Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

PREPARATORY EXAMINATION

SEPTEMBER 2017

MARKS: 150

TIME: 2½ Hours

N.B. This question paper consists of 15 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. Make ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables 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 to D) next to the question number (1.1.1 to 1.1.10) in your ANSWER BOOK, for example 1.1.11 D.

1.1.1 The developing foetus is well protected from mechanical damage in the mother's uterus by the …

A amniotic fluid.
B placenta.
C umbilical cord.
D chorionic villi.

1.1.2 Which ONE of the following represents correct functions of the cerebrum and medulla oblongata?

	CEREBRUM	MEDULLA OBLONGATA
A	Controls involuntary actions	Controls voluntary actions
B	Controls voluntary actions	Controls involuntary actions
C	Controls and co-ordinates voluntary actions	Co-ordinates voluntary actions
D	Controls involuntary actions	Co-ordinates voluntary actions

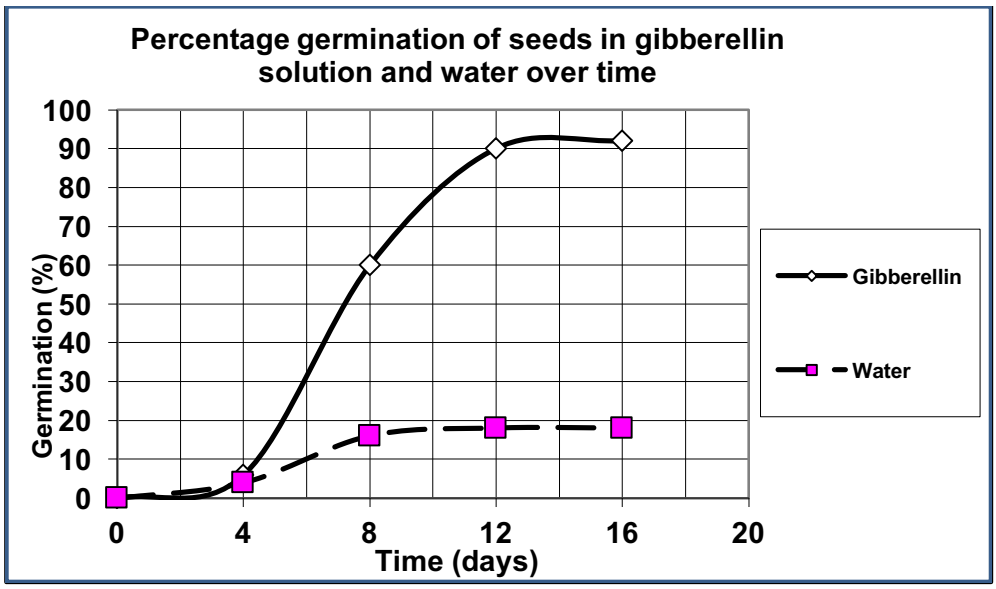
1.1.3 In altricial development, young hatchlings are …

A unable to feed themselves soon after hatching.
B able to move around freely soon after hatching.
C completely independent of their parents after hatching.
D well developed when they hatch.

1.1.4 A function of the tympanic membrane and the oval window is to …

A equalize pressure between the outer and middle ear.
B concentrate sound waves onto a smaller surface area to amplify sound.
C transmit sound impulses to the brain to maintain balance.
D convert sound waves into nervous impulses.

1.1.5 A group of Grade 12 learners carried out an investigation to determine the effect of gibberellins on the germination of seeds.



Which ONE of the following is a CORRECT conclusion for the above investigation?

A Gibberellins show a greater increase in the rate of germination of seeds than water
B Water shows a greater increase in the rate of germination of seeds than gibberellins
C There is no difference in the rate of germination of seeds placed in gibberellins and water
D Gibberellins decrease the rate of germination of seeds

1.1.6 The table below provides the insulin and glucagon levels in the blood of a person over a period of three hours.

TIME (mins)	GLUCAGON CONCENTRATION (mg/ml)	INSULIN CONCENTRATION (mg/ml)
0	115	84
30	113	81
60	125	80
90	100	129
120	90	110
150	93	104
180	89	92

The changes in the level of hormones indicate that the person ate a meal in the period …

A 0 - 60 mins.
B 60 - 90 mins.
C 90 - 120 mins.
D 120 -150 mins.

