



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**SEPTEMBER 2015**

**LIFE SCIENCES P1**

**MARKS:** 150

**TIME:** 2½ hours



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This question paper consists of 18 pages.

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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 your ANSWER BOOK.
3. Start the answer 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 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.
12. Round off all calculations to two decimals after the comma.

**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 numbers (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 D.
- 1.1.1 The reproduction strategy in which the embryo develops inside the egg and is protected from the environment by the egg shell is ...
- A ovipary.
  - B vivipary.
  - C ovovivipary.
  - D ovulation.
- 1.1.2 A disadvantage of external fertilisation is that ...
- A physical contact between the male and female is always required.
  - B courtship behaviour is required to cause ovulation in female partner.
  - C the eggs need to remain in water or a moist environment to prevent dehydration.
  - D fertilisation of eggs only takes place during night time.
- 1.1.3 Which ONE of the following structures is responsible for the temporary storage of sperms?
- A Vas deferense
  - B Epididymis
  - C Seminal vesicle
  - D Testis
- 1.1.4 The following are the functions performed by some structures in the female reproductive system during pregnancy.
- (i) Serves as an attachment of the foetus to the mother.
  - (ii) Controls the optimum temperature for the growth and development of the foetus.
  - (iii) Allows the diffusion of deoxygenated blood with nitrogenous wastes from the embryo to the mother's blood.
  - (iv) Allows the diffusion of oxygenated blood with dissolved food from the mother's blood to the foetus.
- Which ONE of the following combinations are the functions carried out by the placenta?
- A (i), (ii) and (iii) only
  - B (i), (ii) and (iv) only
  - C (i), (iii) and (iv) only
  - D (ii), (iii) and (iv) only

- 1.1.5 Which ONE of the following can be the chromosome number in a somatic cell of an individual in a species?
- A 33
  - B 24
  - C 19
  - D 51
- 1.1.6 The specialised cells of the testes that secrete the male hormone are ...
- A Sertoli cells.
  - B acrosomes.
  - C Leydig cells.
  - D seminal vesicles.
- 1.1.7 An investigation was conducted to determine the concentration of *E. coli* bacteria in a sewage contaminated river.

The result of the investigation is given below:

<b>Percentage of sewage/100 ml</b>	10	18	25	30
<b>Percentage of <i>E. coli</i>/100 ml</b>	20	34	45	55

It can be concluded that ...

- A the percentage of *E. coli* increase with an increase in the percentage sewage in the water.
  - B an increase in percentage of sewage has no effect on the percentage of *E. coli* in the water.
  - C a high percentage of sewage decreases the concentration of *E. coli*.
  - D a high percentage of *E. coli* decreases the percentage of sewage in the water.
- 1.1.8 The homeostatic function of the kidney can be affected by damage to hypothalamus of the brain because the ...
- A blood flow to the kidney increases.
  - B levels of glucose drops drastically.
  - C cellular metabolism increases.
  - D pituitary gland would not be able to release ADH.

- 1.1.9 Which ONE of the following hormones is secreted in excess along with adrenal secretion in situation as illustrated below?



[Source: [www.StrangeDangers.com](http://www.StrangeDangers.com)]

- A Insulin  
B Testosterone  
C Thyroxin  
D Antidiuretic hormone/ADH
- 1.1.10 Crossing over during meiosis takes place between the ...

- A chromatids of the same chromosome.  
B chromatids of non-identical chromosomes.  
C chromatids of homologous chromosomes.  
D chromatid and centromere.

(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 (1.2.1–1.2.6) in the ANSWER BOOK.

- 1.2.1 The largest accessory gland in men that secretes a fluid which promotes movement of the spermatozoa and provides nutrition
- 1.2.2 The female reproductive structure into which sperms are deposited during copulation
- 1.2.3 A disorder of the central nervous system that lead to memory loss in humans
- 1.2.4 The male reproductive structure that controls the optimum temperature for the development of sperms
- 1.2.5 The structure in the spermatozoa that secretes an enzyme
- 1.2.6 An increase in the nutrient content of water bodies such as lakes, rivers and dams as a result of fertilisers washed into them

