Province of the
EASTERN CAPE
EDUCATION

EXAMINATIONS AND ASSESSMENT CHIEF DIRECTORATE
Home of Examinations and Assessment, Zone 6, Zwelitsha, 5600
REPUBLIC OF SOUTH AFRICA, Website: www.ecdoe.gov.za

2022 NSC CHIEF MARKER'S REPORT

SUBJECT	**LIFE SCIENCES**		
QUESTION PAPER	**x**	2	3
DURATION OF QUESTION PAPER	**2½ HOURS**		
PROVINCE	**EASTERN CAPE**		
DATES OF MARKING	**07-12-2022 TO 21-12-2022**		

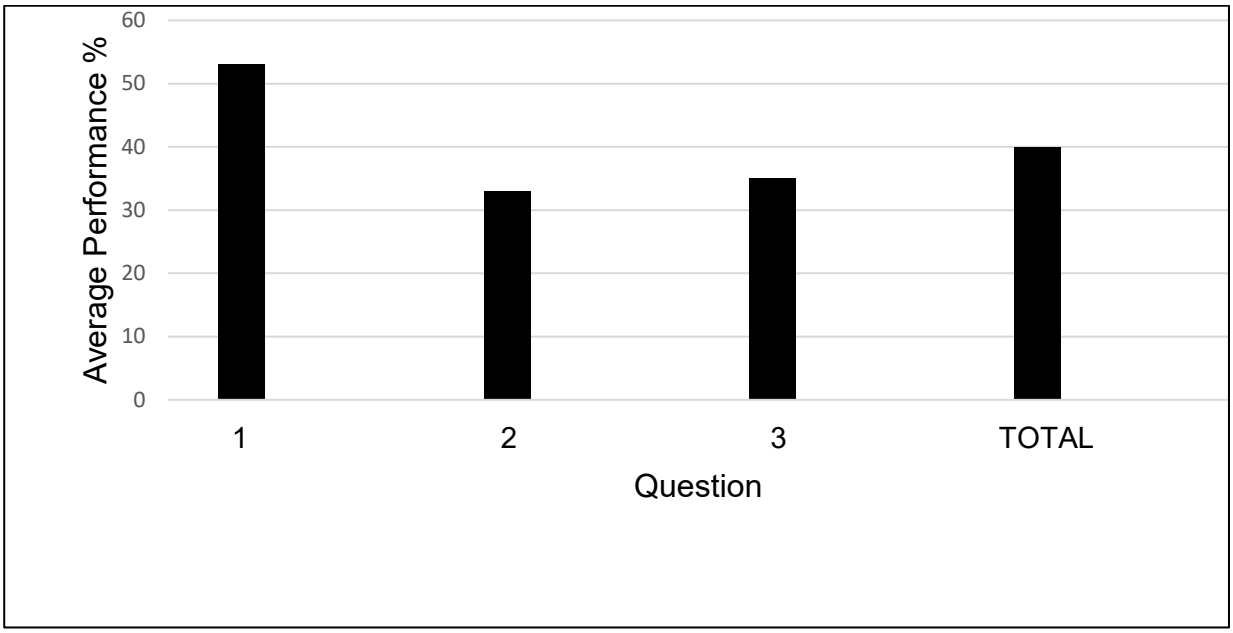
SECTION 1: (General overview of Learner Performance in the question paper as a whole)

The Life Sciences Question Paper 1 for 2022 was viewed by candidates and teachers as a fair paper which was more accessible to all learners. This was due to the straight-forward manner in which questions were asked. Although the structuring of the paper was friendly to candidates the level of questioning was not compromised.

However, the overall performance of learners in this paper is lower than 2021. There is also a noticeable decrease in level 6 and 7 learners. Higher marks were obtained by most candidates in Question 1 which were level 1 questions. Candidates, however; struggled to achieve to the same degree in Questions 2 and 3. They did not describe and explain their answers fully and lost marks for incomplete answers. Some candidates did not read the questions correctly and answers did not relate to what was being asked.

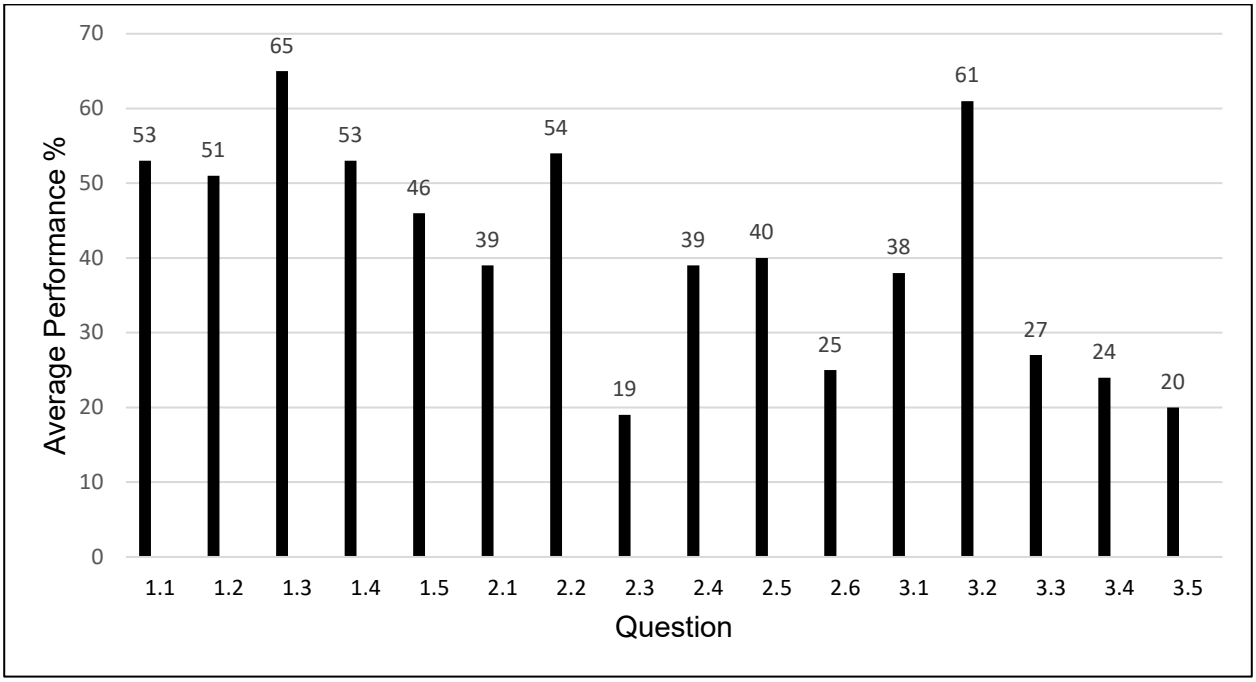
Life Sciences Paper 1

Candidate performance per question as per the Rasch Analysis of 100 Scripts



Life Sciences Paper 1

Candidate performance per sub-question as per the Rasch Analysis of 100 Scripts



SECTION 2: Comment on candidates' performance in individual questions

QUESTION 1

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

The learner performance was relatively higher than the rest of the questions. This is because this question was constructed mainly of level 1 questions which requires simple recall and comprehension. Although, the candidates were expected to score about 80 -90% in this section, they only scored an average of 53%. This is a real concern to all.

