basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

NOVEMBER 2022

MARKS: 150

TIME: 2½ hours

Stanmorephysics

This question paper consists of 17 pages.

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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 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. Do 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.

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SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

1.1.1 Which ONE of the following maintains the shape of the eyeball?

A Cornea
B Lens
C Vitreous humour
D Retina

1.1.2 The choroid …

A is richly supplied with blood vessels.
B contains photoreceptors.
C refracts the light rays.
D sends impulses to the brain.

1.1.3 Which ONE of the following occurs immediately after fertilisation?

A The blastula, which is a hollow ball of cells, is formed by meiosis.
B The morula, which is a hollow ball of cells, is formed by meiosis.
C The blastula, which is a solid ball of cells, is formed by mitosis.
D The morula, which is a solid ball of cells, is formed by mitosis.

1.1.4 On a hot day …

A less blood flows to the surface of the skin.
B the sweat glands become inactive.
C more blood flows to the surface of the skin.
D vasoconstriction takes place.

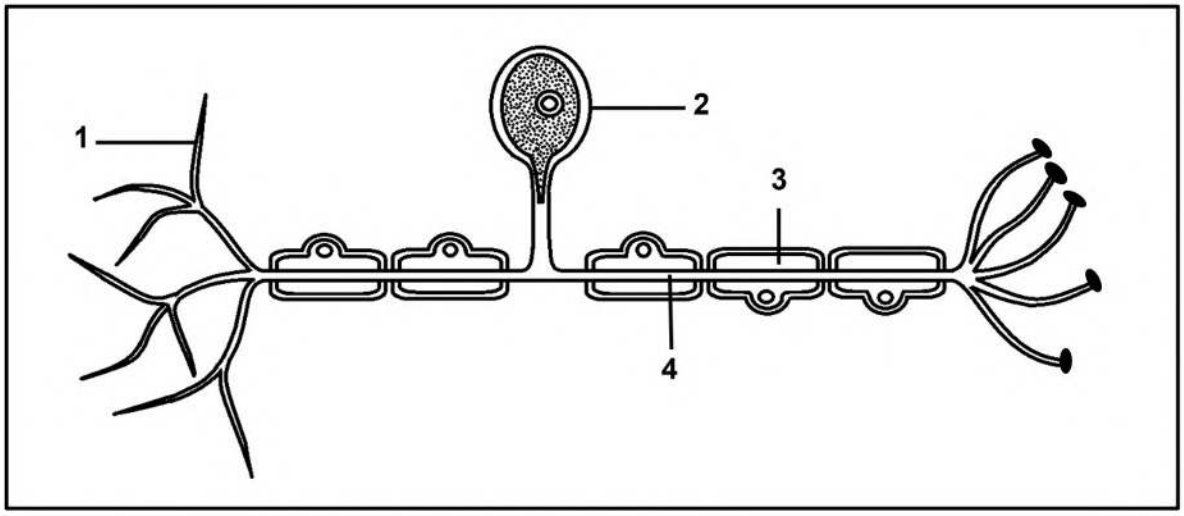
1.1.5 The normal site of fertilisation in a human female is the …

A uterus.
B ovary.
C vagina.
D Fallopian tube.

1.1.6 Which ONE of the following best describes the events of accommodation when a person is viewing an object that is less than 6 m away?

	Ciliary muscle	Suspensory ligaments	Tension on the lens
A	Relaxes	Tighten	Increases
B	Contracts	Slacken	Decreases
C	Relaxes	Slacken	Decreases
D	Contracts	Tighten	Increases

QUESTIONS 1.1.7 AND 1.1.8 ARE BASED ON THE DIAGRAM OF THE NEURON BELOW.



