Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2017

LIFE SCIENCES P1

MARKS: **150**

TIME: **2½ hours**

This question paper consists of 15 pages.

LFSCE1

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your 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. ALL drawings must be done in pencil and labelled 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 a compass where necessary.
11. Write neatly and legibly.
12. Round off all calculations to two decimals after the comma.

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SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Write down the question number (1.1.1–1.1.10) and choose the answer by writing the letter (A–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 Before copulation the male sperm is stored temporarily in the …

A seminal vesicles.
B scrotum.
C prostate gland.
D epididymis.

1.1.2 An increased growth of algae due to too many nutrients in the water is known as …

A bleaching.
B eutrophication.
C ionisation.
D leaching.

1.1.3 The photoreceptors stimulated by dim light:

A Lens and rods
B Rods and cones
C Cones only
D Rods only

1.1.4 The average length of human gestation (from fertilisation to birth) is …

A 280 days.
B 310 days.
C 20 days.
D 210 days.

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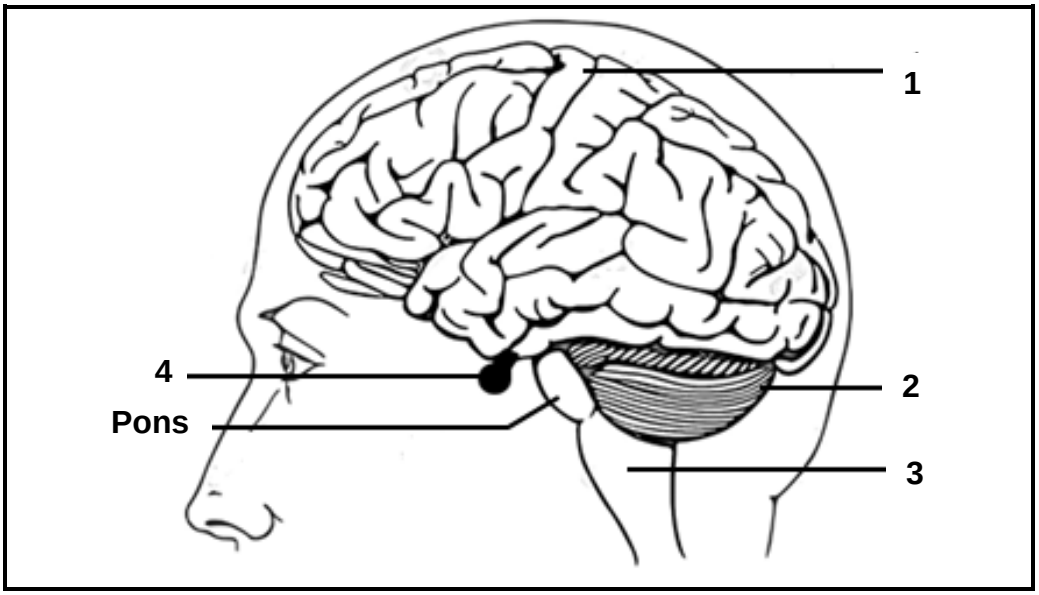
QUESTION 1.1.5 AND QUESTION 1.1.6 REFERS TO THE DIAGRAM BELOW. THE DIAGRAM REPRESENTS THE HUMAN BRAIN AND PART OF THE SPINAL CORD.



1.1.5 Which part of the brain is associated with balance and co-ordinating muscle movement?

A 1
B 2
C 3
D 4

1.1.6 Which part controls rate of breathing and heartbeat?

A 1
B 2
C 3
D 4

1.1.7 During the development of the embryo the function of the amnion is to …

A serve as reserve food.
B give rise to the placenta.
C prevent the developing foetus from moving about.
D hold the fluid which protects the embryo against injury.

1.1.8 Which ONE of the following features of genetically modified crops has the potential of improving food security?

GM crops …

A increase the number of alien plant species.
B increase yield.
C increase the reliance on pesticides.
D decrease genetic diversity.

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1.1.9 Parents will often tell children NOT, for even a few minutes, to stare at the sun because …

A bright light causes damage to the retina.
B the bright light will damage the lens.
C it dries out the aqueous humour.
D the light energy changes to heat energy in the eye.

