GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PREPARATORY EXAMINATION

2018

10831

LIFE SCIENCES

PAPER 1

TIME: 2½ hours

MARKS: 150

22 pages

LIFE SCIENCES: Paper 1
1083E
10831E

X05

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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 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 MUST use a non-programmable calculator, protractor and a compass where necessary.
11. Write neatly and legibly.

SECTION A

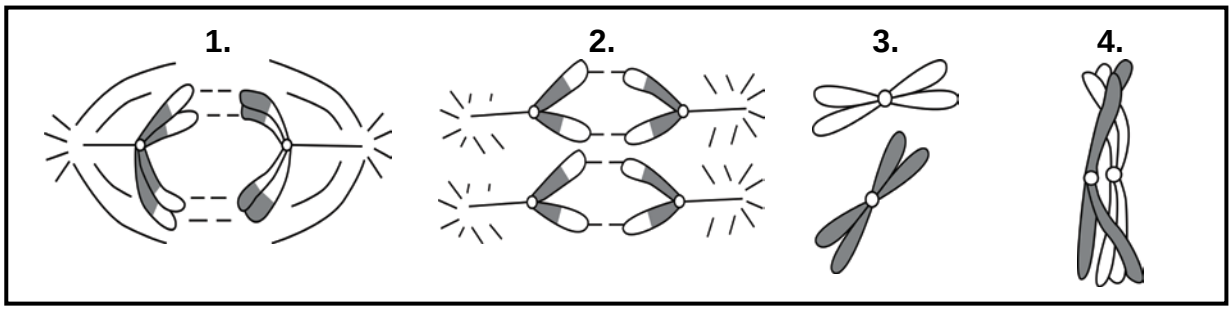
QUESTION 1

1.1 Various options are 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 When a person is frightened, which responses will occur?

A Adrenalin is released, heartbeat increases, pupils of the eyes will dilate.
B Adrenalin released, blood glucose increases, urine production increases.
C Insulin released, breathing rate increases, peristalsis stops.
D Insulin released, eye pupils dilate, saliva secretion stops.

1.1.2 The diagrams show a single pair of homologous chromosomes in various stages of meiosis I and II.



Which of the following combinations is the correct sequence for meiosis?

A 3,4,1,2
B 4,3,1,2
C 2,3,4,1
D 4,3,2,1

1.1.3 The diagram below shows the menstrual cycle of a woman during the month of September.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Key

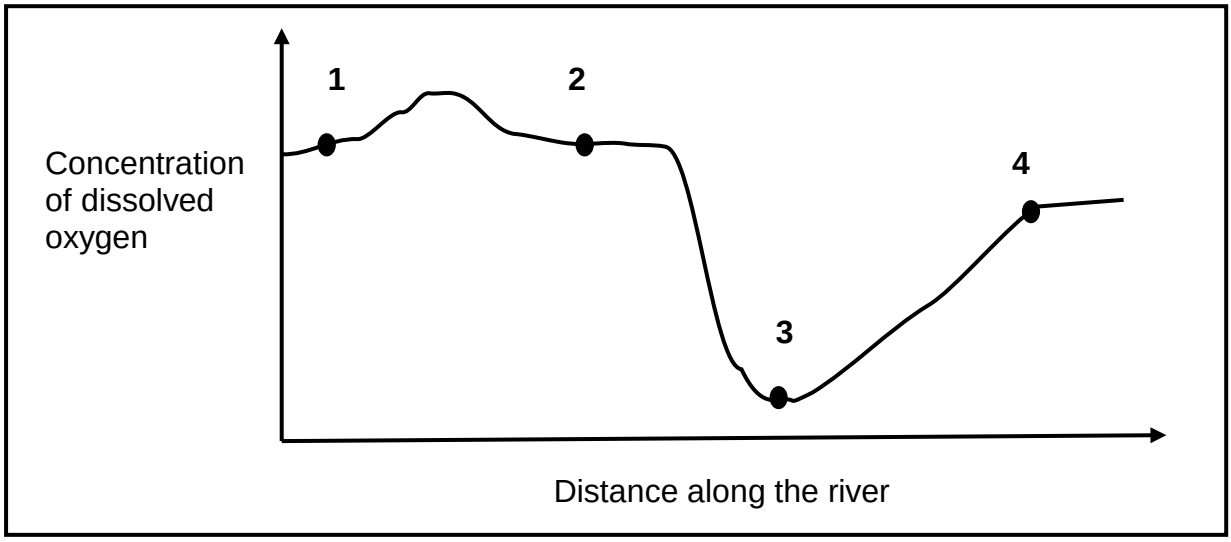
= Ovulation

= Menstruation

The reason why fertilisation cannot take place if sperms are released into the vagina on 10th September is …

A sperms are washed out of the female uterus by the menstrual flow.
B sperms can only survive in the female reproductive system once ovulation has taken place.
C ovulation has not taken place yet.
D the uterus lining is passed out of the female body during menstruation.

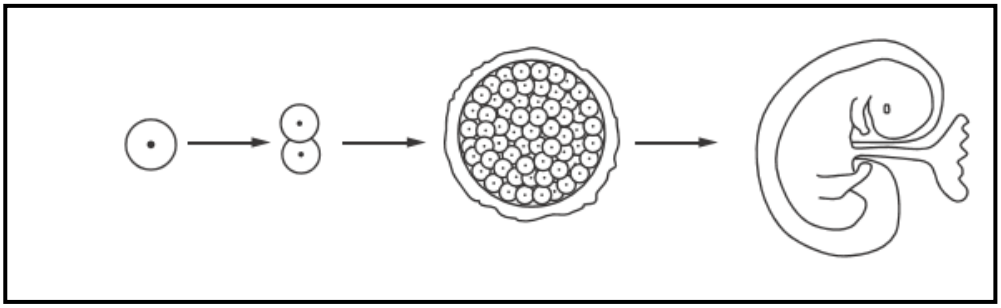
1.1.4 The graph below shows the concentration of dissolved oxygen at different points along a river.



At which point on the graph is sewage most likely to have been poured into the river?