1.1.7 The axon is represented by structure …

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

1.1.8 Which labelled part affects the speed of impulse transmission?

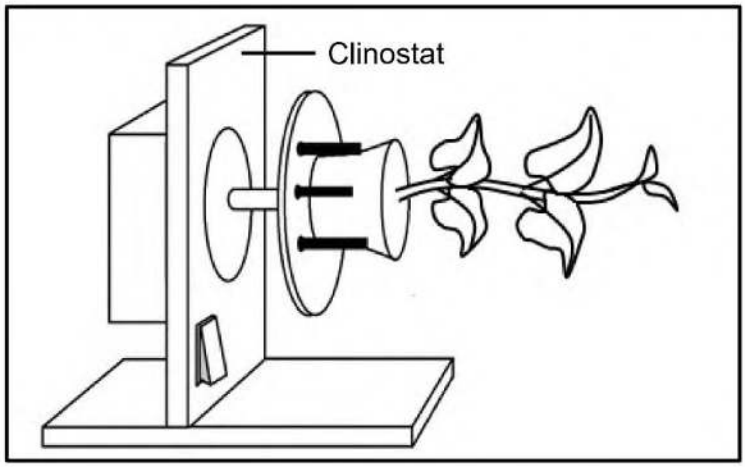
A 1
B 2
C 3
D 4

QUESTIONS 1.1.9 AND 1.1.10 REFER TO THE DIAGRAM BELOW THAT SHOWS AN INVESTIGATION DONE TO DETERMINE THE EFFECT OF AUXINS ON TROPISM.

The procedure was as follows:

- A pot plant was placed on a stationary clinostat.
- The plant was exposed to light from all directions.
- The growth was then observed after few days.

The diagram below shows the set-up of the investigation.



The results after a few days showed the stem growing upwards.

1.1.9 Which ONE of the following is an explanation of the results?

A Phototropism occurred because the auxins moved towards light, which inhibited growth on the lower side of the stem.
B Geotropism occurred because the auxins moved downwards, which stimulated growth on the lower side of the stem.
C Phototropism occurred because the auxins moved away from light, which stimulated growth on the upper side of the stem.
D Geotropism occurred because the auxins moved upwards, which inhibited growth on the upper side of the stem.

1.1.10 A control for the same investigation was set up by putting an identical pot plant on a **rotating** clinostat.

Which ONE of the following would be the expected results observed after a few days?

A There will be no growth.
B The stem will grow upwards.
C The stem will grow downwards.
D The stem will grow horizontally. (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 numbers (1.2.1 to 1.2.10) in the ANSWER BOOK.

1.2.1 The part of the skull that protects the brain

1.2.2 The homeostatic process whereby temperature is controlled in the body

1.2.3 The visual defect characterised by a cloudy lens

1.2.4 The blood vessel that transports deoxygenated blood from the foetus towards the placenta

1.2.5 The part of the brain that controls body temperature

1.2.6 A branch of the nervous system that is made up of spinal and cranial nerves

1.2.7 Finger-like projections that develop from the outer membrane of an embryo after implantation

1.2.8 A hormone that regulates the salt levels in blood

1.2.9 The fluid that protects the developing foetus against mechanical injury

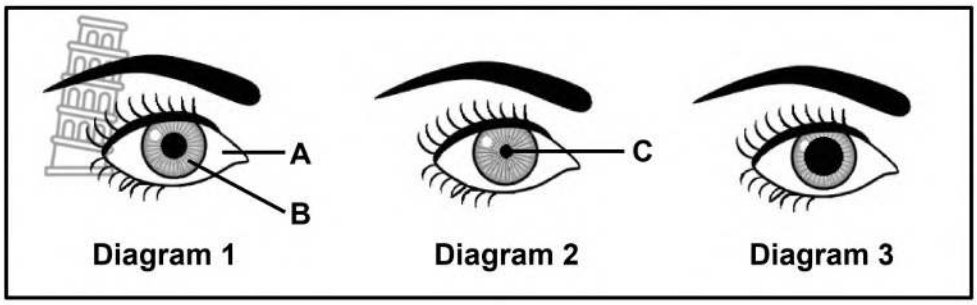
1.2.10 The area of the retina that contains the highest concentration of cones (10 x 1) **(10)**