QUESTIONS 1.1.7 AND 1.1.8 REFER TO THE GRAPH AND THE TABLE BELOW.

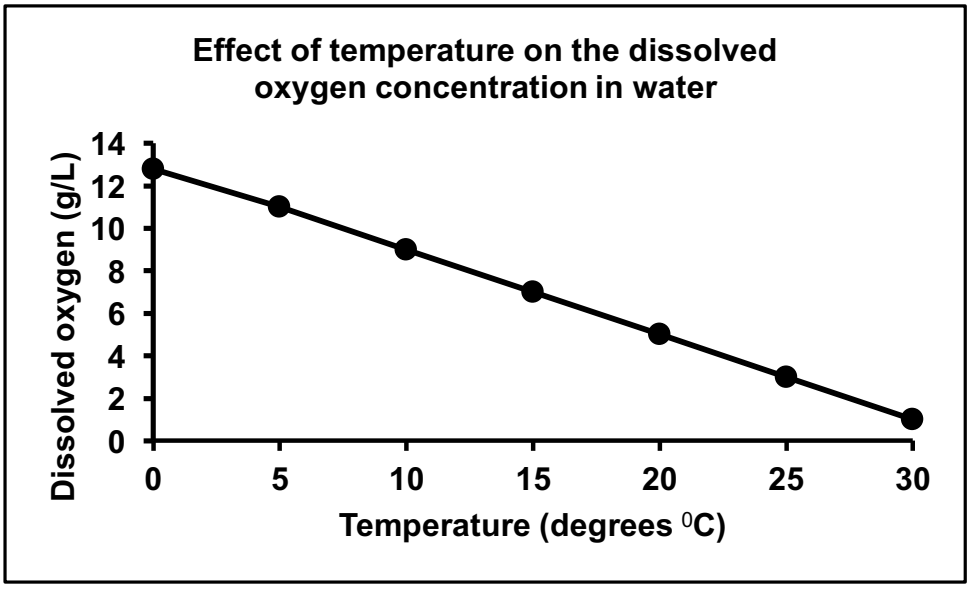


Table of oxygen requirements of different organisms in a river

Animal	Striped Bass	Shad	Yellow perch	Clams	Blue Crab	Spot fish	Worms
Minimum oxygen requirements (mg/L)	6	5	5	4	3	2	1

1.1.7 Thermal pollution causes the level of dissolved oxygen in the water to …

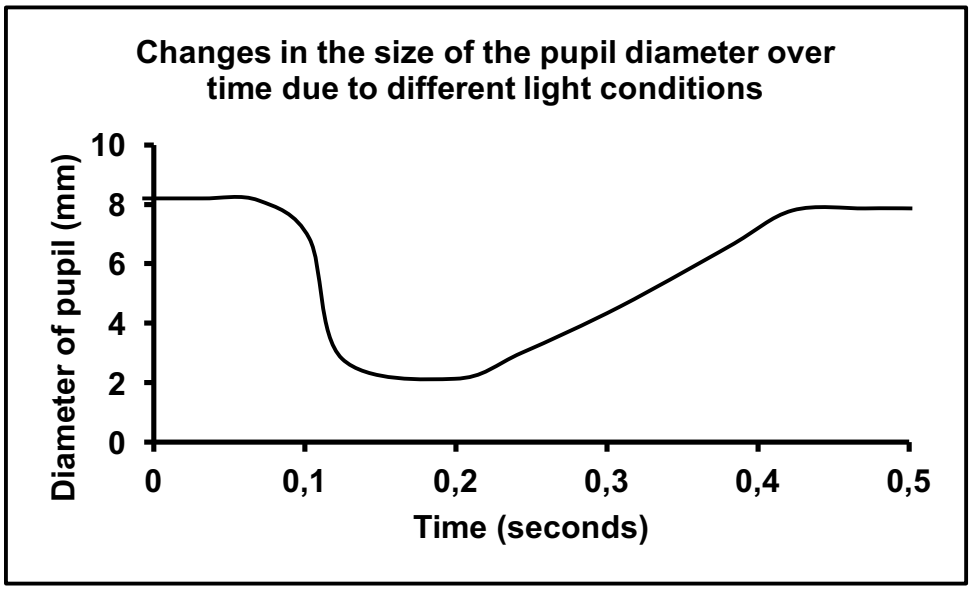
A remain unchanged.
B increase and then decrease.
C increase.
D decrease.