A 1
B 2
C 3
D 4

1.1.5 The diagram shows stages in the development from zygote to foetus.

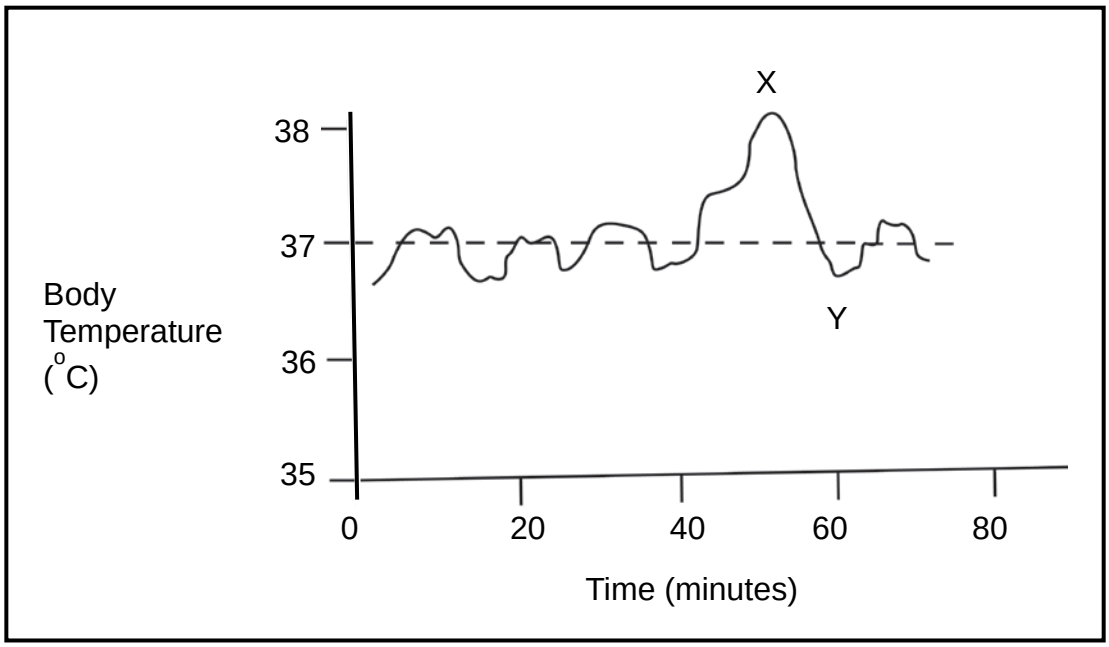


Which of the processes in the table below occur in the stages of development shown.

✓ - Process occurs
× - Process does not occur

	Fertilisation	Growth	Development
A	✓	×	✓
B	✓	×	×
C	×	✓	×
D	×	✓	✓

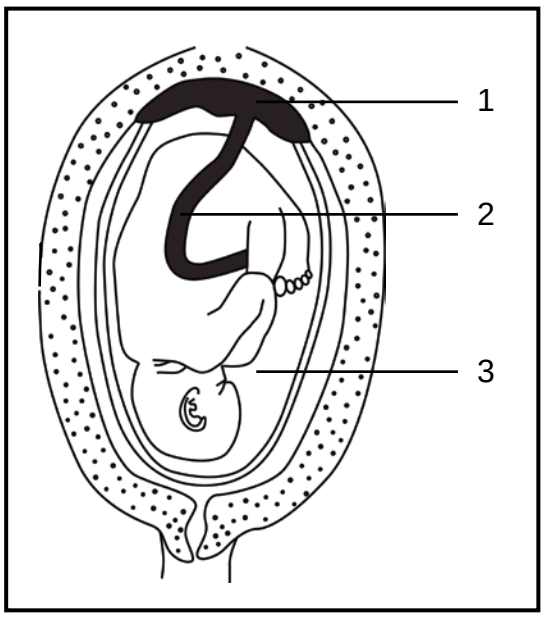
1.1.6 The graph below shows changes in a person's body temperature plotted against time.



What causes the change in temperature between **X** and **Y**?

A Increased air temperature
B Increased evaporation of sweat
C Reduced blood flow through surface capillaries
D Shivering

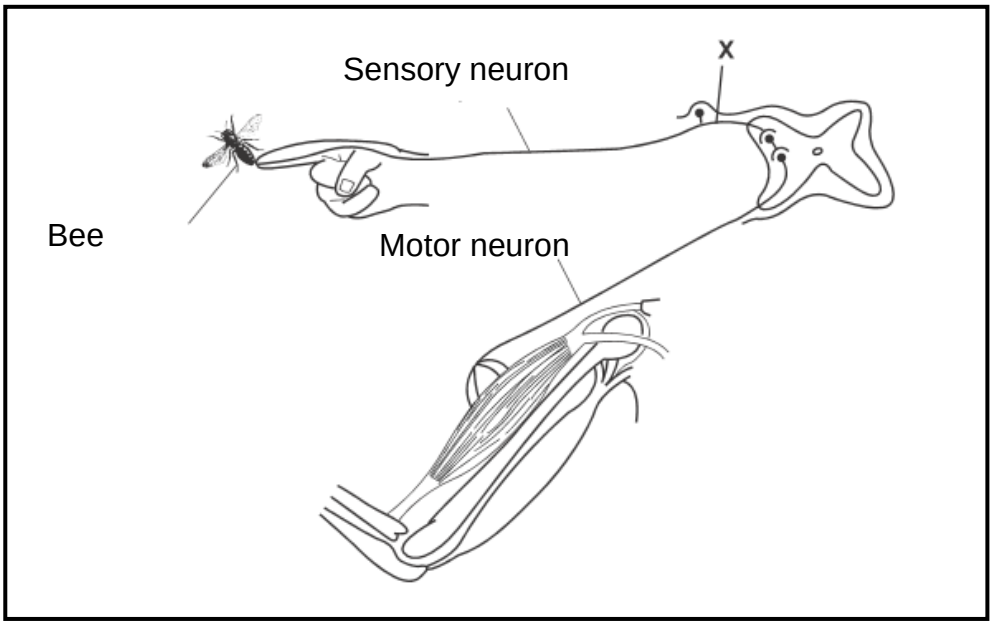
1.1.7 The diagram below shows a foetus in the uterus.