(a) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

1.1 (Multiple choice questions).
There were ten multiple choice questions (2 marks per question). Only a few candidates managed to score full marks in this section.

1.2 (Biological terms)
This is question was poorly answered by majority of our candidates despite our continuous interventions to improve the outcome.

1.2.2 Temperature control was not accepted because it is the description of the process. Thermoregulation is the correct term.

1.2.3 Many candidates could not spell the term 'Cataract' correctly. There were many variations of the term noted. e.g., contract; catarax, catarast. etc.

1.2.4 Umbilical cord / umbilical vein was not accepted.

1.2.5 Thalamus was the wrong choice.

1.2.6 The abbreviation "PNS" was not accepted because it is not the correct biological terminology.
Somatic nervous system was not accepted because it is the part of peripheral nervous system.

1.2.7 Villi was not accepted because this structure can be located in various parts of human body. e.g., small intestine; kidney tubules. etc.
Many candidates could not spell this term correctly. e.g., Chronic villi. Several variations of wrongly spelled term noted.

1.2.9 Amnion fluid was not accepted.

1.2.10 'Macula lutea' was accepted as a correct response. Macula alone was not accepted because macula can also be located in the inner ear.

1.3.3 "None" was not accepted. Although some other hormones (GnRH and FSH) <u>initiate</u> the sexual development. Both testosterone and oestrogen stimulate changes which are part of puberty. This, therefore, did not change the answer in the memo.

1.4.3 Many candidates could not differentiate between circular and ciliary muscles.

1.5.1 Many candidates wrote 'stimulation' but it was not accepted as a correct response. A stimulatory or an inhibitory reaction is the direct result of a negative feedback mechanism. The interaction between Hormone A and Gland B depends on the (negative) feedback generated by the levels of hormone C.

(b) Provide suggestions for improvement in relation to Teaching and Learning

- The leaners are still struggling to comprehend biological terms. This requires continuous drilling. It is better to compile a list of biological terms per topic for the learners to revise the terms effectively. Short 10 minutes tests can be administered and marked immediately at the end of a topic to reinforce what was learnt.
- Diagrams without labels should be given to learners to identify the parts and their functions.
- Compile questions from previous question papers for revision purpose.

(c) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Encourage learners to pay attention to the correct spelling. (Processes, biological terms. etc.)
- Avoid using abbreviations
- Encourage learners use specific terms. e.g., chorionic villi not villi

QUESTION 2

(a) **General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?**

2.1.1 Some candidates could not differentiate between seminal vesicle and seminiferous tubule.

2.1.2 Some candidates lost mark because they wrote the excretory function of the urethra. Many candidates lost mark because they wrote "urethra transports sperm". Urethra transport semen (combination of secretions from accessory glands and sperms from testes) unlike the vas deferens. Many candidates lost mark because they failed to write the destination of semen flow. The urethra is the only duct that transports semen out of the body. This function differentiate urethra from other ducts (vas deferens and ejaculatory ducts) that transport sperm or semen.

2.1.3 Many candidates lost mark because they gave a description of endocrine gland but, failed to give reasons why structure B (the prostate gland) is NOT considered to be an endocrine gland.

2.1.4 This was answered by most candidates.

2.1.5 This question required the combined functions of Gland A (Seminal vesicle) and Gland B (Prostate gland). (Not the individual functions). This is because the functions of the three accessory glands over-lap with each other. Furthermore, the candidates are expected to explain how these secretions improve the chances of fertilisation. Hence the responses should include all desired features(cause) and their effects. The cause and effect should be correctly linked to each other. The response such as "The secretions serve as a lubricator" was not accepted. This is because "lubrication" (lubrication – reduces friction) and does not improve the chances of fertilisation.
Some candidates wrote: The secretions contain nutrients for the sperm to generate energy. They lost 1 mark because they failed to indicate the purpose of energy generated(movement). The candidates did not lose mark for using the incorrect name of the glands as this was not required.

2.2.2 Many candidates lost mark because they did not correctly indicate the role of sperm nucleus. The sperm nucleus fuses with the nucleus of ovum. The sperm nucleus does not fuse with the ovum.

2.2.4 The nucleus of the sperm also carries genetic material (chromosome, DNA or genes)
Some candidates lost marks because they explained the structural suitability of Sperm 2 instead of Sperm 1.
Some candidates lost marks because they failed to explain how the feature was an advantage in comparison with the sperm 2. e.g. A long tail✓ ensures faster movement✓

2.3.1 Many candidates could not identify the hormone B and hence could not write the two functions of the hormone B.

(a) This question was not poorly answered by majority of candidates. To answer this question, candidate must identify the hormone A which is in the pill. Secondly, the candidates must link the hormonal function to the purpose of the treatment. The majority of candidates failed to apply their theoretical knowledge to a given scenario.

(b) Only a few candidates were able to answer this practical question. Most of the candidates wrote the function of LH rather than explaining why its level was monitored. The peak or an increase in the LH level was monitored constantly to know approximate time of ovulation or release of an ovum.

2.3.2 This question was also not answered by the majority of candidates. The candidate was given the graph representing the normal menstrual cycle. The question required a candidate to adapt the graph to answer the question on pregnancy. Many candidates lost marks because they identified the wrong hormone or described the role of all female hormones in the normal menstrual cycle.

2.3.3 The candidates were expected to identify the ovarian hormones, site of their production and their role in the menstrual cycle but, not in pregnancy. This was a level 1 question that required a description. Some candidates wrote all the female hormones that are involved in the menstrual cycle. Some lost marks for not correctly identifying the site of production (glands). Many candidates lost a mark because they wrote "thickening of uterine wall" instead of referring to the uterine lining or endometrium. The uterine wall refers to the muscular wall of the uterus and therefore, it was the wrong answer.

2.4 Some candidates lost a mark because they wrote: "fertilisation takes place outside the body of a female".
Two facts are required to answer this question sufficiently.

(i) The site of embryonic development (inside the egg)
(ii) The site egg development with regards to the female parent. (Outside the female body)

2.5.2 The female fish do not lay eggs, instead they only release ova/ egg cells/ gametes. Hence no mark allocated for laying eggs. (Birds do lay eggs and this feature makes them oviparous). In fish, the eggs are formed after fertilisation.

2.5.5 The candidates were expected to explain why they selected graph X as a correct response in 2.5.4.
This question required a **comparison** between the survival rate of Anchovy and Northern pike fish. Hence, they should write:
The graph X shows:

- a **HIGHER** number of surviving embryos/egg/ offspring.
- Because their fertilised eggs are attached to the vegetation
- Where they are protected from predators/ washing away.

2.6.2 Those who wrote "the graph X shows a high number of surviving embryos/ egg/ offspring", lost a mark because they failed to make a comparison between graph X and Graph Y.

(a) When the insulin level drops, the glucose uptake by the body cells will be drastically reduced. This means that the (high levels) excess glucose in the blood will not be reduced but, will always **remain high**. This is because, (the high level of) excess glucose will not be converted to glycogen in the **liver/ muscles.**
Most of the candidates lost a mark because they failed to include (the target organ) liver/ muscle in their response.

