GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

# GAUTENG DEPARTMENT OF EDUCATION

# PREPARATORY EXAMINATION

# 2019

## 10831

## LIFE SCIENCES

## PAPER 1

**TIME:** 2½ hours

**MARKS:** 150

**18 pages**



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, 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 may 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 correct answer and write only 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 In which part of the female reproductive system does fertilisation occur?

A Ovary
B Fallopian tube
C Cervix
D Vagina

1.1.2 An extract from a gland of an adult monkey was injected into the blood stream of a young monkey. It caused the monkey to grow abnormally tall.

From which gland was the extract obtained?

A Hypothalamus
B Pituitary
C Adrenal
D Thyroid

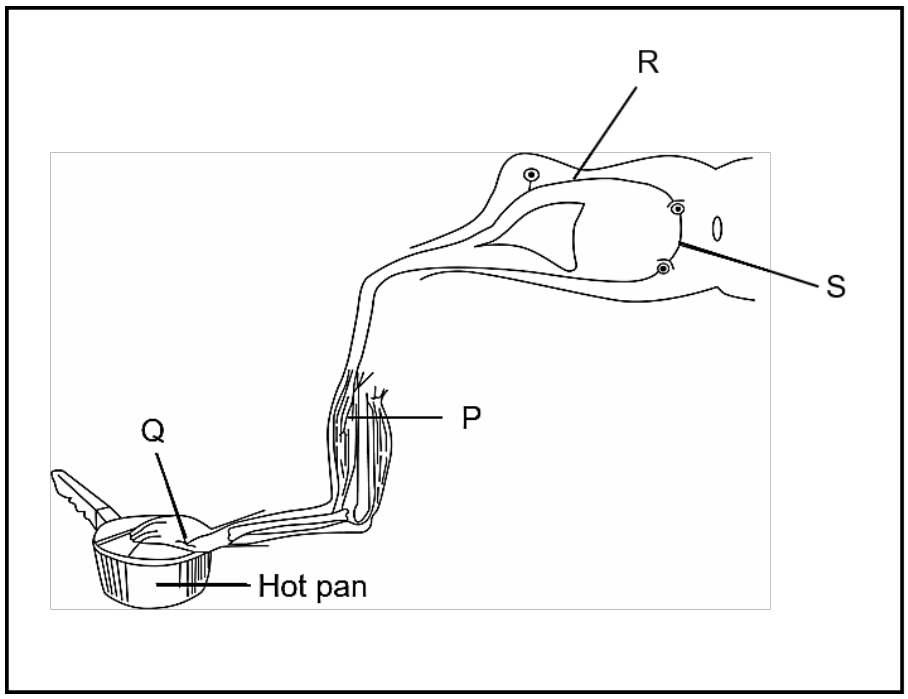
1.1.3 Study the systems listed below.

(i) Gas exchange
(ii) Digestive
(iii) Excretory

Which of the above systems are non-functional in the human foetus?

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

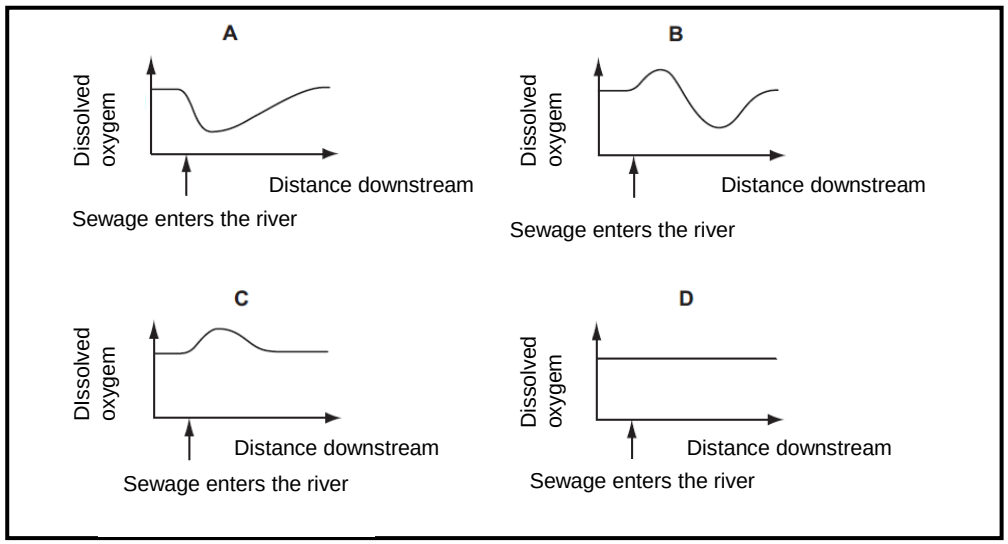
1.1.4 The diagram below shows the structures involved in a reflex action.