1.1.10 One of the functions of hormone, progesterone, is to …

A prepare the uterine wall for implantation of the embryo.
B speed up the development of the follicles.
C bring about the formation of the corpus luteum.
D stimulate the secretion of sweat. (10 × 2) (20)

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

1.2.1 A process by which a molecule of DNA forms a copy of itself

1.2.2 The structure in the head of a sperm cell that contains enzymes which break down the membrane surrounding the ovum

1.2.3 The division of cytoplasm during the process of meiosis

1.2.4 A change in the internal or external environment that will be detected by a receptor and converted into an impulse

1.2.5 The replanting of trees and shrubs in a forest

1.2.6 The hormone which is responsible for development of secondary sexual characteristics in males

1.2.7 A layer of earth or rock that holds water

1.2.8 Structures found only in animal cells and lower plant cells that form the spindle during cell division

1.2.9 Process by which a region becomes progressively drier and drier

1.2.10 That part of the nervous system which consists of cranial and spinal nerves (10 × 1) (10)

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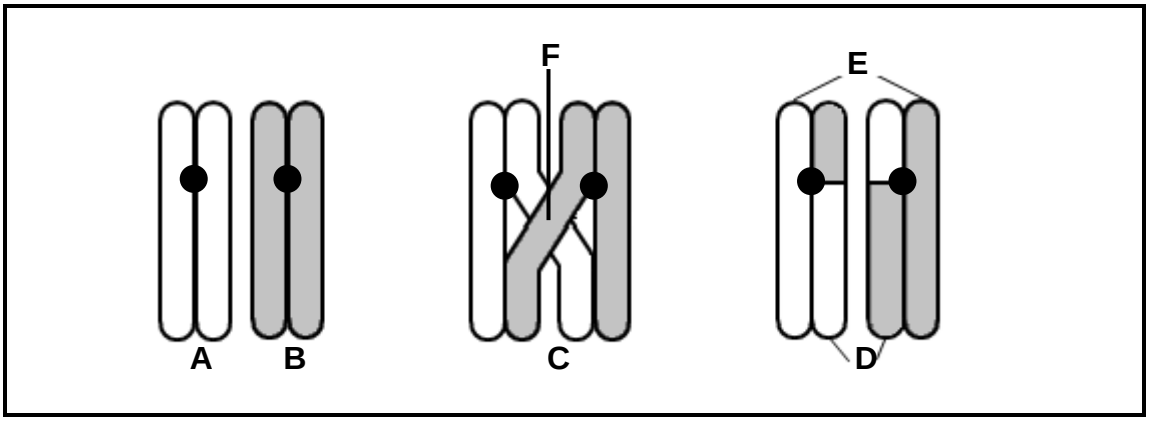
1.3 Indicate whether each of the statements in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A and B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **Both A and B** or **None** next to the question number (1.3.1–1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	A method of reproduction in which young develop inside the mother's body attached by an umbilical cord	A B	ovovivipary vivipary
1.3.2	Young are helpless at birth or hatching and require parental care for a period of time	A B	precocial development altricial development
1.3.3	Fertilisation where the presence of water is essential to take place	A B	internal fertilisation external fertilisation

(3 × 2) (6)

1.4 Study the diagram below of a cell division process and answer the questions:



1.4.1 Name:

(a) The type of cell division (mitosis or meiosis) in which this process takes place (1)
(b) The process taking place at **C** (1)
(c) The phase in which the process mentioned in QUESTION 1.4.1(b) takes place (1)
(d) The structure that holds the two chromatids together (1)
(e) The region marked **F** (1)
(f) The phase that follows the phase represented in the diagrams above (1)

1.4.2 Identify ONE observable feature which indicates that chromosome pair **A** and **B** above are regarded as homologous. (1)

