LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL
SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1
SEPTEMBER 2019

MARKS: 150

TIME: 2 $\frac{1}{2}$ hours

This question paper consists of 19 pages

INSTRUCTIONS AND INFORMATION

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 to D) next to the question number (1.1.1 to 1.1.10) in the ANSWER BOOK, for example1.1.11 D.

1.1.1 Which ONE of the following will cause food insecurity?

A Planting more fruit trees
B Increase in biodiversity
C Increase in invasive alien plants
D Controlled use of fertilizers

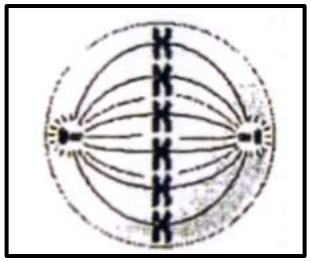
1.1.2 Study the factors below:

(i) Veld fires
(ii) Biodiversity
(iii) Drought
(iv) Floods

Which ONE of the following combinations of factors INCREASES as a result of global warming?

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

1.1.3 Which type of cell division and phase are illustrated in the following diagram?



A Metaphase I of meiosis
B Metaphase II of mitosis
C Metaphase II of meiosis
D Metaphase of mitosis II

QUESTIONS 1.1.4 and 1.1.5 REFER TO THE FOLLOWING INVESTIGATION

In an investigation, a group of scientists collected data on how smoking influences the length of pregnancies.
The normal average length of pregnancy is 42 weeks.

The scientists collected the following data:

- **1% of mothers who smoked heavily gave birth at 24 weeks compared to 0,36% of non-smoking mothers;**
- **1,2% of mothers who smoked heavily gave birth at 30 weeks compared to 0,46% of non-smoking mothers;**
- **1,8% of mothers who smoked heavily gave birth at 36 weeks compared to 0,9% of non-smoking mothers.**

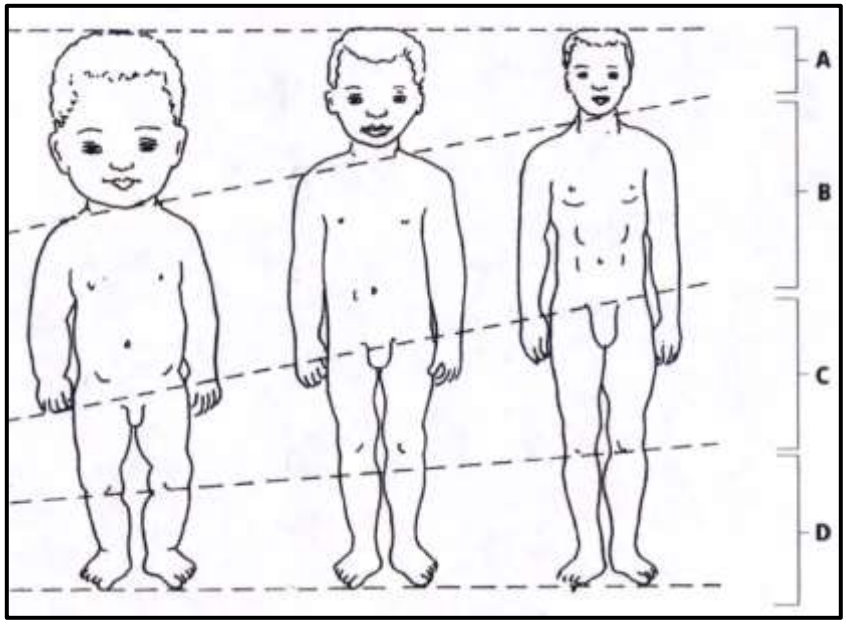
1.1.4 The average percentage difference, in early births between mothers which smoke heavily and non-smoking mothers is …

A 0,76%
B 2,28%
C 4%
D 1,72%

1.1.5 The scientists measured the dependent variable by …

A Dividing the smoking and non-smoking woman into two groups.
B Calculating the % woman giving birth.
C Compare the number of woman giving birth early and woman who gave birth at 42 weeks.
D Calculating the % smoking and non-smoking woman who gave birth early at 24, 30 and 36 weeks.

QUESTION 1.1.6 REFERS TO THE FOLLOWING FIGURES OF A BABY GROWING INTO AN ADULT.



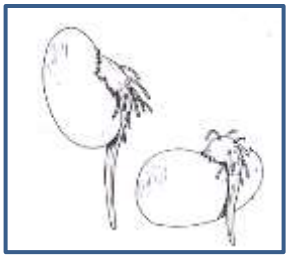
1.1.6 Which labelled region grows the least?