What is the sequence in which these structures become involved?

A P → Q → R → S
B P → S → R → Q
C Q → R → S → P
D Q → S → P → R

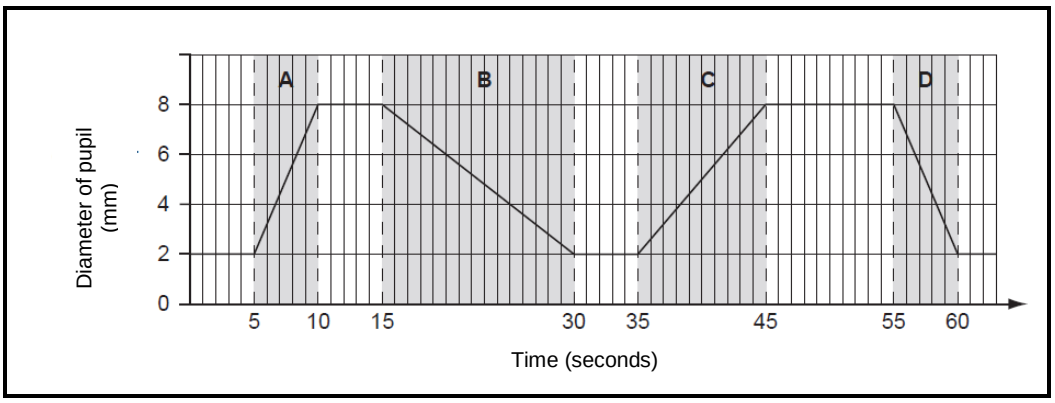
1.1.5 Which graph shows the effect of pollution by sewage on the amount of dissolved oxygen in a river?



1.1.6 Which ONE of the following involves the hatching of fertilised eggs in the body of a female, such that the young are born alive?

A External fertilisation
B Ovipary
C Vivipary
D Ovovivipary

1.1.7 The diameter of a person's pupil was measured over time. The results are shown below.




During which time period did the light intensity increase the fastest?

A 5 – 10 s
B 15 – 30 s
C 35 – 45 s
D 55 – 60 s

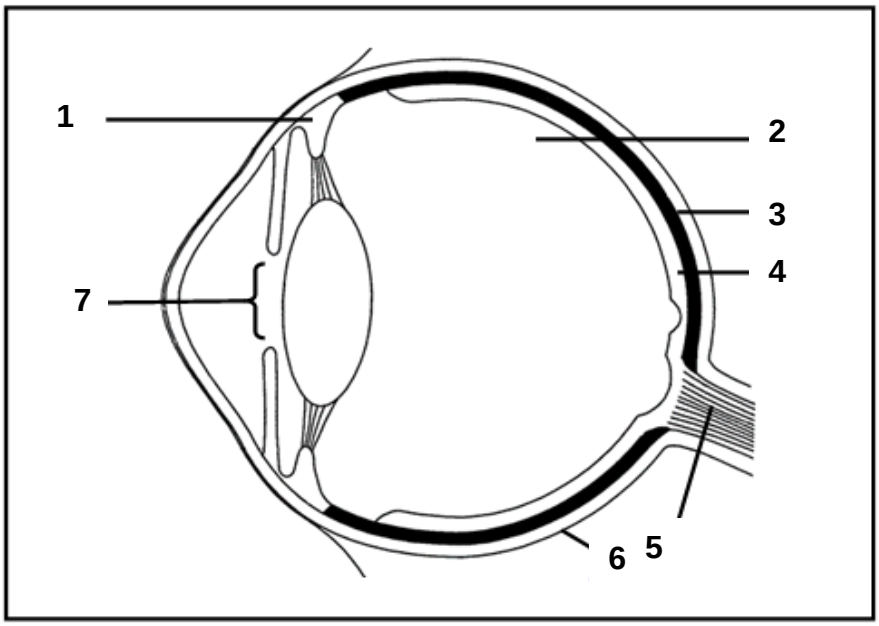
1.1.8 Monoculture should be avoided since it …

A increases the population size of existing pests.
B increases biodiversity.
C decreases crop yield.
D increases soil nutrients.

1.1.9 The level of thyroxin in the body is controlled by the ...

A hypothalamus and the pituitary.
B thyroid and the hypothalamus.
C thyroid and the adrenal gland.
D pituitary and the thyroid gland.

1.1.10 Study the diagram below.




Which ONE of the following represents correct labels?

A 3 - blind spot; 4 - choroid
B 2 - vitreous humour; 1 - suspensory ligaments
C 5 - optic nerve; 7 - pupil
D 6 - conjunctiva; 3 - yellow spot

(10 x 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 – 1.2.7) in the ANSWER BOOK.