During gestation which part(s) labelled **1, 2** or **3** remove(s) metabolic waste from the foetus?

A 1 only
B 1 and 2
C 2 and 3
D 1, 2 and 3

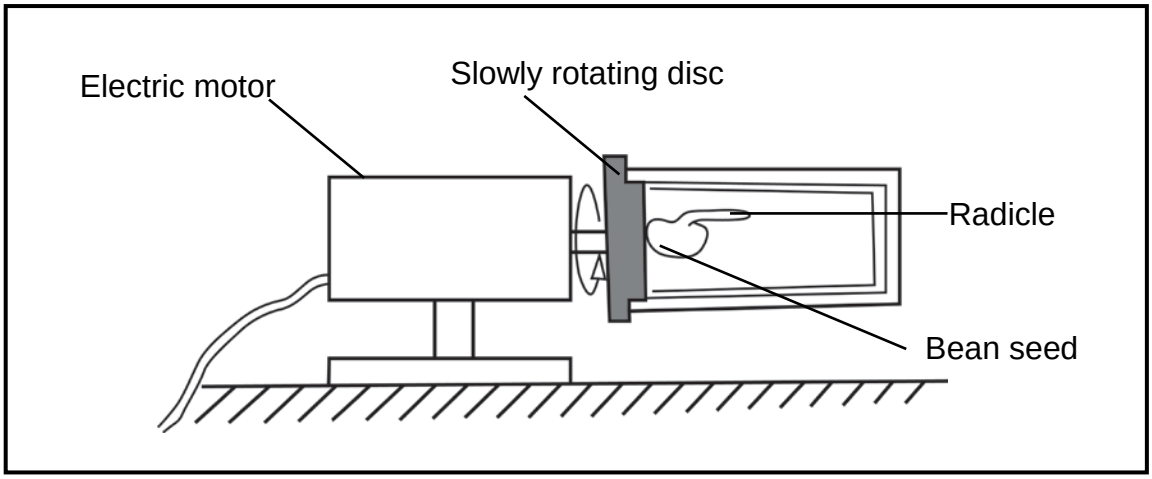
1.1.8 The diagram below shows part of a person's nervous system that has been cut at **X.**



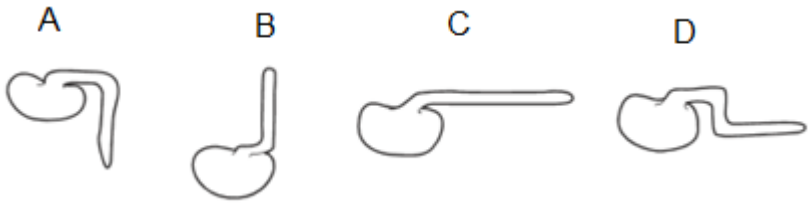
A bee stings the finger, as shown in the diagram above. What are the effects of this sting on the person?

A The person feels no pain and does not move his / her arm away.
B The person feels no pain and moves his / her arm away.
C The person feels pain and does not move his / her arm away.
D The person feels pain and moves his / her arm away.

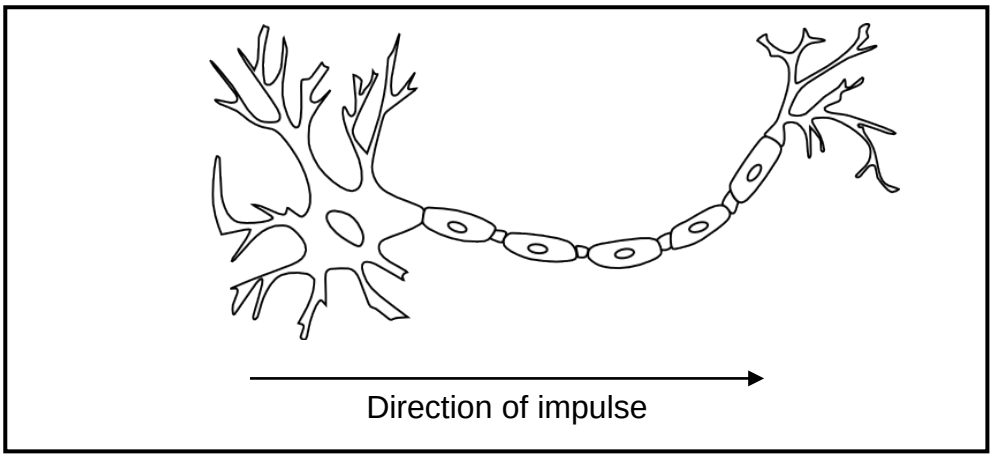
1.1.9 The diagram below shows a germinating bean seed with a horizontal radicle. This is placed on a slowly rotating disc and is left for three days.



Which diagram shows the appearance of the radicle after three days?



1.1.10 The diagram below shows a neuron carrying an impulse.



Identify the type of neuron and the direction of the impulse.

A A motor neuron, the impulse travels towards the spinal cord.
B A sensory neuron, the impulse travels towards the spinal cord.
C A motor neuron, the impulse travels away from the spinal cord.
D A sensory neuron, the impulse travels away from the spinal cord.

(10x2) **(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 outermost membrane found around the embryo / foetus.

