Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2014

LIFE SCIENCES P1

MARKS: **150**

TIME: **2½ hours**

LFSCE1

This question paper consists of 19 pages.

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 Which ONE of the following is a method of reproduction in which young develop from eggs that are fertilised internally and retained within the mother's body after fertilisation but obtain their nutrients from the egg yolk and not from the mother?

A Vivipary
B Ovipary
C Ovovivipary
D Binary fission

1.1.2 In an amniotic egg, the role of the allantois is to …

A produce oxygen for the growing embryo.
B store waste products produced by the embryo.
C serve as food for the embryo.
D act as a shock absorber to prevent possible mechanical damage.

1.1.3 Which ONE of the following fluids is released from the uterus just before the start of child birth?

A Urine from the baby
B Amniotic fluid
C Placental fluid
D Chorionic fluid

1.1.4 The following statements describe the functions of placenta:

(i) Serves as an attachment of the embryo to the mother
(ii) Allows for the diffusion of dissolved nutrients from the mother to the foetus
(iii) Allows for the diffusion of excretory wastes from the mother to the foetus
(iv) Allows for the diffusion of oxygen from the mother to the foetus

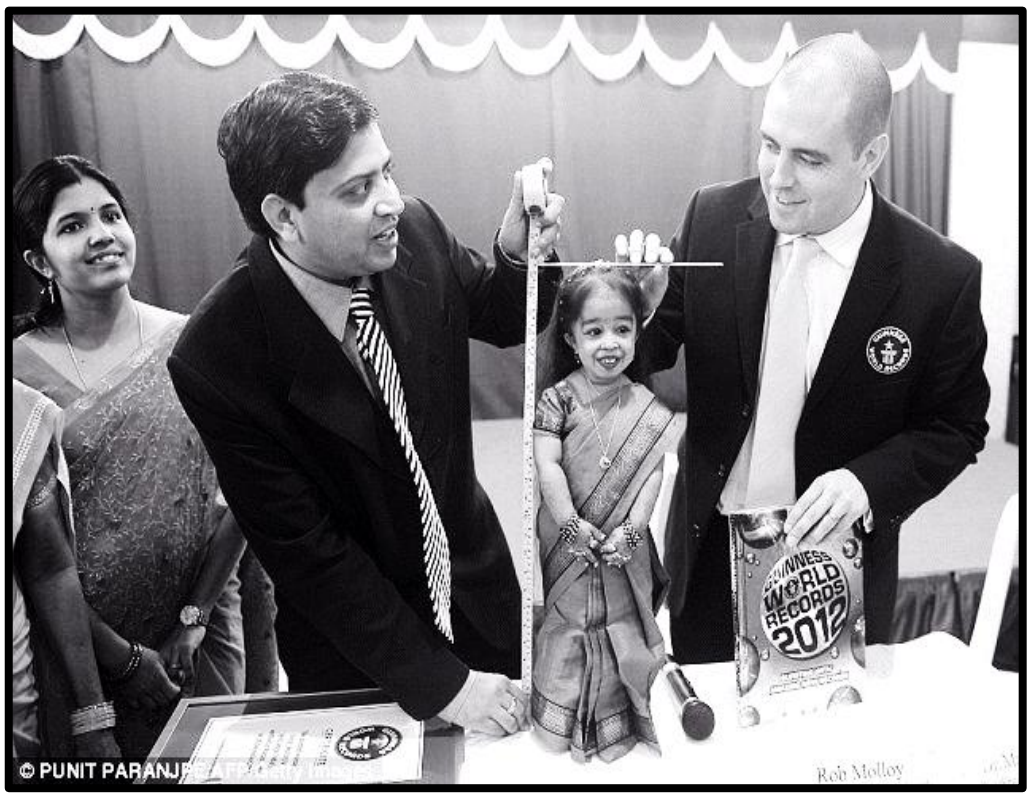
Which ONE of the following combinations correctly describe the functions of placenta?

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

1.1.5 Which ONE of the problems listed below is not directly caused by the dumpsites and landfill sites in an area?

A Uncontrolled breeding of disease-carrying animals such as rats and flies
B Increase in the prevalence of skin cancer and colour blindness among children
C Release of greenhouse gases such as methane and carbon dioxide due to excessive decomposition
D Release of dust and unpleasant smells

1.1.6 Which ONE of the following endocrine glands resulted in the defective physiological condition shown below?



[Jyoti Amge, The world's shortest woman. (62,8 cm) Lauched Guinnes World Records 2014. www.huffingtonpost.com/2013/09/11jyoti-amge_n_3907742-html]

A Adrenal gland
B Ovary
C Pituitary gland
D Pancreas

1.1.7 The diagram below shows a process that takes place during meiosis. Which ONE of the following illustrations correctly represents the end-product of the cell process shown in FIGURE 1?