1.2.1 The type of development in birds where the young are incapable of moving around on their own

1.2.2 A chemical substance secreted by an endocrine gland

1.2.3 The process during which mature, haploid sperms are produced from the germinal epithelium in the testes by meiosis

1.2.4 The failure of chromosomes to separate and segregate into daughter cells during meiosis

1.2.5 The type of fertilisation associated with vivipary

1.2.6 The growth of parts of a plant in response to gravity

1.2.7 The point at which the crossing-over of chromosomes occur during meiosis

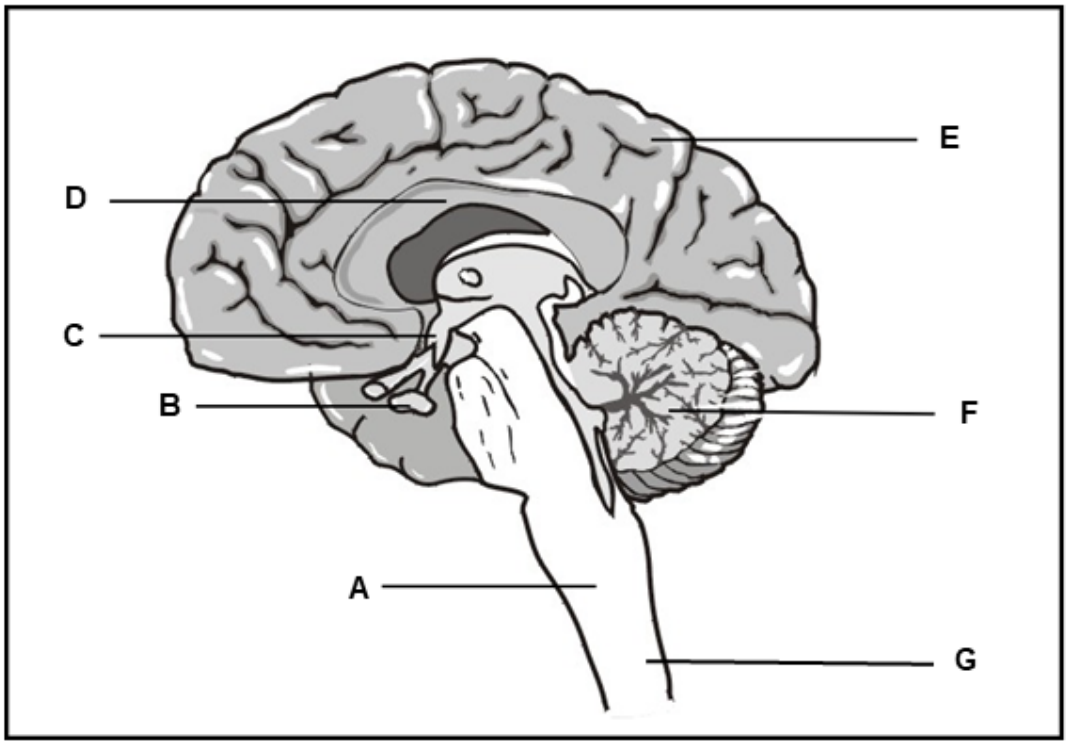
(7 x 1) (7)

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 | Crossing-over takes place | A Prophase I<br>B Prophase II |
| 1.3.2 | Embryo nourished from yolk found in the egg | A Ovipary<br>B Ovovivipary |
| 1.3.3 | Promotes reabsorption of salt in the kidneys | A ADH<br>B Aldosterone |

(3 x 2) (6)