1.3 Indicate whether each of the descriptions in COLUMN I apply 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 numbers (1.3.1 to 1.3.3) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	A plant hormone that inhibits the germination of seeds	A: Gibberellins B: Abscisic acid
1.3.2	The functional connection between two consecutive neurons	A: Synapse B: Effector
1.3.3	A hormone that stimulates puberty	A: Testosterone B: Oestrogen

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

1.4 The diagrams below show the condition of the eyes for different light intensities when viewing the same object.



1.4.1 Give the LETTER and NAME of the part that:

(a) Contains muscles (2)

(b) Is made up of tough white fibrous tissue (2)

1.4.2 Which diagram (**1**, **2** or **3**) represents the eye of a person:

(a) In a very bright area (1)

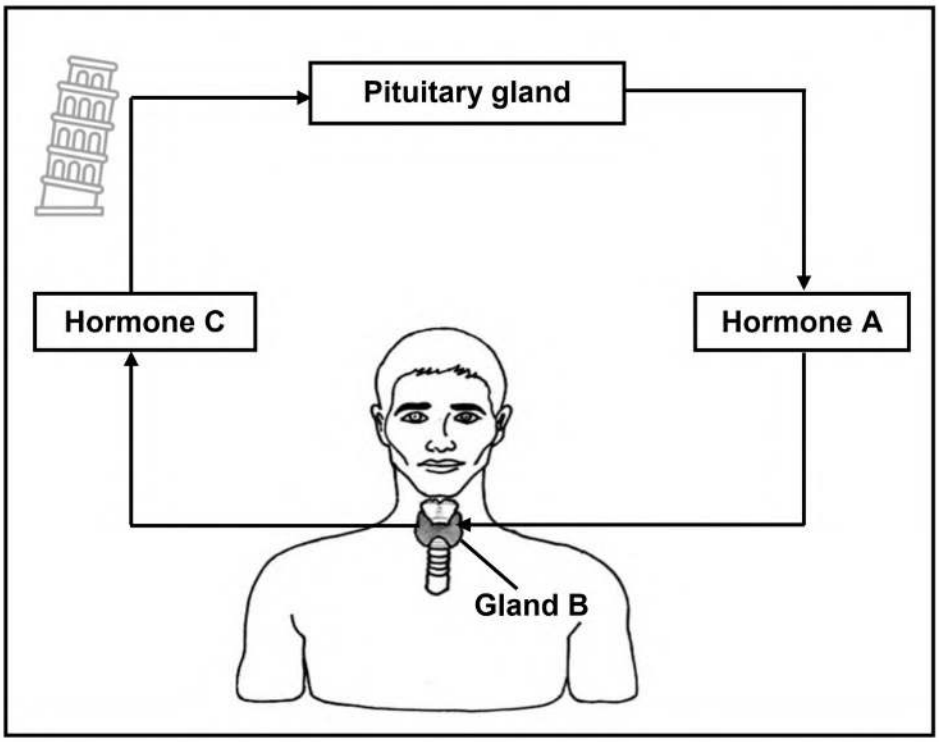
(b) Where the rods are stimulated the most (1)

1.4.3 Which muscles are:

(a) Contracted in diagram **2** (1)

(b) Relaxed in diagram **3** (1)
(8)

1.5 The diagram below shows the interaction between two endocrine glands.



1.5.1 Name the type of interaction that occurs between hormone **A** and gland **B**. (1)

1.5.2 Identify:

(a) Gland **B** (1)

(b) Hormone **A** (1)

(c) Hormone **C** (1)

