

LIFE SCIENCES

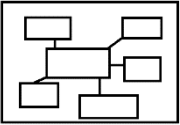



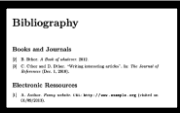
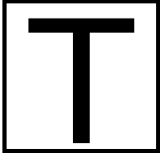
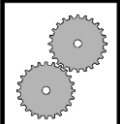

2025 SPRING SCHOOL

GRADE 12

GUIDE FOR TEACHERS AND LEARNERS



ICON DESCRIPTION

| | | | |
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|  <p>BIBLIOGRAPHY</p> |  <p>TERMINOLOGY</p> |  <p>WORKED EXAMPLES</p> |  <p>STEPS</p> |

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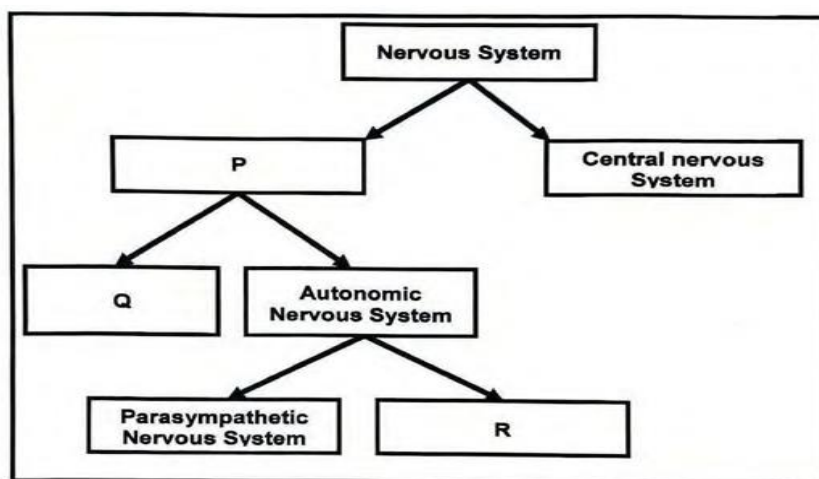
| CONTENT | ELABORATION |
|------------------------|--|
| Introduction | <ul style="list-style-type: none">□ The nervous system (involving nerves) and endocrine system (involving hormones) are two components that help humans respond to the environment |
| Human nervous system | <ul style="list-style-type: none">□ The need for a nervous system in humans:<ul style="list-style-type: none">• Reaction to stimuli (stimuli can be external and internal)• Coordination of the various activities of the body |
| Central nervous system | <ul style="list-style-type: none">□ The brain and spinal cord are protected by meninges□ Location and functions of the following parts:<ul style="list-style-type: none">• Brain<ul style="list-style-type: none">○ Cerebrum○ Cerebellum○ Corpus callosum○ Medulla oblongata• Spinal cord |



Activity 1 Human Nervous System

(KZN 2024 Sep)

The diagram below is based on the human Nervous System

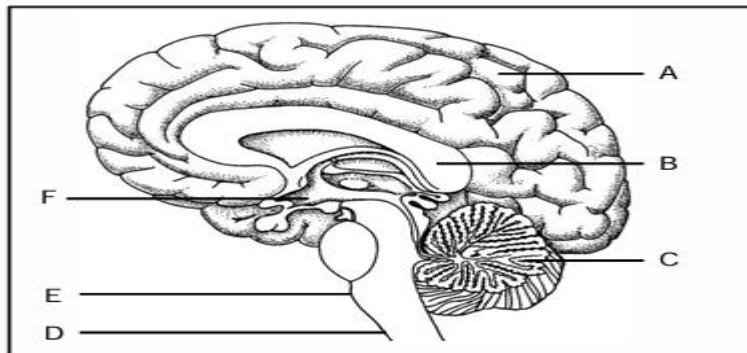


- 1.1 Identify branch **P** of the nervous system which is made up of all the nerves outside the central nervous system. (1)
- 1.2 Name TWO parts that make up the central nervous system. (2)
- 1.3 State ONE function of branch **Q** of the nervous system. (1)
- 1.4 Name the TWO groups of nerves that make up branch **P** of the nervous system (2)
- 1.5 Describe the role of branch **R** of the nervous system when a person is chased by a dog. (5)

Activity 2 *(from Nelson Mandela textbook)*

Structure of the brain

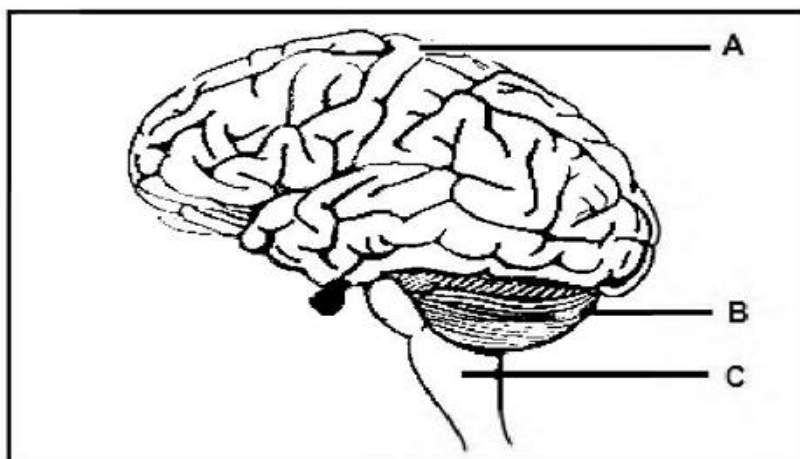
Study the diagram below representing the human brain.



- 2.1 Give the names of the parts labelled A to C. (3)
- 2.2 Give the letter and the name of the part responsible for:
a) Co-ordinating all voluntary movements (2)
- 2.3 Explain two functions of parts:
a) E (2)
b) F (2)
- (09)

Activity 3 *(Mpumalanga Sep 2024)*

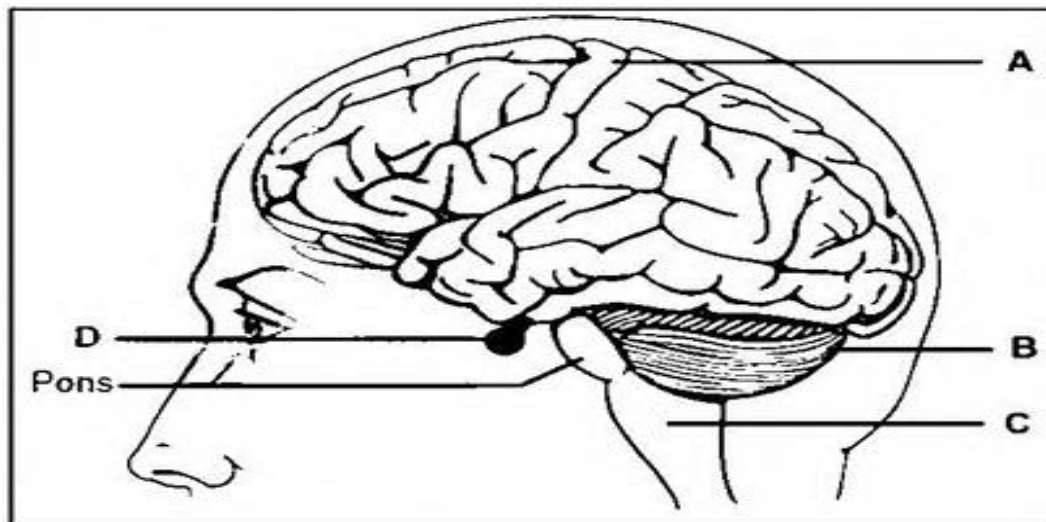
The diagram below represents the parts of the human brain



- 3.1 Give the LETTER and the NAME of the part that coordinates voluntary movement. (2)
- 3.2 State TWO functions of part B. (2)
- 3.3 Give two involuntary actions that are controlled by part C. (2)
- (6)

Activity 4 (Northwest Sep 2024)

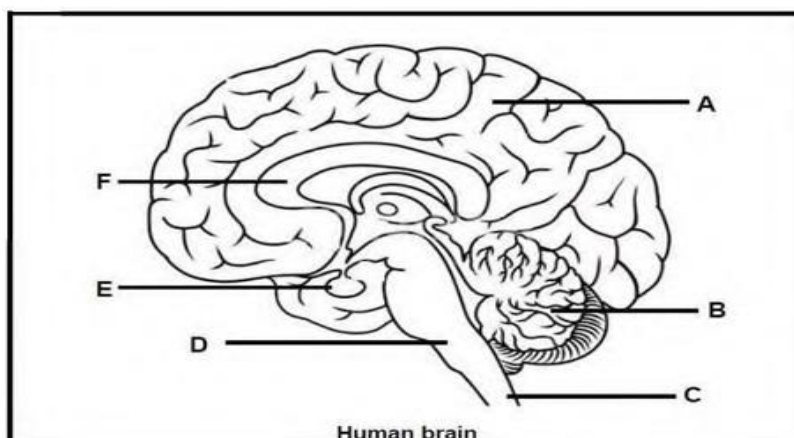
The diagram below represents the human brain.



- 4.1 Identify the part labelled B and give its function. (2)
- 4.2 Identify the part of the brain that receives impulses from the optic nerve. (1)
- 4.3 Name part C. (1)
- 4.4 Describe how balance and equilibrium are maintained by the ear when a person changes their speed and direction of movement. (6)
- (10)

Activity 5 (Western Cape Sep 2025)

The diagram below shows the human brain.



- 5.1 Write down the LETTER and NAME of the part that:
- a) Joins the two hemispheres of part A. (2)
- b) Co-ordinates voluntary actions (2)

c) Is an endocrine gland (2)

5.2 State TWO ways in which the brain is protected (2)

5.3 A concussion is a type of traumatic brain injury where the head and brain move rapidly back and forth. It can cause blurry vision, confusion and slurry speech

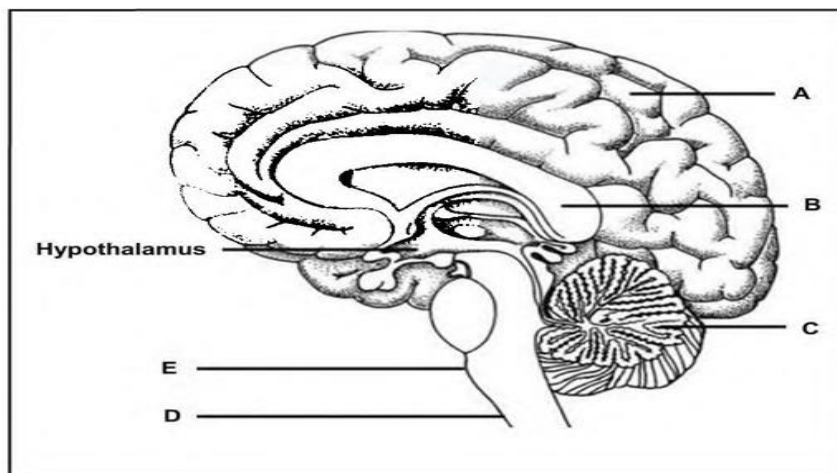
a) NAME the part of the brain that will be affected by a concussion. (1)

b) Explain why a concussion does not affect heartrate. (1)

(11)

Activity 6 (Northern Cape 2024 Sep)

The diagram below shows the part of the central system of a human



6.1 Identify part:
a) B (1)

b) E (1)

6.2 Only give the LETTER of the part responsible for a reflex action that occurs when stepping on a sharp object while barefoot. (1)

6.3 Name the system of membranes that surrounds the brain. (1)

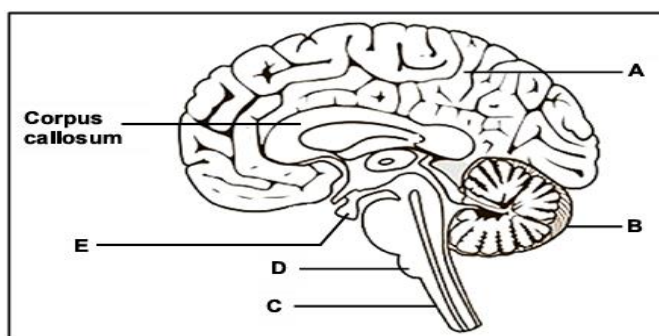
6.4 State TWO functions of part C. (2)

6.5 Explain how the reabsorption of water of a person who injured the hypothalamus in an accident, will be affected. (3)

(9)

Activity 7 (DBE P1 2024)

The diagram below represents part of the central nervous system of a human.



- 7.1 Identify: (1)
 (a) Part C (1)
 (b) G and E (1)
 7.2 Give the LETTER of the part that controls voluntary actions. (1)
 7.3 Describe the location of the corpus callosum. (2)
 7.4 A learner suffered a brain injury during a rugby match. He could still breathe properly but he experienced occasional loss of memory and balance.

