



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**LIFE SCIENCES P1**

**NOVEMBER 2015**

**MARKS: 150**

**TIME: 2½ hours**

**This question paper consists of 17 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. 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.



**SECTION A****QUESTION 1**

- 1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.
- 1.1.1 Which ONE of the following processes is responsible for the production of male gametes?  
A Spermatogenesis  
B Oogenesis  
C Ejaculation  
D Ovulation
- 1.1.2 The part of the central nervous system that protects the human body from serious injuries when a person steps barefoot on a thorn is the ...  
A cerebellum.  
B medulla oblongata.  
C spinal cord.  
D cerebrum.
- 1.1.3 When a person runs a race, sweating helps to ...  
A regulate the amount of salts in the body.  
B control the amount of glucose in the body.  
C cool the body through evaporation.  
D regulate the amount of water in the body.
- 1.1.4 Which ONE of the following is the correct sequence in which impulses are transmitted in a reflex action?  
A Receptor → sensory neuron → interneuron → motor neuron → effector  
B Receptor → motor neuron → sensory neuron → interneuron → effector  
C Receptor → motor neuron → interneuron → sensory neuron → effector  
D Receptor → interneuron → sensory neuron → motor neuron → effector
- 1.1.5 Which ONE of the following is a function of adrenalin?  
A Lowering blood pressure  
B Promoting the conversion of glucose to glycogen  
C Increasing skeletal muscle tone  
D Causing the blood vessels of the skin to dilate



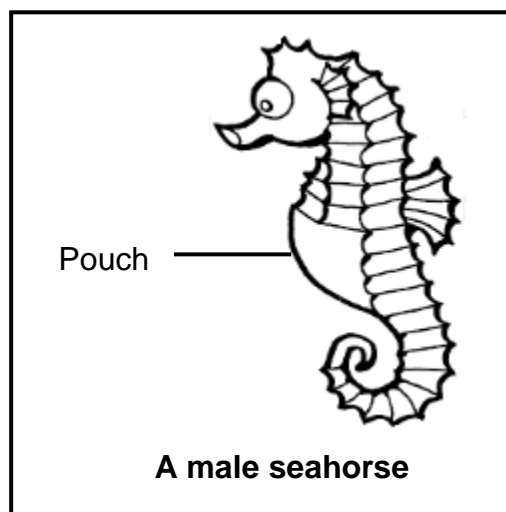
1.1.6 The following structures are part of the male reproductive system:

- (i) Scrotum
- (ii) Prostate gland
- (iii) Seminal vesicles
- (iv) Penis
- (v) Testes

Which ONE of the following combinations of structures produces semen?

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

1.1.7 In seahorses the female deposits the eggs into a pouch in the male's body. The male then secretes sperm into the pouch. Fertilisation takes place in the pouch. The fertilised eggs develop in the pouch.



What type of fertilisation and reproductive strategy does this represent?

- A External fertilisation and vivipary
- B Internal fertilisation and vivipary
- C External fertilisation and ovipary
- D Internal fertilisation and ovipary

**QUESTIONS 1.1.8 AND 1.1.9 REFER TO THE INVESTIGATION BELOW.**

An investigation was conducted to determine the effect of alcohol on reaction time.

The procedure was as follows:

- Fifty adult volunteers were used.
- Their reaction times were measured at the beginning of the investigation.
- They were each given alcohol to drink.
- Their reaction times were measured again after 30 minutes.

1.1.8 What is the independent variable in the investigation above?

- A Number of volunteers
- B Time after drinking alcohol
- C Reaction time
- D Alcohol in the body