Most of the candidates lost a mark because they failed to write "glucose level remains high". Some candidates wrote: "the glucose level will increase" which is also a wrong answer. It is not increasing but, remains high.

2.6.3 Many candidates lost a mark because they wrote: "Adrenalin stimulate the production of glucagon".

(b) Provide suggestions for improvement in relation to Teaching and Learning

- Use past question papers to revise and practice high order questions.
- Many candidates could not analyse the questions properly therefore, failed to respond sufficiently.
- Teachers need to teach for understanding. Teaching for the examination will not give candidates the understanding required to answer high order questions.

(c) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Organise in service content-based training for teachers
- Regular workshop for teachers to empower and equip them to handle high order questions.

QUESTION 3

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

3.1.2 Most candidates lost a mark because they did not explain why breathing will stop when the medulla oblongata is damaged. The breathing/ heartbeat will stop because these vital processes are controlled by the medulla oblongata.

3.1.3 Moving skeletal muscles of the leg is a voluntary activity and therefore, the reference must be made to cerebrum not cerebellum. That means that the impulse must be transmitted from the cerebrum to the skeletal muscles of the leg. Since the lower back is damaged the impulses from cerebrum will not be transmitted to the skeletal muscles of the leg

3.2.3 Most of the candidates lost a mark for the caption of the graph. The caption of the graph should show the relationship between the dependent and independent variables. The candidates only wrote part of the description for the independent variable.
The caption should explain the relationship between the dependent and independent variable. Some candidates still write: "dependent vs independent" variable. This is incorrect.
Some candidates lost a mark because they did not include the unit for the Y-axis label.
Some lost a mark for inaccurate coordinates.
Many candidates lost mark for unequal width and unequal spacing of bars.

3.3.2 Some candidates lost a mark for wrong reference to the location. They wrote: "releases pressure from middle ear" instead of inner ear.

3.3.3 Candidates lost a mark for: "sound waves/ sound vibrations are converted to impulses"

3.3.4 A mark was not awarded when a candidate wrote: sound waves will not be carried to the middle ear.

3.3.5 Majority of candidates lost two to three marks for giving the wrong response. They failed to understand the purpose of inserting the grommet into the tympanic membrane as a treatment to reduce infection and prevent the possible hearing loss. Some gave a wrong response that the grommet equalises the pressure on both sides of ear.

3.4.1 (a) Candidates lost a mark because they only wrote 'facemask'.
(b) Candidates lost a mark because they only wrote 'carbon dioxide' with no reference to blood.

3.4.3 Majority of candidates gave a generic response "large sample size" with no reference to the specific sample size used in the investigation. No mark will be credited for generic response.

3.4.4 Many candidates could not comprehend the design of the investigation and purpose of giving 15 minutes interval between each 10-minute phase.

3.4.5 Majority of candidates lost a mark for writing the generic response: "To compare the results".

3.4.6 This was a level 1 question, and it was answered sufficiently by many

candidates. No challenges encountered.

3.5.1 Candidate lost marks for not locating the exact site of auxin production in plants. Some wrote: "stem" others wrote: "root" with no reference to the tip.

3.5.2 Some of the candidates were able to respond the question correctly.

3.5.3 The majority of candidates could not answer this question correctly because they were unable understand the question. Many described phototropism and some described geotropism.
The role auxin in plant propagation is to stimulate the root growth of cuttings and able to plant many cutting in order to increase the number of plants in an area within a short period of time. By doing so, we are able to save the plant from possible extinction.

(b) Provide suggestions for improvement in relation to Teaching and Learning

- Many candidates struggle to understand the concepts and processes regarding the role of auxins.
- The topics that deal with hearing and balance pose a challenge to many candidates. The concept such as sound waves, sound vibrations and pressure waves pose a confusion amongst many candidates. They are also confused with various processes that takes place at each of the regions (middle ear and inner ear) of the ear.

(c) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Organise in service content-based training for teachers
- Regular workshop for teachers to empower and equip them to handle high order questions.

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

NOVEMBER 2022

MARKS: 150

TIME: 2½ hours

This question paper consists of 17 pages.

LFSCE1

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.

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.

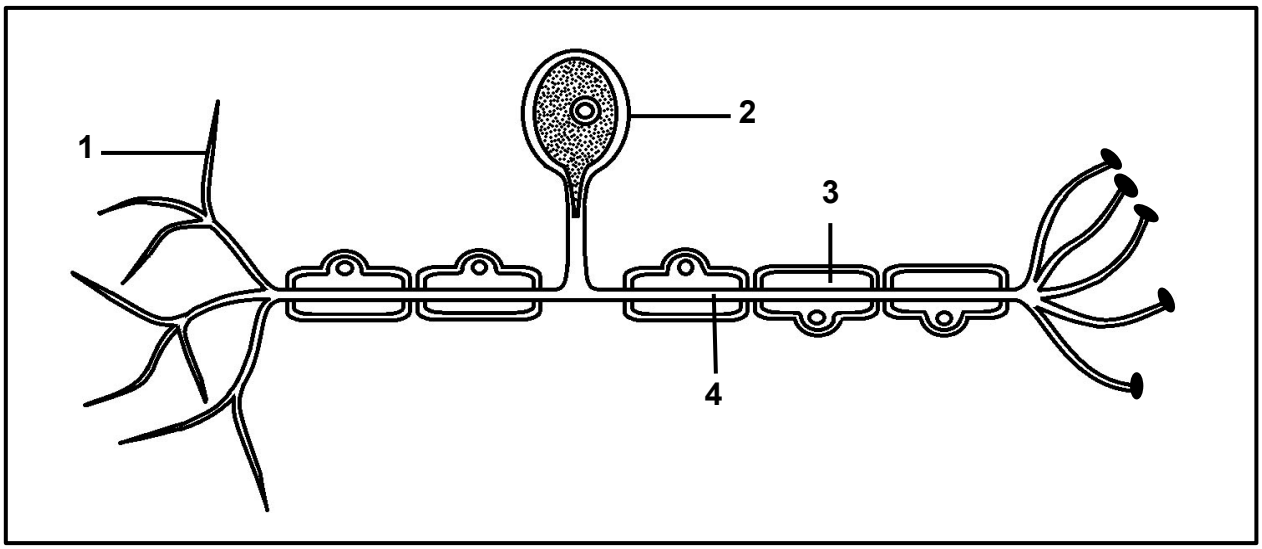
1.1.5 The normal site of fertilisation in a human female is the …

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?