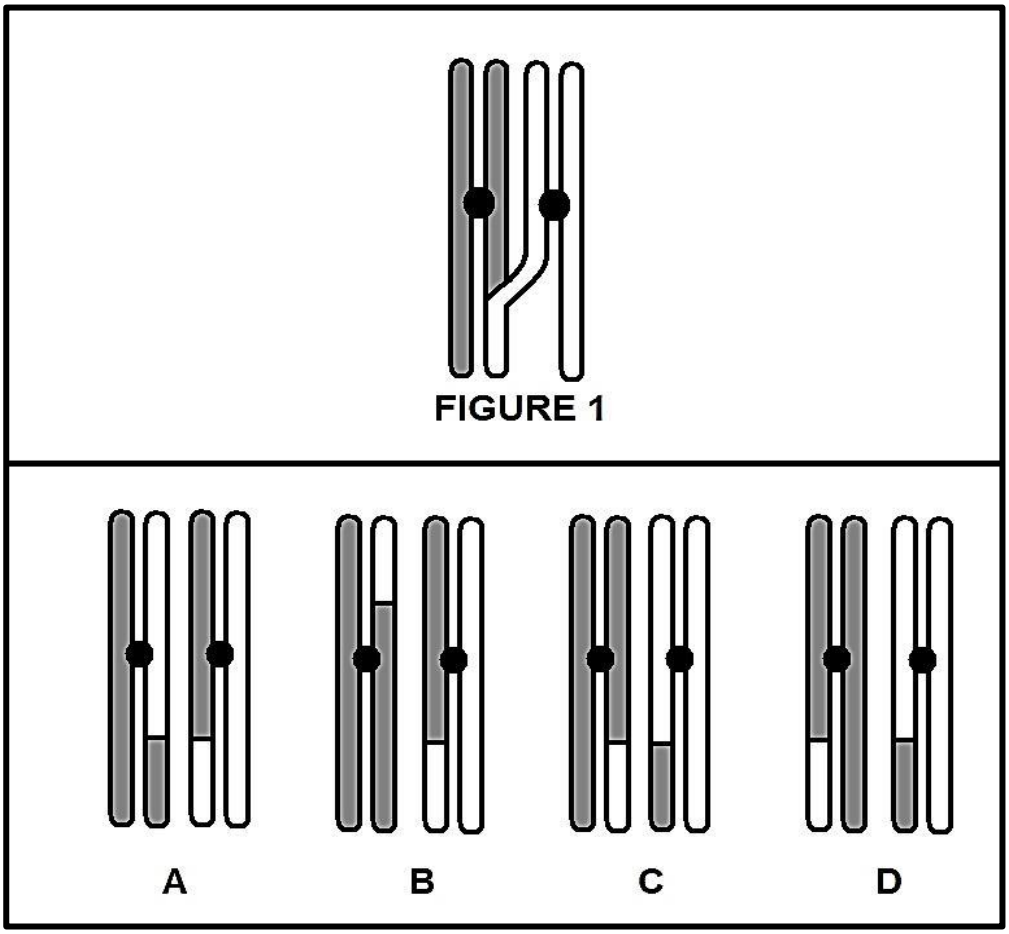


FIGURE 1

A (i)
B (ii)
C (iii)
D (iv)

1.1.8 Which ONE of the following hereditary defects could occur when a gamete with 24 chromosomes fuses with a gamete with 23 chromosomes?

A Haemophilia
B Down syndrome
C Colour blindness
D Albinism

1.1.9 A process by which spermatozoa are produced from the germinal epithelium of the testis is known as …

A oogenesis
B ovulation
C spermatogenesis
D fertilisation

1.1.10 The homeostatic function of the skin is mainly that of …

A osmoregulation.
B acid-base regulation.
C thermoregulation.
D regulation of the sugar level. (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 blood vessel that carries oxygenated blood to the foetus

1.2.2 The period during which the embryo develops within the uterus of the mother up to the time the baby is born

1.2.3 A disorder that occurs when one's own immune system surrounds, attacks and destroys the myelin sheath that envelops the axons

1.2.4 Three month old human embryo

1.2.5 The membrane that forms finger-like projections which grows into the uterine wall

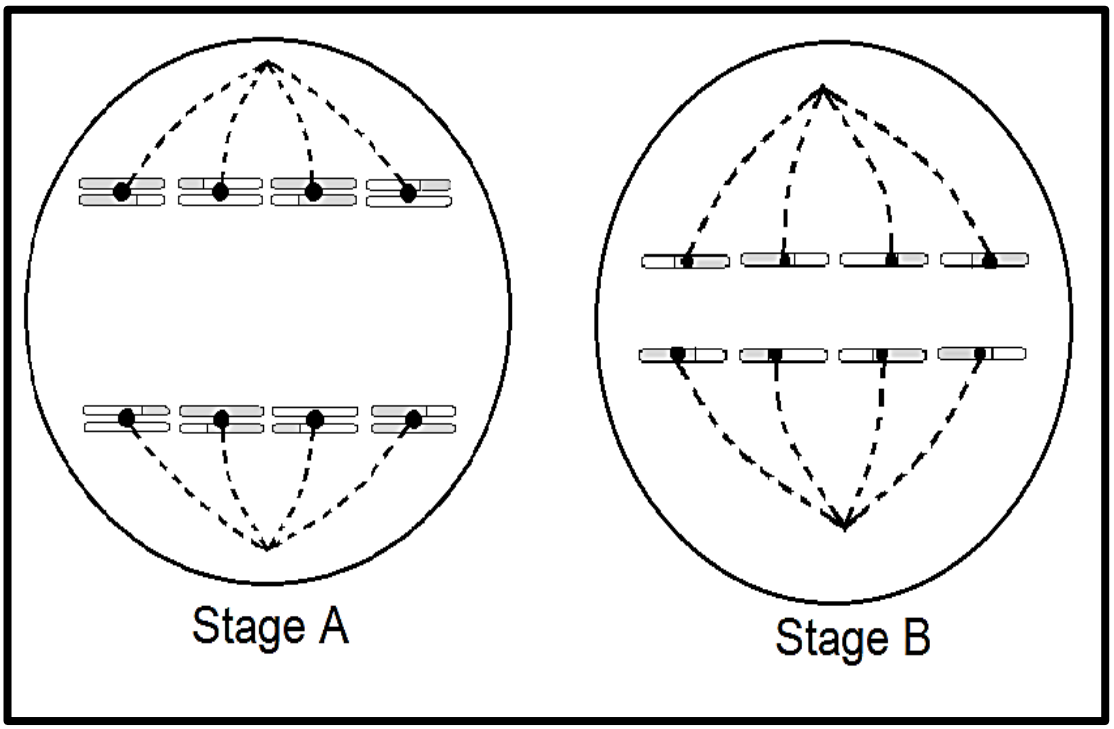
1.2.6 Organisms that occupy an area they do not normally inhabit and where they outcompete the natural species of that area (6 x 1) (6)

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 (1.3.1–1.3.6) in the ANSWER BOOK, for example 1.3.7 **B ONLY**.