1.1.9 The following factors were considered during the investigation:

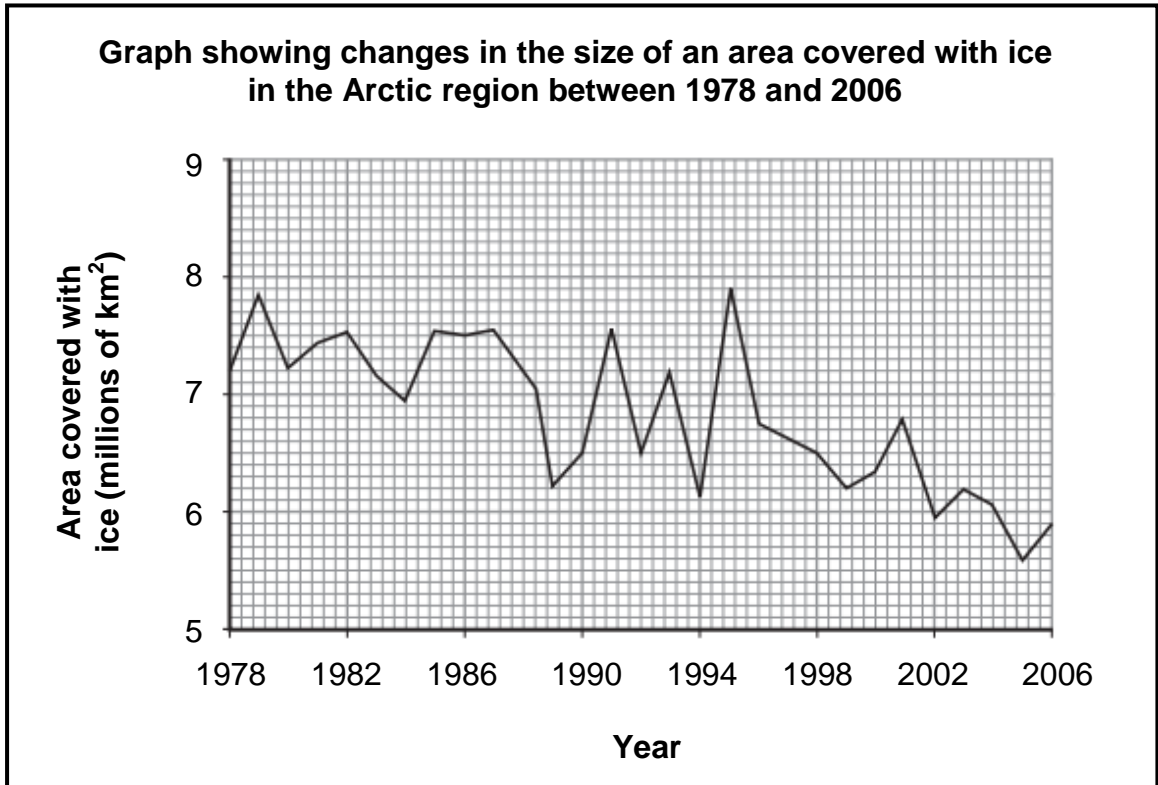
- (i) Age of the volunteers
- (ii) Number of volunteers
- (iii) Intake of alcohol
- (iv) Tool used to measure reaction time

Which ONE of the following combinations of factors will affect the validity of the investigation?

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

1.1.10 Rising temperatures on Earth, as a result of the enhanced greenhouse effect, have led to the melting of ice in glaciers.

The graph below shows the results of an investigation that measured changes in the size of an area covered with ice in the Arctic region between 1978 and 2006.



[Adapted from [nsidc.org](http://nsidc.org)]

The difference between the size of the area covered with ice in 1978 and the size of the area covered with ice in 1998 is ... million km<sup>2</sup>.

- A 1,3
- B 7,2
- C 0,7
- D 5,9

(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 to 1.2.7) in the ANSWER BOOK.

- 1.2.1 The part of the brain that controls the heart rate
- 1.2.2 The maintenance of a constant internal environment in the body within certain limits
- 1.2.3 The plant growth hormone that promotes seed dormancy
- 1.2.4 A collective name for the membranes that protect the brain
- 1.2.5 A hormone that regulates the salt concentration in human blood
- 1.2.6 A layer in the atmosphere that is damaged by chlorofluorocarbons (CFCs)
- 1.2.7 A hormone that stimulates the maturation of sperm (7 x 1) **(7)**