A **A**
B **B**
C **C**
D **D**

1.1.7 The reason why organisms more closely resemble their parents, than unrelated individuals of the same species is…

A they inherit one chromosome from one parent and another chromosome from the other parent.
B that both parents endow their offspring with genes that program specific traits that emerge as they develop into adults.
C that the offspring inherit all their parents' genetic material.
D is that one set of each of the parents' gonosomes are inherited by the children.

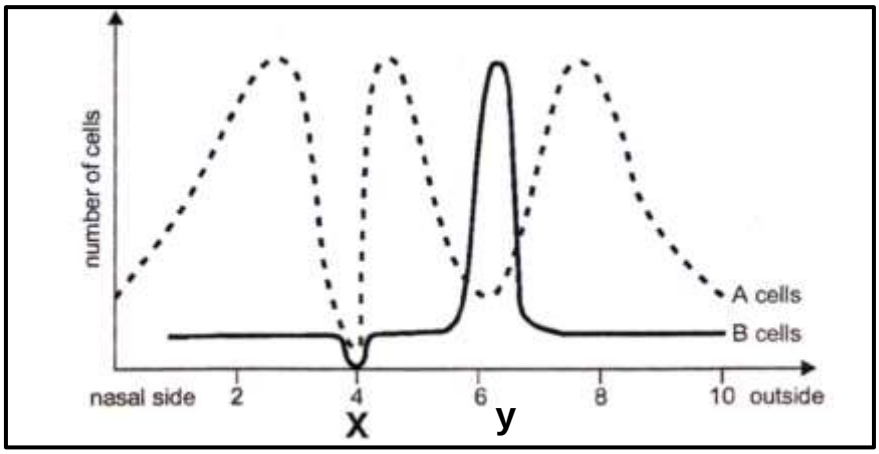
1.1.8 Study the following diagram which illustrates germinating seeds.



Which plant hormones play a role in this germinating seeds?

A Abscisic acid and auxins
B Auxins and gibberellins
C Gibberellins and abscisic acid
D Abscisic acid, auxins and gibberellins

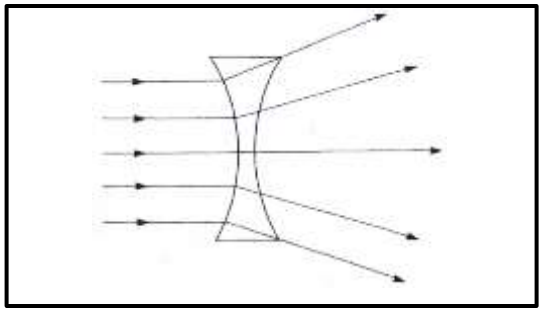
1.1.9 The following graph shows the number of photo receptor cells (types **A** and **B**) in the retina along a horizontal line from the nasal side of the eye to the outer side.



Study the graph and choose the correct combination of facts in the table.

	A cells	**B cells**	**X**	**Y**
A	Cones	Rods	Peripheral vision	Colour vision
B	Photoreceptors	Rods	Blind spot	Peripheral vision
C	Rods	Cones	No vision	Sharpest vision
D	Rods	Photoreceptors	Macula lutea	No vision

1.1.10 The following lens is used as a corrective measure for a visual defect.



Choose the correct combination of facts:

A It is a concave lens which diverge light rays used as remedy for myopia
B It is a convex lens which diverge light rays used as remedy for myopia
C It is a concave lens which converge light rays used as remedy for short sightedness
D It is a convex lens which converge light rays used as remedy for long- sightedness

(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 1.2.10) in the ANSWER BOOK.