COLUMN I		COLUMN II	
1.3.1	The development in birds where the hatchlings can move soon after being born	A B	Precocial development Altricial development
1.3.2	Place where fertilisation occurs in humans	A B	Cervix Fallopian tube
1.3.3	The cells that secretes testosterone in males	A B	Stem cells Sertoli cells
1.3.4	Having access to food, on a regular basis, so as to ensure healthy living	A B	Food security Food sampling
1.3.5	Parts of a spermatozoan	A B	Acrosome Tail
1.3.6	Reduction of water quality	A B	Mining Alien plants

(6 x 2) (12)

1.4 The diagrams below represent two stages of meiosis. Study the diagrams and answer the questions that follow.



1.4.1 Identify stages A and B respectively. (2)

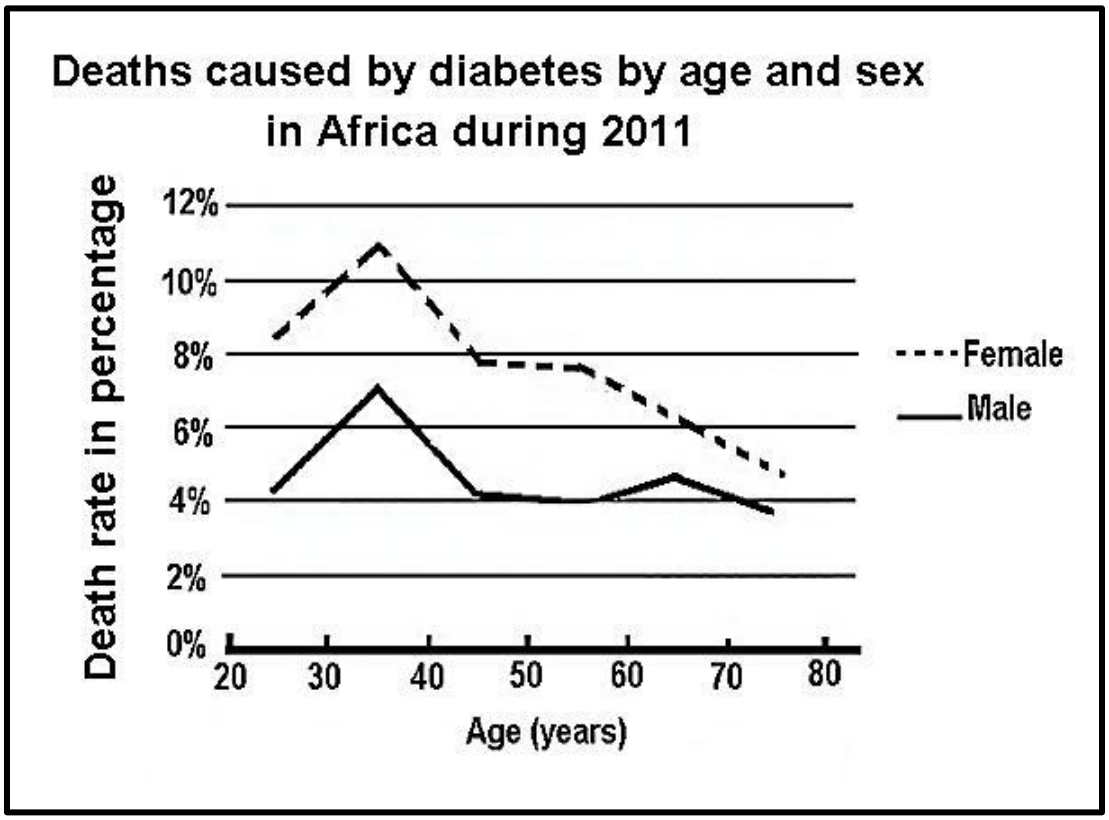
1.4.2 In which stage (A or B), is the actual reduction of the number of chromosomes taking place? (1)

1.4.3 Name TWO processes that lead to genetic variation in daughter cells. (2)

1.4.4 State the number of haploid gametes that would be produced from one diploid cell. (1)

1.4.5 State the number of chromosomes that would be found in each gamete, when the cell shown above completes meiosis. (1)

1.5 Study the graph below and answer the following questions.



[Source: http//www.idf.org/diabetesatlas/Se/Africa]

1.5.1 The malfunctioning of which endocrine gland leads to *diabetes mellitus*? (1)

1.5.2 The lack of which ONE of the hormones secreted by the endocrine gland mentioned in QUESTION 1.5.1, causes *diabetes mellitus*? (1)