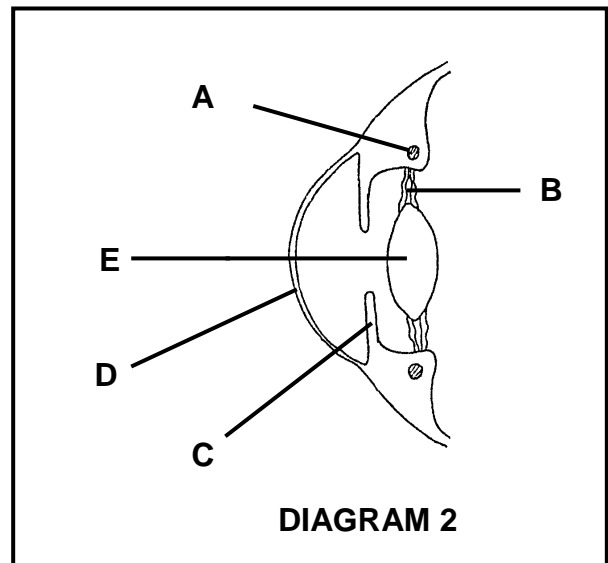
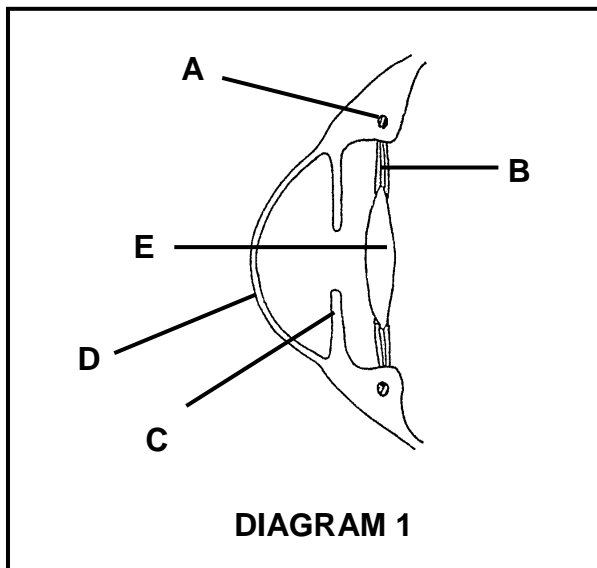
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.5) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	Requires the production of a large number of gametes to ensure survival of the species	A: External fertilisation B: Internal fertilisation
1.3.2	A type of development in birds where the young are incapable of moving and feeding themselves	A: Precocial development B: Altricial development
1.3.3	A plant defence mechanism against pathogens	A: Chemicals B: Thorns
1.3.4	A gland which produces substances that are transported to target organs by ducts	A: Endocrine gland B: Exocrine gland
1.3.5	Used by plants to reduce the chances of being fed upon by herbivores	A: Chemicals B: Thorns

(5 x 2) **(10)**



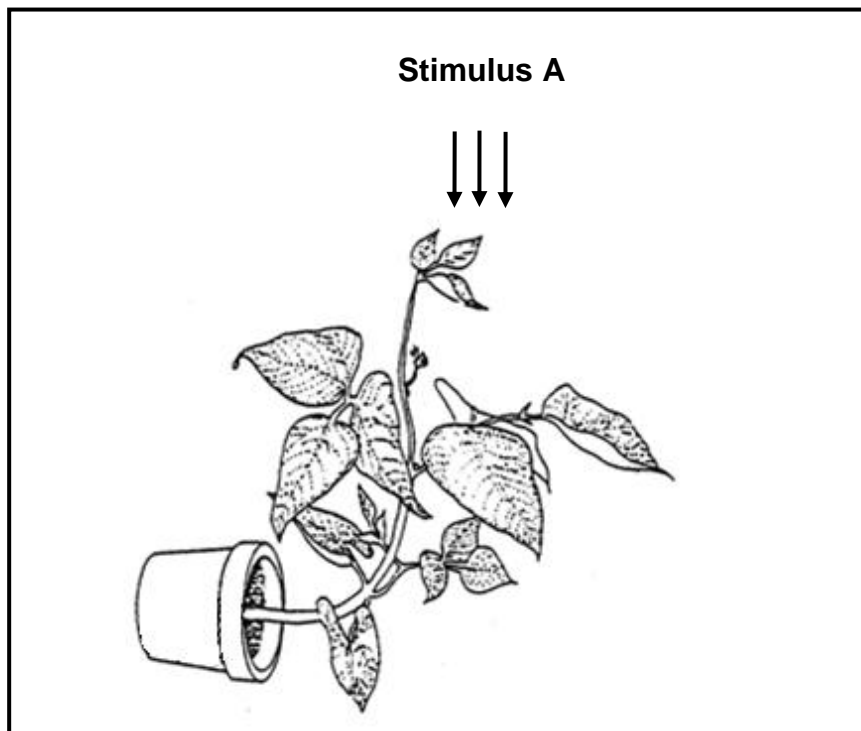
1.4 Each diagram below represents parts of the human eye.