1.5 The photo below is one of a dump site. Answer the questions that follow:

1.5.1 What type of dump site is shown by the photo? (1)

1.5.2 Name a useful gas that may be obtained from this type of dump site. (1)

1.5.3 Give ONE use of the gas mentioned in QUESTION 1.5.2. (1)

1.5.4 State the name of the process where products from this dump site are collected to be re-used again. (1)

1.5.5 Name ONE of the waste components that cannot be decomposed by natural methods. (1)

1.5.6 Give the collective name given to gases causing global warming. (1)

1.5.7 Identify a health risk that poor management of this dump site can have on the community living close by. (1)

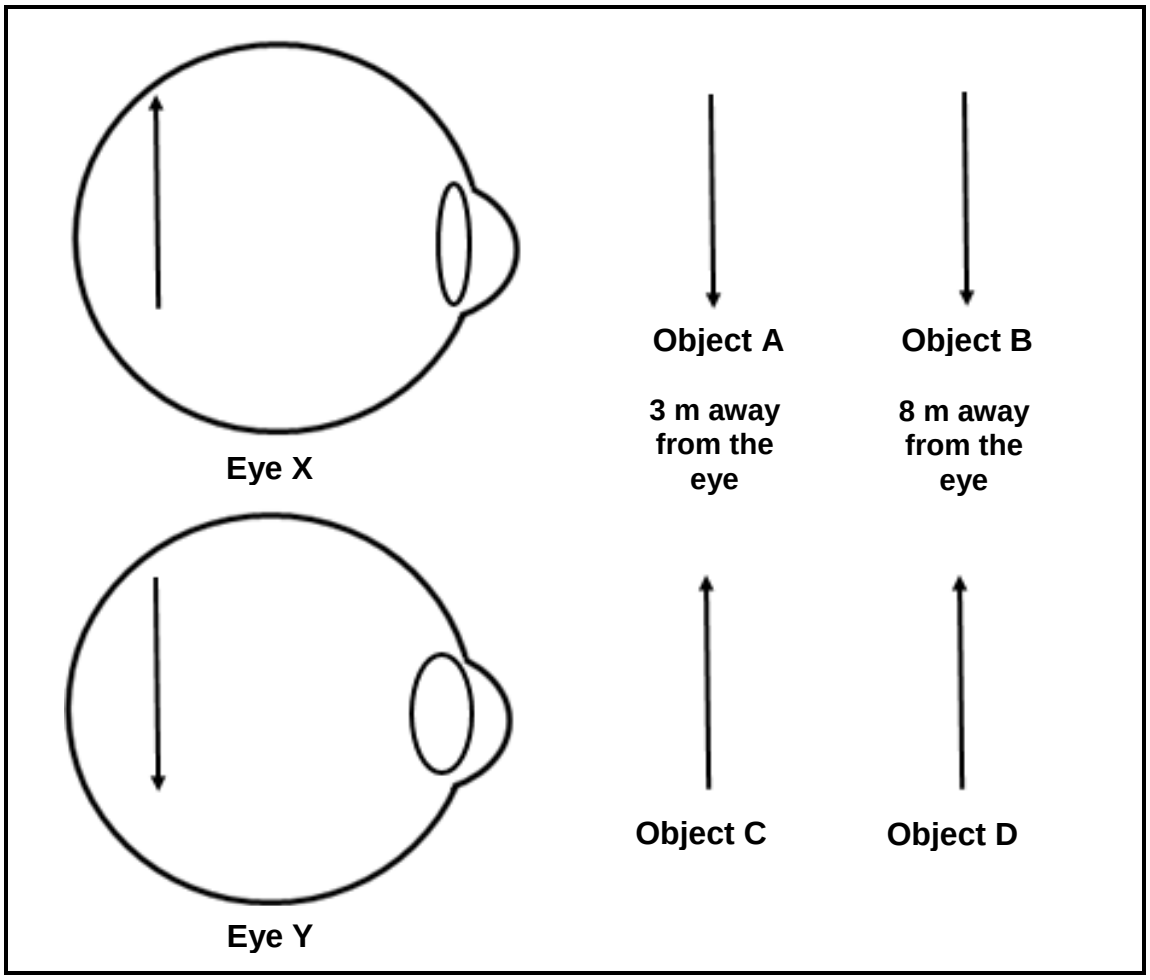
TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram shows two eyes (**X** and **Y**) focused on objects (represented by arrows) at different distances from the eye. Objects **A** and **C** were 3 metres away from the eye. Objects **B** and **D** were 8 metres away from the eye.