1.5.3 Name the disorder that results when gland **B** is overstimulated and becomes enlarged. (1)

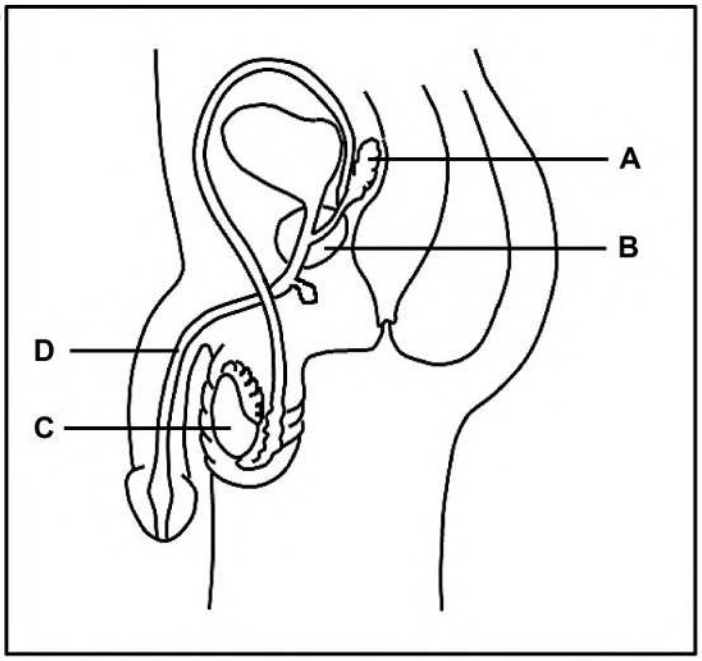
1.5.4 Which hormone (**A** or **C**) will be expected to be high in the blood of the person with the disorder named in QUESTION 1.5.3? (1)
(6)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below represents the human male reproductive system.



2.1.1 Identify structure **A**. (1)

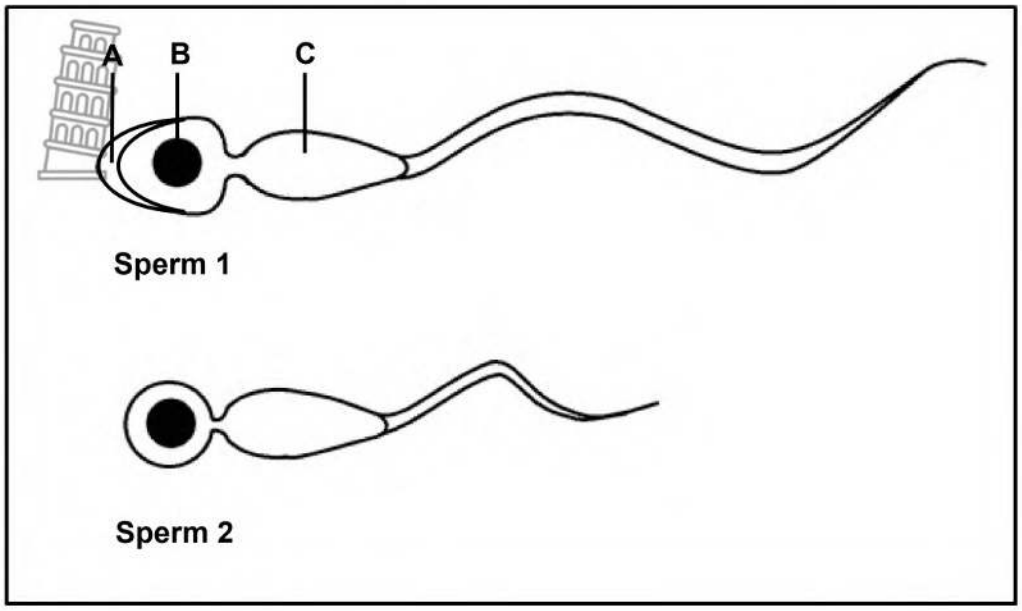
2.1.2 State ONE function of part **D** in reproduction. (1)