- 1.4.1 Give the LETTER and NAME of the part that:
- (a) Contracts to change the shape of the lens (2)
  - (b) Controls the amount of light that enters the eye (2)
  - (c) Is protected by the conjunctiva (2)
- 1.4.2 Study DIAGRAM 1 and DIAGRAM 2. What process is responsible for the change in the shape of the part E? (1)
- 1.4.3 Which diagram (1 or 2) represents the state of the eye when a person is reading a book? (1)
- (8)**



- 1.5 The diagram below shows the growth movement of a part of a plant towards a stimulus.



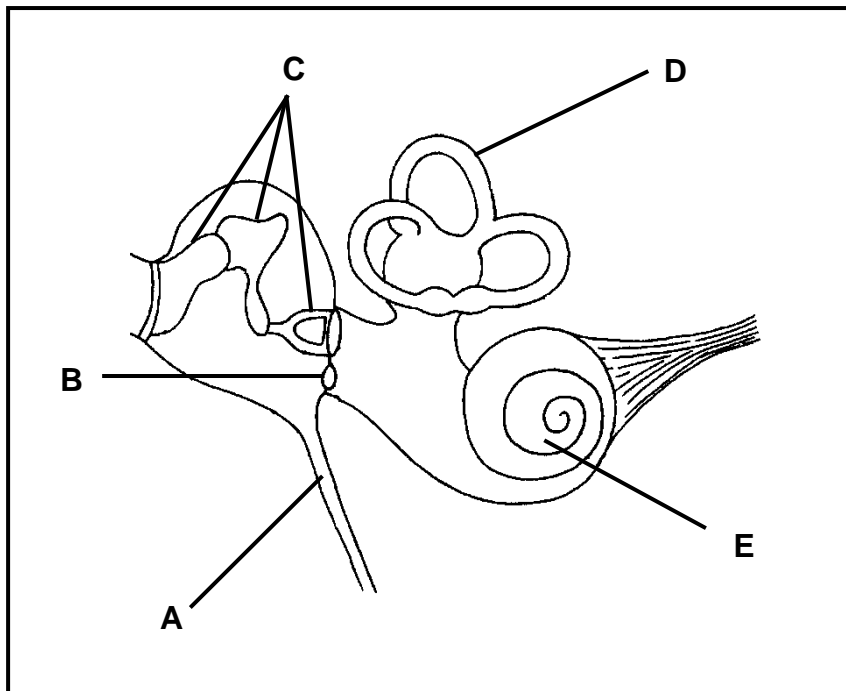
- 1.5.1 What growth movement is represented in the diagram? (1)
- 1.5.2 Identify the stimulus labelled **A**. (1)
- 1.5.3 Name the growth hormone that is responsible for the growth movement named in QUESTION 1.5.1. (1)
- 1.5.4 Will a high concentration of the growth hormone named in QUESTION 1.5.3 **stimulate** or **inhibit** growth in the roots? (1)
- 1.5.5 Name the phenomenon where the buds at the tip of the plant regulate the growth of the lateral branches. (1)