1.5.3 According to the above data, what percentage of 50 year old African males died due to *diabetes mellitus*? (1)

1.5.4 Which gender has the highest death rate due to *diabetes mellitus*? (1)

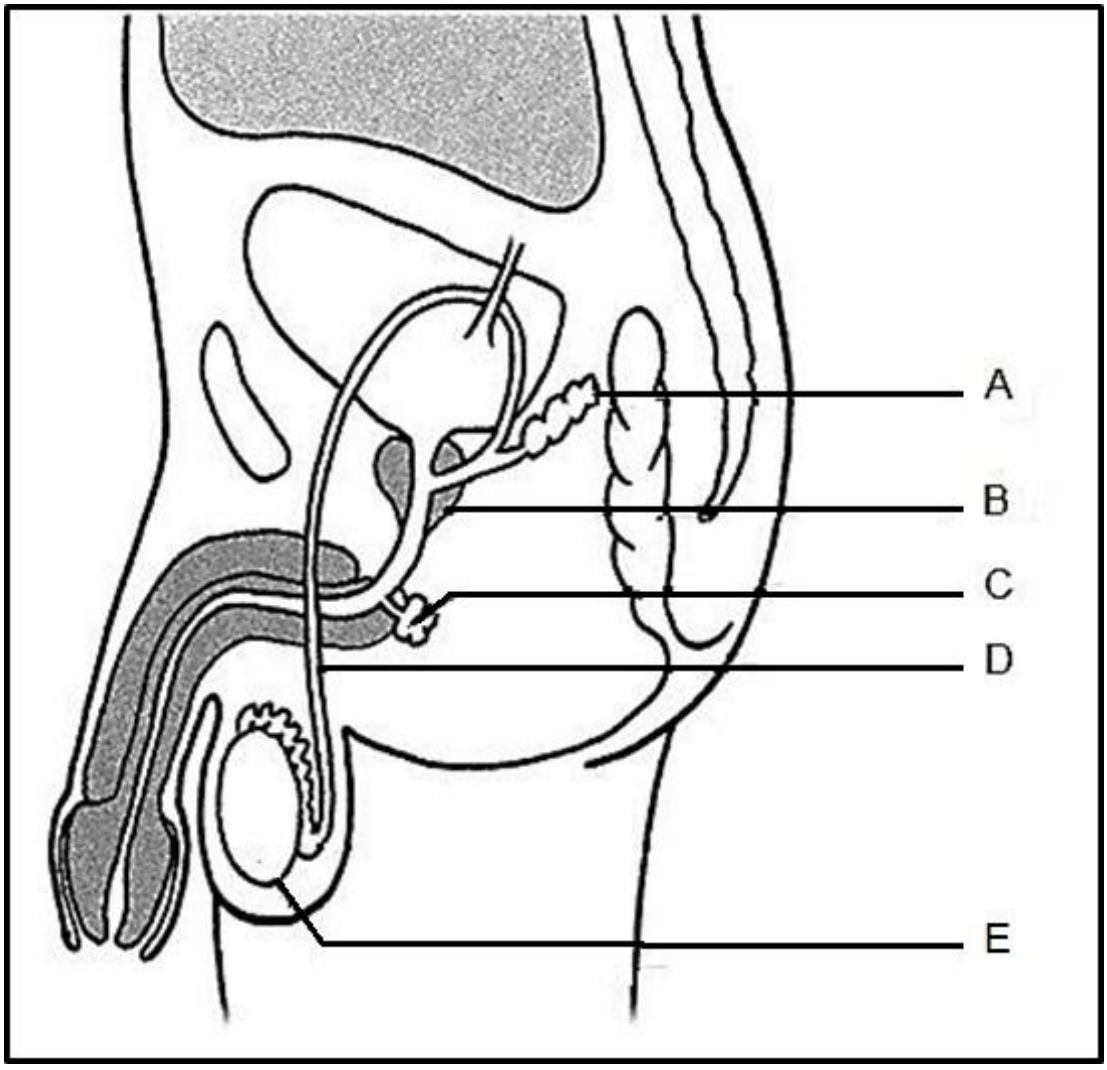
1.5.5 Which age group has the highest death rate? (1)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below shows the structure of a male reproductive system of human. Study the diagram and answer the questions that follow.



2.1.1 Give labels for **A** and **C**. (2)

2.1.2 State ONE function of the secretion from part labelled **B**. (1)

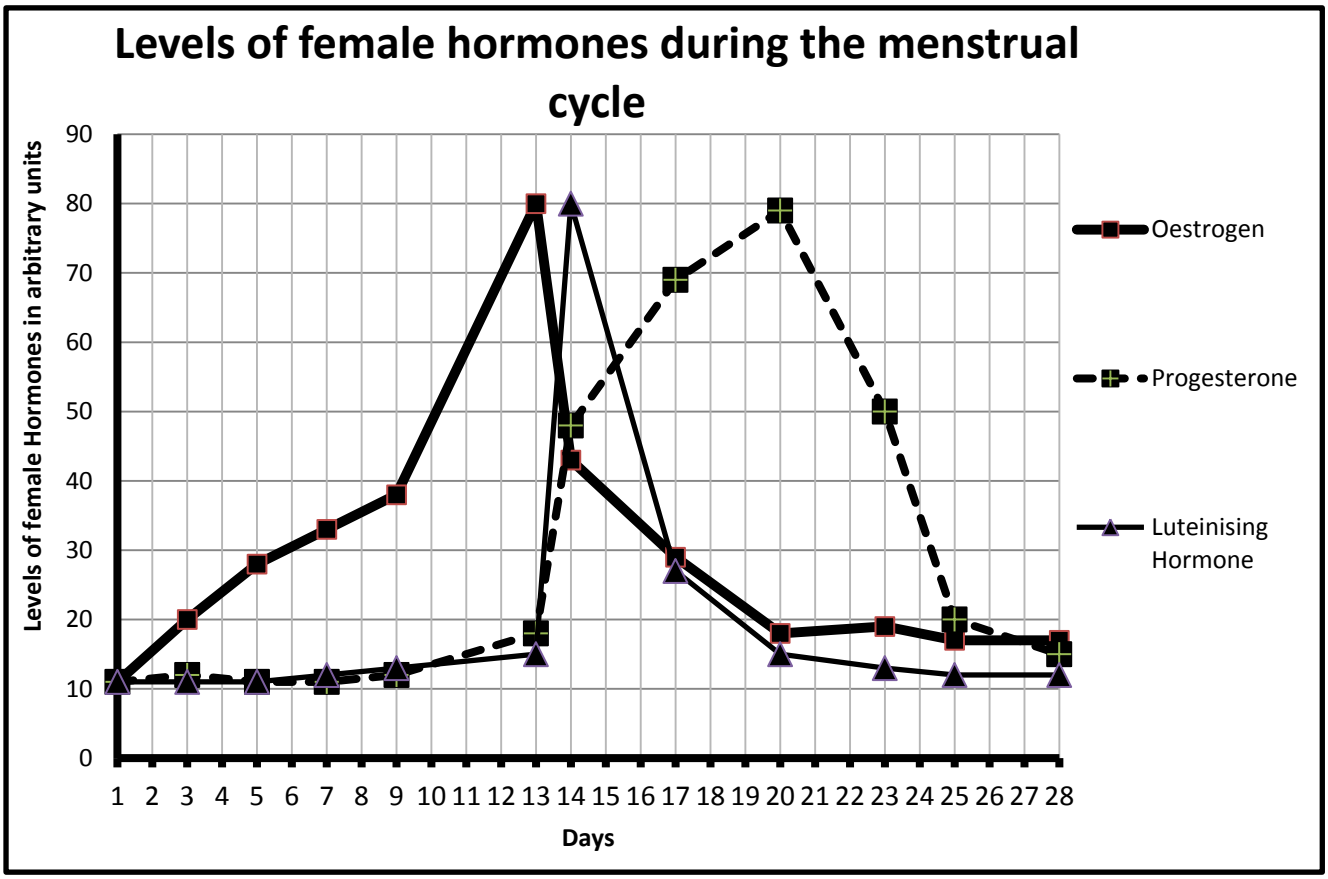
2.1.3 State the letter of the part that:

(a) Transports sperms from the epididymis (1)

(b) Produces male hormone (1)

2.1.4 Name the structure where meiosis takes place. (1)

2.2 Study the graphs below and answer the questions that follow.



2.2.1 State why there is a sharp increase in the production of:

(a) Oestrogen from day 9 to 13 (1)

(b) Luteinising hormone from day 13 to 14 (1)

2.2.2 On which day did ovulation occur? (1)

2.2.3 Give ONE reason for your answer in QUESTION 2.2.2 that can be deduced from the given graph. (1)

2.2.4 State the structure in the ovary that produces the following:

(a) Oestrogen (1)

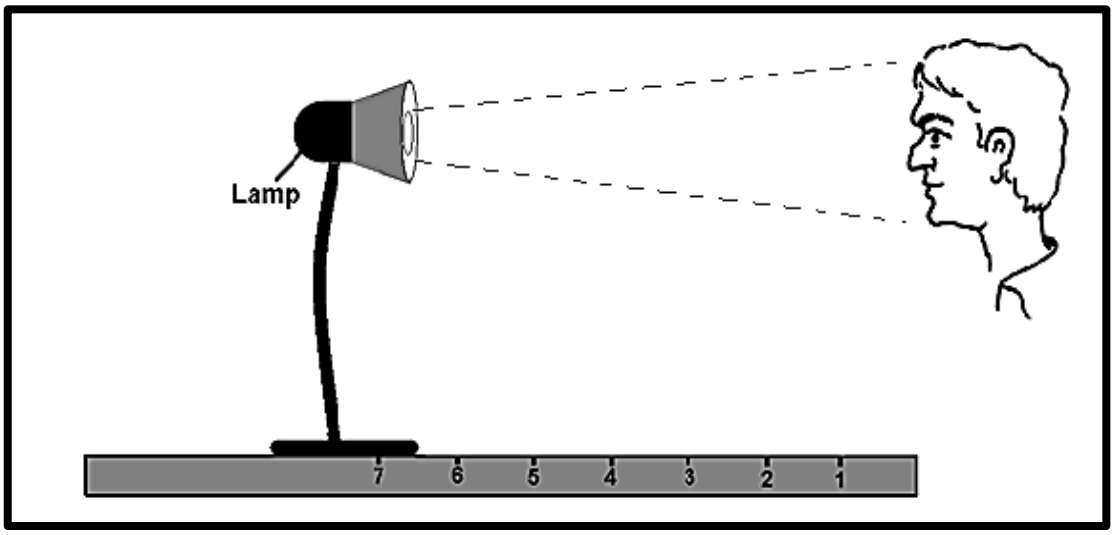
(b) Progesterone (1)

2.2.5 What conclusion can be made if the level of progesterone:

(a) remains high from day 20–28? (1)

(b) drops as shown in the above graph? (1)

2.3 An experiment was conducted to investigate the diameter of the pupil to change in light intensity. An electric lamp was placed at various distances from the face of a person as displayed in the diagram below. Study the diagram and the table of data below to answer the questions.



2.3.1 Suggest a possible hypothesis at the start of the investigation. (2)

2.3.2 Which TWO factors should be kept constant during this investigation? (2)

2.3.3 Identify the:

(a) independent factor (1)

(b) dependent factor (1)

The table below shows the diameter of the pupil when the light was placed at various distances from the person's face.