1.4 Study the diagram below.




1.4.1 Identify part:

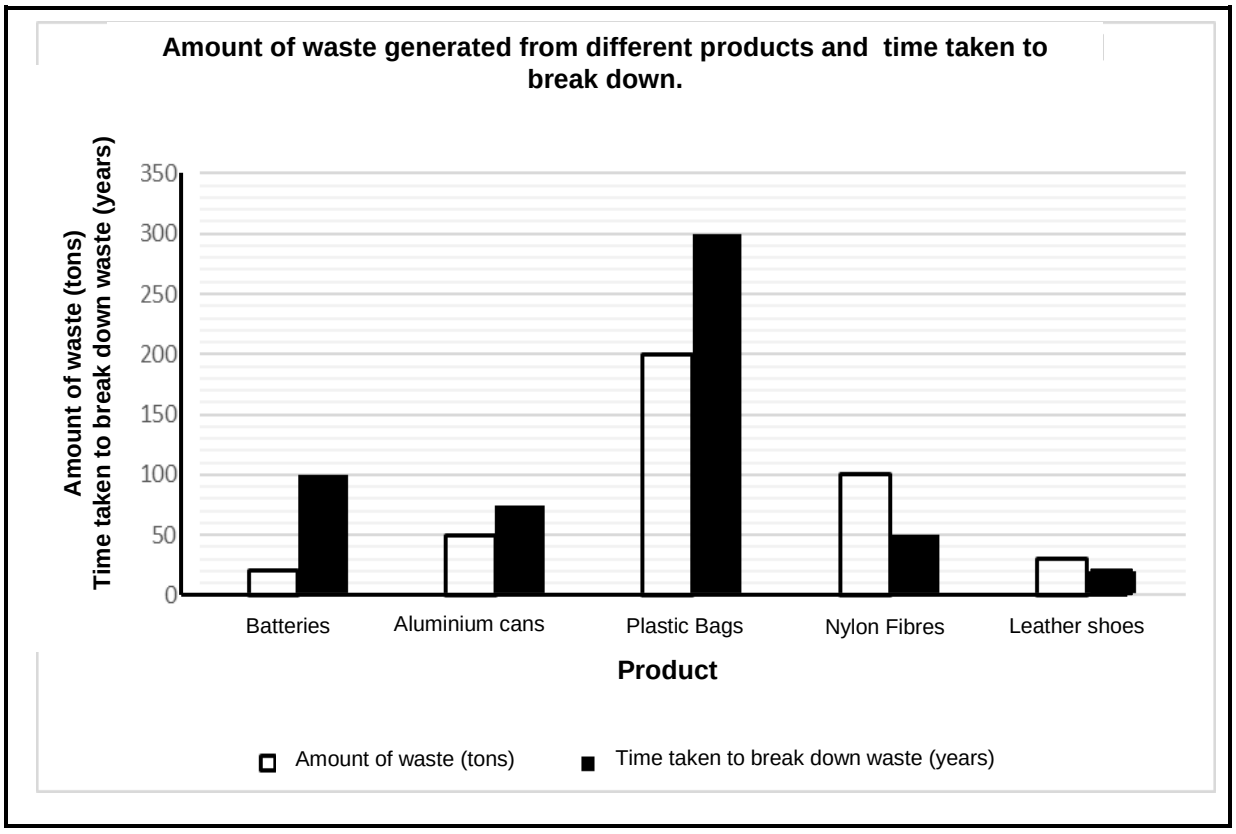
(a) **D** (1)
(b) **G** (1)

1.4.2 Name the system of membranes that surround the brain. (1)

1.4.3 Identify only the **LETTER** of the part of the brain that:

(a) Controls body temperature
(b) Produces prolactin
(c) Controls involuntary activities such as heartbeat
(d) Controls memory storage and voluntary actions (4)
**(7)**

1.5 The graph below shows the amount of waste generated from different products and the time taken for each product to break down.

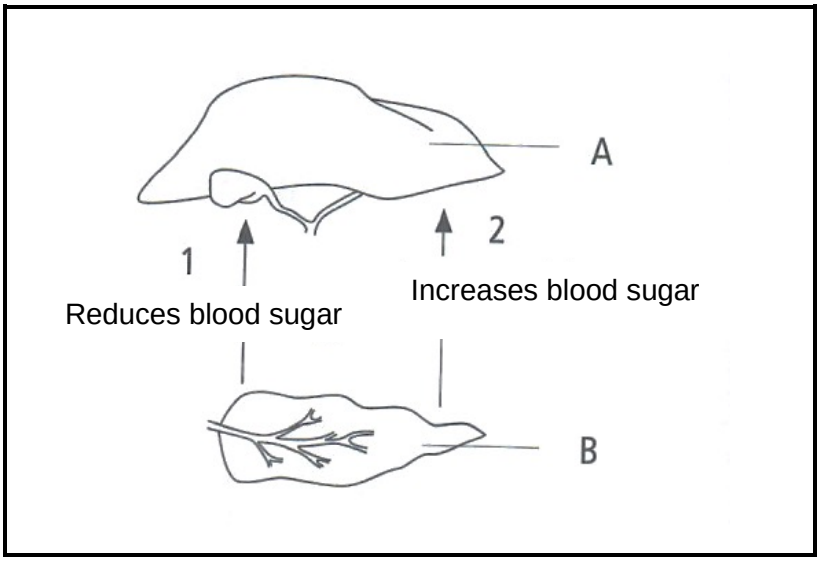



1.5.1 From the graph identify ONE biodegradable product. (1)

1.5.2 According to the graph, how long do plastic bags take to break down? (1)

1.5.3 Calculate the percentage contribution of plastic bags to the total amount of waste generated from the products shown. Show ALL working. (3)
**(5)**