1.2.2 The hormone that stimulates the mammary glands to secrete milk.

1.2.3 The gland that secretes the hormone which controls water concentration in the blood.

1.2.4 Source of energy in the fossilised remains of plants and animals.

1.2.5 The measure of the total amount of carbon dioxide emissions of an individual, population or company per year.

1.2.6 A gas produced in waste disposal sites that can be used for cooking, heating and lighting.

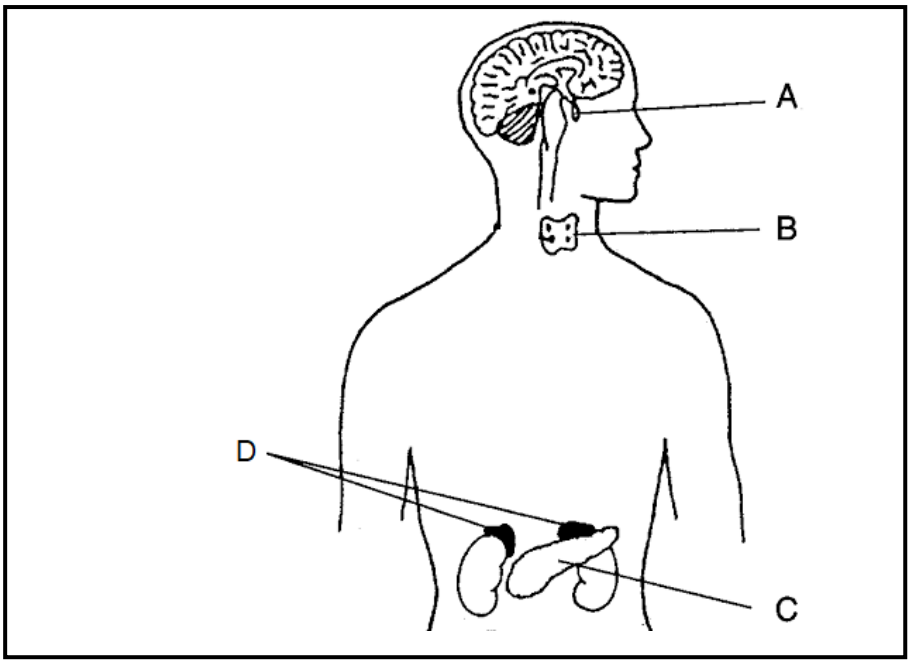
1.2.7 The hormone that regulates the concentration of salt in the blood. **(7)**

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 to 1.3.6) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Carries the impulse from the sensory neuron to the motor neuron in the grey matter	A. Interneuron B. Spinal cord
1.3.2	Receives the stimulus and converts it into a nerve impulse	A: Effector B: Receptor
1.3.3	Transmits impulse to the cell body	A. Axon B. Dendrite
1.3.4	The young develops inside the uterus of the mother	A. Altricial B. Precocial
1.3.5	Structure which provides nutrition for the embryo	A. Chorion B. Yolk sac
1.3.6	Eggs are laid and hatching takes place outside mother's body	A. Ovovivipary B. Ovipary

(6x2) **(12)**

1.4 Study the diagram below showing some endocrine glands in a human.



1.4.1 Identify the LETTER of the endocrine gland that …

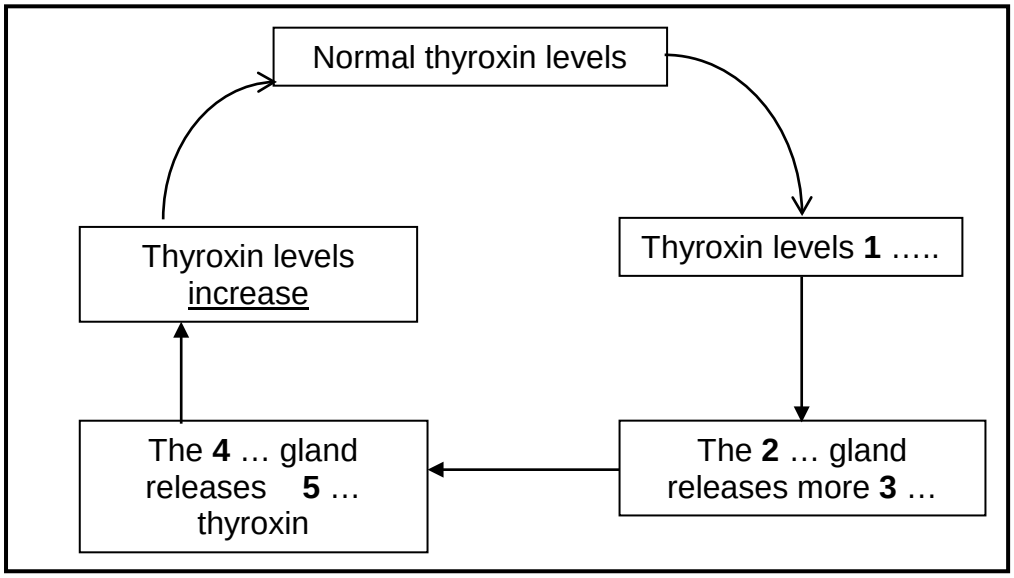
(i) secretes glucagon. (1)

(ii) controls metabolic processes. (1)

(iii) secretes adrenalin. (1)

1.4.2 Name TWO hormones secreted by **A**. (2)
(5)

1.5 The flow chart below shows the control of thyroxin levels in a human body.



1.5.1 Which mechanism is represented by the flow chart above? (1)

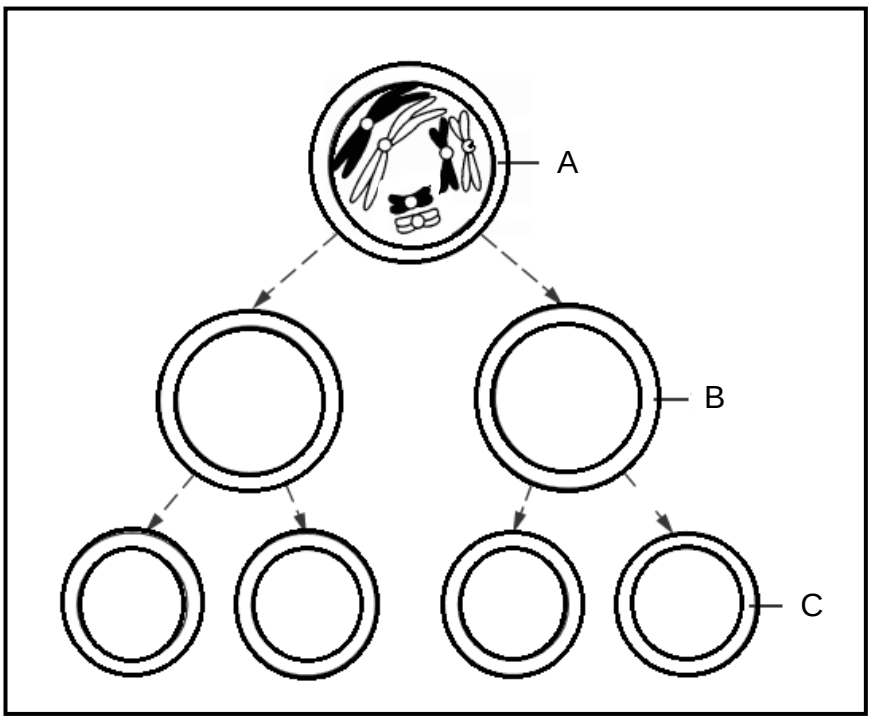
1.5.2 Summarise the changes in the thyroxin levels shown in the flow chart above by writing only the **NUMBE**R and **WORD** in your answer book. (5)
(6)
[50]

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below shows an animal cell undergoing meiosis.