Position of the lamp	Diameter of the pupil (mm)
1	1,2
2	1,8
3	2,4
4	3,0
5	3,6
6	4,2
7	4,8

2.3.4 Based on the available data would you accept, or reject the initial hypothesis? (1)

2.3.5 What conclusion can be deduced from the available data? (2)

2.3.6 Suppose the lamp was moved from position 7 to position 2. Describe the mechanism that caused the change in the diameter of the pupil. (4)

2.3.7 Name the process mentioned in QUESTION 2.3.6. (1)

2.3.8 Plot a bar graph to represent the data gathered during this investigation. (8)

2.4 Define the following terms

2.4.1 Crop rotation (2)

2.4.2 Eutrophication (2)

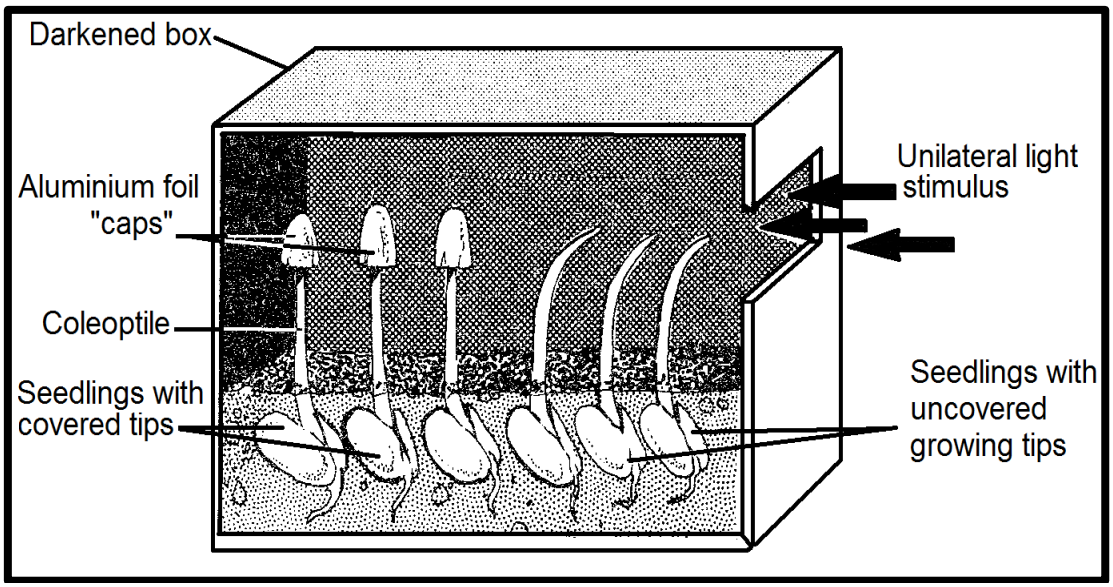
[40]

QUESTION 3

3.1 An experiment was conducted by a learner to investigate the growth movement of plants in response to one-sided light stimulus.

- 6 germinating oats seedlings were planted in a shoe box containing wet soil.
- The growing tips of three of the coleoptiles (enfolded growing tips) were covered with aluminium foil caps and the other three were left uncovered.
- A narrow window was cut out by a slit on one side of the shoe box to allow the entry of sunlight into the shoe box from one side.
- The diagram below shows the longitudinal section of the apparatus that represents the result of the experiment after a week.

Study the diagram below and answer the questions that follow.



3.1.1 What plant growth movement was investigated in the above experiment? (1)

3.1.2 Define the scientific term mentioned as a response in QUESTION 3.1.1 above. (2)

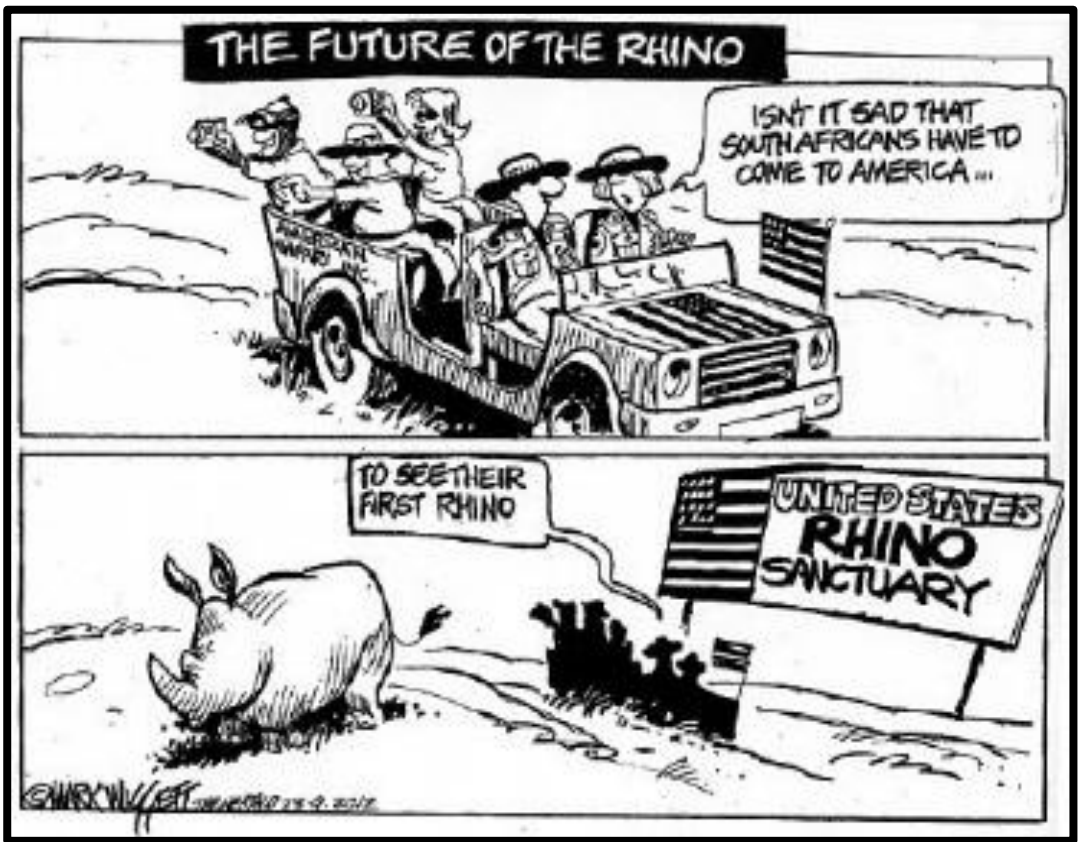
3.1.3 What was the purpose of using a darkened box with a single window, as shown in the diagram? (1)

3.1.4 Which plant hormone causes this plant growth movement? (1)

3.1.5 Explain why the seedlings with uncovered growing tips bend towards the light. (5)

3.1.6 Predict the direction of growth if the growing tips of the uncovered seedlings are covered with aluminium foil 'caps'. (1)

3.2 The cartoon below shows the plight of the rhinoceros population in South Africa. Study the cartoon and answer the questions that follow.