1.6 Study the diagram below.




1.6.1 Identify:

(a) Organ **A** (1)
(b) Hormone **2** (1)
(c) Organ **B** (1)

1.6.2 Name the disease that may develop from an under-secretion of hormone **1**. (1)

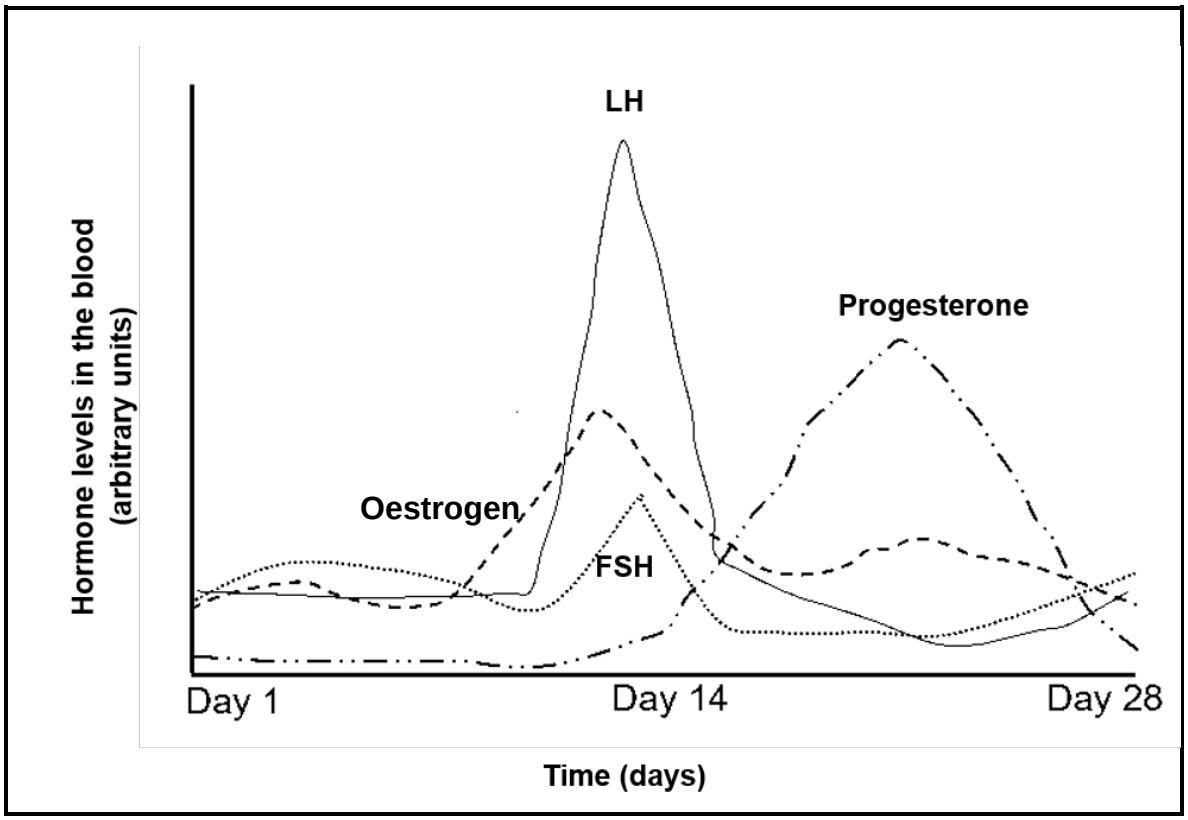
1.6.3 How do hormones **1** and **2** travel to target organ **A**? (1)
**(5)**