2.1.3 Give TWO reasons why structure **B** is NOT considered to be an endocrine gland. (2)

2.1.4 Name the type of gametogenesis that occurs in part **C**. (1)

2.1.5 Explain how the secretions of structures **A** and **B** improve the chances of fertilisation. (4)
(9)

2.2 The diagrams below show the structure of a normal and an abnormal sperm. (The diagrams are drawn to scale.)



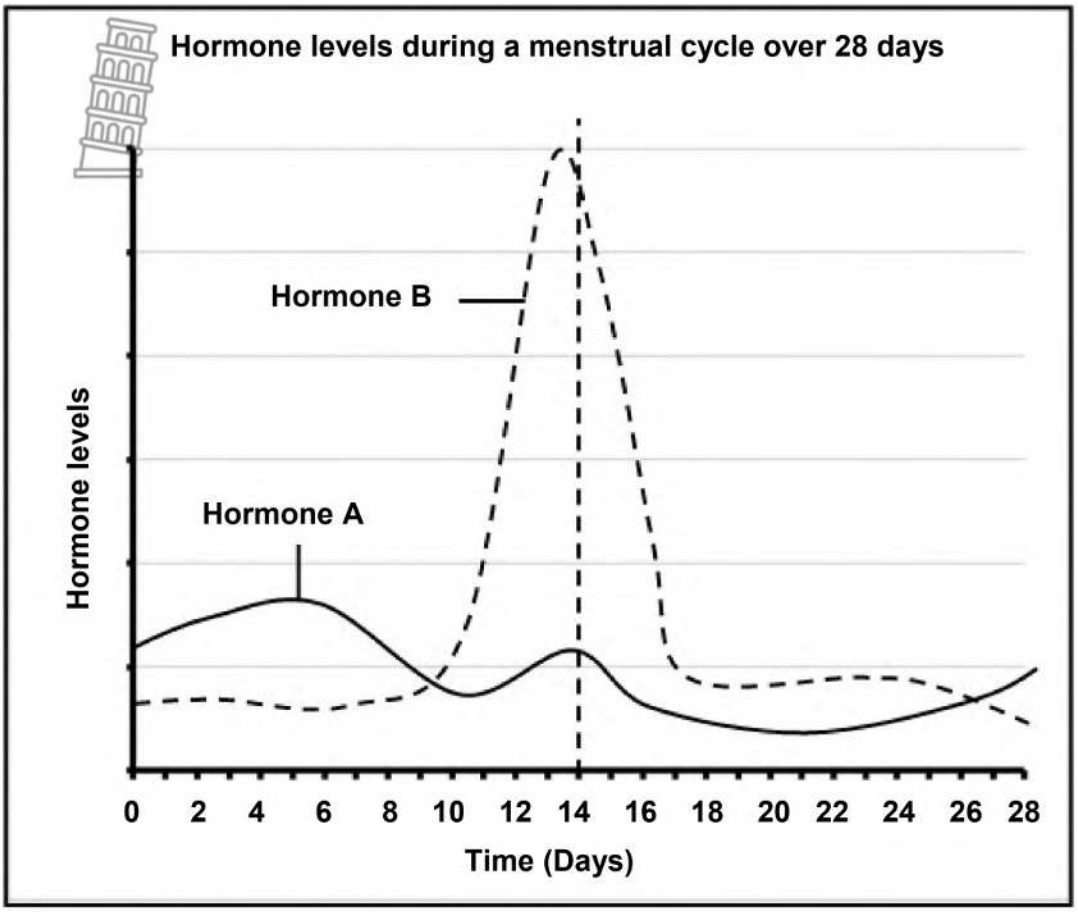
2.2.1 Identify part **A**. (1)

2.2.2 Describe the role of structure **B** during fertilisation. (1)

2.2.3 Explain the role of the organelles found in large numbers in part **C**. (2)

2.2.4 Explain TWO reasons why sperm **1** is structurally better suited for fertilisation than sperm **2**. (4)
(8)

2.3 The graph below shows the levels of two hormones that are secreted by the pituitary gland during the menstrual cycle.