Explain why:

- (a) The learner could still breathe properly. (2)
 (b) It is possible that the injury affected part B. (2)
 (c) The hearing of the learner could also be affected because of the injury (2)

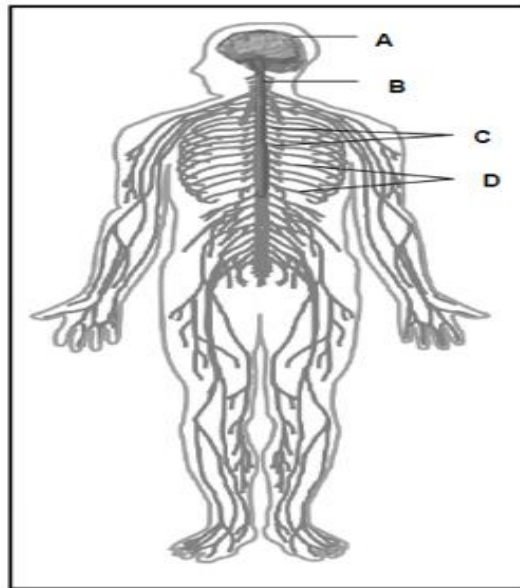
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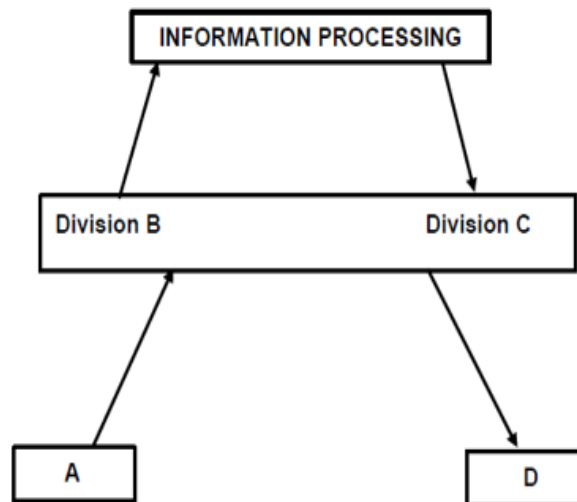
| | |
|---|---|
| Peripheral nervous system | <input type="checkbox"/> Location and functions of the peripheral nervous system (cranial and spinal nerves) |
| Autonomic nervous system | <input type="checkbox"/> Location and functions of the autonomic nervous system (sympathetic and parasympathetic sections) |
| Structure and functioning of a nerve | <input type="checkbox"/> Nerves send and carry signals to and from all parts of the body and are made up of neurons (sensory or motor) <input type="checkbox"/> Functions of sensory and motor neurons <input type="checkbox"/> Structure and functions of parts of sensory and motor neurons, using diagrams: nucleus, cell body, cytoplasm, myelin sheath, axon and dendrites |
| The simple reflex arc | <input type="checkbox"/> Definition of a reflex action and a reflex arc <input type="checkbox"/> Structure of a reflex arc and functions of each part, using a diagram: receptor, sensory neuron, dorsal root of spinal nerve, spinal cord, interneuron, motor neuron, ventral root of spinal nerve, effector <input type="checkbox"/> Functioning of a simple reflex action, using an example <input type="checkbox"/> Significance of a reflex action <input type="checkbox"/> Significance of synapses |
| Disorders of the CNS | <input type="checkbox"/> Causes and symptoms of the following disorders of the nervous system: <ul style="list-style-type: none"> • Alzheimer's disease • Multiple sclerosis |
| Receptors | <input type="checkbox"/> Functions of receptors, neurons and effectors in responding to the environment <input type="checkbox"/> The body responds to a variety of different stimuli, such as light, sound, touch, temperature, pressure, pain and chemicals (taste and smell). (No structure and names necessary except for names of the receptors in the eye and ear.) |

Activity 8 (PNS) (FS, 2023)

The following diagram is a representation of the CNS and PNS



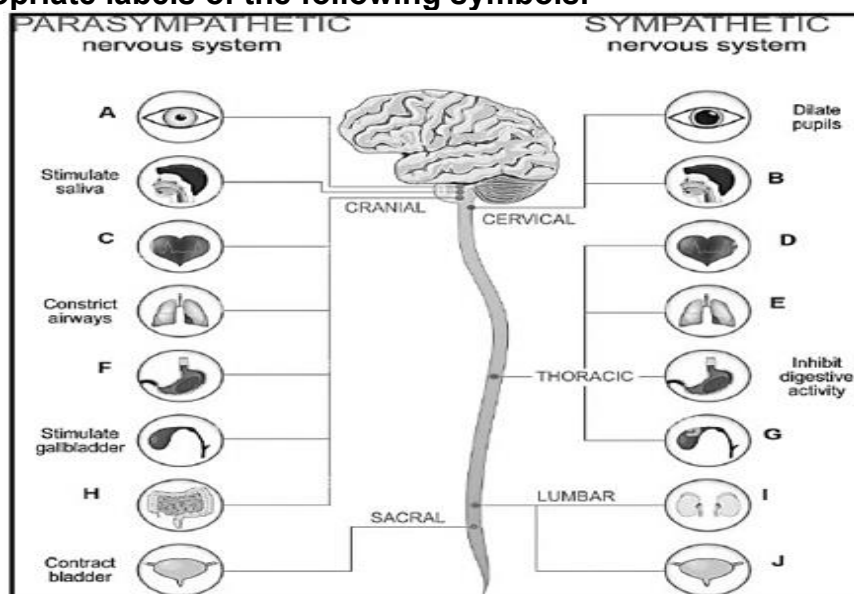
- 8.1.1 State the term that the following abbreviations represent: (1)
a) CNS (1)
b) PNS (1)
- 8.1.2 Give the LETTERS represent the: (2)
a) CNS (2)
b) PNS (2)
- 8.2.1 Tabulate FIVE differences between these two nervous systems (11)
mentioned above
- 8.2.2 Name the TWO divisions that we get with the PNS. (2)
- 8.2.3 Name ONE function of each of these divisions. (2)
- (21)
- 8.3 Study the diagram below



- 8.3.1 A is a type of input that must go to the CNS give one word for this input. (1)
- 8.3.2 D is a type of output that received a message from the CNS, give one word for this output. (1)
- 8.3.3 Identify divisions B and C. (2)
- 8.3.5 What does the label information processing represent? (1)
- (5)

8.4

The diagram below shows the two sections of the autonomic nervous system namely parasympathetic and sympathetic. **Write down the appropriate labels of the following symbols.**



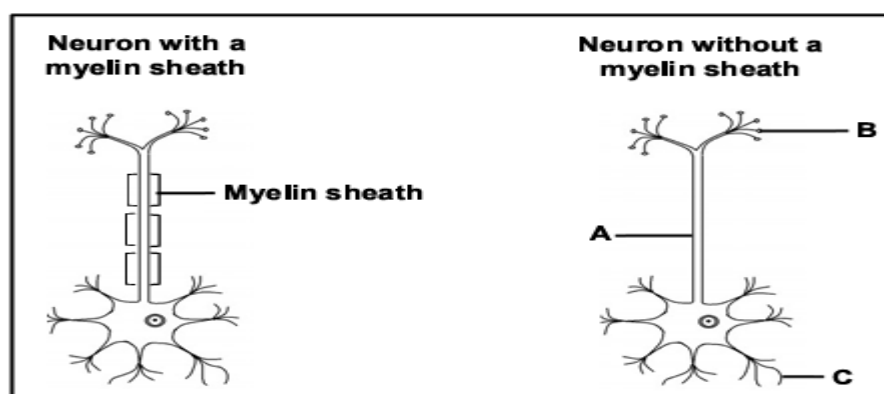
| | |
|---|--|
| A | |
| B | |
| C | |

| | |
|---|--|
| D | |
| E | |
| F | |
| G | |
| H | |
| I | |
| J | |

Activity 9 Neurons (2024 Nov p1)

The diagrams below represent a neuron with a myelin sheath (myelinated) and a neuron without a myelin sheath (unmyelinated).

(The diagrams are NOT drawn to scale.)



- 9.1 Identify the type of neuron shown in the diagrams. (1)
- 9.2 Give ONE visible reason for your answer to QUESTION 9.1. (1)
- 9.3 Describe the function of the type of neuron identified in QUESTION 9.1. (3)
- 9.4 Use the letters A, B and C to indicate the direction in which an impulse moves through the neuron. (2)
- 9.5 Name the disorder associated with degeneration of the myelin sheaths of neurons (1)

(8)

Activity 10 (NW Sep 2024)

Read the extract below about the effects of alcohol on the brain's communication pathways

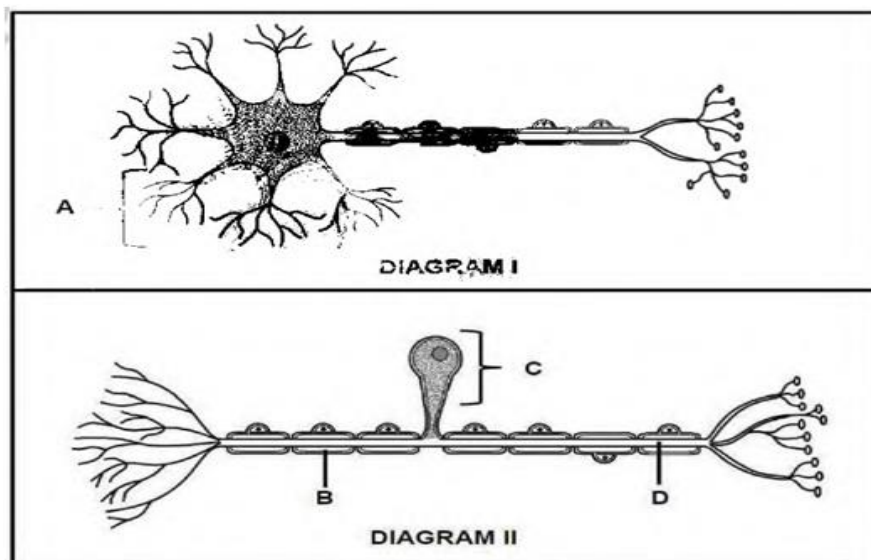
Alcohol consumption can interfere with brain communication pathways and affect its appearance and function. It can make it more difficult for the brain to control balance, memory, speech and judgement. This leads to a higher likelihood of injuries and other negative outcomes.

Neurons can shrink because of long-term heavy drinking. Alcohol blocks chemical signals between brain cells, leading to immediate intoxication symptoms, including impulsive behaviour, slurred speech, poor memory and

- 10.1 What is the hippocampus? (1)
- 10.2 Identify the part of the brain that: (1)
- a) Controls memory, speech and judgement (1)
- b) Controls the concentration of carbon dioxide in the body (1)
- 10.3 Give ONE effect of long-term heavy drinking. (1)
- (4)**

Activity 11 (WC Sep 2024)

The diagram below represents two types of neurons.



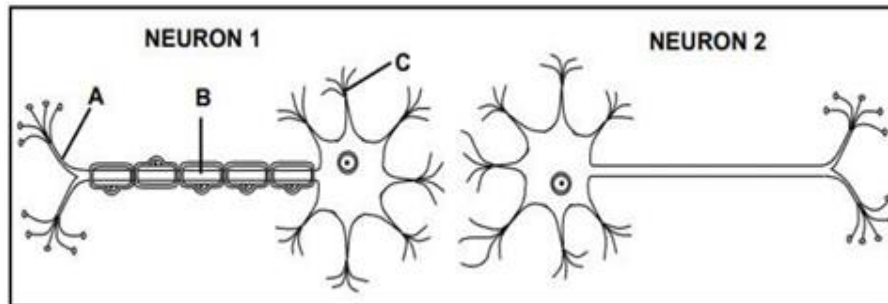
- 11.1 Identify the neuron in: (1)
- a) DIAGRAM I (1)
- b) DIAGRAM II (1)
- 11.2 Identify part C. (1)
- 11.3 Give the LETTER of the part that: (1)
- a) Speeds up the transmission of impulses

- b) Receives incoming impulses (1)
- 11.4 Which neuron (I or II) transmits impulses to the central nervous system. (1)

(6)

Activity 12 (FS 2024 Sep)

The diagram below represents the type of the neuron found in the human body.



- 12.1 Identify the neuron above (1)
- 12.2 Explain how the speed of transmission of impulses will differ for neuron 1 and neuron 2 (3)

(4)

Activity
Study

The diagram below shows a contrast between a healthy brain (left) and a brain with Alzheimer's disease (right). The exact cause of the disorder is not yet established. However, several pieces of evidence show the involvement of genetics, lifestyle-related factors, and environmental factors. The brain tissues of Alzheimer's patients are typically shrunken. In the Alzheimer's brain, abnormal levels of a naturally occurring protein dump together to form amyloid plaques that collect between neurons and disrupt cell function. This causes synaptic loss and eventually results in the death of brain cells. These changes at the cellular level result in the symptoms of Alzheimer's.