1.2.1 The illegal hunting and killing of animals

1.2.2 The plant hormone which promotes fruit and leaf fall

1.2.3 When a high concentration of auxins inhibits the growth of the lateral buds.

1.2.4 The gas in the blood which, when increased, causes an increase in the breathing rate

1.2.5 The part of the brain that coordinates voluntary muscle movement

1.2.6 The part of the neuron that provides electrical insulation

1.2.7 The hormone in the human body that controls the basic metabolic rate

1.2.8 The part in the amniotic egg which act as a reservoir for excretory products

1.2.9 The gland in the body which act as a control centre in the regulation of thyroxin

1.2.10 Type of reproductive strategy when the parents build nests, protect the eggs and young and teach the young

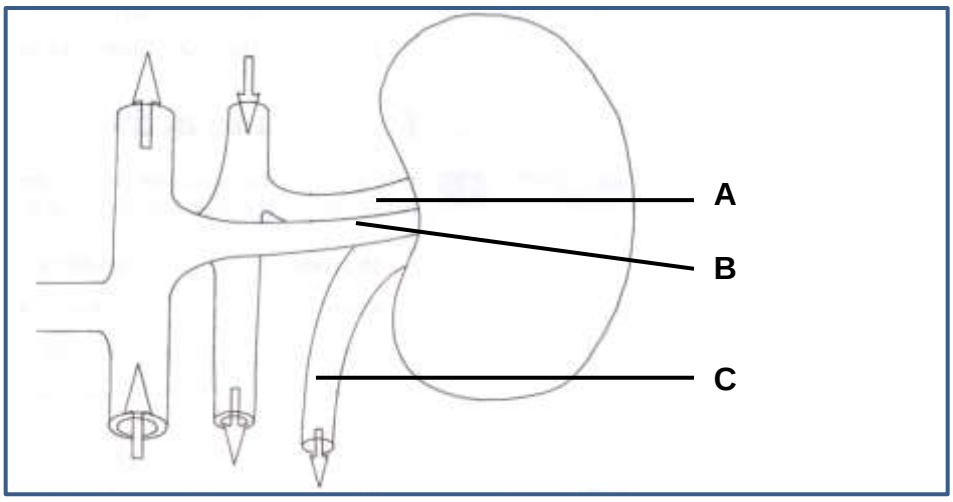
(10 x 1) **(10)**

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 1.3.3) in the ANSWER BOOK.

COLUMN I	**COLUMN II**
1.3.1 The type of cell division which takes place in the fallopian tube	A: Mitosis B: Meiosis
1.3.2 The part of the nervous system which is concerned with voluntary actions	A: Sympathetic B: Parasympathetic
1.3.3 Nutrition provided by the placenta	A: Vivipary B: Ovovivipary

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

1.4 The following diagram shows parts of the urinary system.



1.4.1 Name the hormone which assists in the homeostatic control of salts in the human body. (1)

1.4.2 Name the gland which get stimulated by a high salt concentration. (1)

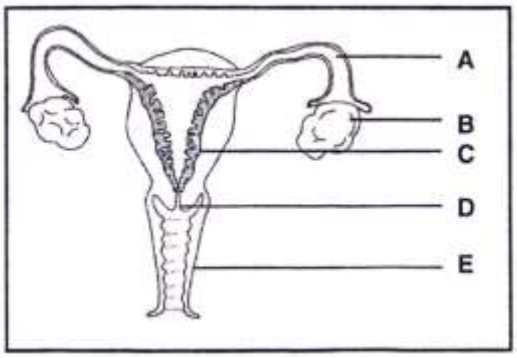
1.4.3 When the secretion of the hormone in Question 1.4.1 increases, suggest what would happen with the salt concentration in:

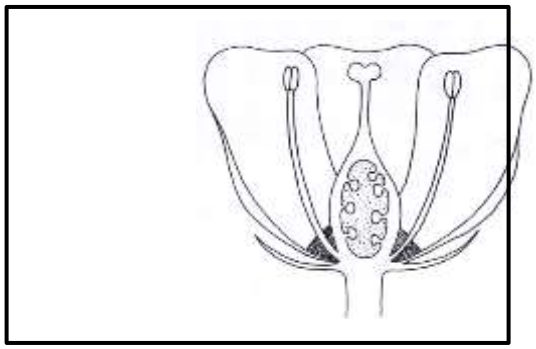
(a) **B** (1)

(b) **C** (1)

1.4.4 Name the part of the kidney nephron where the events in QUESTION 1.4.1 take place. (1)
(5)

1.5 The diagrams below represent a female reproductive system and a flower.





1.5.1 Write down the LETTER and the NAME of the part:

(a) Where spermatogenesis takes place. (2)

(b) In which implantation of the blastocyst takes place. (2)

(c) Provides a pathway for the zygote to move. (2)

1.5.2 Give the LETTERS of the parts where ova are produced. (2)

1.5.3 Identify part **D**. (1)
(9)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Read the following extract on Klinefelter's syndrome.