2.1.1 State the number of chromosomes in cell …

(i) **A** (1)

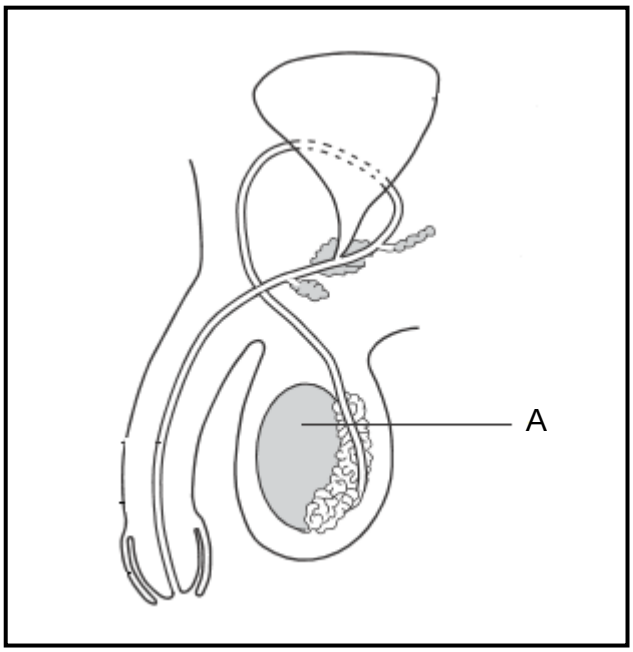
(ii) **B** (1)

2.1.2 Where in a mammal could the cell possibly be found? (1)

2.1.3 Draw a diagram showing the chromosomes that could be found in the cell labelled **C**. Distinguish the different chromosomes by **shading** and **size**, as given in the diagram. (4)

2.1.4 Give TWO reasons why meiosis is biologically important. (2)
[9]

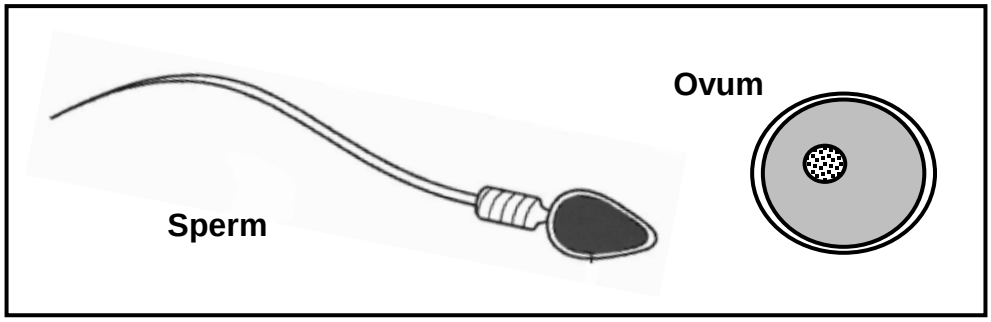
2.2 The diagram below shows a side view of the male reproductive system.



2.2.1 Explain why structure **A** is situated outside the body. (2)

2.2.2 Give TWO functions of the hormone produced in structure **A**. (2)
(4)

2.3 The diagram below shows a human sperm and ovum. The diagram is not drawn to scale.



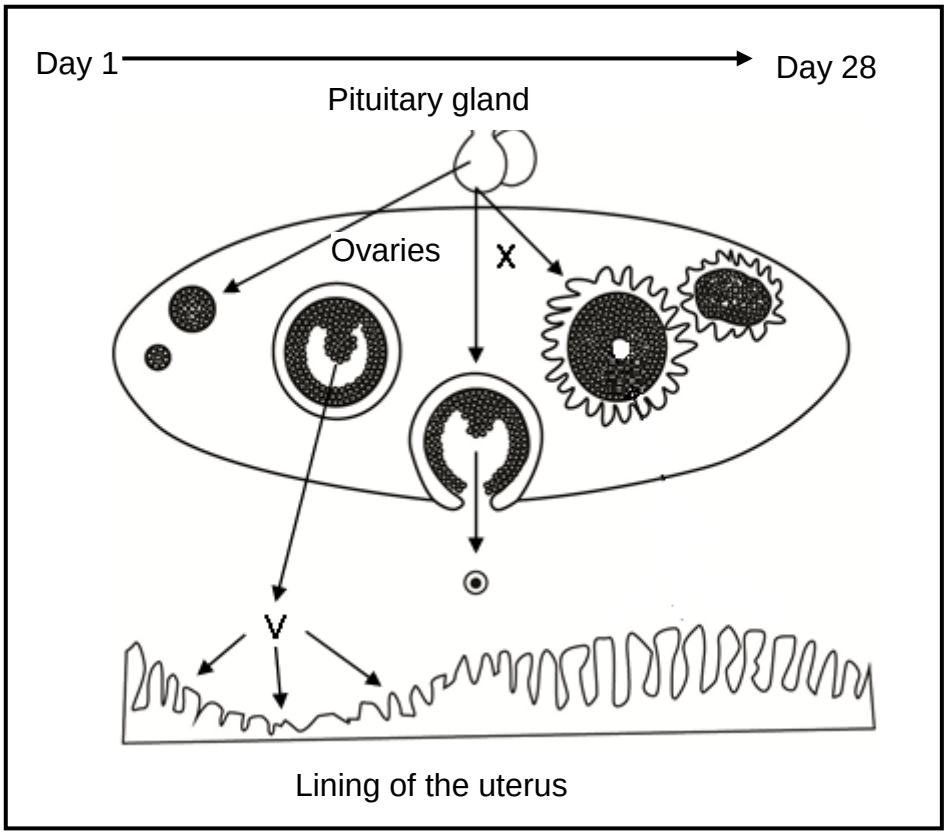
2.3.1 Tabulate ONE difference between the structure of an ovum and a sperm cell. (3)