**TOTAL SECTION A: 50**

## SECTION B

## QUESTION 2

2.1 The graph below shows the changes in the concentraton of hormones in the blood of a woman during a menstrual cycle.




2.1.1 Explain why the concentration of FSH in the blood increases after Day **1**. (3)

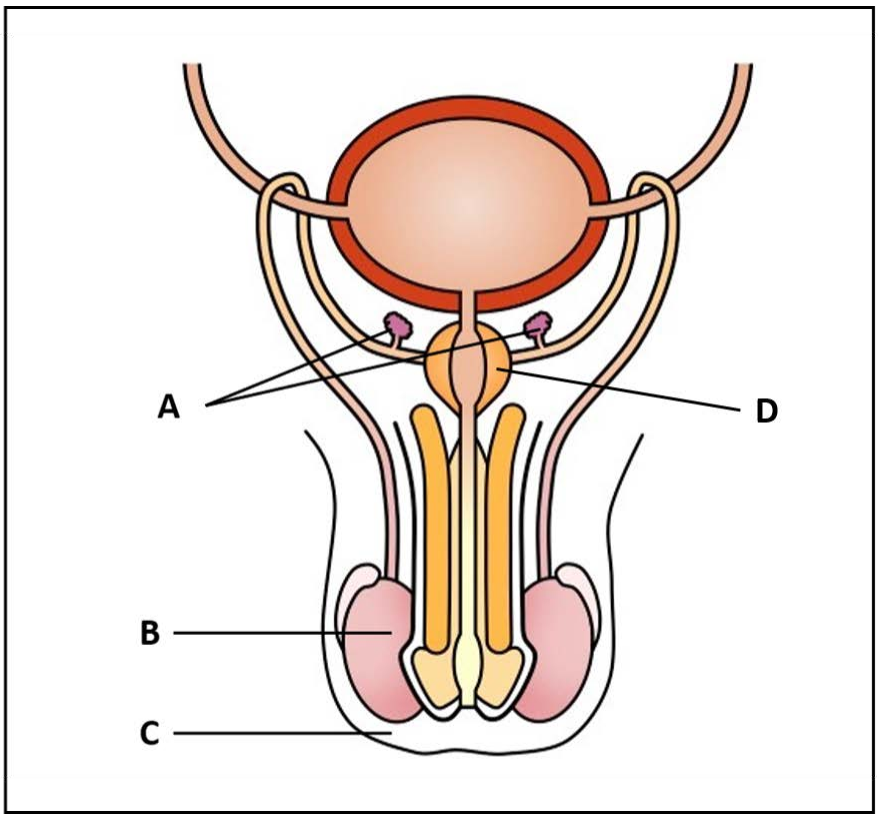
2.1.2 State what happens to oestrogen levels in the blood when the LH level increases. (1)

2.1.3 Explain why the oestrogen level decreases after Day **14**. (2)

2.1.4 With reference to hormonal control, describe what causes menstruation to occur between Days **1 – 4**. (2)

2.1.5 Describe the process of oogenesis. (5)
**(13)**

2.2 The diagram below shows the male reproductive organs.




2.2.1 Identify:

(a) **A** (1)

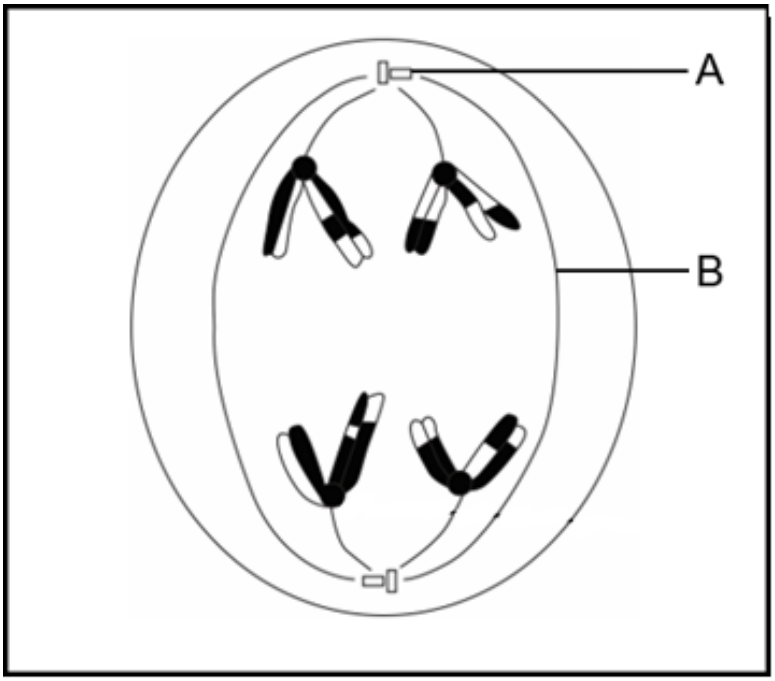
(b) **C** (1)

2.2.2 Explain ONE function of part **D.** (2)

2.2.3 Explain ONE consequence for reproduction if **B** was at the same temperature as the rest of the body. (2)

2.2.4 Explain TWO adaptations of the sperm to ensure that fertilisation is successful. (4)
**(10)**

2.3 The diagram below shows a phase in meiosis.




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

2.3.2 Give an observable reason for your answer to Question 2.3.1. (2)

2.3.3 Name part **A**. (1)

2.3.4 How many chromosomes …

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

(b) will be present in each cell at the **end** of meiosis? (1)