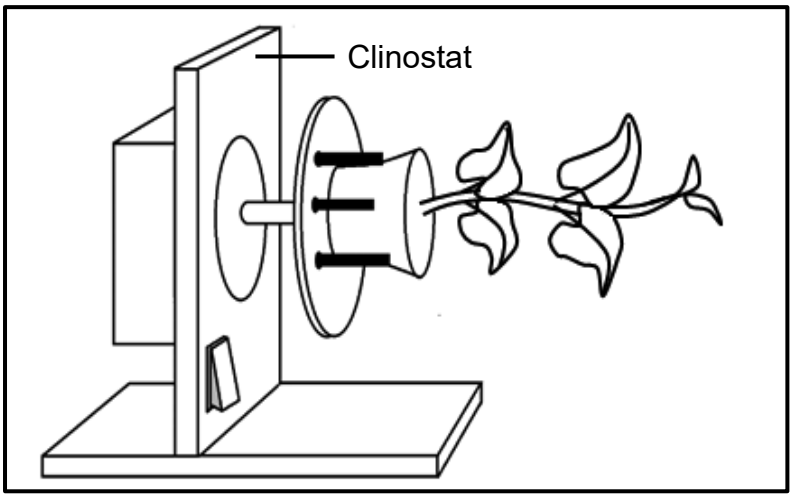
A 1
B 2
C 3
D 4

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

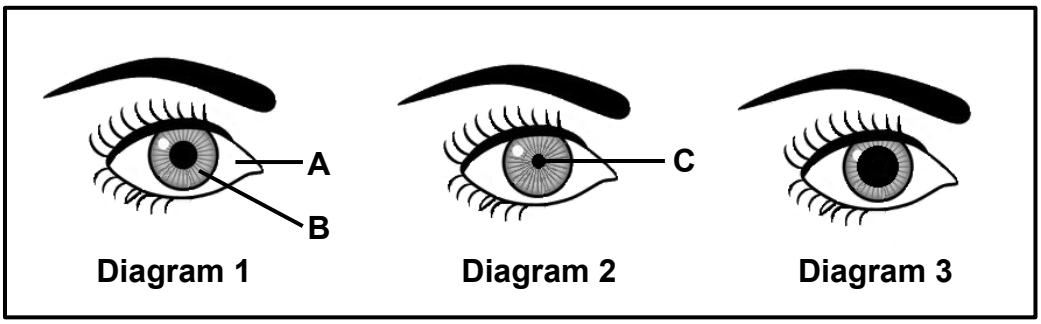
1.2.10 The area of the retina that contains the highest concentration of cones (10 x 1) **(10)**

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)

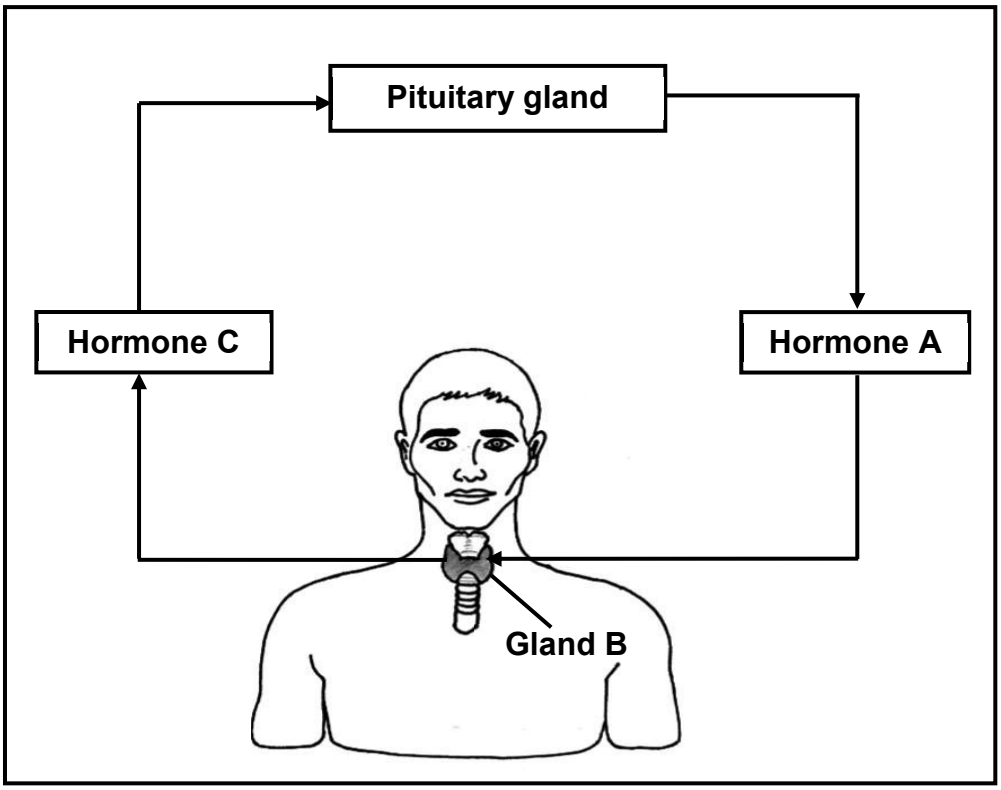
(b) Where the rods are stimulated the most (1)

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)

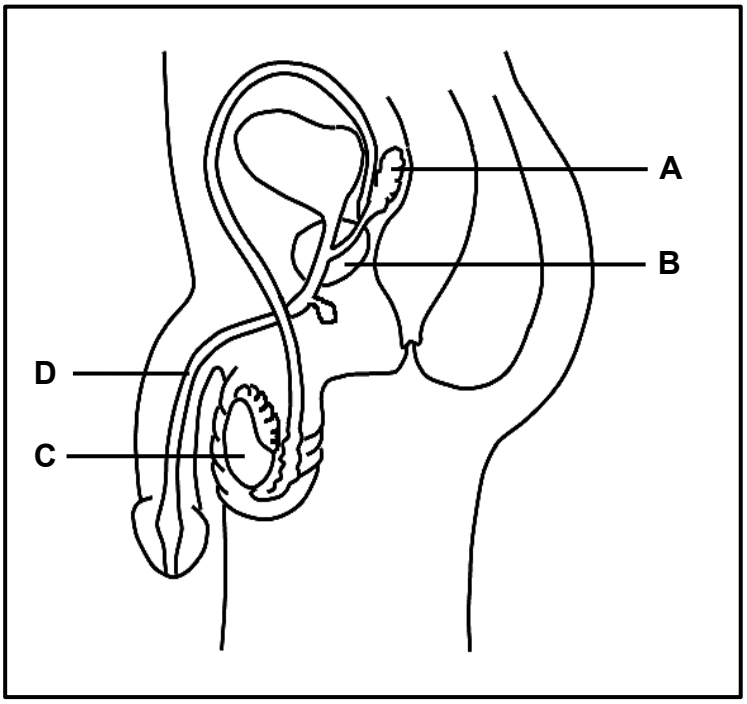
1.5.4 Which hormone (**A** or **C**) will be expected to be high in the blood of the person with the disorder named in QUESTION 1.5.3? (1)
(6)

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)