1.1.8 Due to the release of water from a factory, the temperature of the water in a nearby stream is 30°C.

Two organisms that are likely to be found living in the stream are …

A striped bass and blue crab.
B worms and hard clam.
C worms and spot fish.
D yellow perch and spot fish.

1.1.9 The diagram below shows the changes in the diameter of the pupil over time while exposed to different light conditions.



During which period of time was the person exposed to bright light?

A 0,1 to 0,4 sec
B 0,1 to 0,2 sec
C 0.2 to 0,4 sec
D 0,4 to 0,5 sec

1.1.10 An example of geotropism is the growth of the …

A stem towards gravity.
B root away from light.
C stem towards light.
D root towards gravity .

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 1.2.8) in the ANSWER BOOK.

1.2.1 Failure of chromosomes to separate during meiosis

1.2.2 The structure that provides nutrients to the developing embryo in oviparous organisms

1.2.3 A growth response to gravity in plants

1.2.4 An egg in which the embryo is protected by a shell

1.2.5 The blood vessel that transports oxygen and dissolved food to the foetus

1.2.6 Temporary storage site in a male for sperm cells

1.2.7 The gland that secretes prolactin

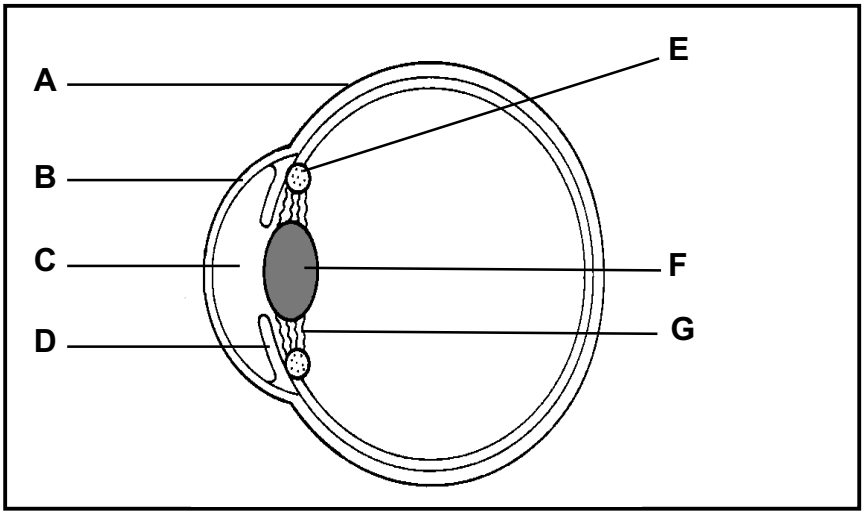
1.2.8 The system of the body composed of glands that secrete hormones responsible for chemical co-ordination **(8)**

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 1.3.3) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Used to correct hearing problems caused by accumulated fluid in the middle ear	A: Cochlear implant B: Grommet
1.3.2	Receptors for hearing	A: Rods B: Cones
1.3.3	The young develop inside the mothers body and are then born 'alive'	A: Ovoviviparous B: Viviparous

(3 x 2) **(6)**

1.4 The diagram below shows some parts of the eye.



Give the LETTER and NAME of the part that:

1.4.1 Contracts when looking at an object that is moving closer (2)

1.4.2 Is affected when a person has cataracts (2)

1.4.3 Regulates the size of the pupil (2)
(6)

1.5 The diagrams below show phases of meiosis in an animal cell.

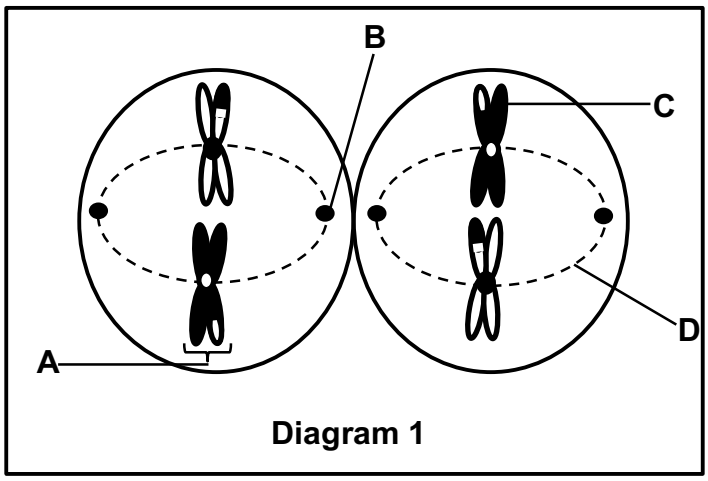


Diagram 1

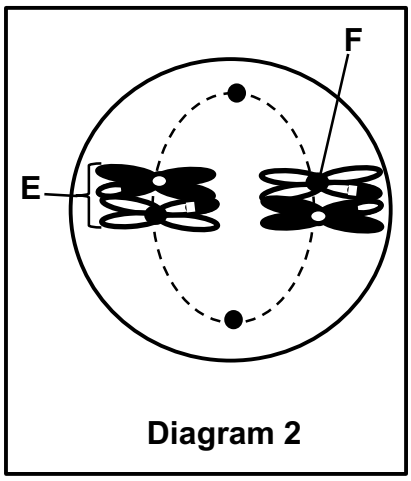


Diagram 2

1.5.1 Identify part:

(a) **A** (1)

(b) **C** (1)

(c) **E** (1)

1.5.2 Give the FUNCTION of:

(a) **B** (1)

(b) **D** (1)

(c) **F** (1)