2.3.2 The head of the sperm contains a protein digesting enzyme. Explain the importance of this enzyme during fertilisation. (2)

2.3.3 An active healthy sperm cell is able to swim about 4 mm per minute. If the distance from the cervix to the end of the Fallopian tube is 20 cm, how long will it take for the sperm cell to reach the ovum at the end of the Fallopian tube? Show your working. (3)

2.3.4 Semen has a pH of 7.5. Sperm cells have a high mortality rate in acidic conditions. How does the male body ensure that the sperm cells are not killed by acidic urine as they travel through the urethra? (2)
(10)

2.4 The diagram below shows how the ovaries and the uterus are changed by various hormones during the menstrual cycle. The diagram below is not drawn to scale.



2.4.1 (i) Name hormone **V**. (1)

(ii) Describe what effect hormone **V** has on the lining of the endometrium. (1)

(iii) Explain the importance of the endometrium lining. (2)

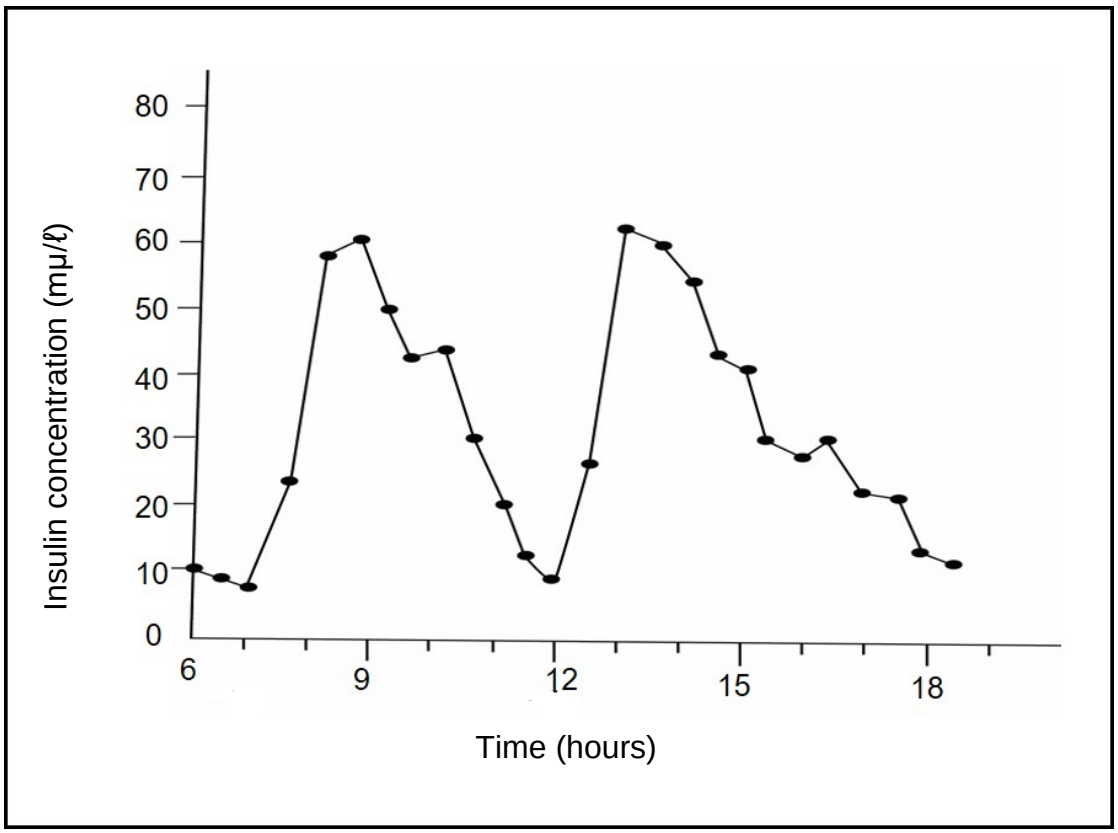
2.4.2 With reference to the diagram:

(i) Name hormone **X**. (1)

(ii) Give the functions of hormone **X** in the menstrual cycle. (2)

2.4.3 Give TWO visible reasons from the diagram that indicate that fertilisation did not take place during this menstrual cycle. (2)
(9)

2.5 The graph below shows normal insulin production over a 24-hour period.



2.5.1 What is the function of insulin? (1)

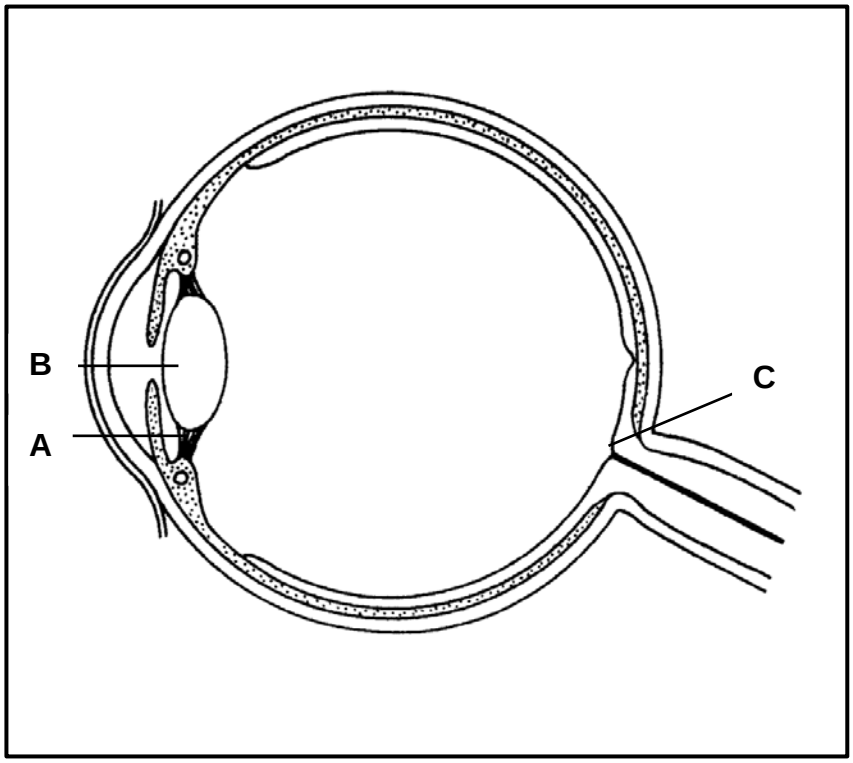
2.5.2 What time of the day is the insulin concentration the highest? (1)

