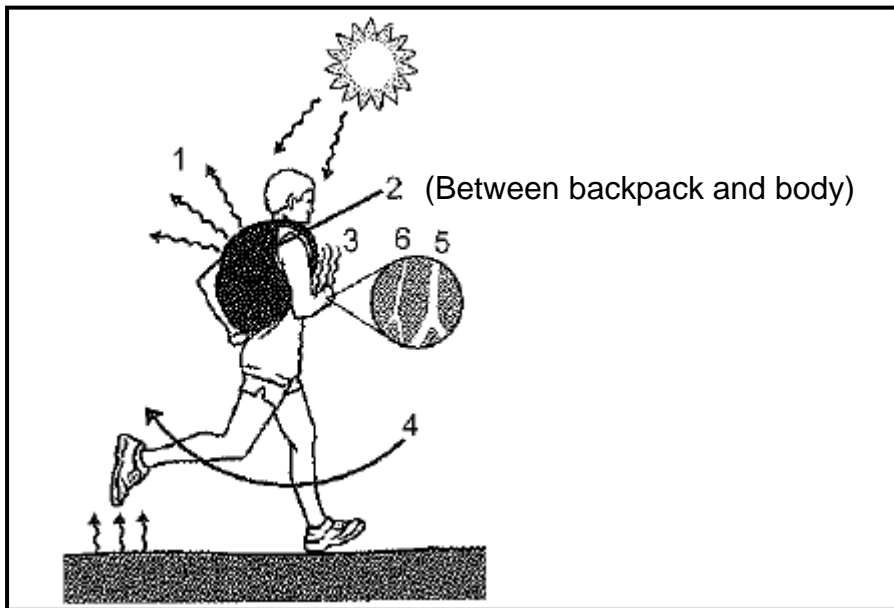
- 3.3.2 Suggest TWO problems that may arise in the body if the glucose concentration is not controlled (4)

- 3.3.3 How can the glucose concentration in the blood be controlled if it rises above normal (2)

- 3.3.4 Name the condition that is caused by high glucose levels in the blood. (1)

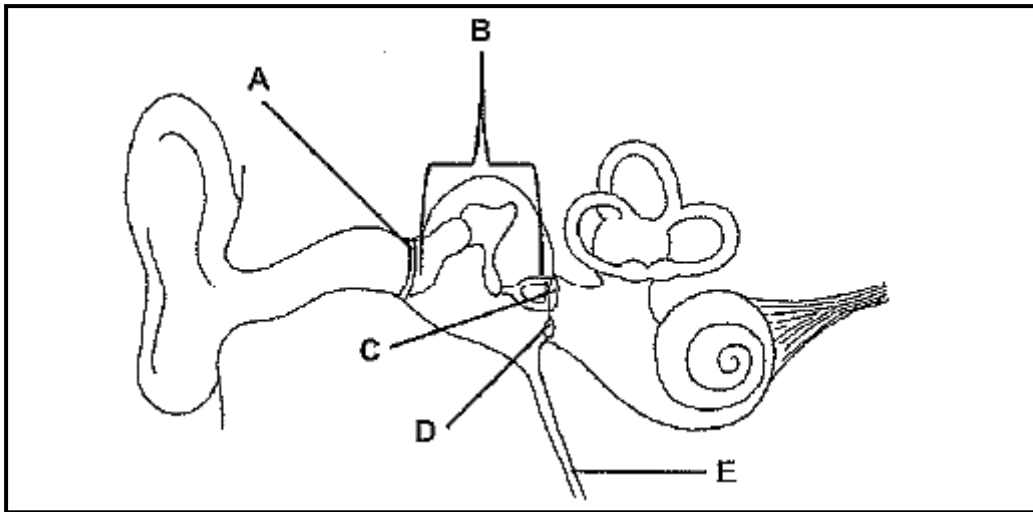
(9)

3.4 Study the representation below and answer the questions that follow



- 3.4.1 Define homeostasis (2)
- 3.4.2 Name the homeostatic process represented in the diagram above (1)
- 3.4.3 Which environmental temperature will lead in an increase in metabolic rate? (1)
- 3.4.4 Describe the role of blood vessels labelled 6 in regulating body temperature (5)
- (9)**

3.5 Study the diagram of part of the human ear and answer the questions that follow



3.5.1 Identify structures:

- | | | |
|-----|---|-----|
| (a) | A | (1) |
| (b) | B | (1) |
| (c) | C | (1) |

3.5.2 State the function of part D? (2)

3.5.3 Explain why a parachutist, who has a severe head cold, should be advised not to participate in any parachute jumping activity until the head cold has cleared (2)

(7)

- 3.6 Records of human fertility for the period 1971 to 2020 have shown changes in the sperm counts of men. The table below shows the changing numbers of men with high or low sperm counts over a period of 50 years

Time period	Men with high sperm counts per hundred	Men with low sperm counts per hundred
1971 - 1980	600	80
1981 - 1990	550	90
1991 - 2000	380	150
2001 - 2010	310	180
2011 - 2020	250	220

- 3.6.1 Calculate the percentage decrease of men with a high sperm count between 1971 to 2020. Show ALL working. (3)
- 3.6.2 Draw a bar graph to show the number of men with a high sperm count and a low sperm count from 1971 to 2020. (7)
- 3.6.3 Analyse what happens between men with high sperm count and men with low sperm count over a 50 year period. (2)

(12)

TOTAL QUESTION 3: [50]

TOTAL SECTION B: 100

GRAND TOTAL: 150