1.5.3 Name TWO processes that are visible in the diagrams that result in genetic variation. (2)

1.5.4 How many chromatids will be present in each cell formed at the end of meiosis I? (1)

1.5.5 Name the phase shown in Diagram **1**. (1)
(10)

TOTAL SECTION A: 50

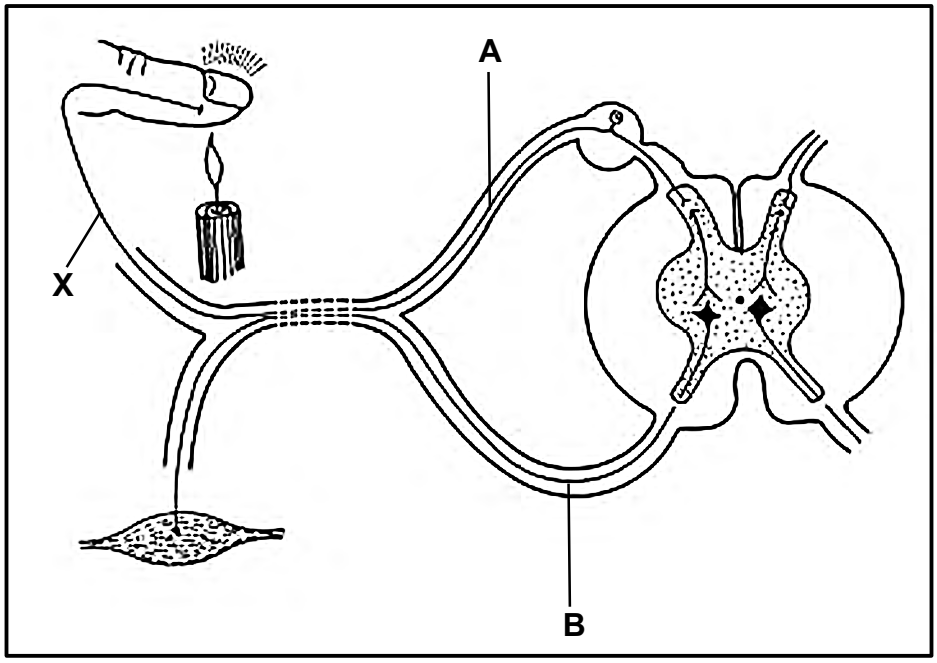
SECTION B

QUESTION 2

2.1 Water shortages in Cape Town have reached crisis levels.

If you were the Minister of Water Affairs, explain THREE strategies you could use to ensure that the city of Cape Town copes with the water crisis. **(6)**

2.2 The diagram below represents a human reflex arc.



2.2.1 Differentiate between a *reflex action* and a *reflex arc*. (2)

2.2.2 Tabulate TWO differences in structure between neuron **A** and **B**. (5)

2.2.3 Describe the reflex action that occurs as represented in the diagram. (5)

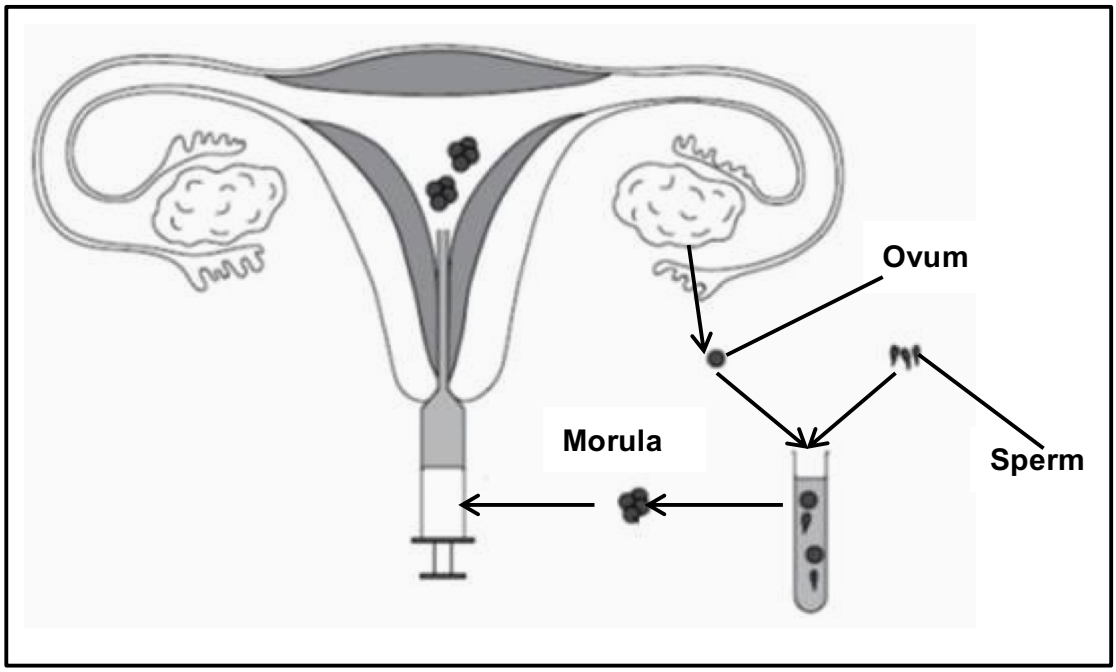
2.2.4 Explain what would happen if neuron **A** was damaged at point **X**. (2)

2.2.5 Explain how multiple sclerosis may result in the poor functioning of reflex arcs. (2)
(16)

2.3. A tubal ligation is a surgical procedure in which a woman's Fallopian tubes are clamped and blocked. Mpume underwent this procedure to prevent pregnancy.