Diagram 1

- 13.1.1 Identify ONE structural problem of an Alzheimer's brain mentioned in the text above. (1)
- 13.1.2 Identify the type of neuron depicted in the diagram above. (1)
- 13.1.3 Name the membrane that surrounds the axon and state its function. (2)
- 13.1.4 State TWO symptoms of Alzheimer's disease. (2)

(6)

(GP Sep 2024)

13.2 The diagram below shows the transmission of impulses between two neurons.

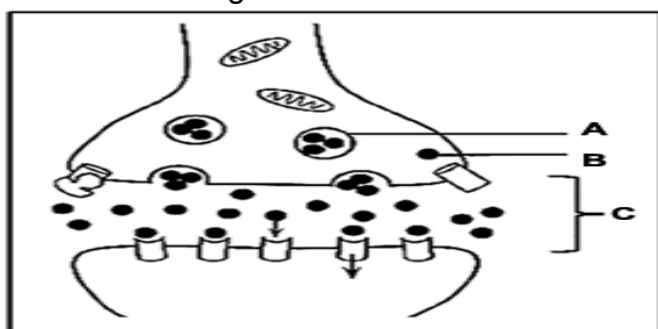


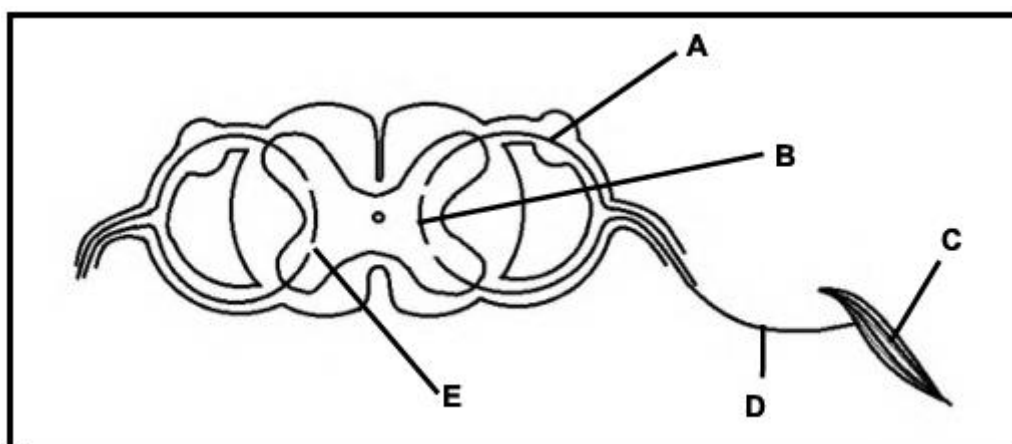
Diagram 2

- 13.2.1 The information in the passage states that Alzheimer's results in synaptic loss. Give the LETTER of the region in diagram 2 which represents the synapse. (1)
- 13.2.2 State the significance of the synapse and identify the specific area where its loss might lead to the Alzheimer's symptoms mentioned in QUESTION 13.1.4. (2)
- 13.2.3 Name the part of a neuron that:
- Transmits impulses to the cell body (1)
 - Transmits impulses away from the cell body (1)

(5)

Activity 14 (May 2024 KZN)

The diagram below shows part of a reflex arc



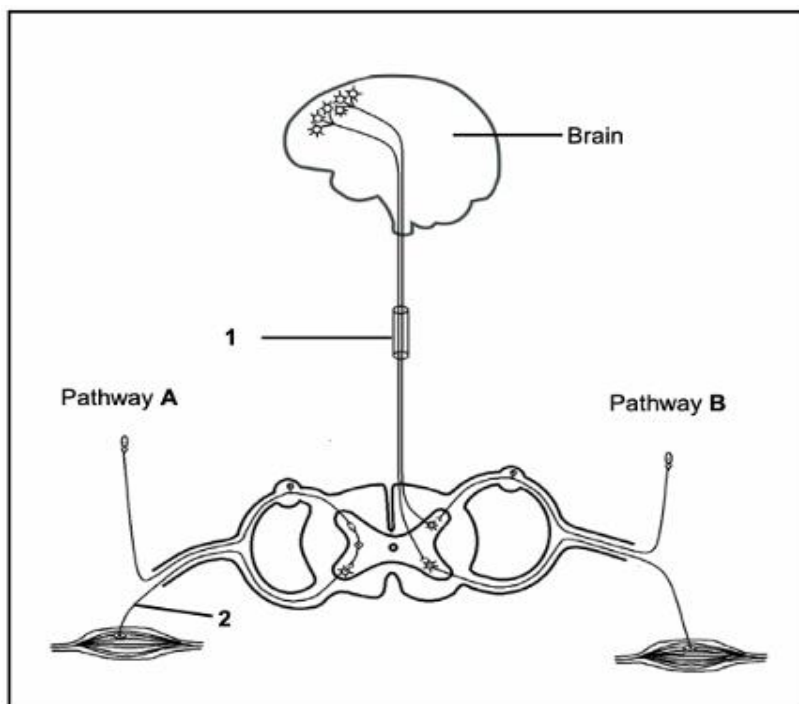
- 14.1 Identify
- Neuron A (1)
 - Microscopic gap E (1)

- 14.2 Give the LETTER and the NAME of the part that brings about a response to stimuli received by the body. (2)
- 14.3 State ONE function of part B. (1)
- 14.4 State ONE consequence regarding reflex action if neuron D was completely cut. (1)
- 14.5 Give ONE function of a spinal cord. (1)
- (7)**

Activity 15

(MP 2024 REV)

The diagram below represents two possible pathways, A and B, which a nerve impulse may follow in the human body.



- 15.1 Which pathway, A or B, represents a reflex arc? (1)
- 15.2 Give a visible reason in the diagram for your answer to QUESTION 15.1 (1)
- 15.3 Describe the importance of a reflex action in the human body. (3)
- 15.4 Identify the part of the nervous system represented by 1. (1)
- 15.5 Explain ONE way in which the myelin sheath is important in the (2)

functioning of neurons.

15.6 Describe how the person would be affected if the axon of neuron 2 was cut. (2)

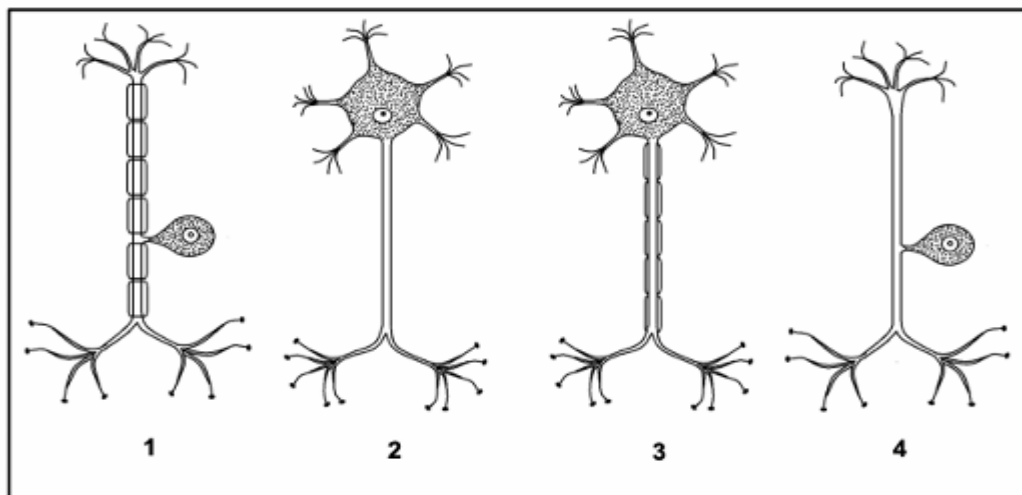
15.7 Describe pathway B. (6)

(16)

Activity 16

(MP2024 Rev)

The diagrams below show different neurons.



Give only the NUMBERS (1, 2, 3 or 4) of TWO neurons that:

16.1 Transport impulses from the receptor to the central nervous system (2)

16.2 Will have a faster transmission of impulses (2)

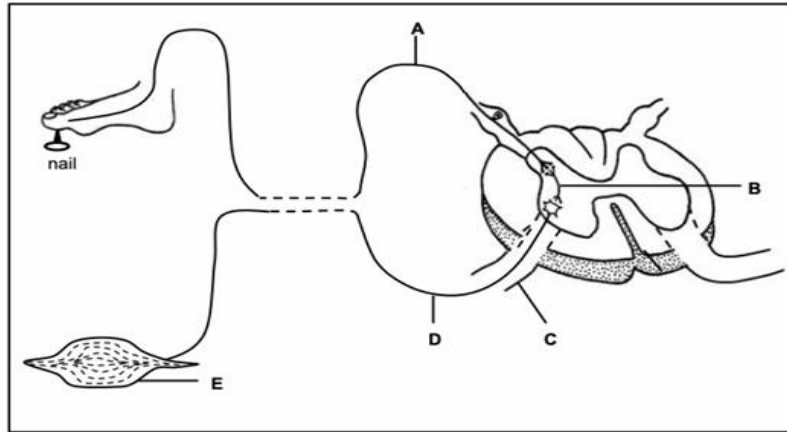
16.3 Are damaged if a person can feel the stimulus but is unable to react (2)

(6)

Activity 17

above

A boy steps on a nail and pulls his leg away suddenly. The diagram below shows the pathway taken to create this reaction.

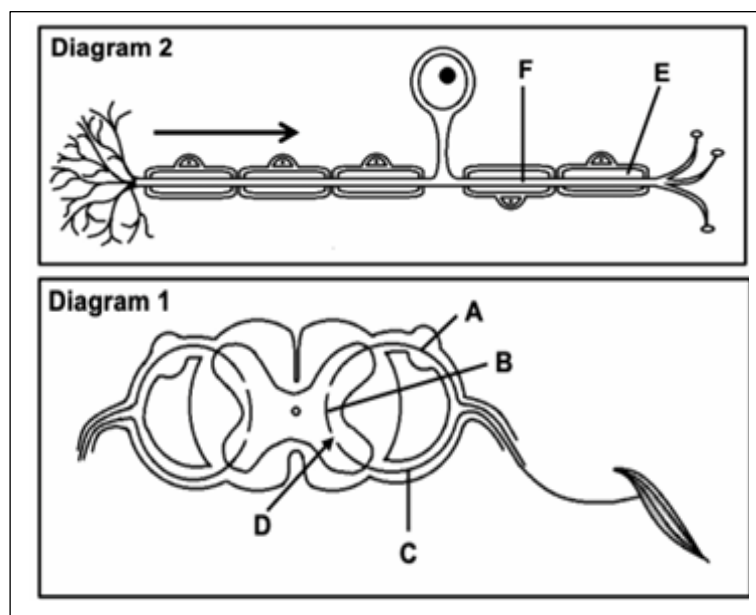


- 17.1 Name the pathway represented by the diagram. (1)
- 17.2 Give ONE advantage of this type of reaction. (1)
- 17.3 Identify part:
- a) B (1)
 - b) C (1)
 - c) E (1)
- 17.4 Give the LETTER and NAME of the neuron that transports impulses towards the spinal cord (2)
- (7)

Activity 18

(Above)

Diagram 1 below represents part of a reflex arc and diagram 2 represents a neuron.

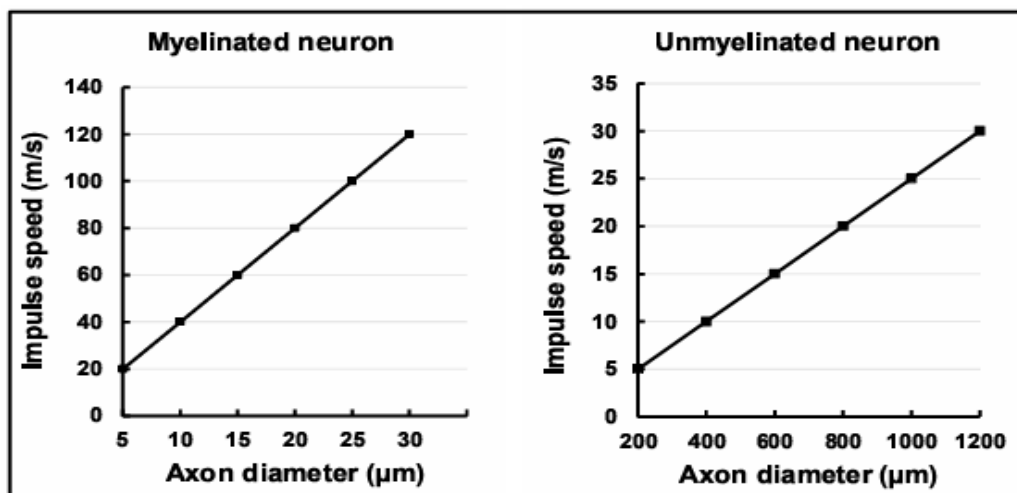


- 18.1 Identify: (1)
 a) Layer E (1)
 b) Structure F (1)
- 18.2 Which neuron (A, B or C): (1)
 a) Represents the type of neuron shown in diagram 2 (1)
 b) Is damaged when a person can feel the stimulus but cannot respond to it (1)
- 18.3 Give the LETTER and NAME of the part that ensures one-directional flow of the impulse (2)

(6)
(above)

Activity 19

In the human body, the axons of myelinated neurons have much smaller diameters than the axons of unmyelinated neurons. The graphs below show the speed of nerve impulses in myelinated neurons and in unmyelinated neurons with different axon diameters.