2.5.3 What is the insulin concentration at 16:00? (1)

2.5.4 Describe the action of insulin when the person eats breakfast at 07:00. (5)
(8)
[40]

QUESTION 3

3.1 The diagram below shows the internal structure of the eye.



3.1.1 The retina is the light sensitive layer of the eye where images are formed. Explain why no image can form at **C**. (2)

3.1.2 With reference to the structures labelled **A** and **B**, explain the accommodation that will take place when a person is viewing an object close to him. (3)

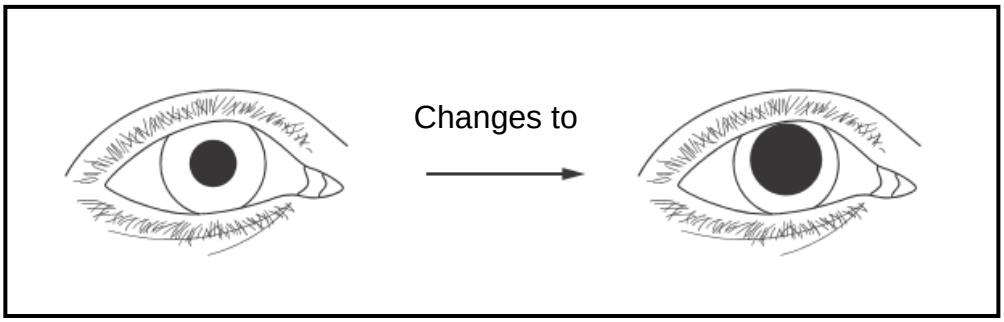
An investigation was done to test the relationship between the thickness of the lens and the focal length of the lens. The data in the table gives the focal length of six lenses which have the same diameter but different thickness.

THICKNESS OF LENS (mm)	FOCAL LENGTH (cm)
10	12.5
9	14.0
8	15.5
7	18.0
6	21.0
5	25.0

3.1.3 Draw a line graph to illustrate the data in the table above. (6)

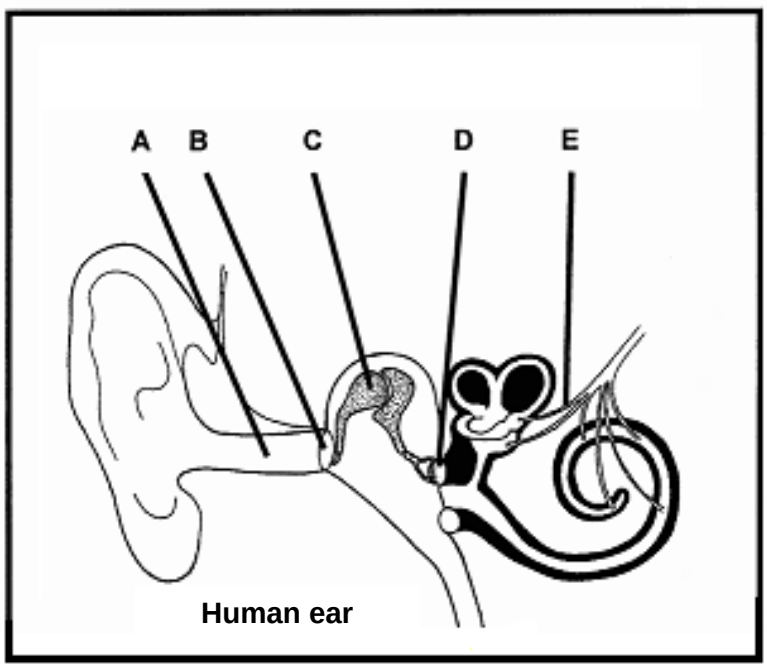
3.1.4 State the relationship between lens thickness and focal length. (2)

3.1.5 The diagram below shows two external views of the eye.



Name and explain how the change shown in the diagram above occurs. (5)
(18)

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



3.2.1 Give suitable labels for:

(i) **A** (1)
(ii) **B** (1)
(iii) **D** (1)

3.2.2 Give the function of the parts labelled:

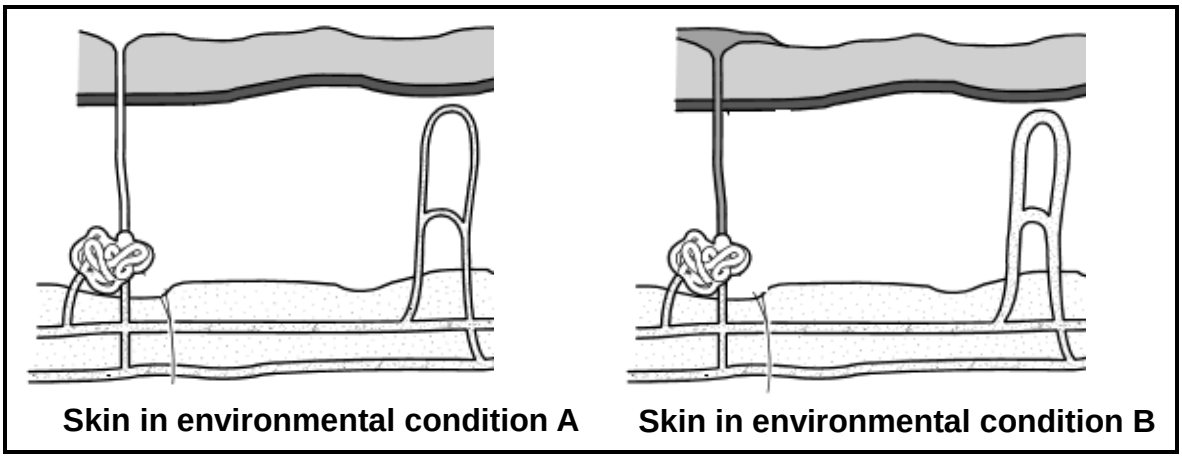
(i) **C** (1)
(ii) **E** (1)