[Mark Wiggett's cartoon published in *The Herald* Newspaper. 25/09/2012]

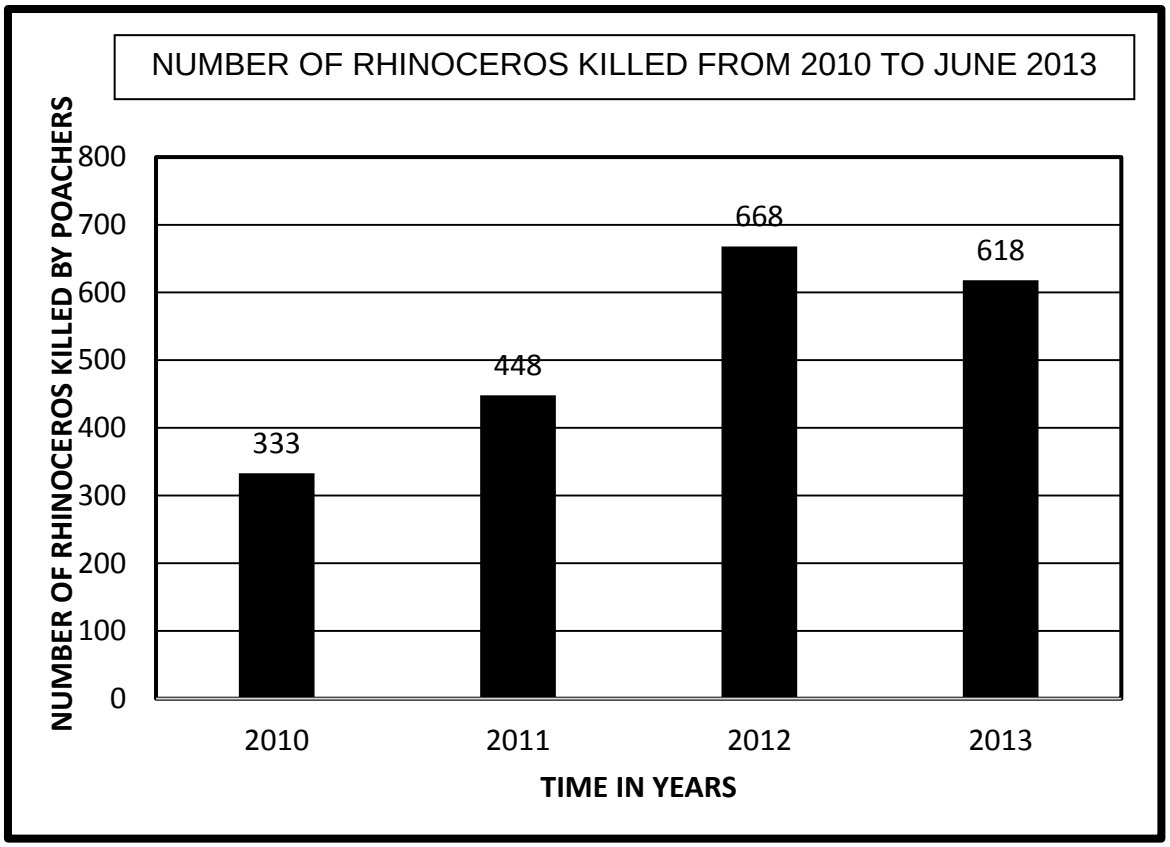
3.2.1 What is the main cause of a drastic decrease of the rhinoceros population in South Africa? (1)

3.2.2 Explain the future chances of survival of the rhinoceros population in South Africa as depicted in the above cartoon. (3)

3.2.3 Which body part of rhinoceros is targeted by the criminals? (1)

3.2.4 Suggest TWO ways to stop rhinoceros population being killed in South Africa. (2)

The graph below shows the number of rhinoceros killed by an illegal activity mentioned in QUESTION 3.2.1. Study the graph and answer the following question:



3.2.5 Calculate the percentage increase in the killing of rhinoceros in South Africa, from 2011 to 2012. (Show all working.) (3)

3.2.6 State the general trend shown in the graph from 2010 – 2012.. (1)

3.3 The photograph shown below was taken while a person was chased by a hippopotamus in the wild. Study the photograph and answer the following questions.

[www.dailymail.co.uk/news/article-1208479. Saturday, 19 October, 2013]

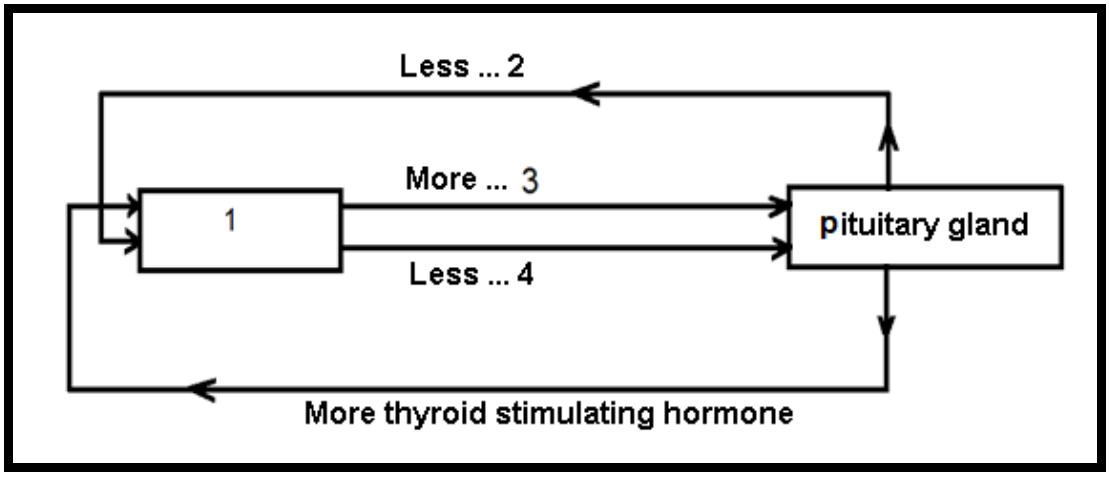
3.3.1 Name the hormone released by the person, to deal with the dangerous situation shown in the above photograph. (1)