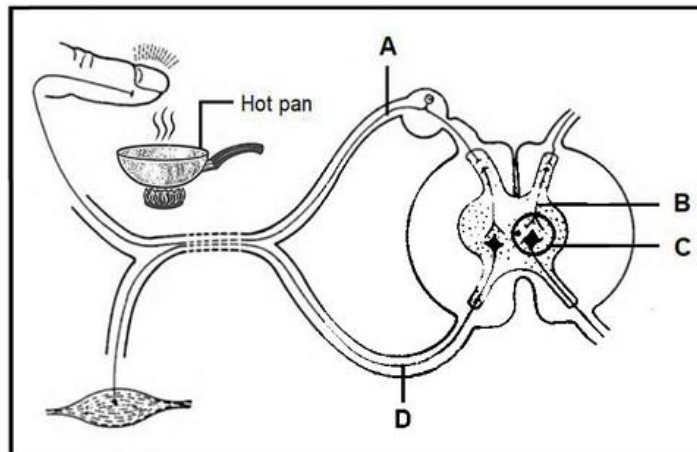
- 19.1 Give the axon diameter (in μm) at which an impulse move at 20 m/s in: (1)
 a) A myelinated neuron (1)
 b) An unmyelinated neuron (1)
- 19.2 Use the graphs to describe the following: (2)
 a) Difference in impulse speed for myelinated and unmyelinated neurons (2)
 b) Relationship between axon diameter and impulse speed. (2)

(6)

Activity 20

(MP 2024 Sep)

The diagram below represents a reflex arc.

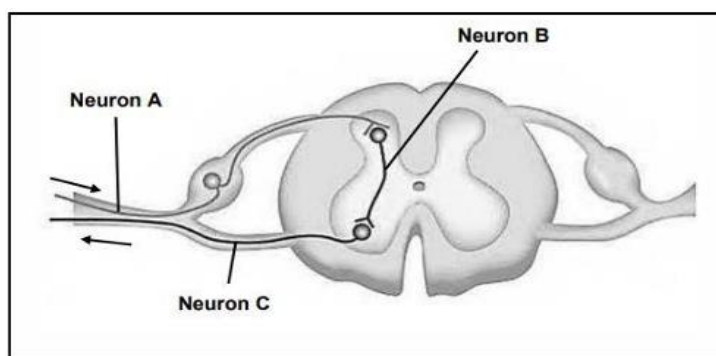


- 20.1 Define a *reflex arc* (1)
- 20.2 Identify the: (1)
- (a) Functional connection at **C** (1)
- (b) Type of neuron at **B** (1)
- 20.3 State TWO significance of the connection mentioned in **QUESTION** 20.2(a). (2)
- 20.4 Name the neurons as they occur, in the correct sequence, from receptor to effector. (2)
- 20.5 Explain the consequences of a reflex action if neuron **D** is damaged. (2)
- 20.6 Draw a labelled diagram to represent the structure of neuron **A**. (5)
- (14)

Activity 21

(Mp pre tri 2024)

- 21.1 The diagram below represents a reflex arc.



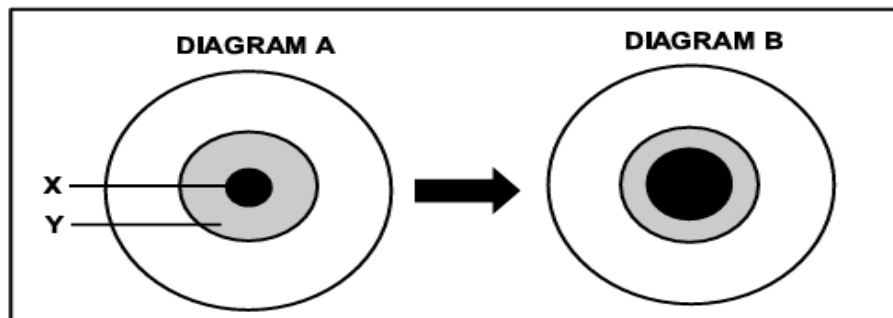
- 21.2 What is a reflex action? (2)
- 21.3 Explain the effect on the reflex action when neuron C is damaged. (2)
- 21.4 Name the disorder that is the result in the breakdown of the myelin sheath of neurons. (1)
- 21.5 Draw a fully labelled diagram of neuron C to show its structure. (4)
- (9)

| CONTENT | ELABORATION |
|------------------|--|
| Human eye | <ul style="list-style-type: none"> ❑ Structure and functions of the parts of the human eye, using a diagram ❑ Binocular vision and its importance ❑ The changes that occur in the human eye for each of the following, using diagrams: <ul style="list-style-type: none"> • Accommodation • Pupillary mechanism ❑ The nature and treatment of the following visual defects, using diagrams: <ul style="list-style-type: none"> • Short-sightedness • Long-sightedness • Astigmatism • Cataracts |
| Human ear | <ul style="list-style-type: none"> ❑ Structure of the human ear and the functions of the different parts, using a diagram ❑ Functioning of the human ear in: <ul style="list-style-type: none"> • Hearing (include the role of the organ of Corti, without details of its structure) • Balance (include the role of maculae and cristae, without details of their structure) ❑ Cause and treatment of the following hearing defects: <ul style="list-style-type: none"> • Middle ear infection (the use of grommets) • Deafness (the use of hearing aids and cochlear implants) |

Activity 22

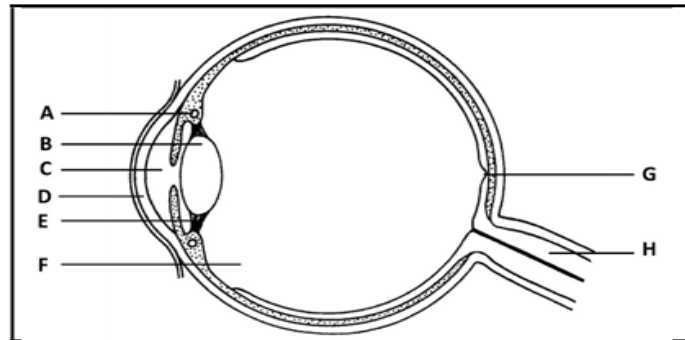
(National 2024 Nov)

22.1 The diagrams below represent the pupillary mechanism in the human eye.



- 22.1.1 Identify part:
- (a) X (1)
- (b) Y (1)
- 22.1.2 Explain why the pupillary mechanism is considered to be a reflex action. (3)
- 22.1.3 Name the TWO effector muscles that are involved in the pupillary mechanism. (2)
- 22.1.4 Explain the significance of the change in the diameter of part X from diagram A to diagram B. (4)
- (11)**

22.2. The diagram below shows a longitudinal section through a human eye. (GP)



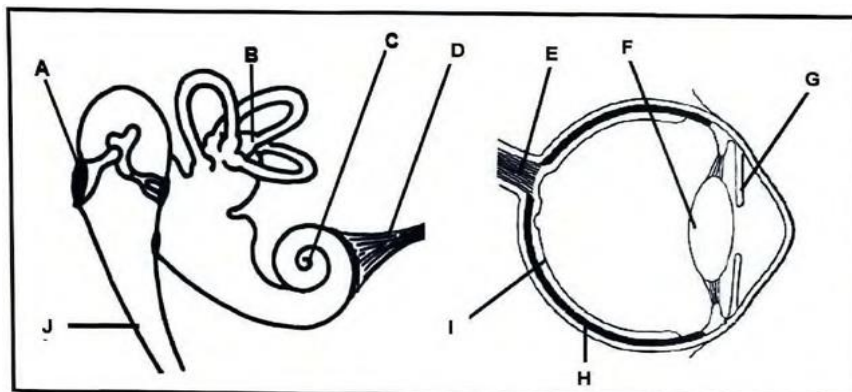
- 22.2.1 Give the NAME of the part that:
- (a) Maintain the shape of the eye together with the sclera (1)
 - (b) Carries the impulses to the cerebrum (1)
- 22.2.2 Explain ONE feature shared by parts B and D that makes them suited to the function for dear vision. (2)
- 22.2.3 Discuss how parts G and H work together for vision to occur. (4)
- 22.2.4 Tabulate TWO structural differences between a healthy eye when looking at an object closer than 6 m away and when looking at an object further than 6 m away. (5)

(13)

Activity 23

(KZN SEP 2024)

The diagram below show part of a human ear and a human eye.



- 23.1 Write down TWO LETTERS only of the parts that:
- (a) Carry impulses (2)
 - (b) Contain receptors (2)
- 23.2 State ONE function of parts:
- (a) **G** (1)
 - (b) **H** (1)
 - (c) **J** (1)
- 23.3 Miss Candice Ndlovu walked into a hall with a wet floor without knowing. She heard a loud voice from the helping lady "it's wet ..." and she slipped and almost fell.

Describe the role of part(s):

B in maintaining balance in Miss Candice Ndlovu

(3)

A to C in enabling her to hear

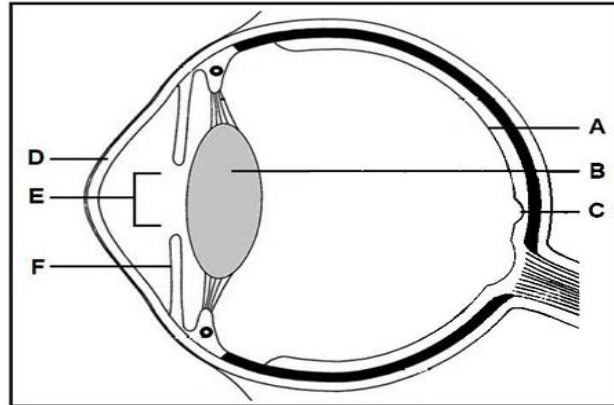
(5)

(15)

Activity 24

(MP 2024 Sep)

The diagram below shows a section of a human eye.



24.1 Give the LETTER and the NAME of the region where the clearest image is formed. (2)

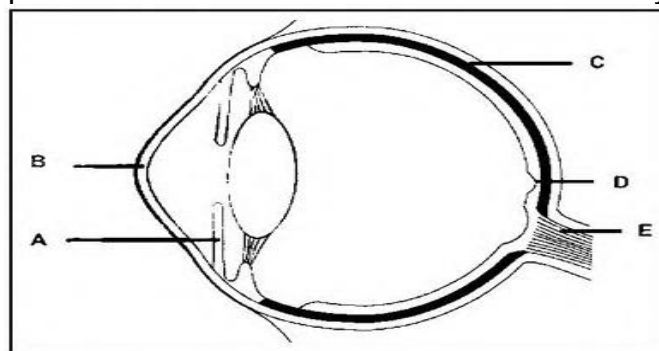
24.2 Using the LETTER and NAME, give the correct sequence through which light travels until it reaches part C. (3)

24.3 Name and describe the changes that occur in the structures labelled E, and F when watching a movie in the cinema. (7)

(12)

Activity 25

The diagram below represents the internal structure of the human eye.