> The most common cause of Klinefelter's syndrome is an extra X chromosome (XXY) caused by meiotic non-disjunction of the sex chromosomes.
>
> Male children with the XXY-genotype appear normal before puberty. However, after puberty, the testes remain small and firm and the lack of local testosterone production cause the abnormal development of seminiferous tubules.
>
> Normal secondary sex characteristics do not appear

2.1.1 Explain the term trisomy by using an example in the text. (1)

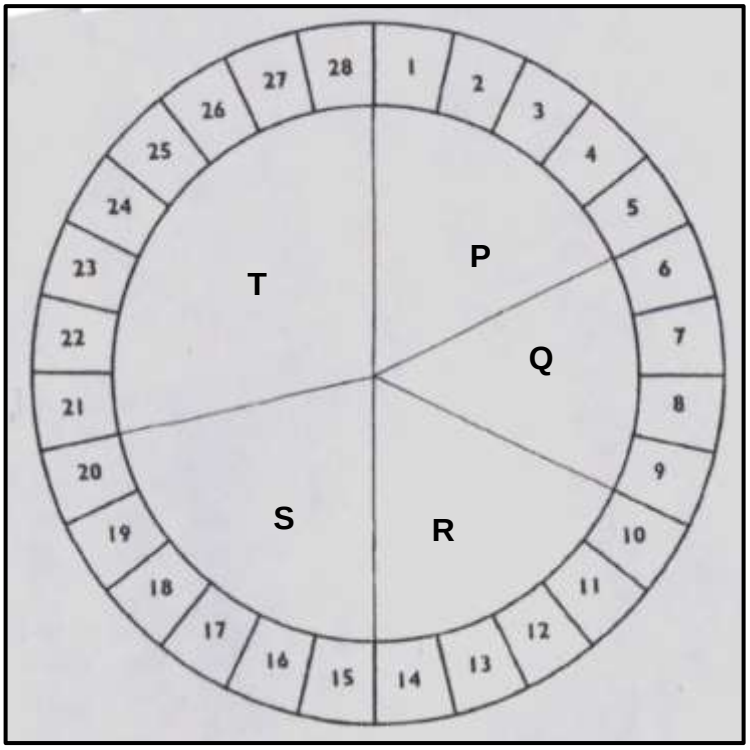
2.1.2 State how many chromosomes would be present in the somatic cells of an individual with Klinefelter's syndrome. (1)

2.1.3 Name THREE noticeable secondary sexual characteristics which are going to be absent in men with Klinefelter's syndrome after puberty. (3)

2.1.4 Explain how non-disjunction results in Klinefelter's syndrome. (5)

2.1.5 Describe the process of spermatogenesis. (3)
(13)

2.2 The following diagram represents a menstrual cycle of a woman, starting at day one.



2.2.1 Indicate the LETTER of the phase when:

(a) Menstruation is likely to occur. (1)

(b) The levels of progesterone and oestrogen are the highest. (1)

2.2.2 The birth control pill is one of the most commonly used contraceptive products. It contains oestrogen and progesterone and is taken daily except for the last 5 days of the 28 day menstrual cycle.
Explain how the presence of high levels of these hormones prevents pregnancy. (5)

2.2.3 Draw a labelled diagram of an ovary with only the follicles indicated at stages **P** and **S** on the diagram. (4)
(11)

2.3 The frequency of sound is measured in units called Hertz (Hz)
Three learner's hearing were tested by testing their **range of sound** that they can hear.
The results are recorded in the following table:

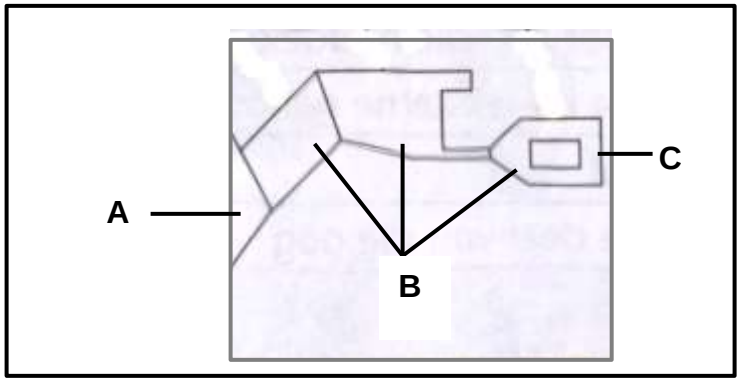
	Lowest frequency of sound heard	**Highest frequency of sound heard**
Pabalelo	19 Hz	20300 Hz
Nkazi	18 Hz	20100 Hz
Hazel	320 Hz	1000 Hz