NB: The diagrams are not drawn to scale



2.1.1 Write down the LETTER ONLY of the object that:

(a) **Eye Y** is focused on (1)

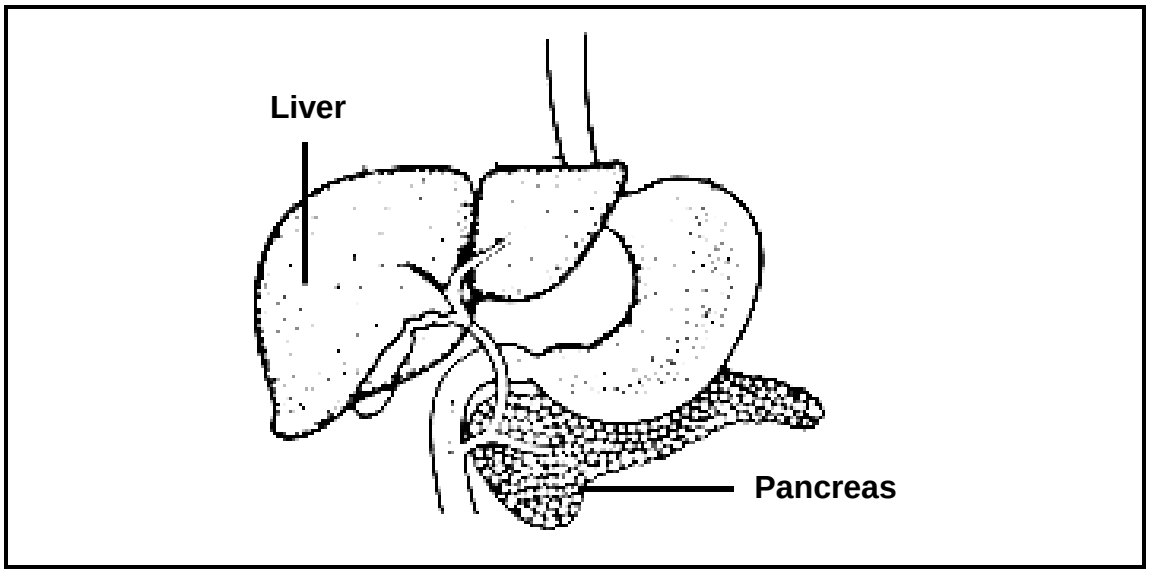
(b) **Eye X** is focused on (1)

2.1.2 (a) Name the eye defect which results from the inability of the **Eye Y** to focus on **Object D**. (1)

(b) Name the type of lens used to rectify the defect mentioned in QUESTION 2.1.2(a). (1)

2.1.3 Name and describe the process that allows **Eye Y** to form a clear image on the retina. (5)

2.2 The diagram below shows a certain section of the human alimentary canal.



The blood glucose level is regulated to a range of 70–110 mg per 100 mℓ blood in a normal person. If it rises above this level for an extended period the person may have diabetes mellitus.

2.2.1 Name the chemical substance secreted by the pancreas that will ensure that the glucose level in a healthy person is not higher than 110 mg per 100 mℓ blood. (1)

2.2.2 Explain how the malfunctioning of the pancreas will affect the maintenance of the correct level of glucose in the blood. (3)

2.2.3 Explain the possible negative influence on the body cells if the glucose level is above 110 mg per 100 mℓ blood for a long time. (2)

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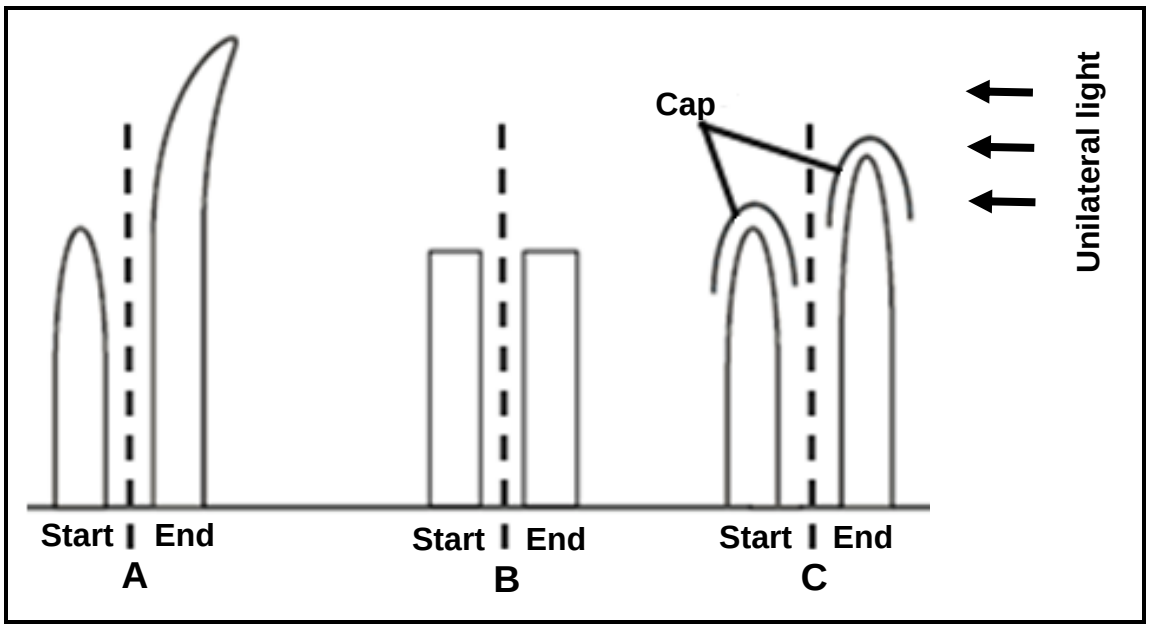
2.3 A Grade 12 learner performed an investigation to determine the effect of light on the growth of plant shoots. The learner divided the plants that were used into three groups as follows:

Group **A** The tip of the shoot was intact.
Group **B** The tip of the shoot was removed.
Group **C** The tip of the shoot was covered by a cap that does not allow light to pass through.

The diagram in each group (**A**, **B** and **C**) below shows each shoot at the start of the investigation and next to each, the same shoot at the end of the investigation.

The arrows indicate the direction to which each of the shoots **A**, **B** and **C** were exposed.



2.3.1 Name the dependent variable in this investigation. (1)

2.3.2 Which plant hormone is being investigated in this experiment? (1)

2.3.3 State TWO factors that must be kept constant during this investigation. (2)

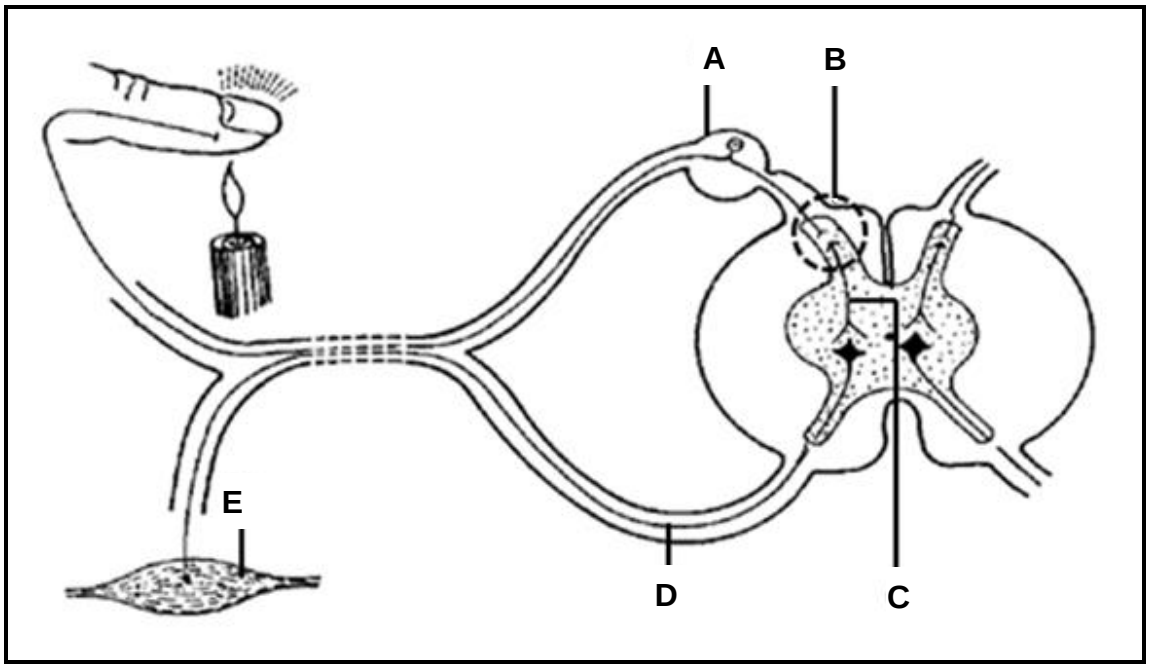
2.3.4 Explain the results observed in:

(a) investigation **A** (3)