3.2.3 Part **A** secretes a wax called cerumen. Sometimes the wax forms a solid plug against part **B**.

(a) Give TWO functions of cerumen. (2)

(b) Explain the effect on hearing if a waxy plug is formed against part **B**. (3)
(10)

3.3 The diagram below shows a section through the skin in two different environmental conditions, A and B.



Skin in environmental condition A **Skin in environmental condition B**

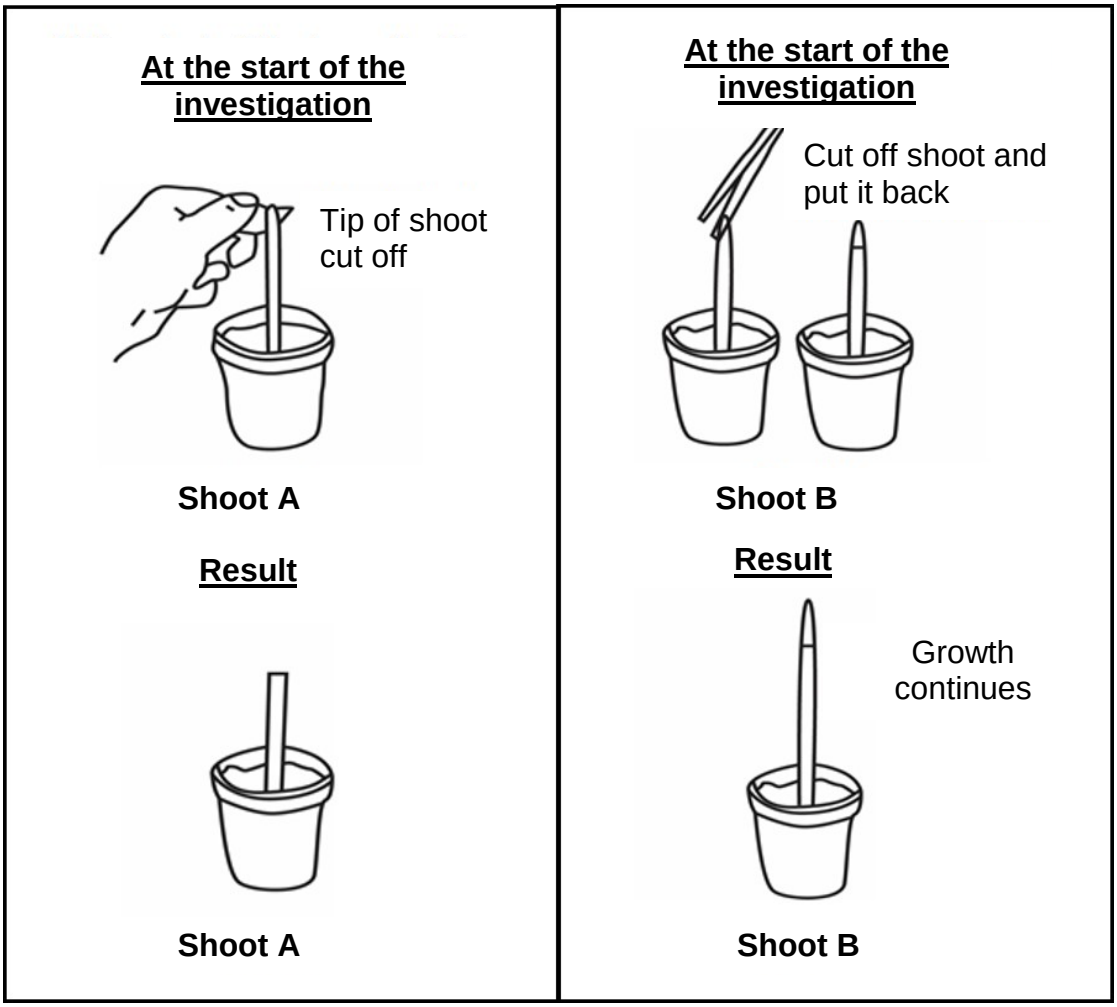
3.3.1 What is the environmental condition represented in diagram **B**? (1)

3.3.2 Give TWO visible reasons from the diagram for your answer in QUESTION 3.3.1. (2)
(3)

3.4 Lesego, a learner in Grade 12, is investigating the effect of plant hormones on growth. The following method was used.

Method:

- She uses two shoots, which she labels Shoot **A** and **B**.
- She cuts off the tip of Shoot **A**.
- She cuts the tip off Shoot **B** and then puts it back again.
- She leaves the apparatus for a few days.
- After a few days she observes the result of Shoot **A** and Shoot **B**, as shown in the diagram below.



3.4.1 Identify the …

(a) independent variable. (1)

(b) dependent variable. (1)

3.4.2 Discuss the reasons for the results observed in the investigation. (4)

3.4.3 Suggest ONE way in which Lesego could improve the reliability of her investigation. (1)

3.4.4 Give TWO ways in which she could ensure that her results are valid. (2)

(9)

[40]

TOTAL FOR SECTION B: 80

SECTION C

QUESTION 4

Food security may be influenced by many factors. Define the term *food security*.
Discuss how poor farming practices, alien plants and climate change negatively affected food security in South Africa.

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

TOTAL SECTION C: 20

TOTAL: 150

END