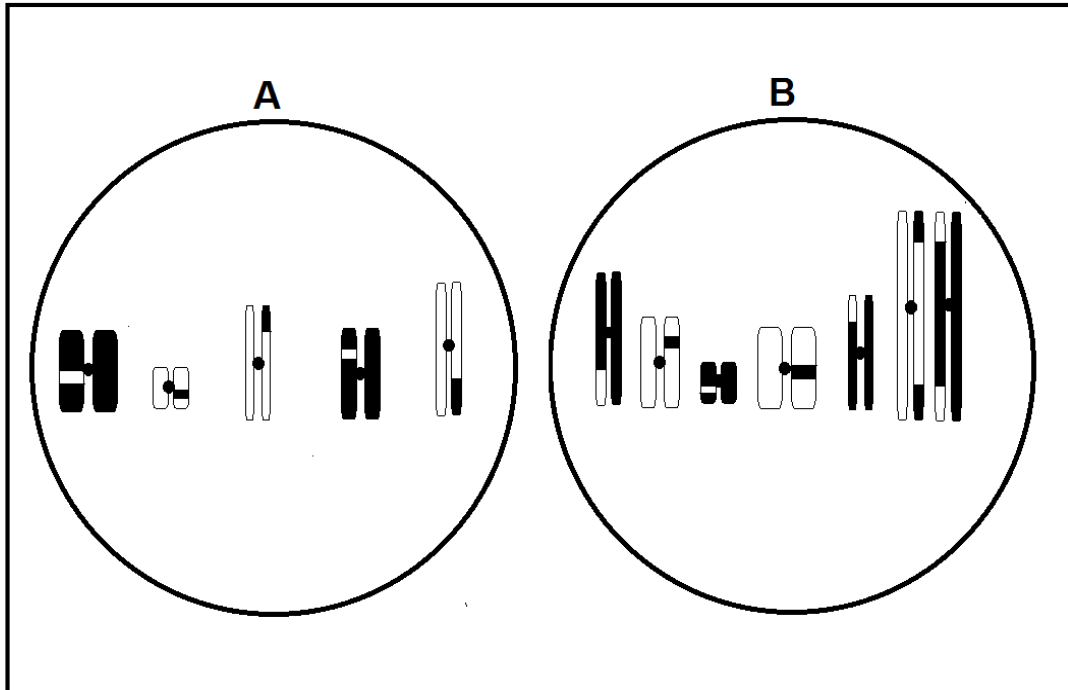
(6 x 1) (6)

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 (1.3.1–1.3.7) in the ANSWER BOOK, for example 1.3.8 **B ONLY**.

COLUMN I		COLUMN II
1.3.1	The type of development in birds where the offspring are born incapable of moving and feed by themselves	A: Precocial development B: Altricial development
1.3.2	The production of ova by meiosis	A: Oogenesis B: Ovulation
1.3.3	A hollow ball of cells into which fertilised ovum develops	A: Chorion B: Amnion
1.3.4	The earth's resources that are negatively impacted upon by overgrazing and desertification	A: Topsoil B: Water table
1.3.5	The reproductive structure where meiosis occur	A: Testes B: Ovary
1.3.6	Growing one type of crop repeatedly on the same land	A: Crop rotation B: Monoculture
1.3.7	The structure that connects sister chromatids	A: Centromere B: Centriole

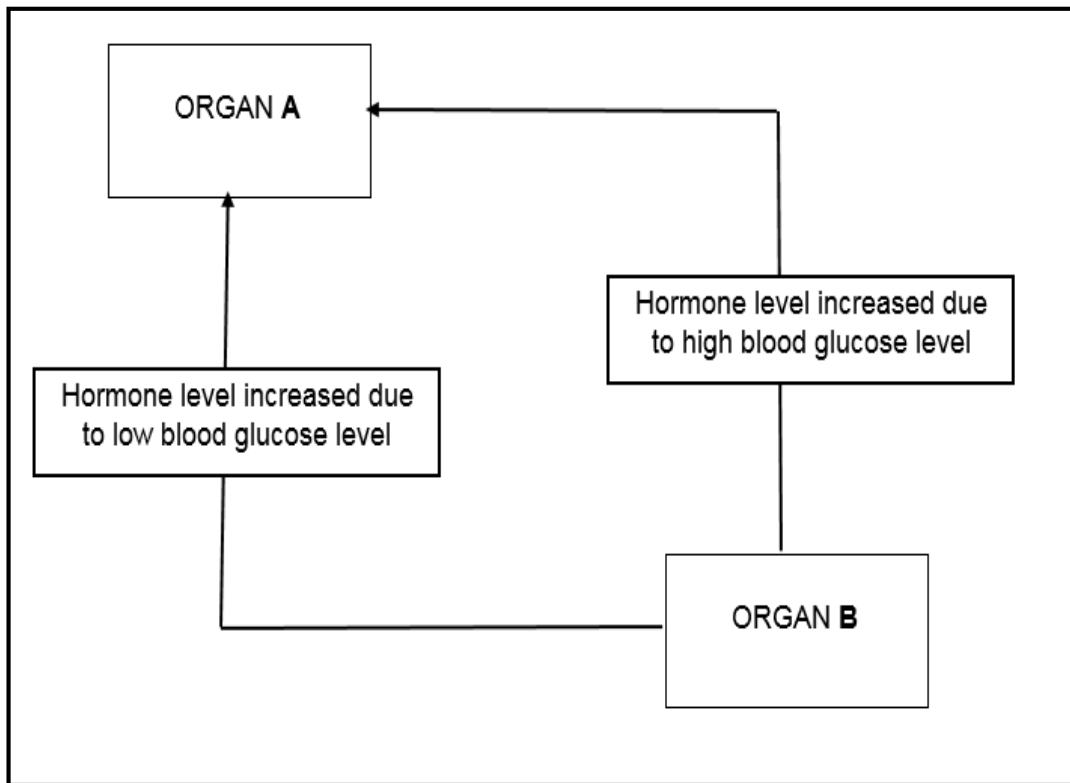
(7 x 2) (14)

1.4 The diagram below shows two daughter cells formed at the end of meiosis I.



- 1.4.1 Name the error that led to the unequal number of chromosomes in cell **A** and **B**. (1)
- 1.4.2 During which phase of the meiosis I did the error mentioned in QUESTION 1.4.1 occur? (1)
- 1.4.3 What was the number of chromosomes in the parent cell before the start of the cell division? (1)
- 1.4.4 What would be the chromosome number at the end of meiosis II in Cell A? (1)
- 1.4.5 What would have been the chromosome number in each of the daughter cells if the error mentioned in QUESTION 1.4.1 had not occurred? (1)

- 1.5 The diagram below shows the interaction of two hormones in controlling blood sugar levels.