2.3.1 State TWO functions of hormone **B**. (2)

2.3.2 Explain why a female who is struggling to get pregnant:

(a) May be given pills containing hormone **A** as a treatment (3)

(b) Will have her levels of hormone **B** constantly monitored (2)

2.3.3 Explain how the levels of hormone **A** on days 0 to 5 will differ in a pregnant female. (3)
(10)

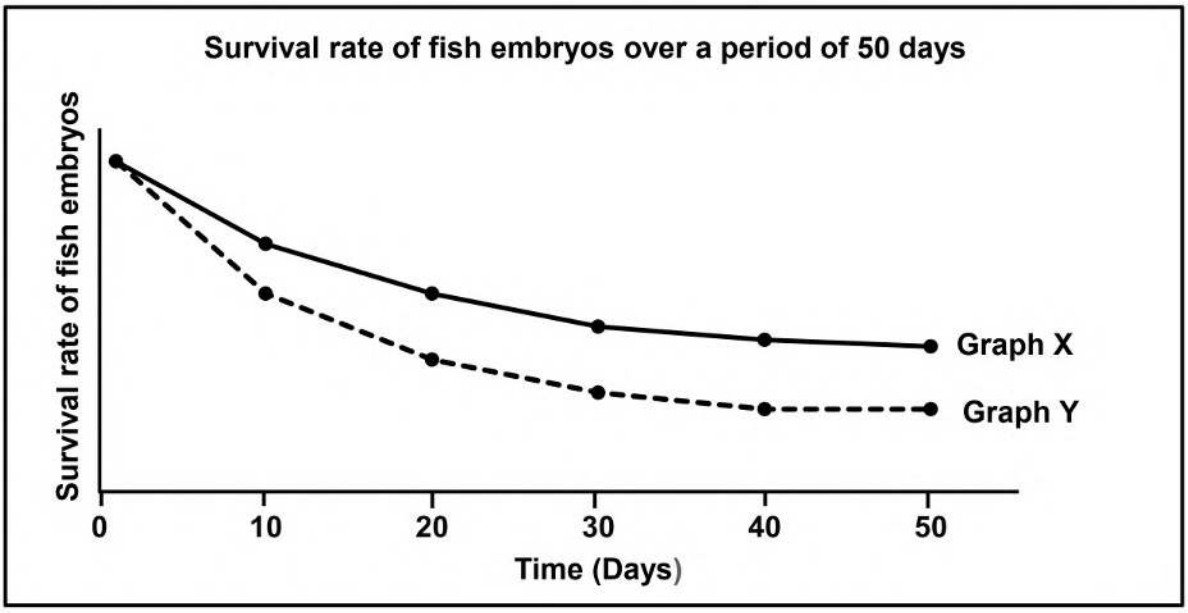
2.4 Describe the secretion of the ovarian hormones and their role in the menstrual cycle. **(5)**

2.5 Read the extract below.

Anchovy is a type of fish found in the Pacific Ocean. During the breeding season, the females and males gather in large groups and release ova and semen into the water. Once fertilised, the eggs float in the water and embryonic development occurs until hatching.

The northern pike fish is found mainly in rivers. During the breeding season, the female releases thousands of ova and the male releases semen all around the female. The fertilised eggs attach to vegetation near the riverbed, where embryonic development occurs until hatching.

The graph below shows the survival rate of both fish species.



2.5.1 Name the type of fertilisation that takes place in both fish species. (1)

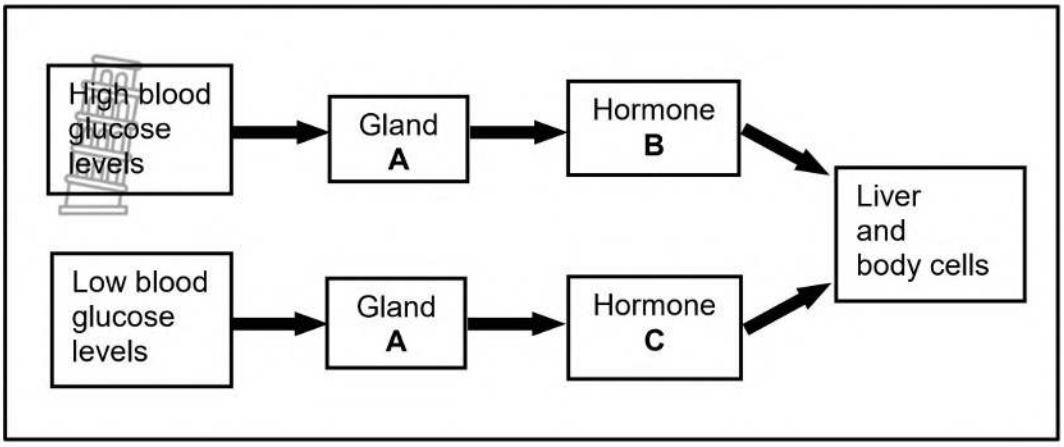
2.5.2 Explain why both fish species are oviparous. (2)