After many years, Mpume decided to have children but was advised that it was dangerous to reverse the tubal ligation. It was recommended that she try in vitro fertilisation (IVF) instead. She was given hormone supplements before the IVF was performed.

The diagram below is a representation of how the IVF procedure was done.



2.3.1 Identify TWO hormones that were likely to be present in the hormone supplement given to Mpume. (2)

2.3.2 Why is it not necessary for the hormone supplement to contain progesterone? (2)

2.3.3 How does a tubal ligation prevent a pregnancy? (3)

2.3.4 Describe the events that take place after fertilisation in the test tube until implantation occurs in the uterus. (6)

2.3.5 Describe the negative feedback mechanism between FSH and progesterone as it would occur in Mpume's body during pregnancy. (3)

2.3.6 When Mpume falls pregnant, what will happen to the:

(a) Corpus luteum (1)
(b) Endometrium (1)

(18)

[40]

QUESTION 3

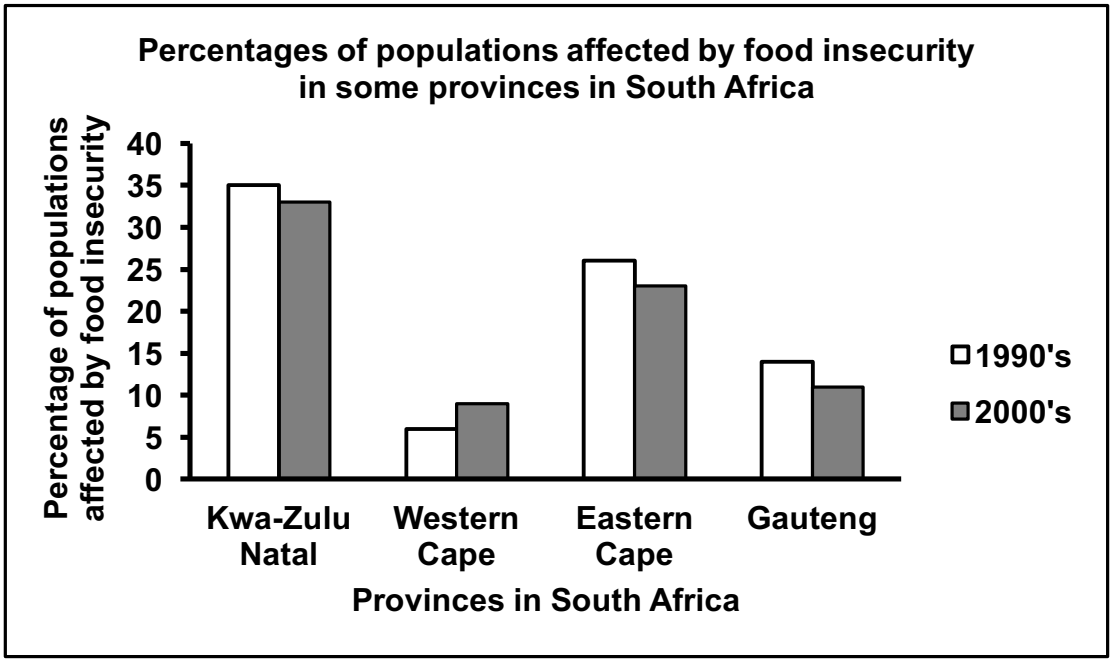
3.1 Gametogenesis occurs in males and females.