2.3.1 Which learner most probably needs a hearing-aid? (1)

2.3.2 Explain your answer in QUESTION 2.3.1. (2)

2.3.3 Bats produce sounds between 30 000 and 80 000 Hz. Explain why humans are not able to hear sound produced by bats. (2)
(5)

2.4 The following diagram is a simplified diagram of structures in the middle ear of a human.



2.4.1 Give the NAMES and the FUNCTIONS of the membranes labelled:

(a) **A** (2)

(b) **C** (2)

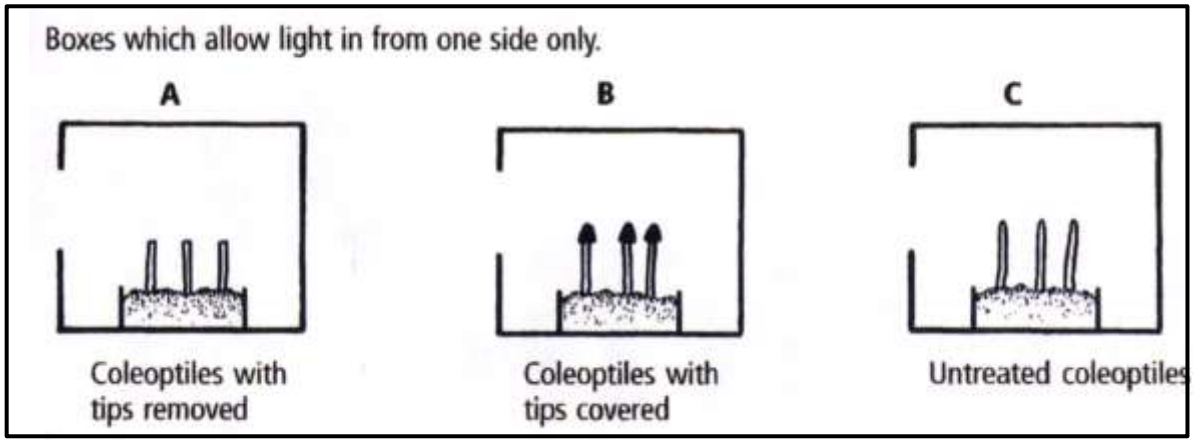
2.4.2 Explain how parts **B** are structurally suited to amplify sound waves. (2)

2.4.3 Describe the role of the sacculus and utriculus in maintaining balance (5)
(11)
[40]

QUESTION 3

3.1 Learners carried out an investigation to see which part of a shoot is sensitive to light.

- They put several maize seeds in three pots labelled **A**, **B** and **C**.
- The seeds germinated and grew shoots called coleoptiles.
- They cut of the tips of each coleoptile in pot **A**.
- They covered the tips of each coleoptile in pot **B** with foil.
- The coleoptiles in pot **C** were left untreated.
- They measured the length of the coleoptiles and recorded the average length of the coleoptiles in each pot.
- They put pots **A**, **B** and **C** into boxes that allowed light to enter in from one side only, and left them seven days to grow.



- They measured the new average length and growth pattern of the coleoptiles and compare it with the original length and shape of the coleoptiles.
- They entered the results on the following table:

Pot	A	B	C
Increase in length	No	Yes	Yes
Growth in reaction to unilateral light	**(a)**	**(b)**	**(c)**

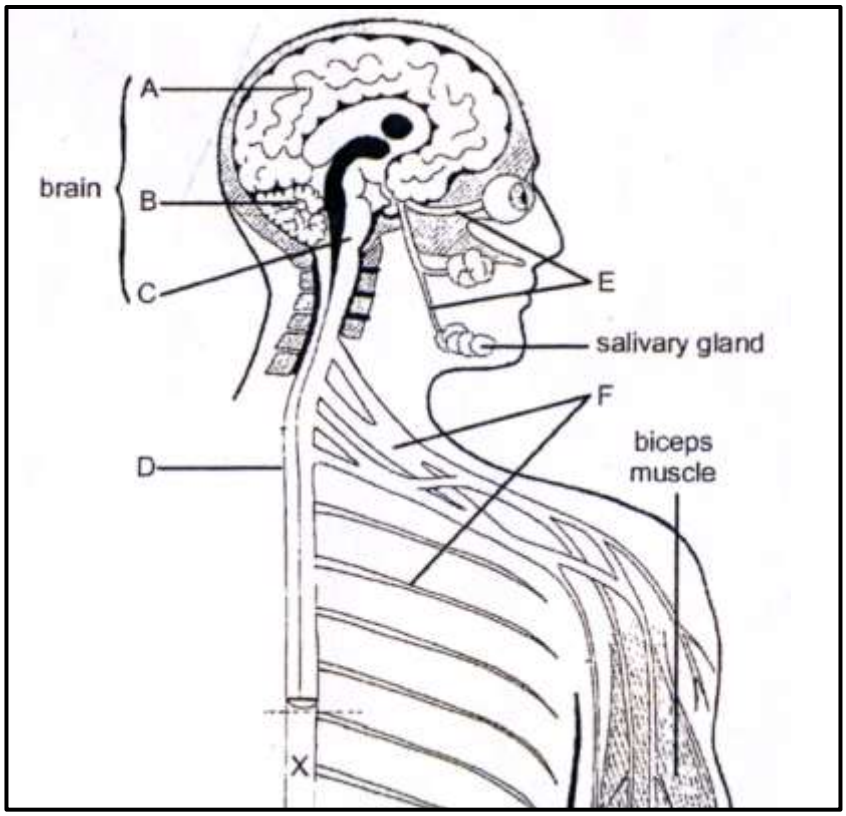
3.1.1 Explain how the average length of the coleoptiles were calculated. (2)