(b) investigation **C** (3)

2.3.5 State TWO ways in which the learner could improve the reliability of this investigation. (2)

2.4 The diagram below shows a reflex action.



2.4.1 Identify parts:

(a) **A** (1)

(b) **E** (1)

2.4.2 State ONE the function of each part:

(a) **B** (1)

(b) **C** (1)

2.4.3 Explain why the brain is not initially involved in a reflex action shown above. (3)

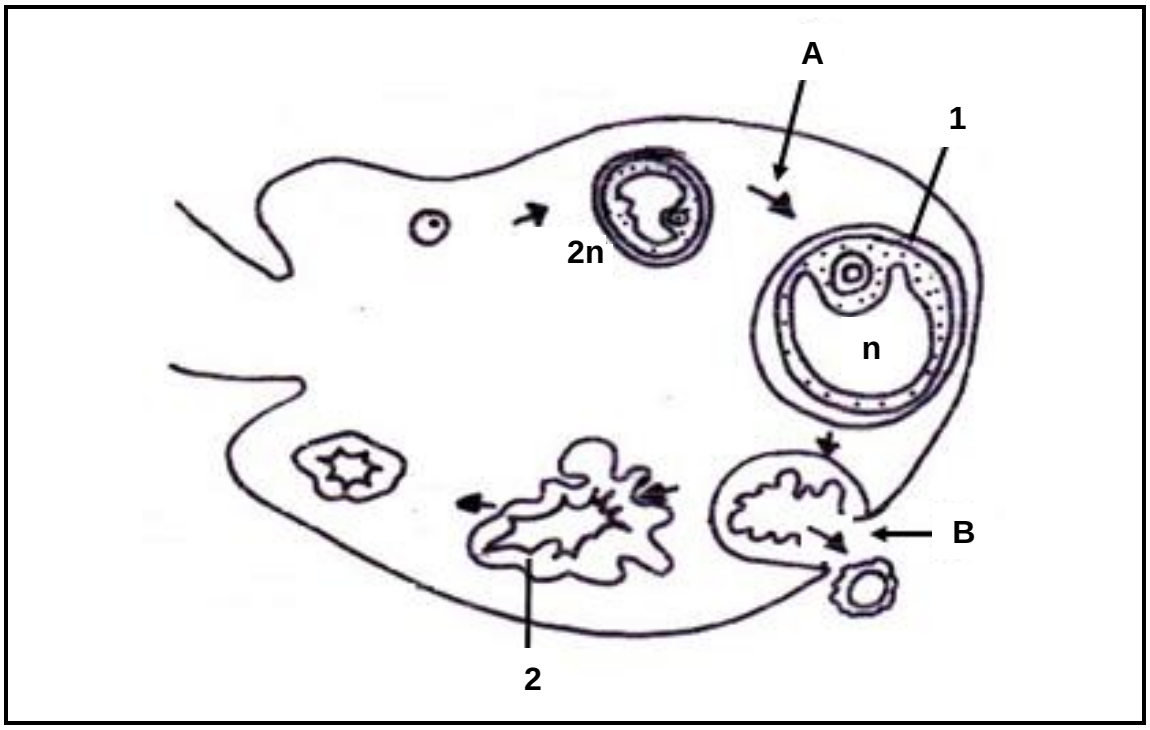
2.4.4 Explain what the effect will be, in the action shown in the diagram above, if a person is suffering from multiple sclerosis. (2)

2.4.5 Explain the effect on the body if the part labelled **D** is cut/severed. (4)

[40]

QUESTION 3

3.1 The diagram below shows the development of an ovum in an ovary of a female. **2n** and **n** refer to the chromosome number (**2n** is diploid and **n** is haploid).



3.1.1 Name the processes taking place at:

(a) **A** (1)

(b) **B** (1)

3.1.2 Explain the effect on the ovarian cycle shown above if a contraceptive containing progesterone is injected before the cycle starts. (3)

3.1.3 Describe the changes that occurs from **1** to **2** in the diagram under the influence of hormones. (6)

3.2 Records of human fertility for the period 1941 to 1990 have shown changes in the sperm count of normal men. The table below summarises the changing percentages of men with high or low sperm count over a period of 50 years.