- 1.5.1 Identify organs **A** and **B**. (2)
- 1.5.2 Which hormone is secreted when the levels of glucose in blood ...
- (i) increases? (1)
  - (ii) decreases? (1)
- 1.5.3 Which **ONE** of the organs (**A** or **B**) monitors the concentration of glucose in the blood? (1)

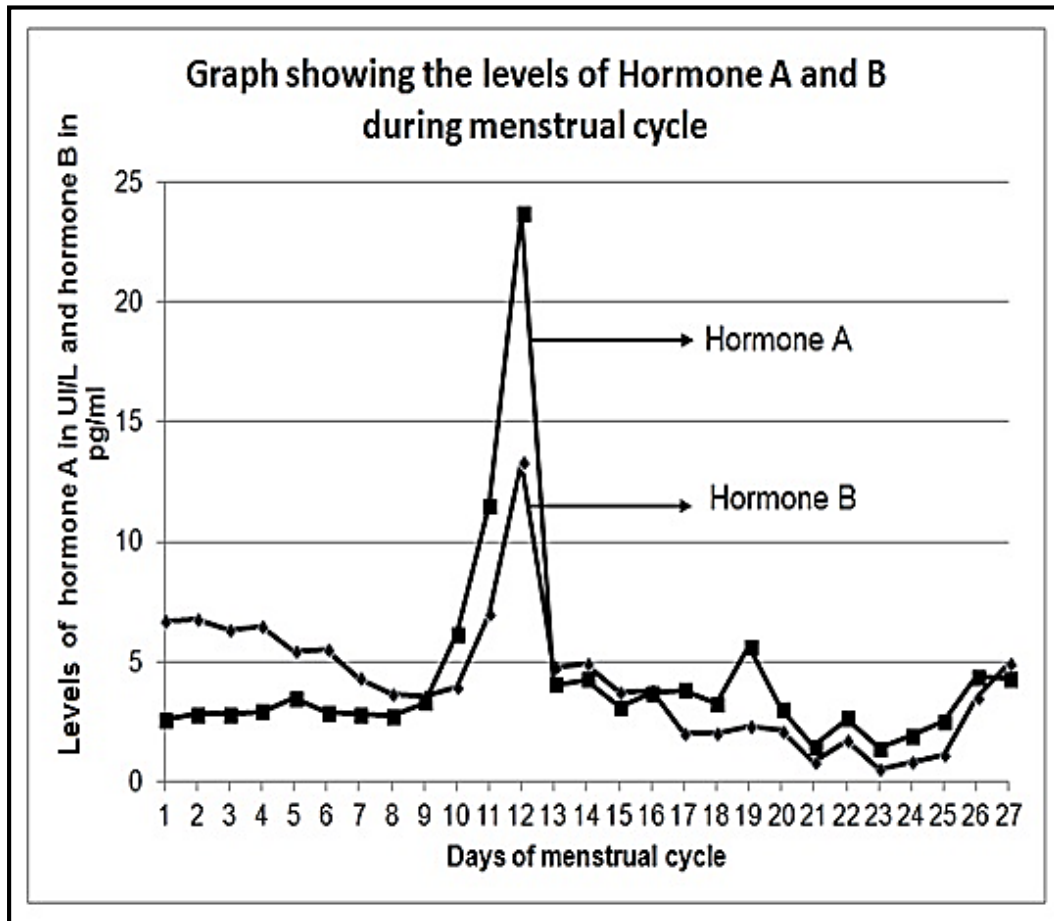
**TOTAL SECTION A: 50**



## SECTION B

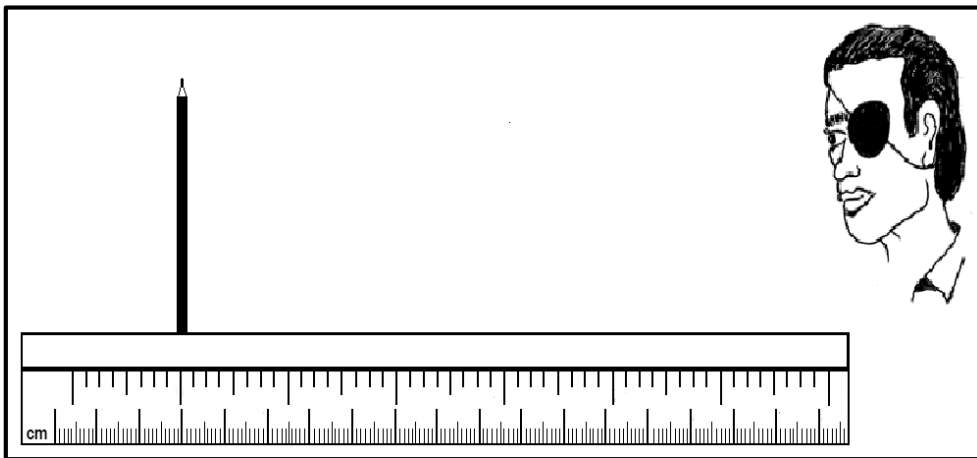
## QUESTION 2

- 2.1 The graph below shows the levels of two female hormones A and B secreted during the menstrual cycle. Hormone A is secreted by pituitary gland and hormone B is secreted by the Graafian follicle.



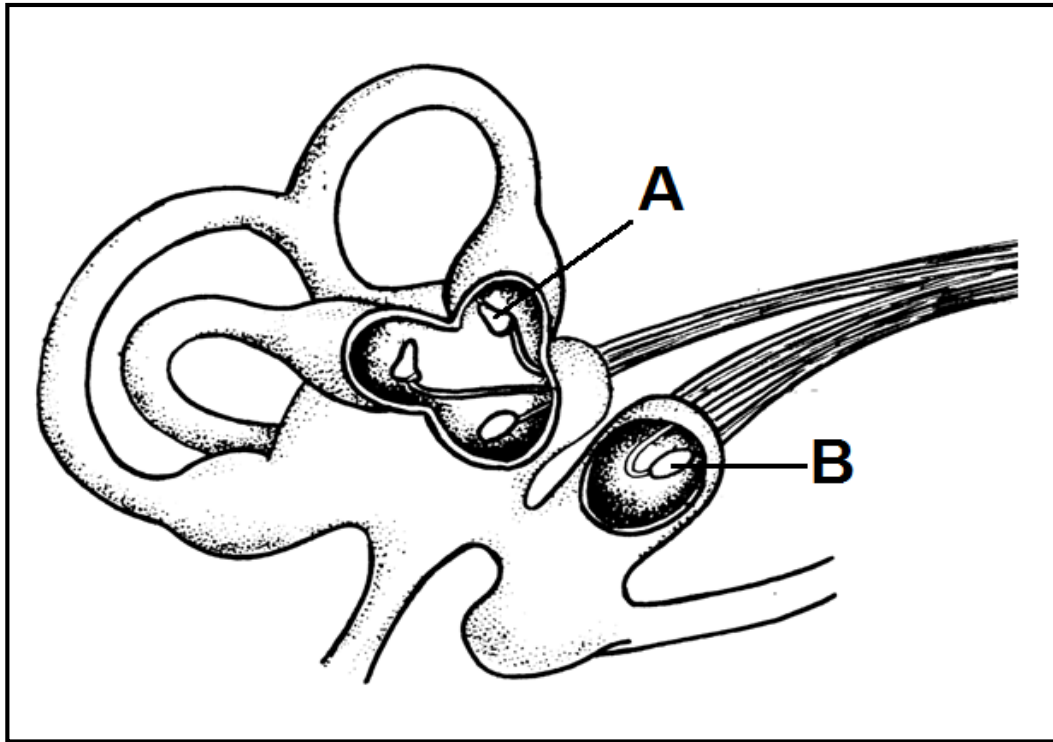
- 2.1.1 Identify hormones **A** and **B**. (2)
- 2.1.2 On which day of the cycle could the ovulation have taken place? (1)
- 2.1.3 Give a reason for your answer in QUESTION 2.1.2. (2)
- 2.1.4 Which **ONE** of the hormones (**A** or **B**) is responsible for the formation of *corpus luteum*? (1)
- 2.1.5 Explain the consequence if the Graafian follicle fail to secrete hormone **B**. (2)
- 2.1.6 Mention **ONE** secondary sexual characteristic that develops in the female at the onset of puberty. (1)

- 2.2 An experiment was performed by a student to determine the effect of distance on the curvature (thickness) of the lens of the human eye.
- The student sat at the end of a wooden desk in a well-lit room.
  - A 2 m measuring tape was stretched from one end of wooden desk to the other.
  - The student covered the student's one eye with an eye patch.
  - A pencil was held in front of the student's uncovered eye for 10 seconds.
  - The student focussed on the pencil until a clear image could be seen and at the same time the curvature of the lens of the student's eye was measured with an optical instrument.
  - The student repeated the previous step by placing the pencil at various distances from the student's eye.
  - The student recorded all the data in a recording.