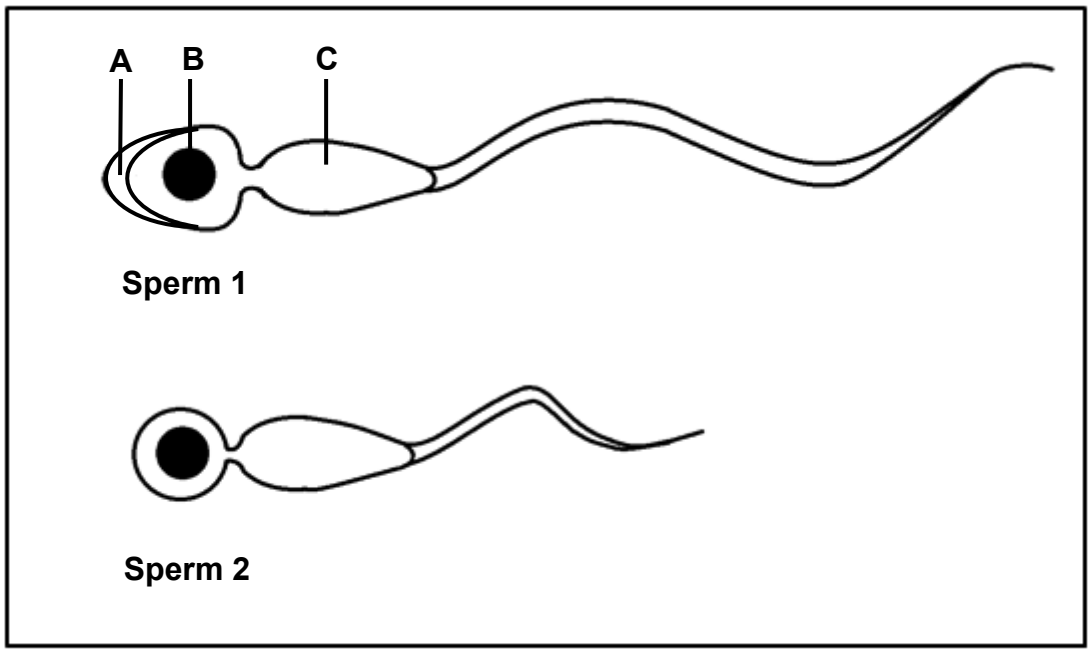
2.1.2 State ONE function of part **D** in reproduction. (1)

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.)



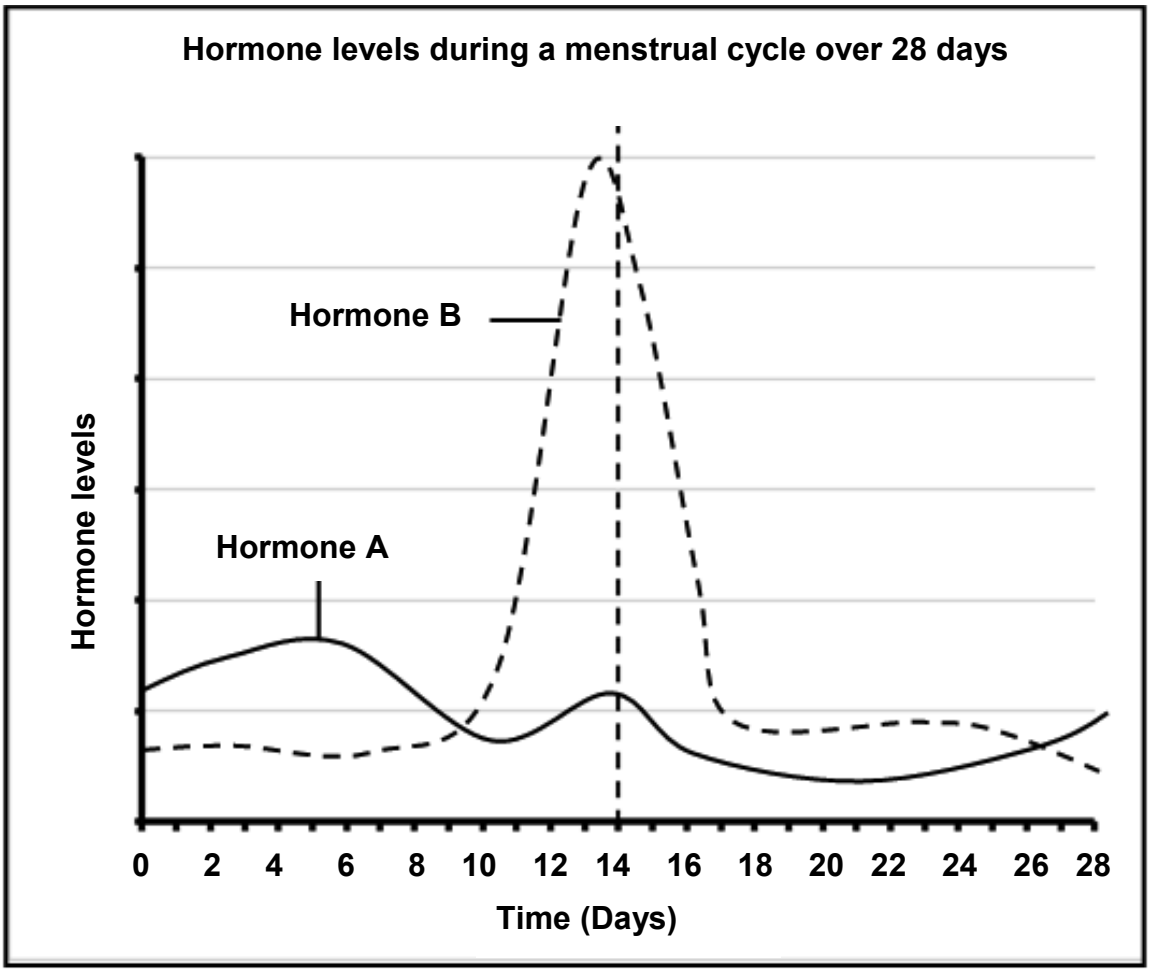
2.2.1 Identify part **A**. (1)

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)

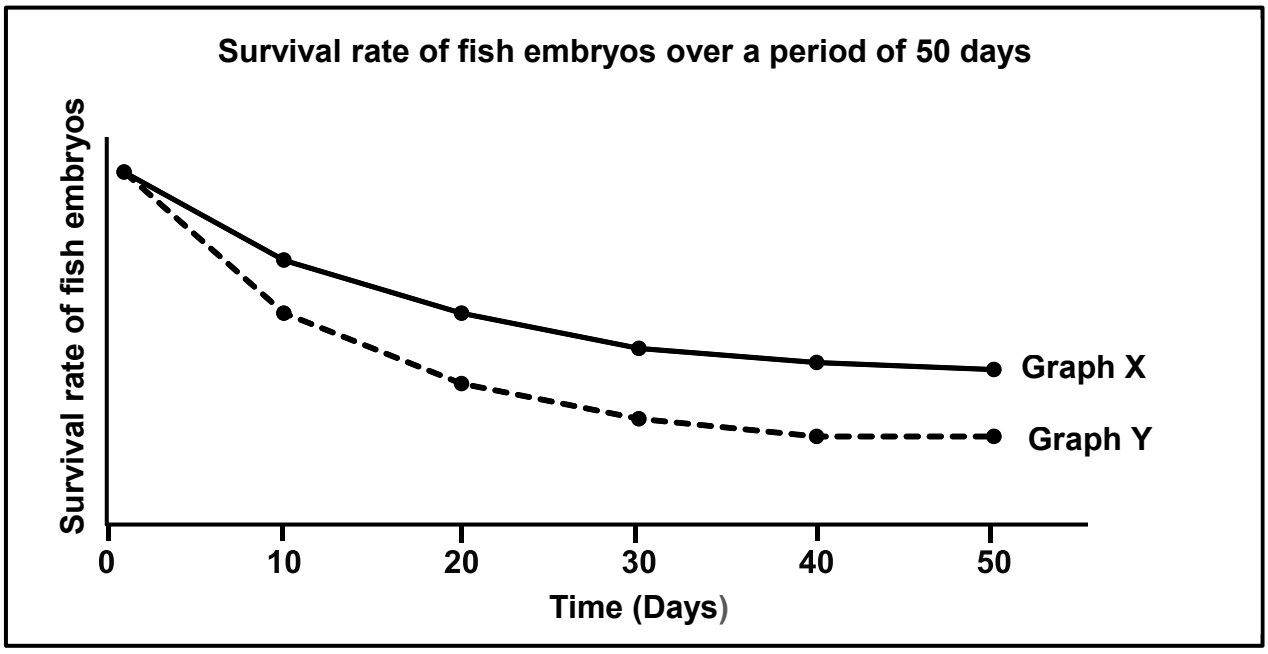
2.4 Describe the secretion of the ovarian hormones and their role in the menstrual cycle. **(5)**