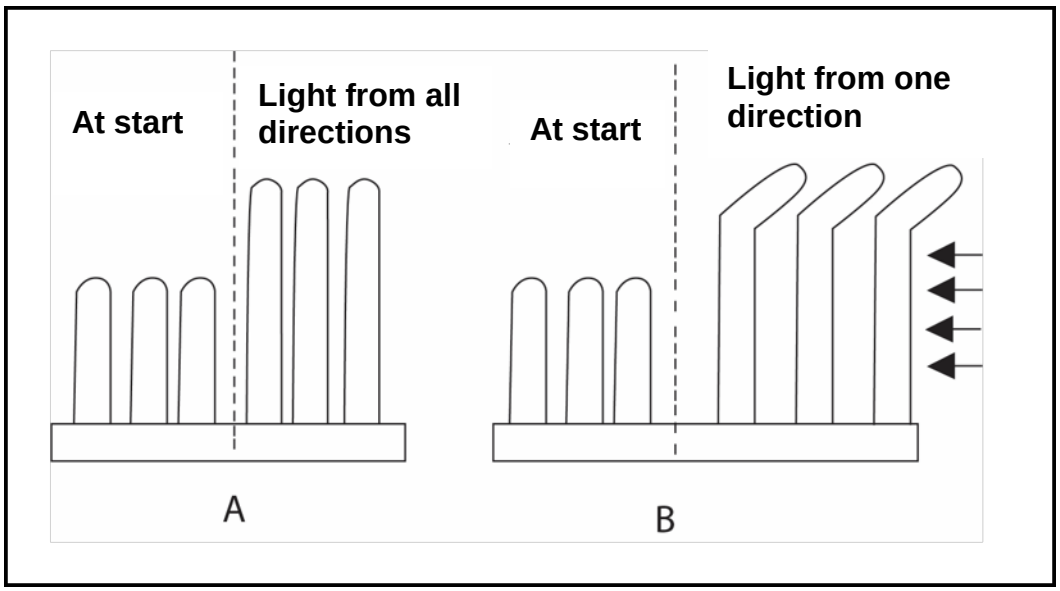
2.3.5 State ONE biological importance of meiosis. (1)
**(7)**

2.4 Maria wanted to investigate the effect of light coming from one direction on the growth of shoots. She planted some bean seeds in two seed trays and allowed them to germinate. When the young shoots appeared above the soil level, the shoots were exposed to light from all directions for three days.

After three days, the trays received the following different treatments:

- Tray **A**: The shoots were exposed to light from all directions.
- Tray **B**: The shoots were exposed to light from one direction only.

The diagram below shows the effects of these treatments.




2.4.1 Explain why it is important to include Tray **A** as part of this investigation. (2)

2.4.2 Explain the results obtained in Tray **B** in terms of the role of auxins. (6)

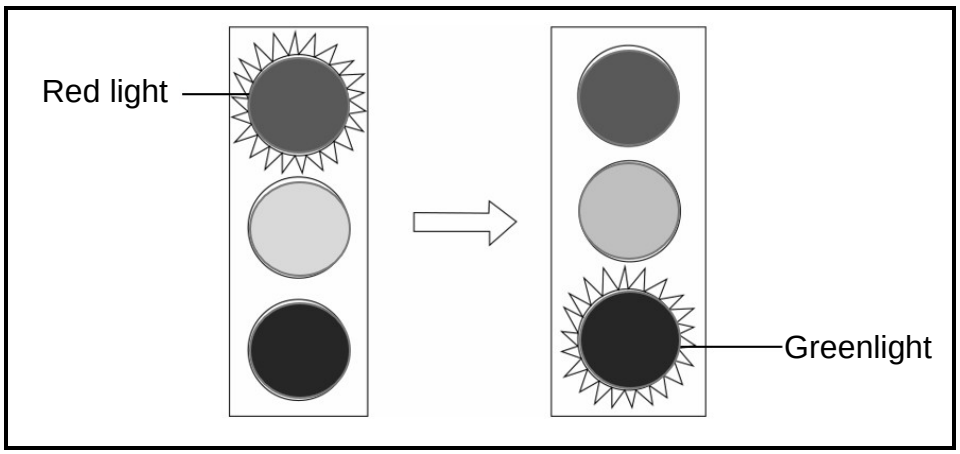
2.4.3 State TWO factors that should be kept constant in this investigation. (2)

**(10)**
**[40]**

## QUESTION 3

3.1 Describe how accommodation takes place in the eye for distant vision. **(5)**

3.2 Car drivers need quick reactions to avoid accidents. A learner uses a computer to measure reaction time. The computer screen shows a traffic light on red. The traffic light then changes to green. The diagram below shows the change the person sees on the computer screen.




When the traffic light changes to green the person has to click the computer mouse as quickly as possible. The computer programme works out the time taken to react to the light changing colour.