3.1.2 Explain why the coleoptiles in pots **B** and **C** grew, but those in pot **A** did not grow. (2)

3.1.3 Complete **(a)**, **(b)** and **(c)** on the table above by only writing **(a)**, **(b)** and **(c)** and your answer. (3)

(7)

3.2 The diagram below represents parts of the human nervous system.



3.2.1 Explain each of the following observations by referring to the function and the part of the brain indicated:

(a) Damage to the part of the brain labelled **C** result in death, even if all the other parts of the brain and body are functioning. (2)

(b) A blood clot in the right cerebral cortex at position labelled **A** may result in paralysis in the left arm. (3)

3.2.2 Give two reasons why humans do need a nervous system (2)

3.2.3 Tabulate TWO structural differences between nervous and chemical coordination. (5)

3.2.4 Give the LETTERS and the NAMES of the parts which make up the peripheral nervous system. (4)
(16)

3.3 An oral glucose tolerance test is used to determine if a person is diabetic.

After an 8-hour period of fasting (no food intake) the person drinks a glucose solution.
The person's blood glucose levels are then measured at 30 minute intervals.

If the person's blood glucose level is above 200mg/100ml two hours after drinking the glucose solution then the patient is diagnosed as being diabetic.

The results of a glucose tolerance test performed on three different patients
(**1**, **2** and **3**) is provided in the table below.

The normal blood glucose level in the blood is 90mg/100ml

Time (minutes)	**Blood glucose levels(mg/100ml)**		
	Patient 1	**Patient 2**	**Patient 3**
0 (glucose is ingested)	85	130	85
30	125	215	210
60	100	250	180
90	85	260	100
120	80	240	80

3.3.1 Explain why the patients had to fast for 8 hours. (2)

3.3.2 Describe the homeostatic control of blood glucose during the last 6 hours of fasting. (4)

3.3.3 Explain why patients **1** and **3** are not diabetic according to the results in the table. (2)

3.3.4 Although patient **3**'s initial blood sugar level the same is as patient **1**'s, there is a steep increase in his blood glucose levels at 30 minutes. Suggest any other hormone which could cause such a sudden rise in blood sugar levels as indicated in the table. (2)
(10)

3.4 Read the following extract.

South Africa has 3 000 km of coastline with ±10 000 marine species. This is 15% of all coastal marine species in the world. One area of spectacular beauty is the iSimangaliso Wetland Park, previously known as the Greater St Lucia Wetland Park.

Two species of sea turtle come ashore here to lay their eggs on the beach. A higher tide line would mean there would not be enough beach for the turtles to lay their eggs. This would result in a reduction, if not the extinction, of the sea turtle population.

The predators of the sea turtles include seagulls. A drop in the turtle population may result in a drop in the seagull population too. This in turn would result in a much higher level of decaying animal matter on the beaches because seagulls eat that too.

3.4.1 Explain how climate change can result in a higher tide line. (3)

3.4.2 Sea turtles feed on jelly fish and jelly fish eat plankton. Suggest how the extinction of sea turtles may influence this food chain. (2)

3.4.3 Explain how a drop in the seagull population will influence food security in humans. (2)
(7)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

The control of water quality is essential in an ecosystem as well as in the human body.

Explain how the need for fresh and processed food influence water quality in an ecosystem and describe how a low water concentration in human blood is homeostatically corrected.

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