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)

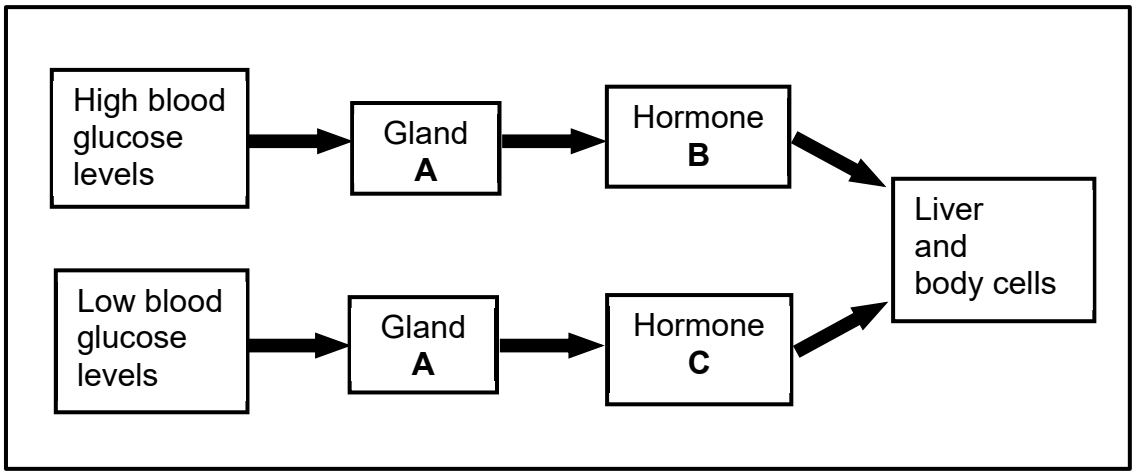
2.5.2 Explain why both fish species are oviparous. (2)

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)

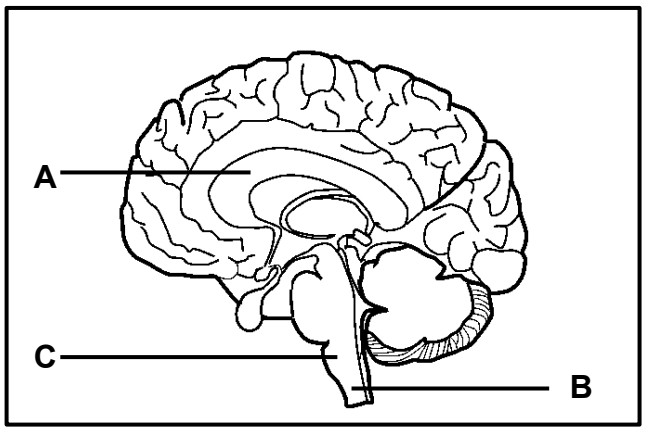
(b) Name the disorder. (1)

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.

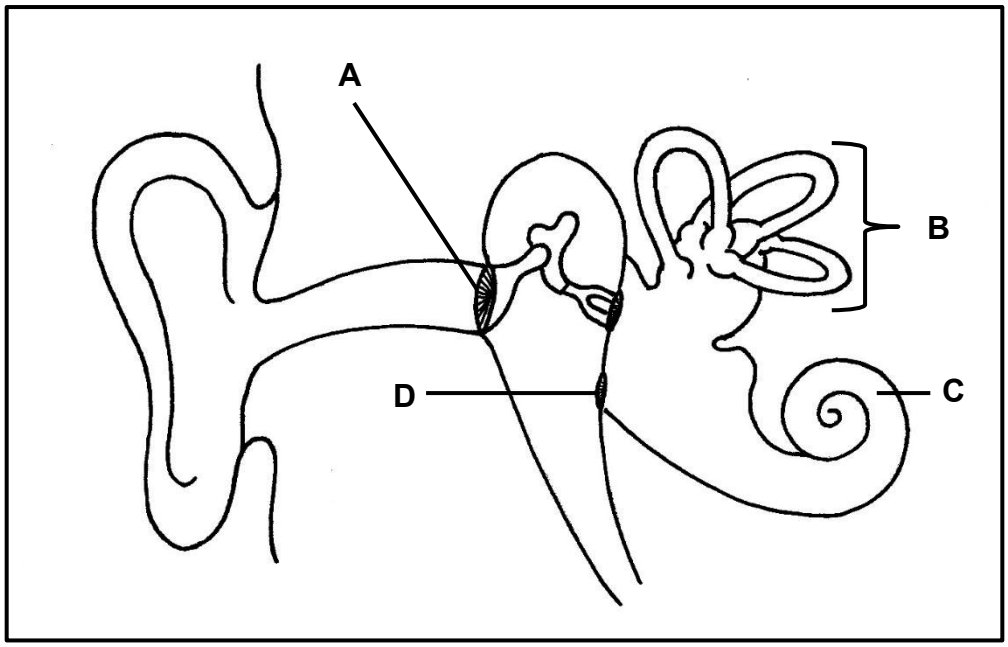
REGIONS OF THE WORLD	NUMBER OF SEVERE BRAIN INJURIES (PER 100 000 PEOPLE PER YEAR)
Latin America	900
USA and Canada	1 300
East Mediterranean	890
Europe	1 010
Africa	800

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

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

NOVEMBER 2022

FINAL MARKING GUIDELINES – 27/11/2022

MARKS: 150

RENETTE VAN DER WATT
INTERNAL MODERATOR
27/11/2022

HAMIDA MOOSA
INTERNAL MODERATOR
27/11/2022

These marking guidelines consist of 10 pages.

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27/11/2022

DR P. PREETHLALL
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PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when maximum marks is reached and put a wavy line and 'max' in the right-hand margin.

2. **If, for example, three reasons are required and five are given**
   Mark the first three irrespective of whether all or some are correct/ incorrect.

3. **If whole process is given when only a part of it is required**
   Read all and credit the relevant part.