The learner used three measurements to calculate the average reaction time. The table below shows the results.

| Age in years | Average reaction time (milliseconds) |
|---|---|
| 30 | 182 |
| 45 | 221 |
| 60 | 258 |
| 75 | 364 |
| 90 | 526 |

3.2.1 Plot a line graph of the results shown in the table in your ANSWER BOOK. (6)

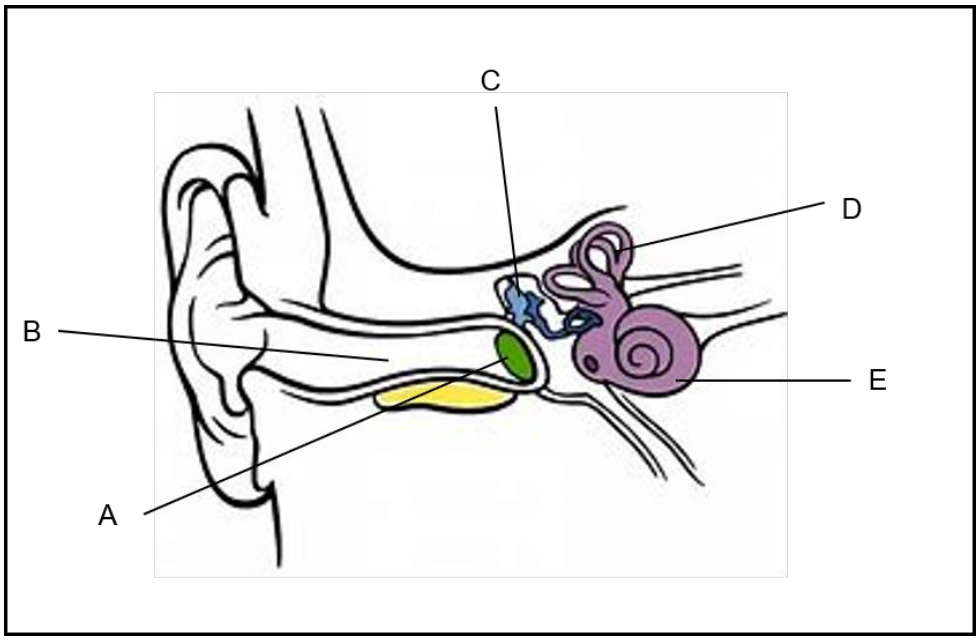
3.2.2 Some people think that people in the age group 75 – 90 should not be allowed to drive a car.

Use the information from the table to explain why it is more dangerous for old people to drive cars. (2)

3.2.3 State ONE way in which the learner increased the reliability of the results. (1)

**(9)**

3.3 The diagram below shows a section through the human ear.




3.3.1 Provide the LETTER ONLY of the part of the ear where the following will be inserted:

(a) A grommet (1)

(b) A cochlear implant (1)

3.3.2 Explain how the functioning of the ear would be affected if the bones at **C** were fused. (2)

3.3.3 A goalkeeper dives to save a ball being kicked towards the goal.

Provide an explanation on how his ears and nervous system control his balance while diving to save the ball. (6)
**(10)**

3.4 Global warming and ozone depletion are two environmental challenges.

3.4.1 What is meant by the term *carbon footprint*? (2)

3.4.2 State TWO ways in which we can reduce our carbon footprint in order to decrease global warming. (2)

3.4.3 State TWO possible health effects on the human body if the destruction of the ozone layer continues. (2)

3.4.4 Most of the electricity in South Africa is produced from coal. Describe the impact of using this energy source on global warming. (4)
**(10)**

3.5 Read the following extract and answer the questions that follow.

**WHY AFRICAN CROP FARMERS SHOULD BALANCE INSECTICIDES WITH OTHER PEST CONTROL METHODS**

When insect pests threaten crops, many smallhold farmers turn to insecticides. These directly reduce the incidence of insect pests which severely damage crops. This means higher yields, higher income for farmers and less malnutrition.

In the long run, the use of insecticides is not sustainable because insects quickly become resistant. Insecticides also cause damage to the environment.

3.5.1 Explain what is meant by the term *food security*. (2)

3.5.2 State TWO advantages according to the extract, of the use of insecticides to kill pests. (2)

3.5.3 Explain a more suitable, alternate way of killing pests. (2)
**(6)**
**[40]**

**TOTAL SECTION B: 80**

## SECTION C

### QUESTION 4

Simphiwe took part in the Comrades Marathon which is a long distance race that starts very early on a cold, winter's morning.

Describe the effect of adrenalin on his body and how his body temperature was regulated as he waited to start the race on a cold day. Also describe the changes that took place in his eyes to adjust to the increasing light as the sun was rising.

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

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

**TOTAL SECTION C: 20**

**TOTAL: 150**

**END**