25.1 Identify and give ONE function for each of the following structures:

(a) A

(2)

(b) E

(2)

25.2 What treatment is prescribed if part B has an uneven surface?

(1)

25.3 Describe the pupillary mechanism when eyes are exposed to bright light.

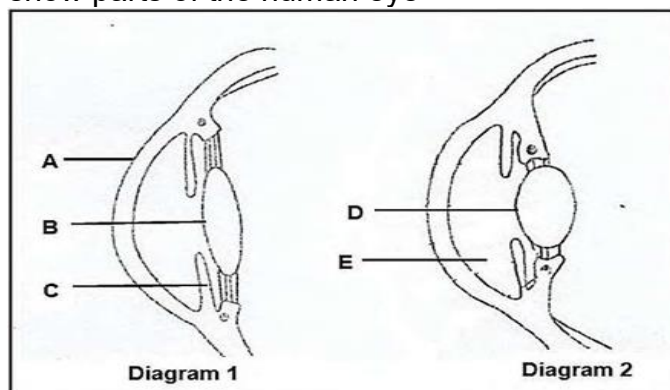
(4)

(9)

Activity 26

(Sep 2024 NW)

The diagrams below show parts of the human eye



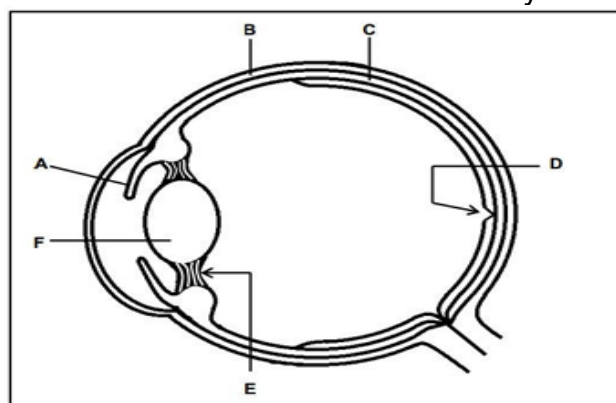
- 26.1 Give the LETTER and NAME of the part that regulates the amount of light that enters the eye. (2)
- 26.2 Name and describe the process that the part named in QUESTION 26.1 will undergo when exposed to bright light. (5)
- 26.3 Explain how part A is structurally suited to perform its function. (2)
- 26.4 State TWO functions of the liquid in part E. (2)
- 26.5 Which diagram (1 or 2) is adapted to distant vision? (1)
- 26.6 Give a reason for your answer to question 26.5. (1)
- 26.7 Describe how the changes in the lens from diagram 1 to diagram 2 are brought about. (5)

(18)

Activity 27

(FS moc 2024 sep)

The diagram below represents the structure of the human eye.



- 27.1 Explain ONE way in which part B is structurally different from part F (4)
- 27.2 Describe how the muscles in part A function, to increase the amount of light entering the eye. (3)
- 27.3 Describe how a blurred image forms if a person with normal vision wears spectacles with biconvex lenses while reading a book. (3)

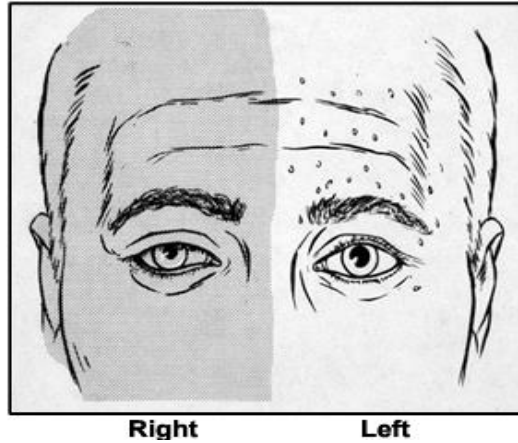
(10)

Activity 28

(Sep GP 2023)

Horner syndrome (Oculosympathetic palsy) is a condition that negatively affects parts of the sympathetic nervous response in the face and eye on one side of the body and is caused by a disruptive nerve in the brain.

This condition may lead to decreased pupil size, a drooping eyelid and decreased sweating on the affected side of the face. Horner syndrome, however, does not affect a person's ability to focus on an object (near or far).



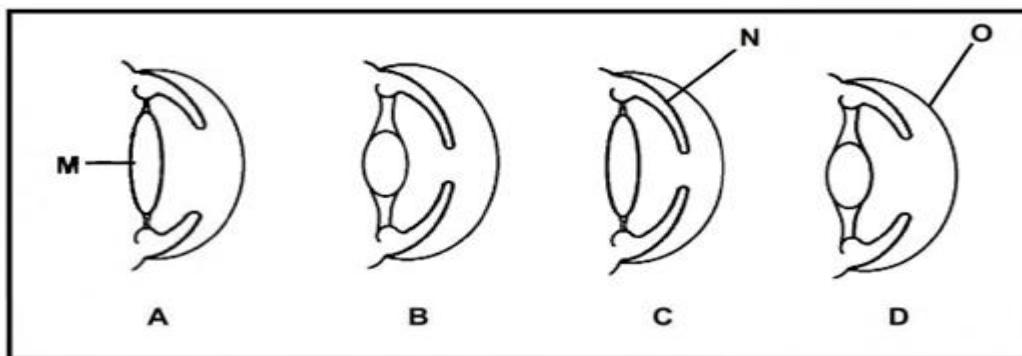
- 28.1 Which side of the face shown above is affected by Horner syndrome? (1)
- 28.2 Give ONE reason for your answer in QUESTION 28.1 by referring to the text and the diagram. (1)
- 28.3 Name the part of the brain which interprets what you see. (1)
- 28.4 Name the part of the nervous system which controls the pupillary reflex. (1)
- 28.5 Describe the risk that the decreased pupil size in Horner syndrome may pose to a driver at night. (2)
- 28.6 Tabulate TWO differences between the functions of adrenalin and the parasympathetic nervous system. (5)
- 28.7 Name and describe the process which allows a person with Horner syndrome to focus clearly on an object which was far away and is now less than 6 m from them. (4)

(15)

Activity 29

(KZN 2023 Tri)

The diagrams (A, B, C and D) below show part of the eye under different conditions.

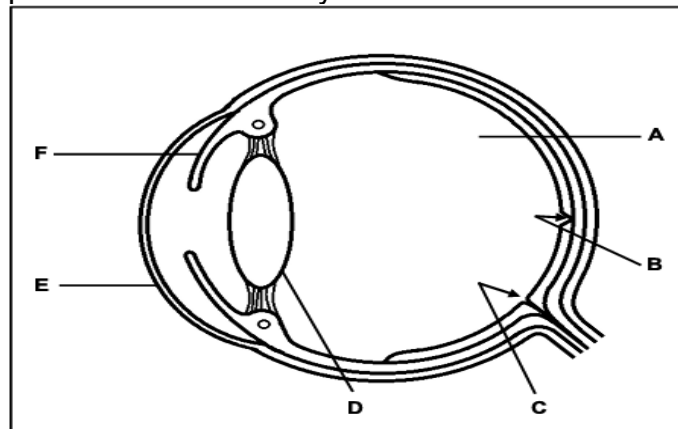


- 29.1 Name the process that involves the changes in the curvature of part M. (1)
- 29.2 Give the LETTERS of TWO diagrams (A, B, C or D) that represent the eye of a person whose part M has a high refractive power (will be able to bend the light the most). (2)
- 29.3 Explain the changes that would occur in part N if a person was sitting in a well-lit room at night when all the lights suddenly go out. (4)
- 29.4 Which diagram (A, B, C or D) represents the eye of a person reading a book in a room with bright light? (1)
- 29.5 Name the eye defect that results from the uneven curvature of part O. (1)
- 29.6 State ONE way by which the defect named in QUESTION 29.5 is corrected. (1)

(10)

Activity 30

The diagram below represents the human eye.



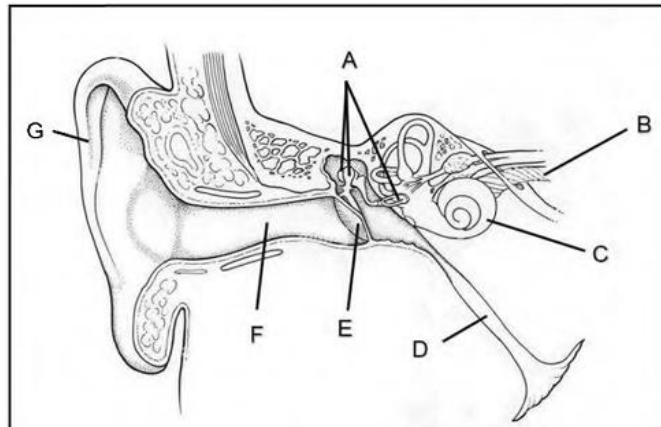
- 30.1 Identify structure F. (1)
- 30.2 State TWO functions of fluid A. (2)
- 30.3 Describe the structural difference between area B and area C. (2)
- 30.4 Name the visual defect that occurs when the curvature of part E is uneven. (1)
- 30.5 Explain how the sight of a person will be affected if cataracts developed in part D. (3)
- 30.6 Describe the process of accommodation that takes place when an object is less than 6 metres away from the eye. (6)

(15)

Activity 31

(NW 2024 Sep)

The diagram below shows the cross-section of the human ear.

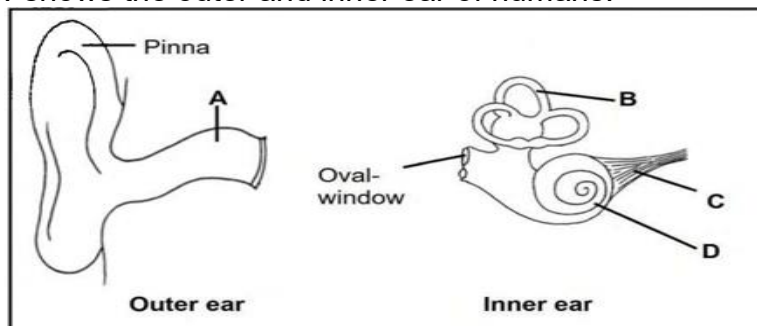


- 31.1 Identify parts A and F. (2)
- 31.2 Identify passage D and state its function. (2)
- 31.3 Give the pathway (in LETTERS) of hearing in the human ear. (2)
- 31.4 Explain the function of part E in the process of hearing. (2)
- 31.5 Explain what would happen to the ability to hear if part C is damaged. (4)

(12)

Activity 32

The diagram below shows the outer and inner ear of humans.



- 32.1 Give the LETTER of the part that:
 - (a) Transmits impulses to the brain. (1)
 - (b) Produces wax. (1)
 - (c) Has structures that are arranged at right angles to each other. (1)
- 32.2 Describe the role of the middle ear in equalising air pressure. (2)
- 32.3 Explain how part B of the inner ear is involved in restoring balance when a person trips over a brick. (5)

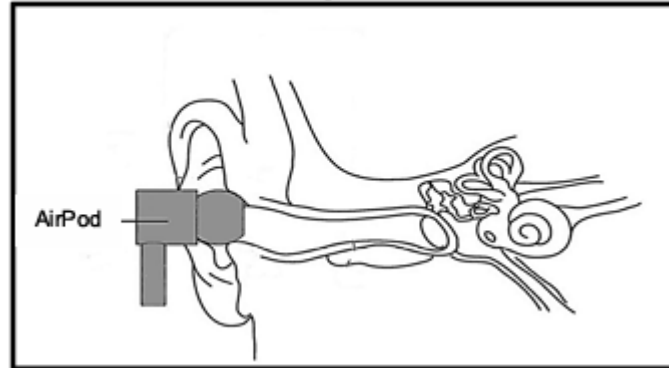
(10)

Activity 33

(GP 2024 Sep)

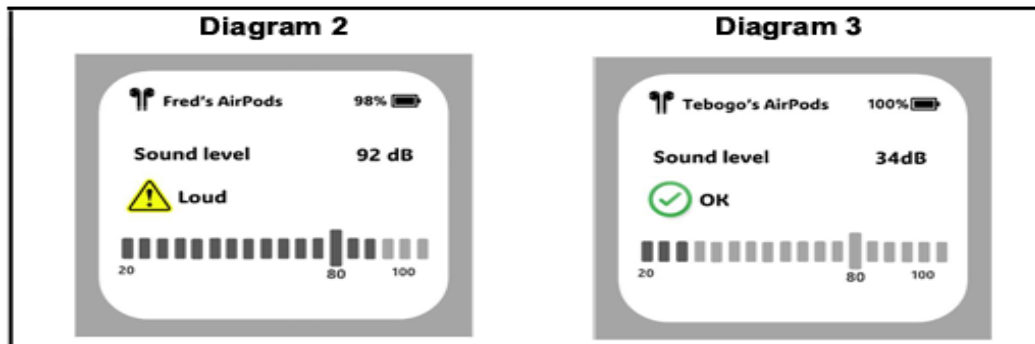
AirPods are wireless listening devices that fit into the ear and direct sound, allowing users to listen to music from their phones privately without disturbing others.

Diagram 1



A smartphone has a feature that can monitor the volume of music being played through the AirPods and give warning notifications if the volume exceeds 80 dB (decibels).

Fred and Tebogo are listening to the same music. Diagrams 2 and 3 below show their phone displays.