4. **If comparisons are asked for but descriptions are given**
   Accept if the differences/similarities are clear.

5. **If tabulation is required but paragraphs are given**
   Candidates will lose marks for not tabulating.

6. **If diagrams are given with annotations when descriptions are required**
   Candidates will lose marks.

7. **If flow charts are given instead of descriptions**
   Candidates will lose marks.

8. **If sequence is muddled and links do not make sense**
   Where sequence and links are correct, credit. Where sequence and links are incorrect, do not credit. If sequence and links become correct again, resume credit.

9. **Non-recognised abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation but credit the rest of the answer if correct.

10. **Wrong numbering**
    If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable.

11. **If language used changes the intended meaning**
    Do not accept.

12. **Spelling errors**
    If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names are given in terminology**
    Accept, provided it was accepted at the national memo discussion meeting.

14. **If only the letter is asked for but only the name is given (and vice versa)**
    Do not credit.

15. **If units are not given in measurements**
Candidates will lose marks. Marking guidelines will allocate marks for units separately.

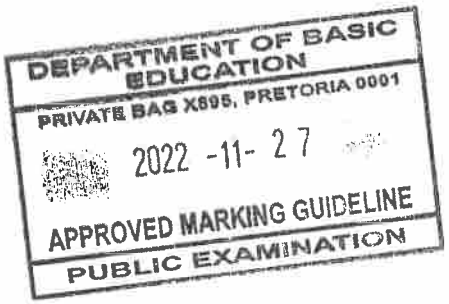
16. **Be sensitive to the sense of an answer, which may be stated in a different way.**

17. **Caption**
All illustrations (diagrams, graphs, tables, etc.) must have a caption.

18. **Code-switching of official languages (terms and concepts)**
A single word or two that appear(s) in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

19. **Changes to the marking guidelines**
No changes must be made to the marking guidelines without consulting the provincial internal moderator who in turn will consult with the national internal moderator (and the Umalusi moderators where necessary).

20. **Official marking guidelines**
Only marking guidelines bearing the signatures of the national internal moderator and the Umalusi moderators and distributed by the National Department of Basic Education via the provinces must be used.



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SECTION A

QUESTION 1

1.1	1.1.1	C✓✓		
	1.1.2	A✓✓		
	1.1.3	D✓✓		
	1.1.4	C✓✓		
	1.1.5	D✓✓		
	1.1.6	B✓✓		
	1.1.7	D✓✓		
	1.1.8	C✓✓		
	1.1.9	B✓✓		
	1.1.10	D✓✓	(10 x 2)	**(20)**
1.2	1.2.1	Cranium✓		
	1.2.2	Thermoregulation✓		
	1.2.3	Cataract✓		
	1.2.4	Umbilical artery✓		
	1.2.5	Hypothalamus✓		
	1.2.6	Peripheral✓ nervous system		
	1.2.7	Chorionic villi✓		
	1.2.8	Aldosterone✓		
	1.2.9	Amniotic✓ fluid		
	1.2.10	Fovea centralis✓/ yellow spot	(10 x 1)	**(10)**
1.3	1.3.1	B only✓✓		
	1.3.2	A only✓✓		
	1.3.3	Both A and B✓✓	(3 x 2)	**(6)**
	1.4.1	(a) B✓ - Iris✓		(2)
		(b) A✓ - Sclera✓		(2)
	1.4.2	(a) 2✓		(1)
		(b) 3✓		(1)
	1.4.3	(a) Circular✓ muscles		(1)
		(b) Circular✓ muscles		(1)
				(8)
1.5	1.5.1	Negative feedback✓ mechanism		(1)
	1.5.2	(a) Thyroid✓		(1)
		(b) TSH✓/thyroid stimulating hormone		(1)
		(c) Thyroxin✓		(1)
	1.5.3	Goitre✓		(1)
	1.5.4	Hormone A✓		(1)
				(6)
			TOTAL SECTION A:	**50**

SECTION B

QUESTION 2

2.1	2.1.1	Seminal vesicle✓		(1)
	2.1.2	Transports semen out of the body✓ **(Mark first ONE only)**		(1)
	2.1.3	- Transports its secretions in ducts✓/ secretion not directly in blood - Does not produce a hormone✓ **(Mark first TWO only)**		(2)
	2.1.4	Spermatogenesis✓		(1)
	2.1.5	- The secretion is alkaline ✓ to neutralise the acidity of the vagina✓/ urethra - The secretion contains nutrients✓ for the sperm to generate energy for movement✓ - The secretion is a fluid✓/mucus which facilitates the movement of the sperm cells✓	Any (2 x 2)	(4) **(9)**
2.2	2.2.1	Acrosome✓		(1)
	2.2.2	- Fuses with the nucleus of the ovum✓ - Carries genetic material✓	Any	(1)
	2.2.3	- Produce energy✓/ site for cellular respiration - which is needed for movement✓ of the sperm		(2)
	2.2.4	- The oval/torpedo-shaped head✓ - will facilitate faster movement✓ - The presence of an acrosome✓/part **A** - enables the sperm to penetrate the ovum✓ - A longer tail✓ - ensures faster movement✓ **(Mark first TWO only)**	Any (2 x 2)	(4) **(8)**

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2.3 2.3.1
- Stimulates ovulation✓
- Stimulates the development of the corpus luteum✓ (2)

(Mark the first TWO only)

2.3.2 (a)
- FSH✓/a high concentration of hormone A
- will stimulate follicles to develop✓
- Therefore, ova will be produced✓ increasing the chances to fall pregnant (3)

(b)
- A peak in hormone B✓/LH
- will indicate that ovulation is about to happen✓
- therefore, an ovum will be available for fertilisation✓ Any (2)

2.3.3
- The levels will remain low✓ because
- the high progesterone levels✓ during pregnancy
- will inhibit the secretion of FSH✓ /hormone A (3)

(10)

2.4
- The Graafian follicle✓
- secretes oestrogen✓
- causing the endometrium to become thicker✓/more glandular or vascular
- The corpus luteum✓
- secretes progesterone✓
- which (further) increases the thickness of the endometrium✓
- High levels of progesterone inhibit FSH secretion✓ Any **(5)**

2.5 2.5.1 External✓ fertilisation (1)

2.5.2
- Their embryos develop inside eggs✓ that are
- outside the body of the female✓ (2)

2.5.3
- The males release semen all around the female✓
- A large number of gametes/ ova are produced✓ (2)

2.5.4 Graph X✓ (1)

2.5.5
- They will have a higher number of surviving embryos✓/eggs/offspring
- Because their fertilised eggs are attached to the vegetation✓
- where they are protected from predators✓/washing away (3)

(9)

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2.6	2.6.1	(a) Pancreas✓ /Islets of Langerhans	(1)
		(b) Glucagon✓	(1)
	2.6.2	(a) - The blood glucose levels will remain high✓ - because the cells will not be able to absorb glucose✓ from the blood - excess glucose cannot be converted to glycogen by the liver✓/ muscles	(3)
		(b) Diabetes✓mellitus	(1)
	2.6.3	- Adrenalin stimulates the liver✓ - to convert glycogen to glucose✓ - to increase the blood glucose levels✓	(3) **(9)** **[50]**