3.1.1 Describe the process of spermatogenesis. (4)

3.1.2 State ONE way in which the process of oogenesis is different from spermatogenesis. (2)

3.1.3 Explain why the testes in males are situated outside the body cavity. (2)
(8)

3.2 The graph below shows the percentage of populations affected by food insecurity in some provinces in South Africa.



3.2.1 Define *food security*. (2)

3.2.2 Name ONE province in which food insecurity has increased. (1)

3.2.3 List TWO factors that could have caused the increase in food insecurity in the province named in QUESTION 3.2.2. (2)

3.2.4 What percentage of the population in the Eastern Cape was food secure in the 1990's? Show ALL working. (2)

3.2.5 Explain ONE way in which pesticides could decrease food security. (2)

3.2.6 Explain TWO ways in which genetically modified foods could increase food security. (4)

3.2.7 What conclusion can be made about the food security in Kwa-Zulu Natal from the graph provided. (2)
(15)

3.3 An investigation was carried out as to determine the effect of adrenalin on heart rate.

The procedure was as follows:

- The resting heart rate of three different men (**A**, **B** and **C**) was determined.
- Each man was injected with the same amount of adrenalin.
- After the injection each man's heart rate was measured after 5 minutes.

The results of the investigation are provided in the table below.

CONDITION	MAN A	MAN B	MAN C
Resting heart rate	80	85	92
Heart rate after the injection was given	115	98	120

3.3.1 State TWO ways in which the investigators increased the validity of the investigation. (2)

3.3.2 What served as a 'control' in this investigation? (1)

3.3.3 Explain how the effect of adrenalin on heart rate shown in the results is of benefit to a person in a dangerous situation. (3)
(6)

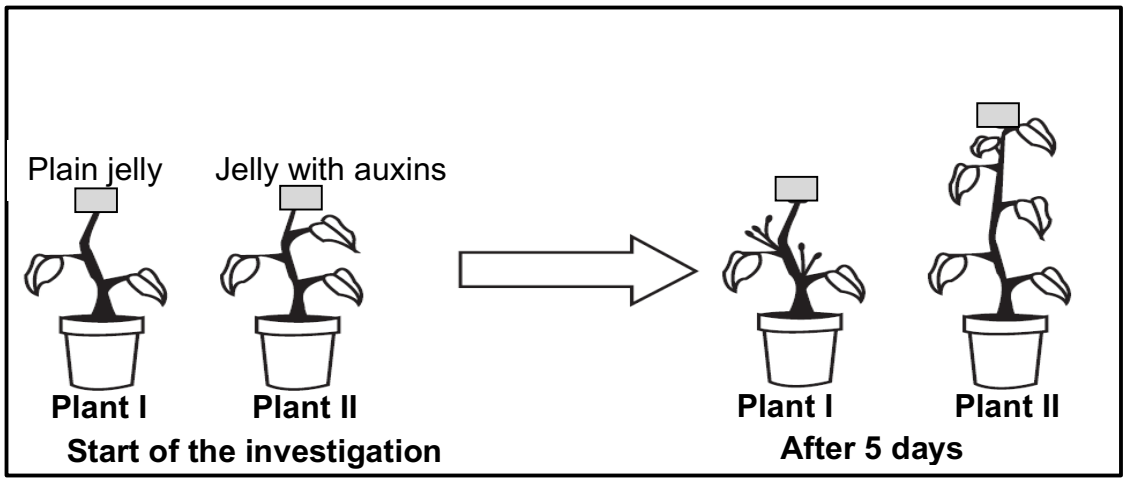
3.4 Describe how the human body regulates the salt level in blood when it decreases below normal. **(5)**

3.5 The following investigation was performed to demonstrate one of the effects of auxins.

- Plant **I** had the top removed and replaced with a block of plain jelly.
- Plant **II** had the top removed and replaced with a block of jelly containing auxins.
- Both plants were watered well and left in sunlight.

The jelly is able to allow auxins in it to diffuse into the plant.

The results of the experiment are shown below.



3.5.1 State which phenomenon is being investigated. (1)

3.5.2 Describe ONE change in appearance of Plant **I** after five days. (1)

3.5.3 Explain how the change in Plant **I** was brought about. (3)

3.5.4 State ONE way in which the reliability of the above investigation can be improved. (1)

(6)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Kagiso Rabada, a South African cricket player, bowls during a cricket match on a hot day.

Describe how Rabada's temperature was lowered on the hot day, how he maintained his balance and equilibrium during his bowling and the role of hormones in maintaining his energy levels.

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
RAND TOTAL: 15