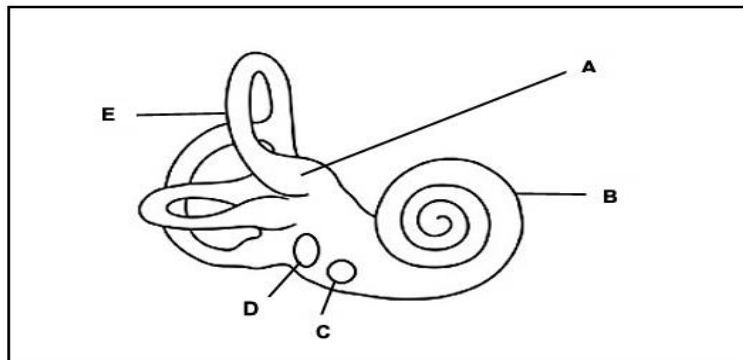


- 33.1 Name the part of the ear that:
- (a) Vibrates due to the direct effect of sound waves (1)
 - (b) Contains receptor cells which detect the sound stimulus (1)
 - (c) Equalises pressure in the middle ear (1)
 - (d) Channels sound waves to the middle ear (1)
- 33.2 Explain TWO ways in which AirPods could prevent a person from hearing other environmental noise. (4)
- 33.3 Use diagrams 2 and 3 and answer the following questions.
- (a) Who is more at risk for damage to their sound receptor cells? (1)
 - (b) Explain your answer to QUESTION 33.3 (a). (2)
- (11)**

Activity 34

(EC Sep 2024)

The diagram below shows the structure of the inner ear.



- 34.1 Give the LETTER and NAME of the part that:
- (a) Collects vibrations from ossicles and converts them into pressure waves (2)
 - (b) Contains the organ of Corti (2)
- 34.2 Top ice-figure skaters can spin up to six **revolutions** on their body's axis per second.

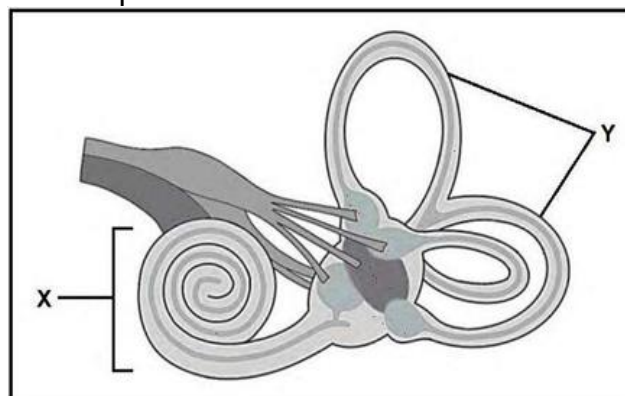


- Describe the role of part A in the maintenance of balance of their body while spinning. (4)
- 34.3 Describe ONE structural suitability of part B to perform its function. (2)
- (10)

Question 35

(MP 2024 Tri)

The diagram below represents part of the inner ear.

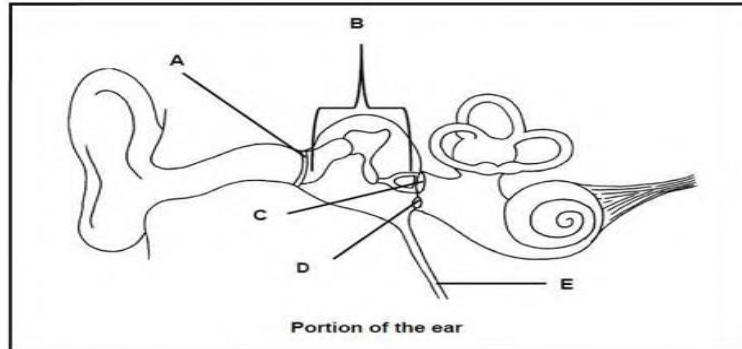


- 35.1 Identify part:
- (a) **X** (1)
- (b) **Y** (1)
- 35.2 Describe the role of the parts of the ear from the time sound waves are trapped until pressure waves are set up in the inner ear. (6)
- (8)**

Activity 36

(WC Sep 2024)

Study the diagram below showing a portion of the human ear and answer the questions that follow.

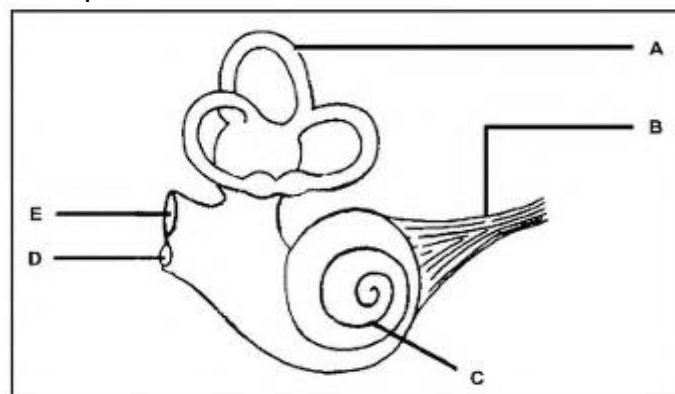


- 36.1 Provide labels for parts B and C, respectively. (2)
- 36.2 Give the LETTER and NAME of the part where grommets are inserted. (2)
- 36.3 State ONE function of part D. (1)
- 36.4 Explain the consequence for hearing if part E is blocked with mucus (3)
- 36.5 Describe the process of hearing from the time the sound waves reach part A. (6)
- (14)**

Activity 37

(NC Sep 2024)

The diagram below shows parts of the inner ear

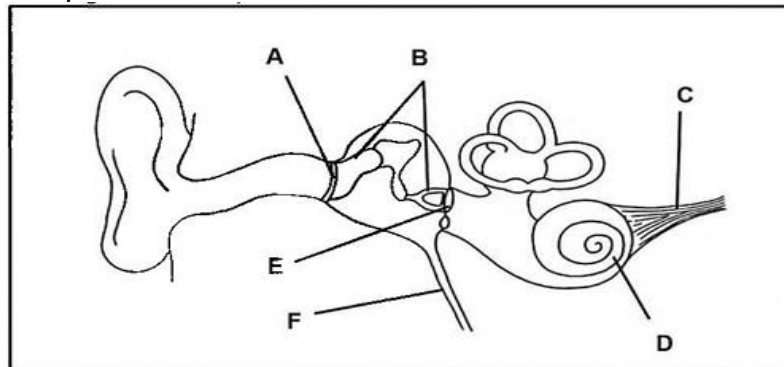


- 37.1 Identify part B (1)
- 37.2 Give the name of the receptor found in part C. (1)
- 37.3 Give the LETTER and the NAME of the structure that:
- (a) Creates pressure waves in the inner ear (2)
- (b) Absorbs excess pressure waves from the cochlea (2)
- (c) Detects changes in the movement of the head (2)
- (8)**

Activity 38

(Lim 2024 Sep)

The diagram below represents the Human ear

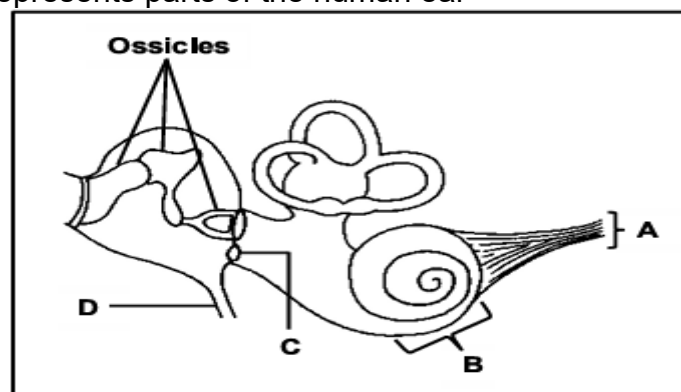


- 38.1 Identify part:
- (a) C (1)
 - (b) D (1)
 - (c) E (1)
- 38.2 State ONE function of part F (1)
- 38.3 Middle ear infection is a common cause for loss of hearing. Name ONE way in which middle ear infection can be treated (1)
- 38.4 Describe how part A, B and E assists in amplifying sound. (4)
- 38.5 Describe how the semi-circular canals play a role in maintaining balance when the body changes speed and direction. (5)
- (14)**

Activity 39

(NSC Jun 2024)

The diagram below represents parts of the human ear



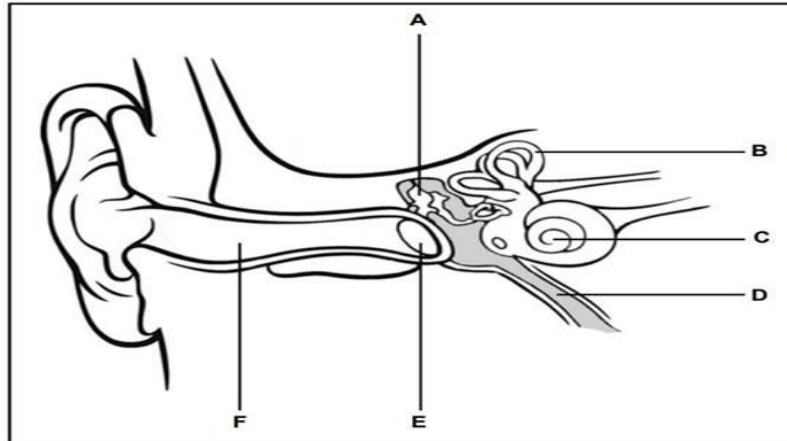
- 39.1 Identify part:
- (a) A (1)
 - (b) B (1)
- 39.2 State the function of part:
- (a) C (1)
 - (b) D (1)

- 39.3 Otosclerosis is a medical condition that prevents the ossicles from vibrating. (4)
 Explain how this condition will affect hearing.
- 39.4 Describe the role of the ear in maintaining balance. (6)
(14)

Activity 40

(NC Jun 2024)

The diagram below shows the internal structure of the ear

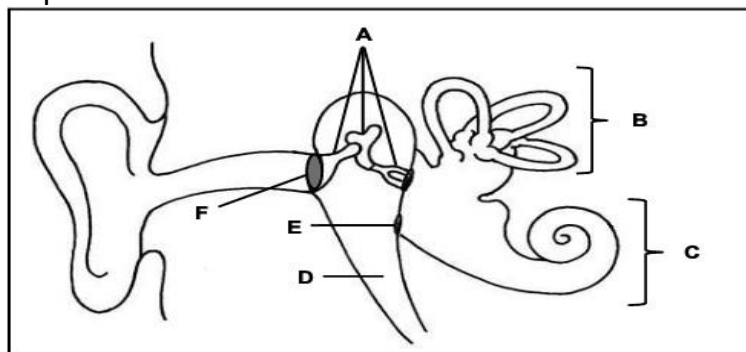


- 40.1 Identify Structure: (1)
 (a) **E** (1)
 (b) **C** (1)
- 40.2 Give the LETTER of the part of the ear that: (1)
 (a) Is the first of three ossicles (1)
 (b) Contains receptors for balance. (1)
- 40.3 Name the: (1)
 (a) Receptor found at C. (1)
 (b) Nerve that carries the impulses from parts B and C to the brain. (1)
(6)

Activity 41

(Nov 2023 SA)

The diagram below represents the human ear.



- 41.1 Identify part: (1)
 (a) **B** (1)
 (b) **E** (1)
- 41.2 Give the LETTER and NAME of the part that: (2)
 (a) Is filled with air (2)
 (b) Contains the organ of Corti (2)

- 41.3 Give the LETTER of the part:
- (a) Where grommets are inserted (1)
- (b) That amplifies vibrations (1)
- (8)

| | | |
|--|---------------------|-----------------|
| ENDOCRINE SYSTEM AND HOMEOSTASIS Paper 1: 34 marks | Term 2 and 3 | 2½ weeks |
|--|---------------------|-----------------|

| CONTENT | ELABORATION |
|--|--|
| Endocrine system | <ul style="list-style-type: none"> <input type="checkbox"/> Difference between an endocrine and an exocrine gland <input type="checkbox"/> Definition of a hormone <input type="checkbox"/> Location of each of the following glands, using a diagram, the hormones they secrete and function(s) of each hormone: <ul style="list-style-type: none"> • Hypothalamus (ADH) • Pituitary/Hypophysis (GH, TSH, FSH, LH, prolactin) • Thyroid glands (thyroxin) • Islets of Langerhans in the pancreas (insulin, glucagon) • Adrenal glands (adrenalin, aldosterone) • Ovary (oestrogen, progesterone) • Testis (testosterone) |
| Introduction – Homeostasis | <ul style="list-style-type: none"> <input type="checkbox"/> Homeostasis as the process of maintaining a constant, internal environment within narrow limits, despite changes that take place internally and externally. <input type="checkbox"/> The conditions within cells depend on the conditions within the internal environment (the tissue fluid) <input type="checkbox"/> Factors such as carbon dioxide, glucose, salt, water concentration, temperature and pH must be kept constant in the internal environment (tissue fluid) |
| Homeostasis: Negative feedback mechanisms | <ul style="list-style-type: none"> <input type="checkbox"/> Negative feedback mechanism controlling each of the following in the body: <ul style="list-style-type: none"> • Thyroxin levels • Blood glucose levels • Blood carbon dioxide levels • Water balance (osmoregulation) • Salt <input type="checkbox"/> Disorders caused by an imbalance in levels of: <ul style="list-style-type: none"> • Thyroxin – Goitre • Blood glucose – Diabetes mellitus |

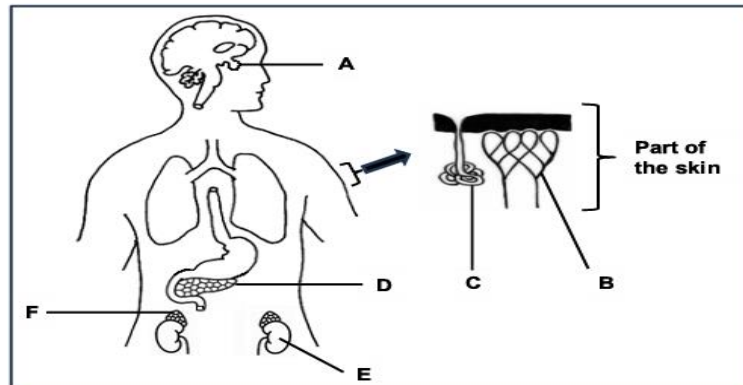
INSTRUCTIONS AND INFORMATION

1. Read the following instructions carefully before answering the questions.
2. Answer ALL the questions.
3. Write all the answers in the ANSWER BOOK.
4. Start the answers to EACH question at the top of a NEW page.
5. Number the answers correctly to the numbering system used in the question paper.
6. Present your answers according to the instructions of each question.
7. Do ALL drawings in pencil and label them in blue or black ink.
8. Draw diagrams, tables or flow charts only when asked to do so.
9. The diagrams in this question paper are NOT necessarily drawn to scale.
10. Do NOT use graph paper.
11. You must use a non-programmable calculator, protractor and a compass, where necessary.
12. Write neatly and legibly.