**TOTAL SECTION A: 50**



**SECTION B****QUESTION 2**

2.1 The diagram below represents a part of the human ear.



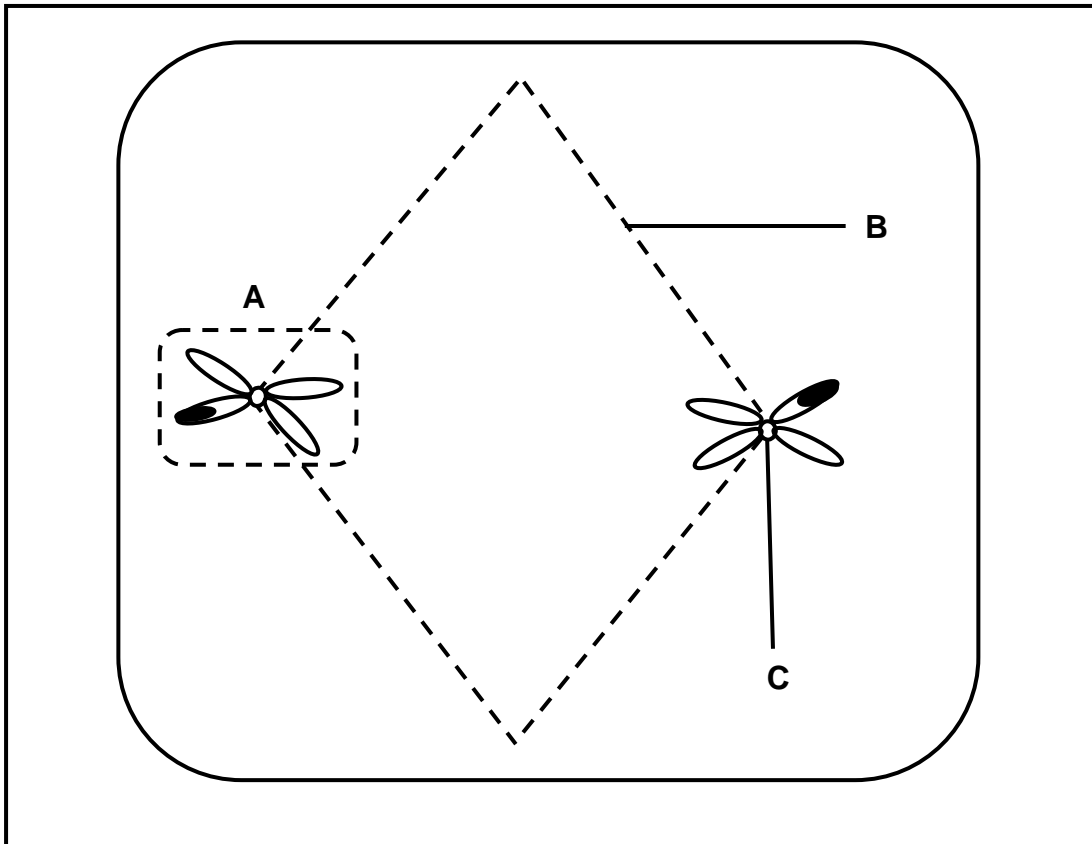
2.1.1 Identify part:

- (a) **A** (1)
- (b) **B** (1)
- (c) **E** (1)

2.1.2 Explain the result if part **A** is blocked. (4)

2.1.3 Describe how part **D**, the semi-circular canals, plays a role in maintaining balance when the body changes speed and direction. (5)  
**(12)**

2.2 The diagram below illustrates a phase in meiosis.



2.2.1 Identify part:

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

2.2.2 Identify the phase illustrated above. (1)

2.2.3 Give a reason for your answer to QUESTION 2.2.2. (2)

2.2.4 Draw a diagram of the cell above as it would appear during **anaphase I**. (4)  
**(10)**

2.3 An investigation was conducted to determine the diameter of a healthy follicle in a human ovary during the menstrual cycle.

A sample consisting of 50 women aged between 20 and 25, with regular menstrual cycles, was used for this investigation.

The average changes in the follicle diameters of all 50 women during their menstrual cycles were measured and recorded.

2.3.1 Name TWO steps that were considered during the planning of this investigation. (2)

2.3.2 The following results were obtained from the investigation.

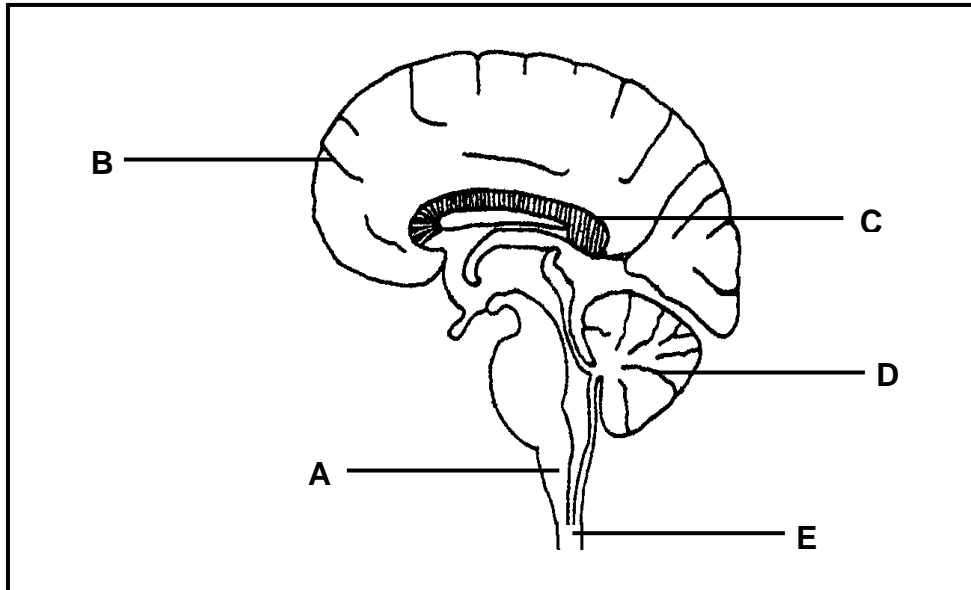
<b>DAYS WHEN FOLLICLES WERE MEASURED</b>	<b>AVERAGE FOLLICLE DIAMETERS OF THE 50 WOMEN (mm)</b>
5	6,9
10	13,3
13	18,8
14	22,0
20	3,4
25	2,6