- 2.2.1 Formulate a hypothesis for the investigation. (2)
- 2.2.2 State TWO factors that should have been kept constant during the investigation. (1)
- 2.2.3 State ONE way in which the reliability of the investigation can be improved. (2)
- 2.2.4 Describe how the curvature of the lens will change as the pencil is placed further away from the eye. (5)
- 2.2.5 If this person is unable to see the pencil when it is placed closer to the eye:
- (a) Name the disorder that the person is suffering from. (1)
  - (b) State ONE way in which the disorder mentioned can in QUESTION 2.2.5(a) can be treated. (1)
- 2.2.6 Name the part of the eye that regulates the amount of light entering the eye to enhance clear vision. (1)

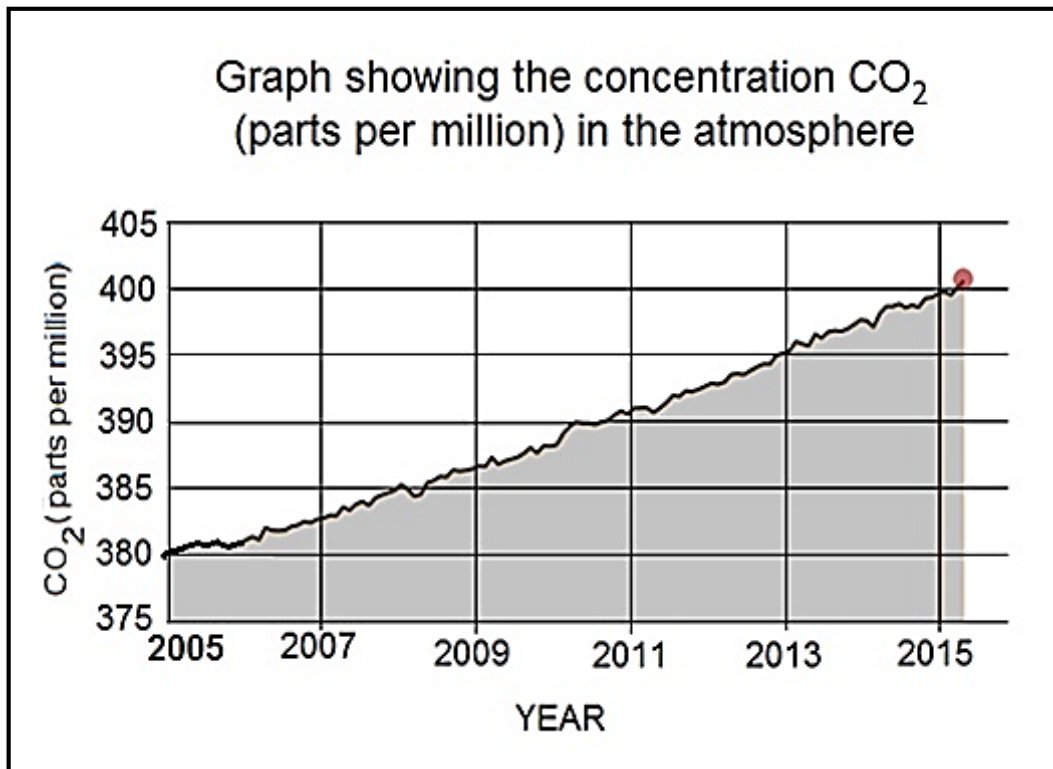
2.3 The diagram below represents the structure of human inner ear.



2.3.1 Identify the receptors **A** and **B**. (2)

2.3.2 Describe how balance and equilibrium is maintained by the human body. (5)

- 2.4 Study the graph below showing the percentage of carbon dioxide concentration in the atmosphere between 2005 and 2015.



- 2.4.1 Calculate the percentage increase in the concentration of CO<sub>2</sub> from 2005 to 2015. Show ALL workings. (3)
- 2.4.2 Predict the level of CO<sub>2</sub> in the year 2025 if the current trend is continued. (2)
- 2.4.3 Mention TWO activities that cause an increase in the concentration of CO<sub>2</sub> in the atmosphere. (2)
- 2.4.4 Describe how an increase in carbon dioxide concentration can contribute to climate change. (4)