2.5.3 Describe TWO ways in which the chances of fertilisation are increased in the northern pike fish. (2)

2.5.4 Which graph (**X** or **Y**) represents the survival rate of the northern pike fish? (1)

2.5.5 Explain your answer to QUESTION 2.5.4. (3)
(9)

2.6 The diagram below shows the homeostatic control of blood glucose levels.



2.6.1 Identify:

(a) Gland **A** (1)

(b) Hormone **C** (1)

2.6.2 A certain disorder causes decreased production of hormone **B**.

(a) Explain how this will affect the blood glucose levels. (3)

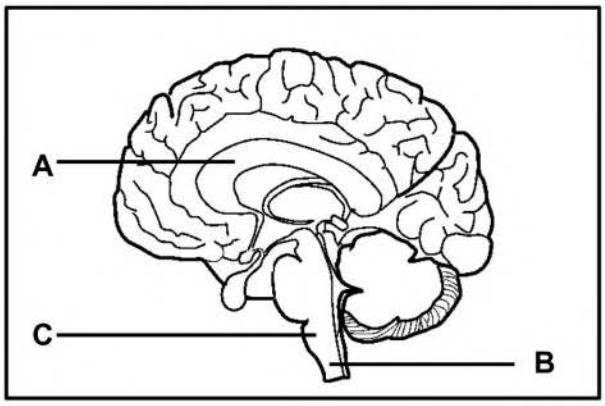
(b) Name the disorder. (1)

2.6.3 Scientists have been investigating the use of adrenalin as a treatment for people who cannot produce hormone **C**.

Explain why this treatment may work. (3)
(9)
[50]

QUESTION 3

3.1 The diagram below shows a part of the human brain.



3.1.1 Identify part **A**. (1)

3.1.2 Explain why a person may die if part **C** is damaged. (2)

3.1.3 Part **B** is damaged in a person's lower back.

(a) Identify part **B**. (1)

(b) Explain why the person will have no control of the skeletal muscles of the legs. (2)
(6)

3.2 The table below shows the recorded number of severe brain injuries per 100 000 people per year in different regions of the world.

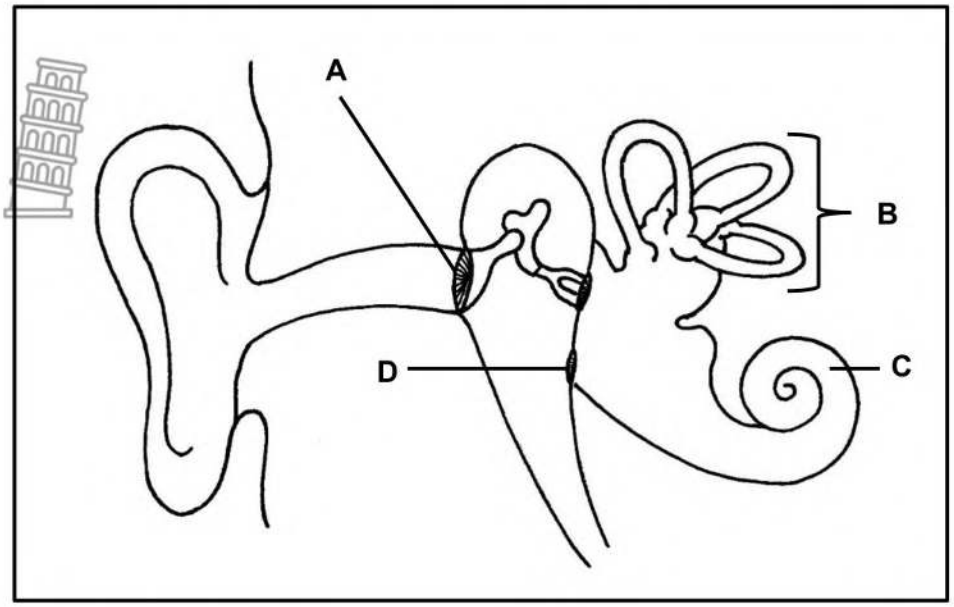
REGIONS OF THE WORLD	NUMBER OF SEVERE BRAIN INJURIES (PER 100 000 PEOPLE PER YEAR)
Latin America	900
USA and Canada	1 300
East Mediterranean	890
Europe	1 010
Africa	800