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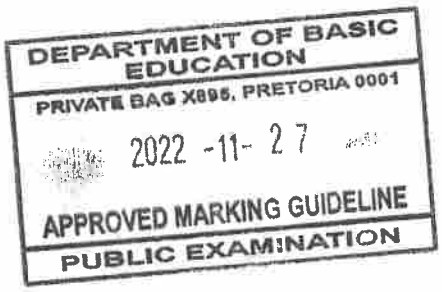


QUESTION 3

3.1 3.1.1 Corpus callosum✓ (1)

3.1.2 - It controls vital processes✓/heartbeat/breathing
- which will stop✓ when it is damaged (2)

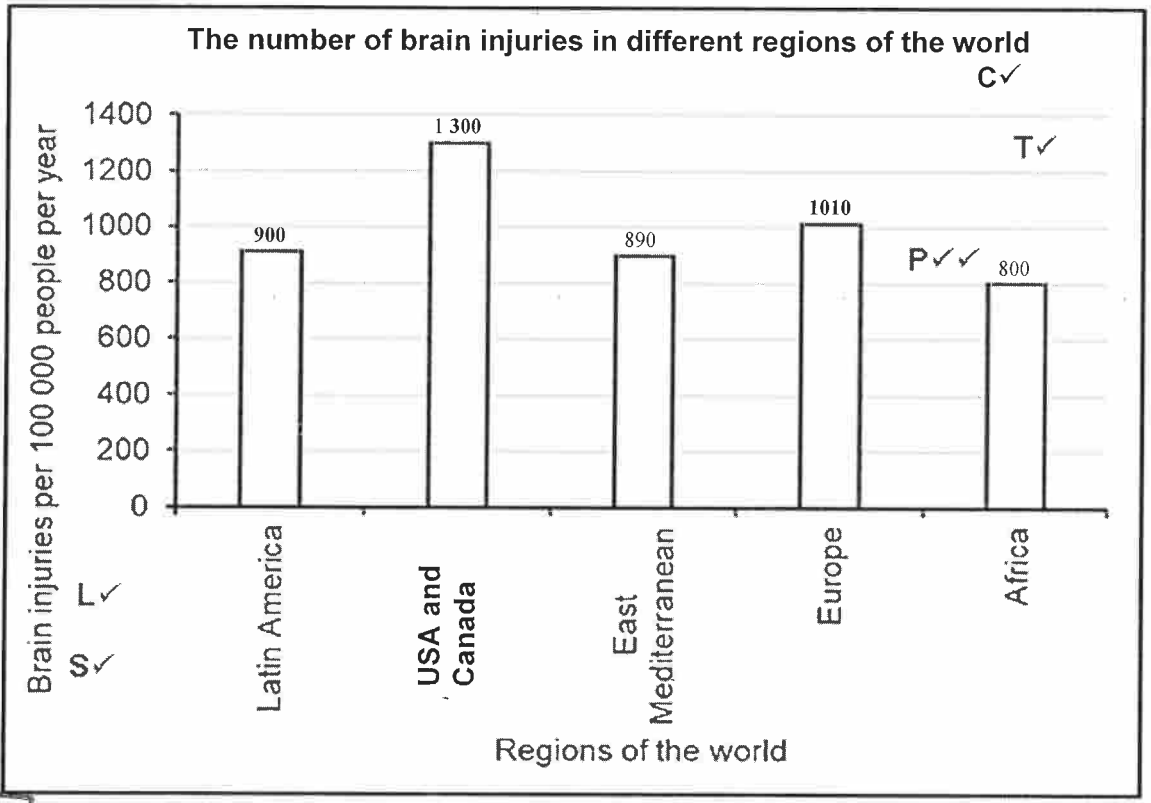
3.1.3 (a) Spinal cord✓ (1)

(b) - The impulses from the cerebrum✓
- are not transmitted✓ to the skeletal muscles (2)
(6)

3.2 3.2.1 Africa✓ (1)

3.2.2 - Not all brain injuries are recorded✓
- due to poor health facilities✓ (2)

3.2.3



Criteria for marking graph:

Criteria	Mark allocation
Bar graph is drawn (T)	1
Caption of the graph includes both variables (C)	1
Correct labels on X-axis and Y-axis (L)	1
Correct scale for Y-axis Equal spaces between bars and equal width of bars for X-axis (S)	1
Plotting: (P) 1-4 co-ordinates plotted correctly All 5 co-ordinates plotted correctly	 1 2

(6)
(9)

3.3 3.3.1 Cochlea✓ (1)

3.3.2 (a) Absorbs excess pressure waves✓/releases pressure from the inner ear/ prevents an echo (1)
(Mark first ONE only)

(b) It converts stimuli/pressure waves into impulses✓ (1)
(Mark first ONE only)

3.3.3
- Part A/tympanic membrane will not be able to vibrate✓/vibrate freely
- No/less vibrations will be carried to the middle ear✓/ossicles (2)

3.3.4
- Middle ear infections cause fluid build-up in the middle ear✓
- which can block the Eustachian tube✓
- The grommet will release the pressure✓ that will build up in the middle ear/ drain the fluid from the middle ear
- The pressure on either side of the tympanic membrane is equalised✓
- preventing the tympanic membrane from rupturing✓ and
- allowing the ossicles to vibrate freely✓ Any (4)

3.3.5
- The cristae are stimulated✓ and
- convert the stimuli into impulses✓
- The impulses are sent via the auditory nerve✓
- to the cerebellum✓
- which interprets the information✓ and
- sends impulses to the skeletal muscles✓ to restore balance

Any (4)
(13)

3.4 3.4.1 (a) Wearing of a facemask✓ (1)

(b) Carbon dioxide levels in blood✓ (1)

3.4.2
- Age✓
- Healthy✓ individuals (2)

(Mark first TWO only)

3.4.3 150 volunteers were used✓ (1)
(Mark first ONE only)

3.4.4
- To allow the carbon dioxide levels in the blood to go back to normal✓
- so that each phase will have the same carbon dioxide level as a starting point✓ (2)

3.4.5
- To act as a control ✓/baseline
- To see if it is the facemask that affects the carbon dioxide levels and not the physical activity✓ Any (1)

3.4.6
- Receptors in the carotid artery are stimulated✓ and
- impulses are sent to the medulla oblongata✓
- The medulla oblongata stimulates the heart✓
- to beat faster✓ causing
- more carbon dioxide to be taken to the lungs✓
- The breathing muscles✓/intercostal muscles and diaphragm
- contract more actively✓ and
- the rate/ depth of breathing increases✓
- More carbon dioxide is exhaled✓
- The carbon dioxide level in the blood decreases✓ /returns to normal

Any (7)
(15)

3.5 3.5.1
- (Apical) tip of the stem✓ /apical bud
- (Apical) tip of the root✓

(2)
(Mark first TWO only)

3.5.2
- Stimulate cell division✓/mitosis
- Stimulate cell elongation✓

(2)
(Mark first TWO only)

3.5.3 Gibberellins✓ (1)
(Mark first ONE only)

3.5.4
- Increased plant growth✓
- saves species that are facing extinction✓

(2)
(7)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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