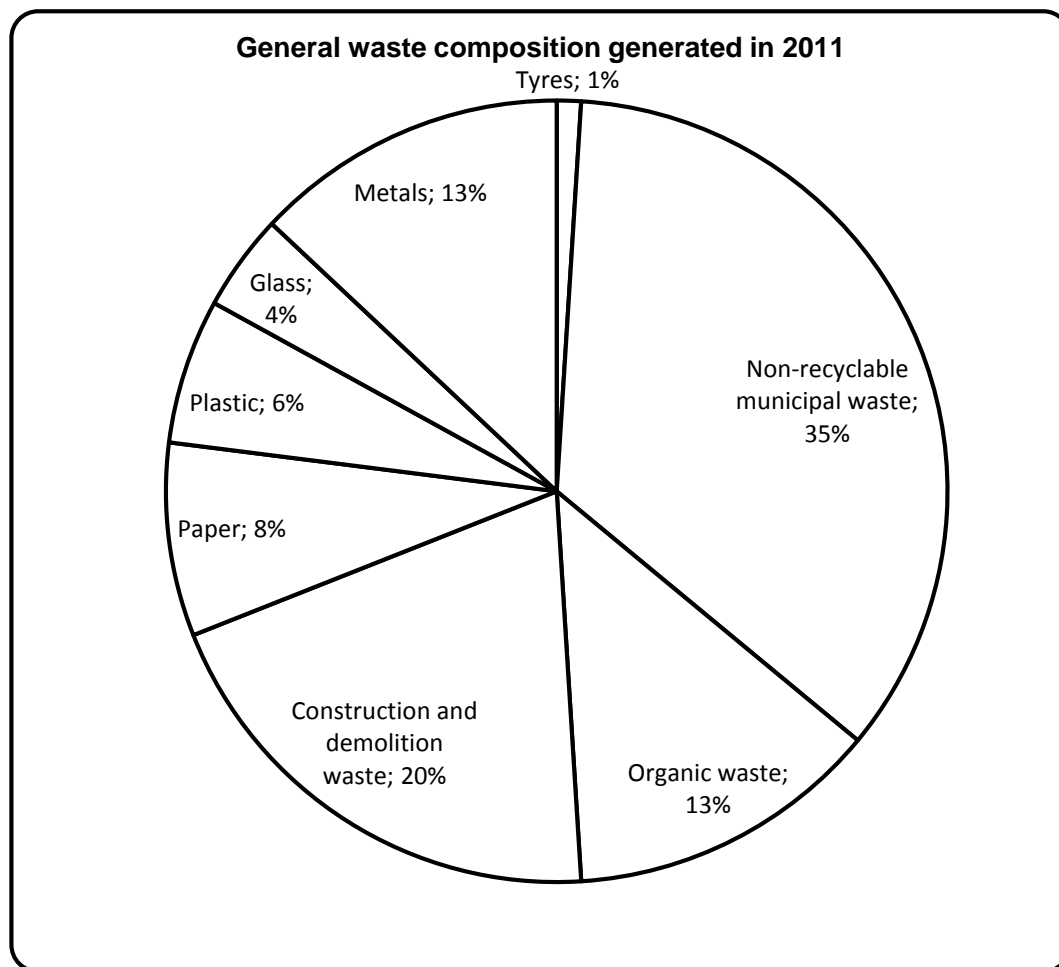
**[40]**

**QUESTION 3**

3.1 South Africa generated 59 million tons of general waste in 2011. An estimated 10% of all waste generated in South Africa was recycled in 2011. The remaining quantity of general waste was thrown in landfill sites.

3.1.1 Calculate the estimated quantity of general waste that was thrown in landfill sites in 2011. Show all working. (3)

The graph below shows the percentage of each components that form part of general waste generated in South Africa in 2011.



[Adapted from: [sawic.environment.gov.za](http://sawic.environment.gov.za)]

3.1.2 With reference to the pie chart shown above, what is the total percentage of waste that could have been re-cycled? (2)

3.1.3 State ONE way in which organic waste could be used to our advantage. (1)

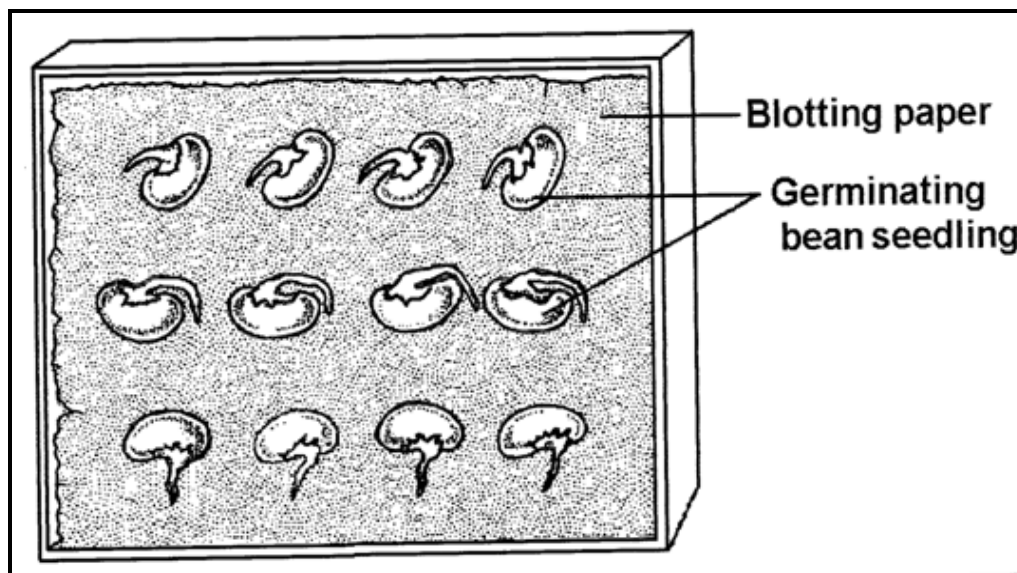
3.1.4 State TWO reasons why dumping of waste in a residential area is strictly prohibited by municipalities in South Africa. (2)

3.2 An investigation was conducted to determine the effect of an external stimulus on plant growth movement.

The procedure was as follows:

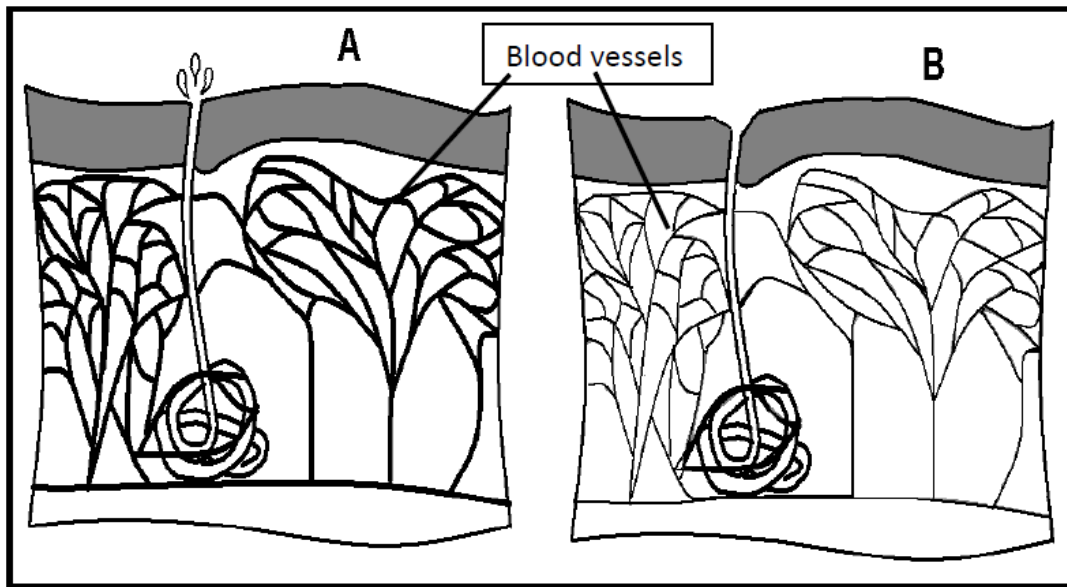
- A glass jar was lined with a layer of thick blotting paper.
- Approximately 21 germinating bean seeds were placed between the glass beaker and the blotting paper so that the root tips and coleoptiles of each seedling are visible through the glass.
- The seedlings were arranged as follows:
  - seven seedlings with their root tips pointing downwards
  - another seven with their root tips pointing upwards
  - and the remaining seedlings with their root tips pointing in a horizontal direction.
- The sides of the glass jar were covered with aluminium foil.
- The growth response of the root tips was observed.

The diagram below shows the observation made after a week. (The diagram below does not represent all of the 21 seedlings.)



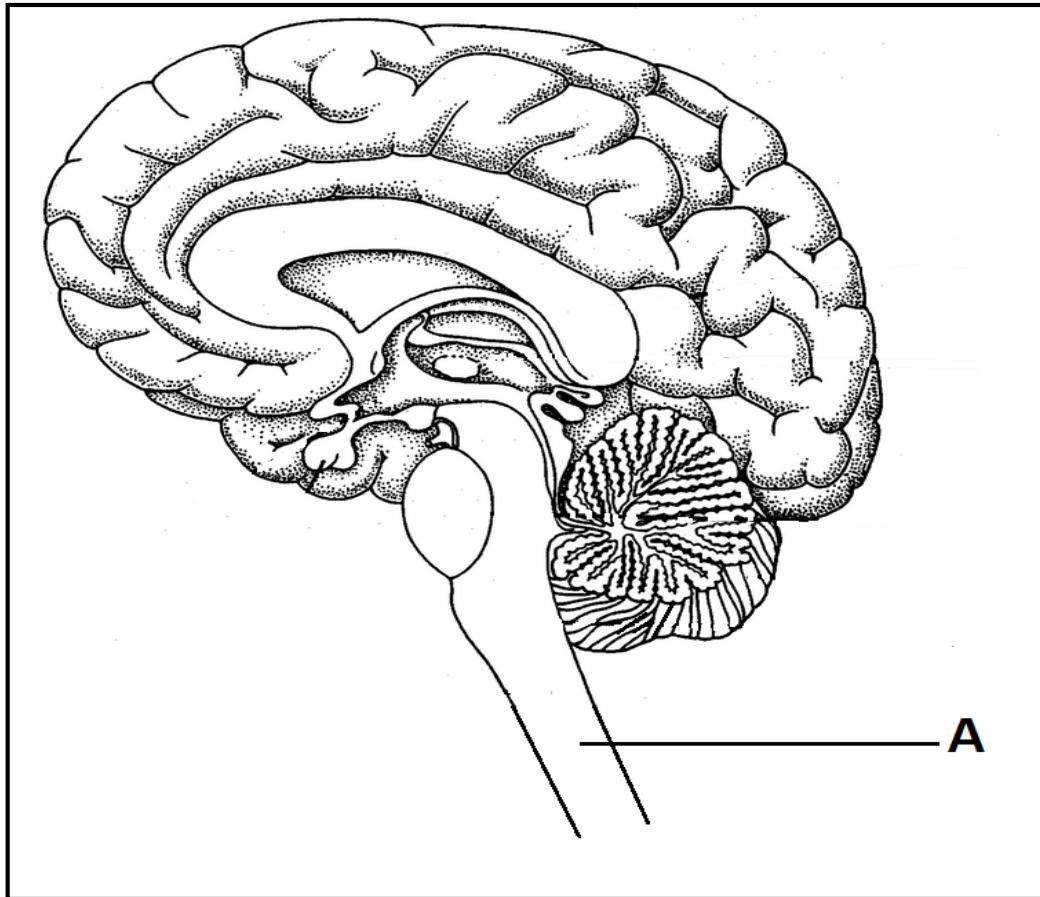
- 3.2.1 What was the aim of conducting the above experiment? (1)
- 3.2.2 Define the term *tropism*. (2)
- 3.2.3 Explain ONE step that was done to improve the validity of the investigation. (2)
- 3.2.4 Name the plant hormone that is responsible for the growth response that is being investigated. (1)
- 3.2.5 Describe the effect of the external stimulus on a root tip placed horizontally. (5)