Activity 42

(nov 2024 SA)

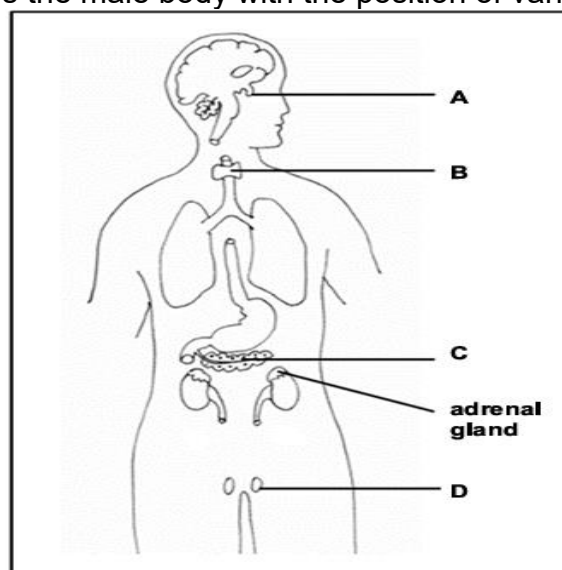
The diagram below represents some structures involved in homeostasis in the human body.



- 42.1 Write the LETTERS of the parts that serve as endocrine glands only. (2)
- 42.2 Give the LETTERS and NAMES of the parts responsible for the regulation of body temperature. (4)
- 42.3 Name the following with regard to the regulation of water content in the blood: (1)
- (a) Hormone secreted by part A (1)
- (b) Target organ E (1)
- (8)

Activity 43

The diagram below shows the male body with the position of various gland



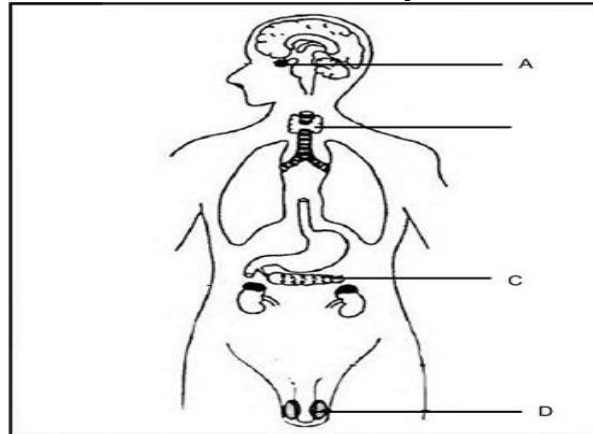
- 43.1 (a) Name TWO hormones secreted by the adrenal gland. (2)
- (b) Name the hormone secreted by gland D (1)

- 43.2 Name and describe the role of gland A when the hormone secreted by gland B increases above the normal level. (5)
- (8)

Activity 44

(Fs Pre Tri 2024)

The diagram below represents the human endocrine system.

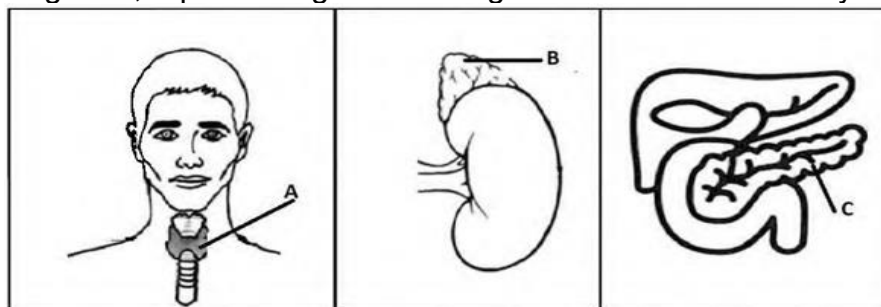


- 44.1 Identify gland A (1)
- 44.2 Name a hormone secreted by the gland in QUESTION 44.1 that stimulates the growth of a person (1)
- 44.3 Give the LETTER and the NAME of the gland that secretes a hormone responsible for:
- (a) Reducing glucose levels in the blood (2)
 - (b) Initiating puberty in males (2)
 - (c) Controlling the metabolic rate (2)
- (8)

Activity 45

(WC2024Sep)

Study the following diagrams, representing endocrine glands in the human body.



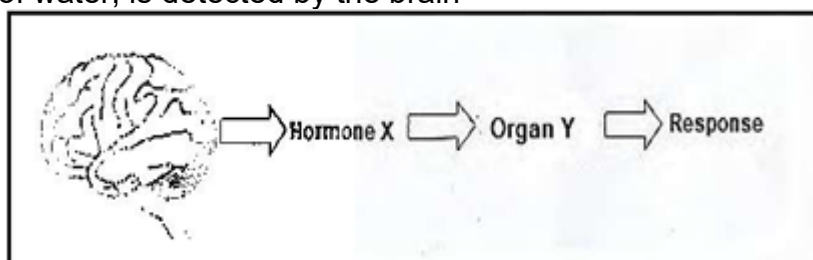
- 45.1 Identify the endocrine glands labelled:
- (a) **A** (1)
 - (b) **B** (1)
 - (c) **C** (1)
- 45.2 The functioning of the gland in diagram **A** is controlled by another hormone.
- (a) Provide the name of this hormone. (1)
 - (b) Name the gland responsible for the secretion of the hormone identified in QUESTION 4.2 (a). (1)

- (c) Name the type of interaction between the gland in diagram **A** and the gland mentioned in QUESTION 4.2 (b). (1)
- 45.3 Name the hormone secreted by the gland B, that is responsible for the 'flight or fight' reaction. (1)
- 45.4 Name the hormone secreted by the endocrine gland C, when the blood glucose levels are low. (1)
- (8)**

Question 46

(LIM Sep 2024)

The diagram below represents a homeostatic response that occurs when a person is dehydrated. The decrease in blood volume, as a result of the excessive loss of water, is detected by the brain



- 46.1 Define the term homeostasis. (2)
- 46.2 Identify: (1)
- (a) Hormone X (1)
- (b) Target organ Y (1)
- 46.3 Describe what happens when the Carbon dioxide level in the blood increases above normal. (5)
- 46.4 Read the passage below

Sphiwe was walking alone in the bush. She suddenly saw a big snake and she was very frightened. She screamed asking for help, turned around and ran away. During that time, she was breathing heavily and her eyes were wide open.

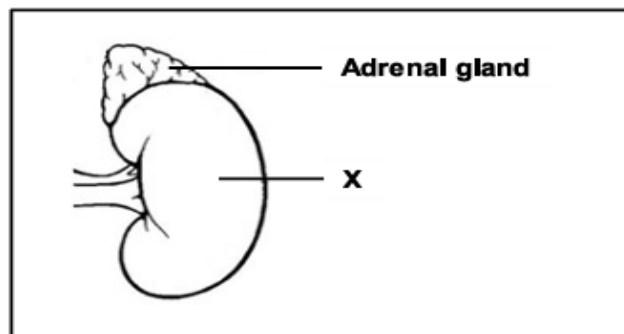


- 46.4.1 Name the hormone that prepared the body to evade the danger. (1)
- 46.4.2 State the role of the liver during an emergency. (1)
- 46.4.3 Explain the effects of the hormone mentioned in question 46.4.1 on the blood vessels of skeletal muscles. (4)
- 46.5 Explain how the thyroid gland is functionally related to body temperature on a cold day. (4)
- (10)**

Activity 47

(nov 2023)

The diagram below shows the location of the adrenal gland in the human body.



- 47.1 Identify: (1)
- (a) Organ X (1)
 - (b) The system to which the adrenal gland belongs (2)
- 47.2 State TWO characteristics of the type of glands that belongs to the system identified in QUESTION 47.1(b). (5)
- 47.3 Describe the interaction between the adrenal gland and organ X in maintaining homeostasis when salt levels in the blood are low (5)
- 47.4 Explain the effect that a secretion of the pituitary gland will have on organ X when a person experiences dehydration. (14)

Activity 48

(Sep GP 2023)

Testosterone is responsible for a number of secondary sexual characteristics in males, including the growth of beards. A group of learners hypothesised that a greater density of beard growth will be found in men with an increased concentration of testosterone. They got male volunteers with different facial hair density, and they measured the amount of testosterone for each. The results of the study are shown below:

| Density of hair growth (Hair follicles per cm ²) | Measured testosterone level (ug) |
|---|----------------------------------|
| 30 | 0,52 |
| 40 | 0,53 |
| 50 | 0,52 |
| 60 | 0,51 |
| 70 | 0,53 |

- 48.1 List TWO other secondary sexual characteristics that are unique to males. (2)
- 48.2 State a suitable aim for this investigation. (2)
- 48.3 Suggest THREE variables regarding the males that learners should (3)

have kept the same to increase the validity of the investigation.

48.4 Calculate the average testosterone level. Show all calculation steps. (3)

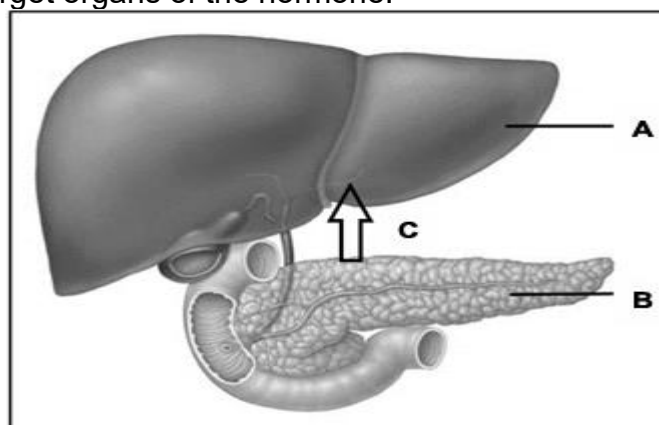
48.5 Was the learners' hypothesis accepted or rejected? Explain your answer. (2)

(12)

Activity 49

(Sep GP 2023)

The diagram below shows an endocrine gland involved in regulating blood glucose levels. It shows the hormone it releases when blood glucose levels are high and one of the target organs of the hormone.