TIME PERIOD	MEN WITH HIGH SPERM COUNT (%)	MEN WITH LOW SPERM COUNT (%)
1941–1950	50	4
1951–1960	45	5
1961–1970	28	11
1971–1980	21	14
1981–1990	15	18

3.2.1 During which time period was there:

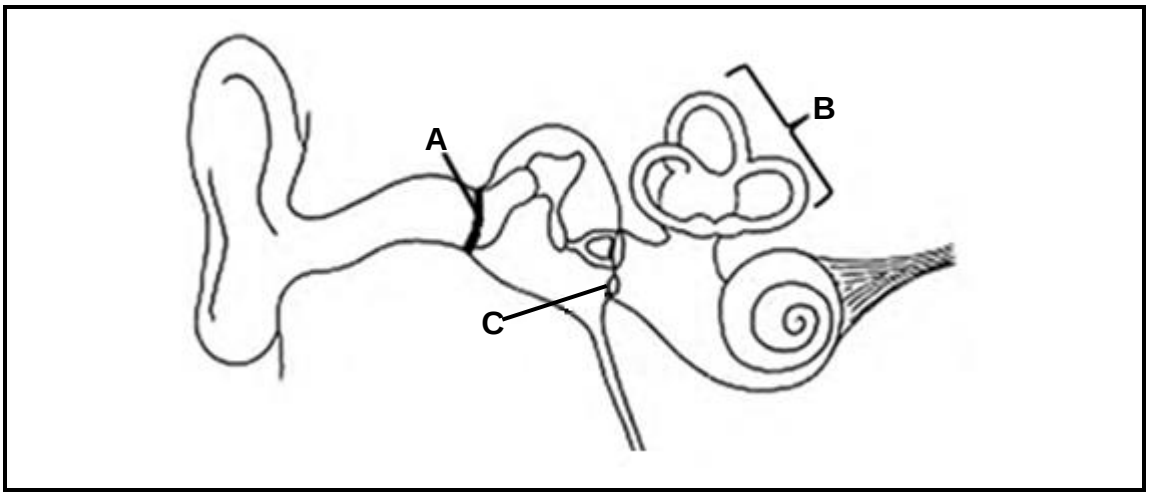
(a) The highest percentage of men with low sperm count (1)

(b) The lowest percentage of men with high sperm count (1)

3.2.2 Calculate the percentage increase of men with low sperm counts from 1971 to 1990. (2)

3.2.3 Draw a bar graph to show the percentages of men with a high sperm count for the period indicated in the table. (6)

3.3 The diagram below shows the longitudinal section of a human ear.



3.3.1 Give the letter of the part that absorbs extra pressure/vibration set up in the cochlea. (1)

3.3.2 A surgeon place a tube called a “grommet” into the structure marked **A**. Once in place the child should not go swimming. Explain this instruction. (2)

3.3.3 Explain the significance of the positions of the structures labelled **B**. (3)

3.3.4 Name the tube connecting the middle ear to the throat and explain what role it plays regarding pressure in the ear. (2)

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3.4 Study the extract below and answer the questions:

Environmental impact of Acid mine drainage

Pyrite is a mineral composed of iron and sulphur that occurs in large quantities in mine dumps. When pyrite is exposed to oxygen and water, it gradually breaks down to form sulphuric acid. The sulphuric acid drains in to ground water to make ground water acidic.

By law, mines are required to pump acidic water into reservoirs. In the reservoir, the acidic water mixed with limestone to lower the acid levels. This is called neutralisation process.

In old gold and coal mines which are not in production any more the acidic water is not pumped out and neutralised but accumulates in mine shafts and finally flows out, contaminating the surrounding waterways and ground water.

3.4.1 From the passage, name the mineral found in mine dumps causing ground water to be acidic. (1)

3.4.2 From the passage, describe the formation of acidic water in mines. (2)

3.4.3 Explain how acid mine drainage could affect:

(a) The infrastructure in a nearby town (2)

(b) Agricultural production on a nearby farm (2)

3.4.4 Explain why abandoned gold and coal mines could affect food chains in ponds/rivers/dams. (4)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

A marathon runner took only 1 liter of water with him when he set off on a race on a hot day. Describe the changes in his body to try to maintain normal body temperature. Describe the role of the hypothalamus in regulating the water balance of his body.

Content: (17)
Synthesis: (3)

NOTE: No marks will be awarded for answers in the form of a charts or diagrams.

TOTAL SECTION C: 20
GRAND TOTAL: 150

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