[Adapted from *Journal of Reproduction and Fertilisation*, 1983]

Use the results and explain:

- (a) The changes in the follicle diameters from day 14 to day 25 (3)
- (b) How the results would probably differ if all 50 women used contraceptive pills that contained a high level of progesterone (3)
- (8)**

2.4 The diagram below represents the central nervous system in a human.



2.4.1 Identify part:

- (a) **A** (1)
- (b) **C** (1)
- (c) **D** (1)

2.4.2 State THREE functions of part **B**. (3)  
(6)

2.5 Describe the structure and the functioning of the autonomic nervous system. (4)  
[40]

**QUESTION 3**

- 3.1 Describe how the human body restores the carbon dioxide concentration in the blood when it rises above normal levels. (6)
- 3.2 An investigation was conducted to compare the glucose concentration in the blood of two people, Mo and Thabiso, before and after ingesting glucose.

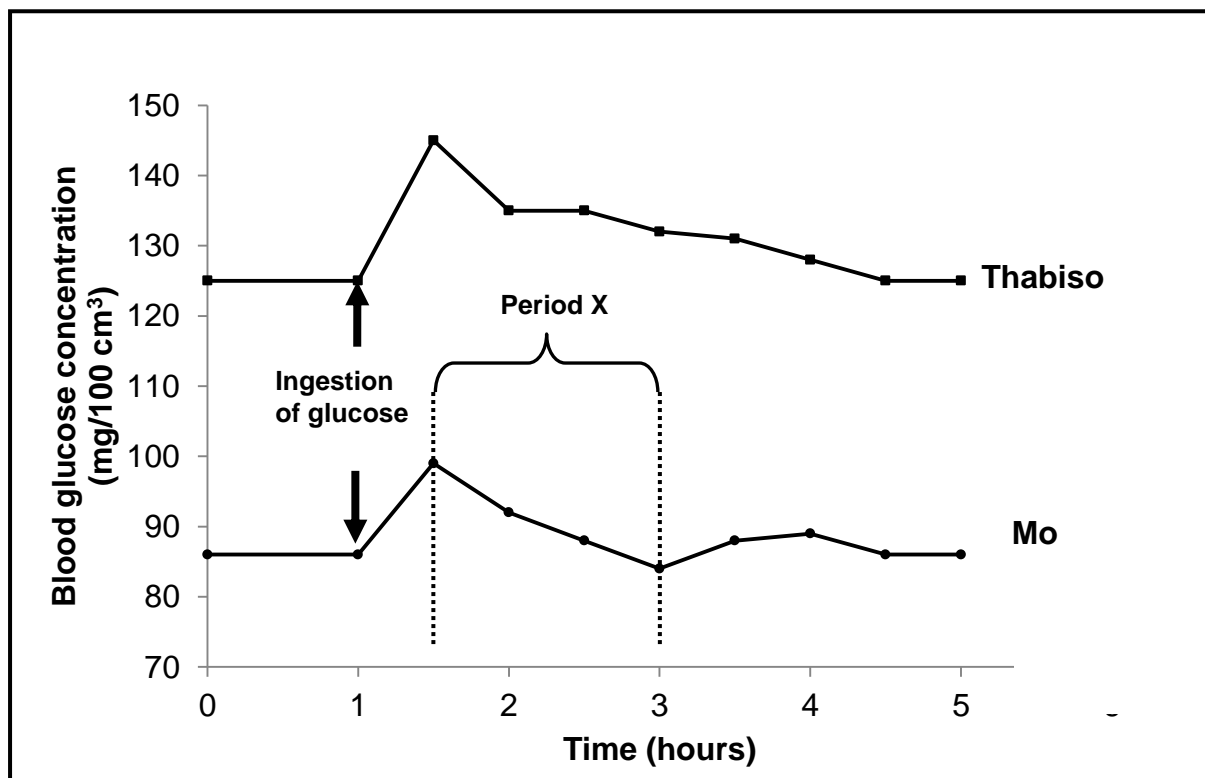
The following procedure was followed:

- The glucose concentration in their blood was measured at the start of the investigation and again 1 hour into the investigation.
- One hour into the investigation each of them was given 50 ml of a glucose solution to drink.
- For the next 4 hours after ingesting the glucose solution the glucose concentration in their blood was measured every 30 minutes.