3.3 The diagram **A** and **B** represent the longitudinal section of the human skin exposed to different environmental temperatures.



- 3.3.1 Which diagram (**A** or **B**) is exposed to warm environmental condition? (1)
- 3.3.2 Provide TWO observable reasons for your answer in QUESTION 3.3.1. (2)
- 3.3.3 Name the part of the brain that monitors the body temperature. (1)
- 3.3.4 Explain how sweat glands will function to regulate the body temperature after drinking a hot tea. (4)

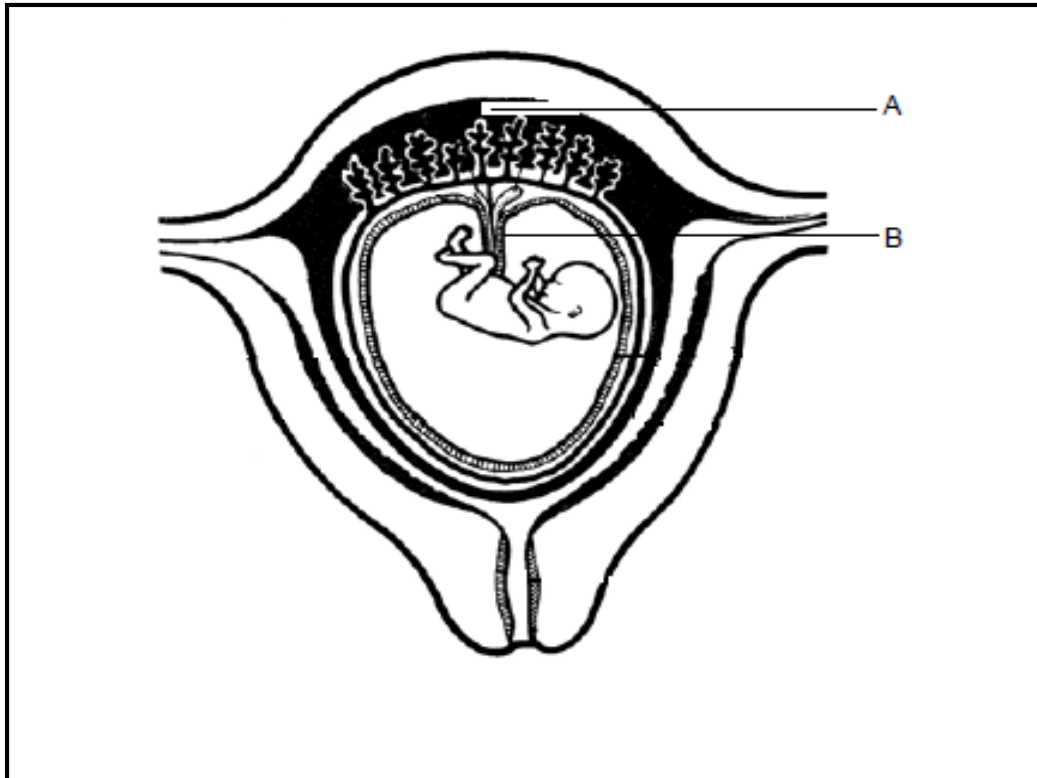
3.4 The diagram below shows the structure of a human brain.



- 3.4.1 Identify part **A**. (1)
- 3.4.2 If the part labelled **A** in the diagram is damaged during an accident, explain how:
- (a) The person is able to see, taste, smell, speak, hear and maintain heart and rate of breathing normal (3)
  - (b) The pituitary gland is still able to control the activities of other endocrine glands in the body (2)



3.5 Study the diagram showing a developing foetus in the uterus.



- 3.5.1 Explain TWO reasons why the foetus would die if part **B** is damaged. (4)
- 3.5.2 Explain how the hormone secreted by part **A** prevents a second pregnancy during the development of a foetus. (3)

[40]

**TOTAL SECTION B: 80**

**SECTION C****QUESTION 4**

A large spider fell on the lap of a person who was reading a book under a tree. The person dived out of the chair with a loud scream before running away at a high speed to a safer place.

State what is meant by *reflex action* and describe how the reflex action functioned in order for the person to react quickly. Also explain how the adrenalin helped the person to react quickly as stated above.

Content: (17)  
Synthesis: (3)

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

**TOTAL SECTION C: 20**  
**GRAND TOTAL: 150**