3.3.2 Which gland in the human body is responsible for the secretion of the hormone mentioned in the QUESTION 3.3.1? (1)

3.3.3 State whether the gland mentioned in QUESTION 3.3.2 is an exocrine or endocrine gland. (1)

3.3.4 Explain any TWO effects of the hormone named in QUESTION 3.3.1 above. (4)

3.4 The diagram below illustrates the homeostatic control of the pituitary gland (hypophysis) over the functioning of another endocrine gland in the human body. Study the diagram and answer the questions that follow.



3.4.1 By which mechanism is homeostatic control achieved in the above process? (1)

3.4.2 Give labels for the following:

(a) Gland labelled **1**

(b) Hormone labelled **2**

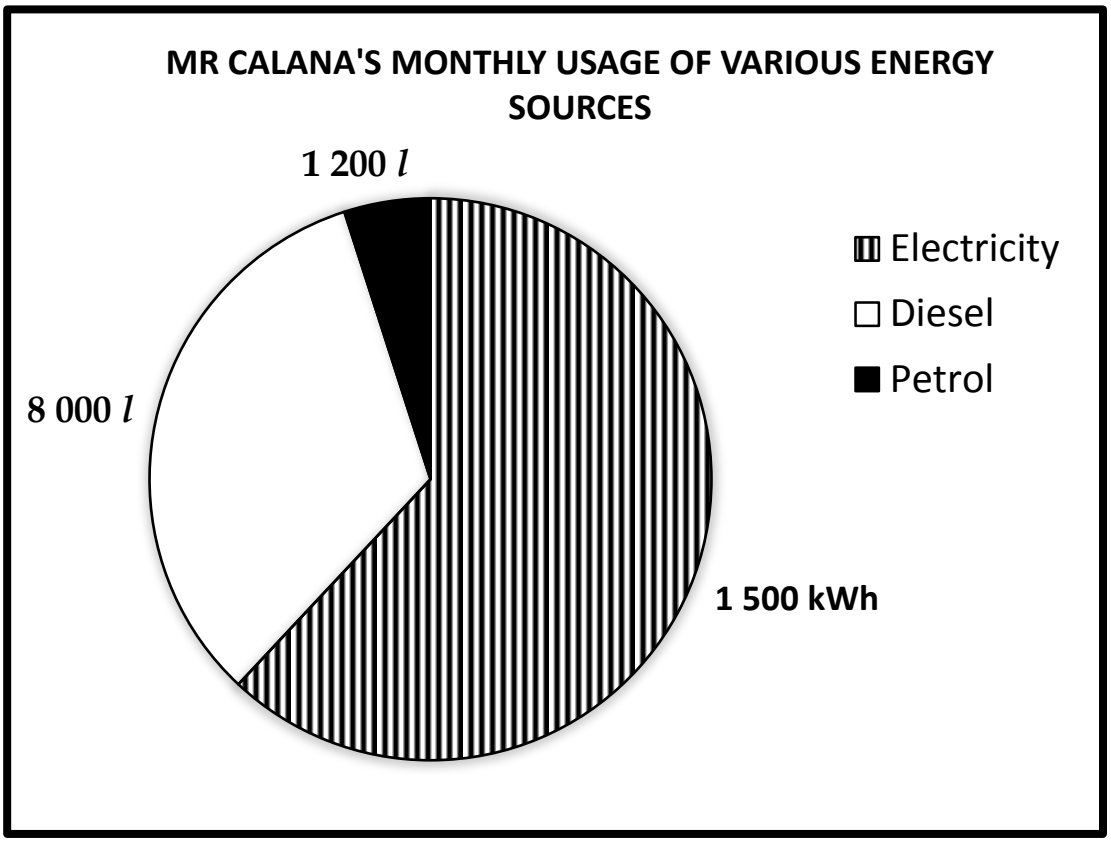
(c) Hormone labelled **3**

(d) Hormone labelled **4** (4 x 1) (4)

3.4.3 Name the nutrient required for the proper functioning of part labelled **1**. (1)

3.4.4 Which physiological defect can be attributed to the absence of the mineral mentioned in QUESTION 3.4.3, in our daily diet? (1)

3.5 Study the graph showing the monthly usage of various energy sources to run a business. Use the information from the graph and the table below to calculate the total carbon footprint of Mr Calana.



Emission factor for electricity and some fossil fuels

Energy source	Emission factor
Electricity	0,845 per kilowatt per hour (kWh)
Petrol	2,68 per litre
Diesel	2,35 per litre

Use the formula given below to calculate the carbon footprint of Mr. Calana.

Amount of CO_2 released in kg = Amount of energy source used per month x Emission factor (4)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Describe the role of the ear in hearing and the maintenance of balance.

Content: (17)
Synthesis: (3)

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

TOTAL SECTION C: 20
GRAND TOTAL: 150