The results are shown in the graph below.

The **arrows** indicate when they drank the glucose solution.

**NOTE:** The normal glucose concentration in blood is between 80 and 120 mg/100 cm<sup>3</sup>.



- 3.2.1 Provide a suitable title for this graph. (2)
- 3.2.2 By how much did Thabiso's blood glucose concentration level increase (in mg/100 cm<sup>3</sup>) after drinking the glucose solution? Show ALL working. (2)



- 3.2.3 How long did it take Mo's blood glucose concentration level to return to its original level after ingesting the glucose solution? (1)
- 3.2.4 (a) Who (Thabiso or Mo) has diabetes mellitus? (1)
- (b) Give ONE observable reason for your answer to QUESTION 3.2.4(a). (1)
- 3.2.5 Explain the changes in Mo's glucose level during period X. (4)
- (11)**

3.3 Read the extract below.

### HUNTING WILDLIFE FOR FOOD

An organisation, Trade Records Analysis of Fauna and Flora in Commerce (TRAFFIC), did an investigation to find out about the extent of the illegal killing of wildlife for use as bush-meat (meat from wildlife) and the influence of this on the environment.

The organisation reported that the illegal killing of wildlife, both for trade and consumption, had been on the increase in many African countries during the past two years. It also reported that some species, such as impala, were preferred to other species of wildlife.

One of the organisation's recommendations was that the hunting of wildlife should be legalised. This would enable governments in these countries to control the number of animals being hunted and also to restrict the age of animals that may be hunted. It also recommended that only those animals that were very old and weak in a population should be hunted.

[Adapted from an article 'Wildlife Under Siege', *Endangered Wildlife*, 2000]

- 3.3.1 What is the illegal hunting and killing of animals called? (1)
- 3.3.2 State ONE way in which humans destroy wildlife habitats. (1)
- 3.3.3 Give TWO reasons for the increase in the illegal killing of wildlife. (2)
- 3.3.4 Explain how the increase in the killing of wildlife will influence the environment. (3)
- 3.3.5 Explain why the organisation recommended that only very old and weak animals in a population should be killed if hunting is legalised. (3)
- (10)**



## 3.4 Read the extract below.

**FOOD SECURITY IN SOUTH AFRICA**

One of the challenges in South Africa is access to food by the poor. In 2009 Statistics SA conducted a survey to determine the percentage of households in each province that had access to food.

The results are shown in the table below:

PROVINCE	HOUSEHOLDS THAT HAVE ACCESS TO FOOD (%)
Western Cape	85
Eastern Cape	79
Mpumalanga	79
Free State	67
Northern Cape	75
North West	79
KwaZulu-Natal	77
Limpopo	88
Gauteng	82

South Africa seems to have adequate food access in urban areas, but the same cannot be said of households in rural areas. In rural areas prices of staple foods (e.g. maize and rice) are usually higher than in urban areas.

Increasing agriculture is the key to food security and poverty alleviation. The majority of people living in rural areas have access to land, but more still needs to be done to make household farming (growing crops for family use only) in these areas more efficient.

[Adapted from *Food Security*, Department of Agriculture, Forestry and Fisheries, March 2011]

- 3.4.1 What is meant by *food security*? (2)
- 3.4.2 Suggest ONE reason why food prices in rural areas are usually higher than food prices in urban areas. (1)
- 3.4.3 State TWO ways in which household farming could reduce poverty. (2)
- 3.4.4 Suggest TWO ways in which the Department of Agriculture can improve farming in the rural areas. (2)
- 3.4.5 DRAW a bar graph to compare access to food in the following three provinces, namely Limpopo, Northern Cape and Free State. (6)
- (13)**  
**[40]**

**TOTAL SECTION B: 80**





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

Explain the structural suitability of the sperm cell for its function and describe its involvement in the formation of a zygote and the development of this zygote until implantation.

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

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

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