3.2.1 Which region has the smallest number of severe brain injuries? (1)

3.2.2 Explain why this data may not be accurate for the region named in QUESTION 3.2.1. (2)

3.2.3 Draw a bar graph to represent the data in the table. (6)
(9)

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



3.3.1 Identify part **C**. (1)

3.3.2 State ONE function of:

(a) Part **D** (1)

(b) The receptors found in part **C** (1)

3.3.3 Explain why a build-up of ear wax at part **A** may result in temporary hearing loss. (2)

3.3.4 A grommet is a small device that allows the air to move into and out of the middle ear. This prevents pressure build-up in the middle ear.

Explain how the use of grommets in the treatment of middle-ear infections prevents hearing loss. (4)

3.3.5 Describe how the receptors in part **B** are involved in maintaining balance when there are changes in the speed and direction of movement of the head. (4) **(13)**

3.4 Wearing a face mask is recommended to reduce the spread of the coronavirus. There are some concerns about the efficiency of breathing when wearing a face mask.

Scientists investigated the effect of wearing face masks on the carbon dioxide levels in blood.

They:

- Obtained permission from 150 healthy volunteers, aged 30, to participate in the investigation
- Applied a sensor to the participants' skin to measure the carbon dioxide levels in the blood
- Asked the participants to:
  - Sit still for 10 minutes without wearing a face mask
  - Sit still for 10 minutes while wearing a face mask
  - Exercise for 10 minutes without wearing a face mask
  - Exercise for 10 minutes while wearing a face mask
- Allowed a 15-minute interval between each 10-minute phase
- Recorded the carbon dioxide levels at the end of each 10-minute phase
- Ensured that the face mask covered the nose and mouth

3.4.1 Identify the:

(a) Independent variable (1)

(b) Dependent variable (1)

3.4.2 State TWO factors that were taken into consideration in the selection of the participants. (2)

3.4.3 Give ONE reason why the results at the end of this investigation may be considered reliable. (1)

3.4.4 Explain why scientists allowed a 15-minute interval between each phase. (2)

3.4.5 Give a reason why the carbon dioxide levels were measured while participants were sitting still. (1)

3.4.6 Describe the *homeostatic control* of carbon dioxide when it is high in blood. (7)
(15)

3.5 Read the extract below.

> Auxins control different aspects of growth and development in plants. They are known to influence the growth of stems and they also stimulate the development of new roots on stem cuttings in plant propagation.
>
> During plant propagation, a stem of a plant is cut and is then placed in water containing small quantities of artificial auxins. The auxins stimulate root development in the cuttings.

3.5.1 Name TWO places in plants where auxins are produced. (2)

3.5.2 State TWO ways in which auxins cause an increase in the length of stems. (2)

3.5.3 Name ONE other plant hormone that causes an increase in the length of stems. (1)

3.5.4 Explain how auxins can be used in plant propagation to the advantage of nature conservation. (2)
(7)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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