49.1 Identify the following:

(a) Organ A and B

(b) Hormone C

(2)

(1)

49.2 What is a hormone?

(2)

49.3 Explain how a lack of hormone C affects blood glucose levels.

(3)

49.4 List THREE other hormones that can directly or indirectly affect blood glucose levels.

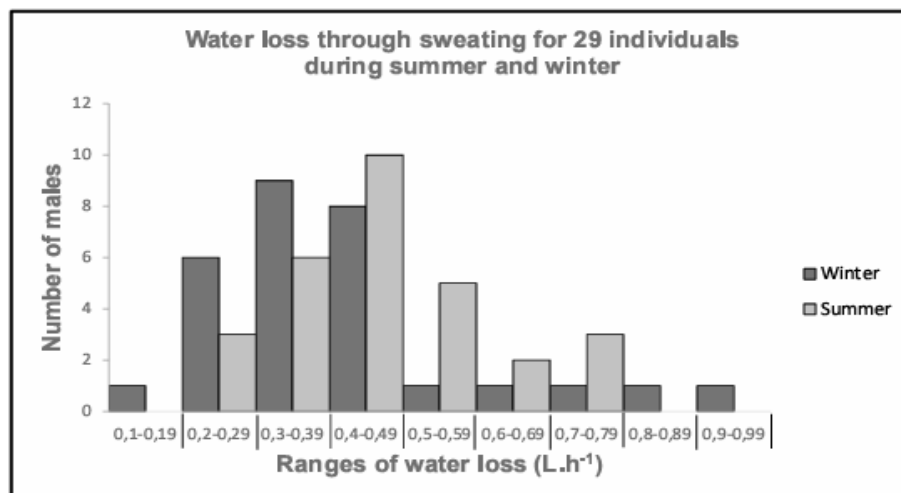
(3)

(11)

Activity 50

(Sep GP 2023)

Scientists found that high sweat rates over prolonged work periods (8 to 12 hour- shifts) in the heat leads to water levels in the blood decreasing below normal. This eventually leads to dehydration, which causes reduced mental and physical performance and may pose a serious risk to health. Scientists therefore carried out an investigation to determine the amount of sweat loss that an individual experiences during manual labour/exercise in summer and winter. The subjects were 29 healthy, male, outdoor, manual workers (various trades) aged between 18 and 50 years. All agreed to participate in the study. Male subjects exercised in a temperature-controlled room on two consecutive days under both winter and summer conditions. Sweat collecting devices were attached to the upper arms and legs. They found that the average water loss through sweating for the group was 0,47 litres per hour (L.h-1) in the summer compared with 0,41 litres per hour (L.h-1) in winter. The graph below shows the number of males that fall into the different ranges of water loss, under summer and winter conditions.



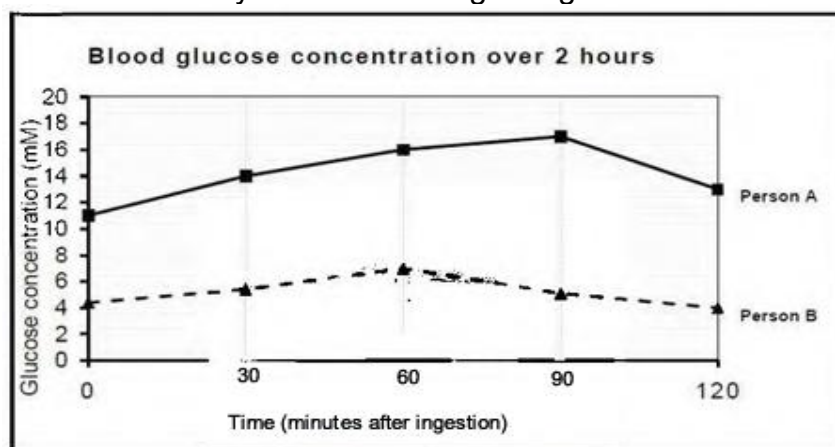
- 50.1 Use the text provided and state ONE effect of dehydration on the body. (1)
- 50.2 Give the water loss range that the largest number of males fell into under summer conditions. (1)
- 50.3 Describe how the body of a healthy person will try to prevent dehydration when the water levels in the blood decrease to below normal. (5)
- 50.4 Explain how the change in the average water loss through sweating, from winter to summer, affects body temperature. (4)
- 50.5 Suggest TWO ways in which a company can decrease the risk of dehydration for their workers. (2)

(13)

Activity 51

(WC2024Sep)

The graph below shows the blood glucose concentration of two people (A and B) over a period of 2 hours after they consumed 100g of a glucose drink.



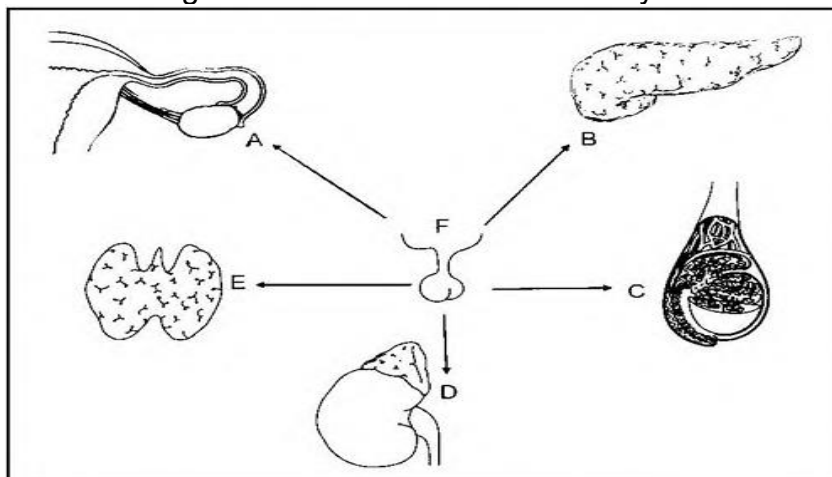
- 51.1 Person **A** is not able to regulate his blood glucose level effectively. (1)
- (a) Name the disease that person **A** has. (1)
- (b) Explain ONE possible reason why the blood glucose concentration remains high in person **A**. (2)
- 51.2 Calculate the difference between the blood glucose concentration (mM) of person **A** and person **B** at 120 minutes. Show your calculations. (2)
- 51.3 Name TWO hormones that will have the opposite effect on the blood glucose concentration to that of insulin. (2)

(7)

Activity 52

(NW Sep 2024)

The diagram below shows organs involved in the endocrine systems.



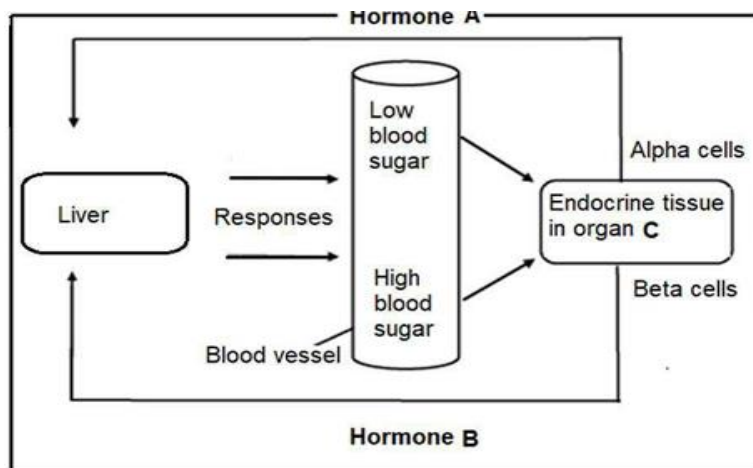
Give the LETTER and NAME of the gland/hormone that:

- | | | |
|------|--|-------------|
| 52.1 | Influence height, building bones and muscles | (2) |
| 52.2 | Serves as both endocrine and exocrine gland | (2) |
| 52.3 | Secrete hormones responsible for pregnancy | (2) |
| 52.4 | Secrete a hormone that when imbalanced causes a goitre | (2) |
| 52.5 | Controls secondary sexual characteristics in males | (2) |
| | | (10) |

Activity 53

(MP 2024 Sep)

The diagram below represents the homeostasis of blood glucose in the human body.



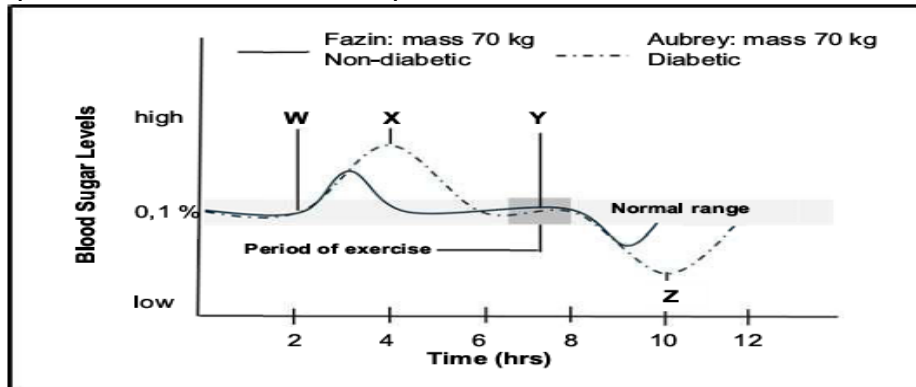
- | | | |
|------|--|-----|
| 53.1 | Identify hormone A and B | (2) |
| | Name: | |
| 53.2 | (a) Organ C | (1) |
| | (b) The endocrine tissue in organ C. | (1) |
| 53.3 | Describe the response that is carried out when a person has not eaten any sugar-containing food for six hours. | (6) |

(10)

Activity 54

(GP Sep 2024)

Study the graph below and answer the questions that follow.

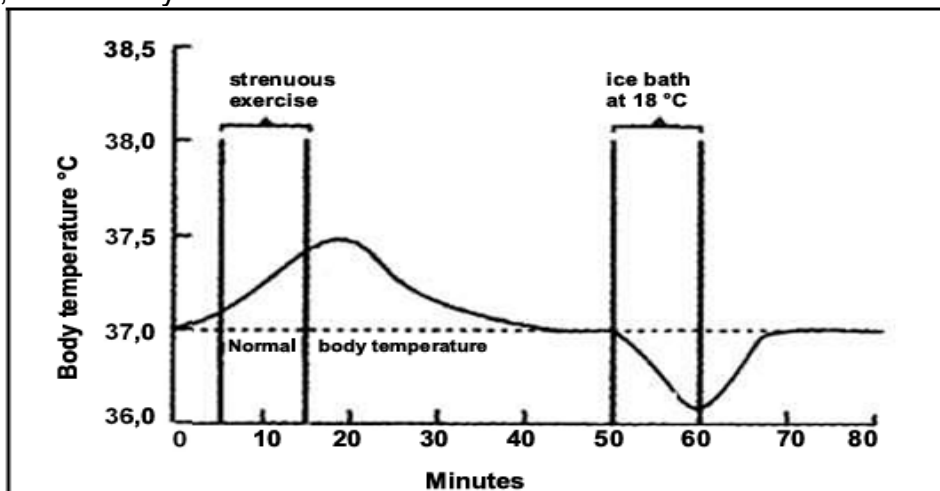


- 54.1 (a) Name the hormone Aubrey received at X on the graph. (1)
(b) Provide a suitable reason for your answer to QUESTION 13.1 (a). (1)
54.2 Define the term homeostasis. (2)
(4)

Activity 55

(GP Sep 2024)

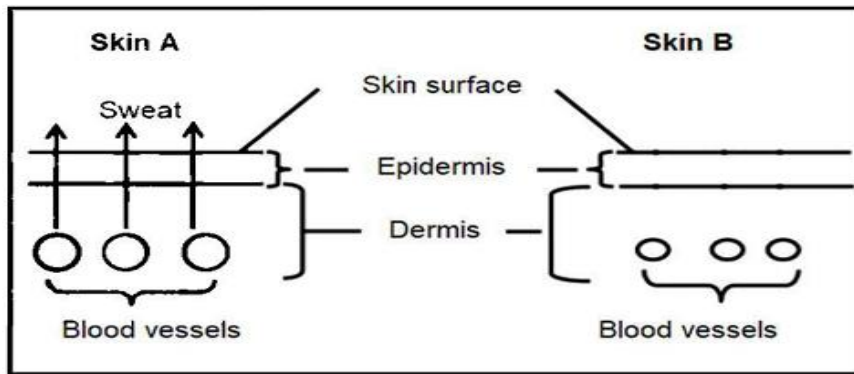
The graph below shows the effect of strenuous exercise on an athlete's body temperature, followed by an ice bath.



- 55.1 Which part of the brain responds to changes in the body's temperature? (1)
55.2 Describe the changes in the athlete's body between 20 and 40 minutes, as illustrated in the graph. (5)
55.3 Explain the cause of the increase in body temperature during strenuous exercise. (2)
(8)

Activity 56

(mp 2024 Sep)



- 56.1 Which is the environmental condition that resulted in appearance of skin **B**? (1)
- 56.2 Describe the process that is taking place in skin **A** in order to maintain a constant body temperature. (3)
- 56.3 Explain why sweating plays an important role in maintaining body temperature, when the environmental temperature increases. (3)
- 56.4 A person with skin **B** started to exercise as a way of keeping warm for a period of 20 minutes. This person's skin temperature was measured over that time period. The table below shows temperature measurements obtained.

| Time (Minutes) | Temperature of person |
|----------------|-----------------------|
| | with skin B (0C) |
| 0 | 19 °C |
| 5 | 27 C |
| 10 | 30 °C |
| 15 | 35 °C |
| 20 | 38 °C |

Calculate the percentage increase of temperature from 10 to 20 minutes. (3)

(10)

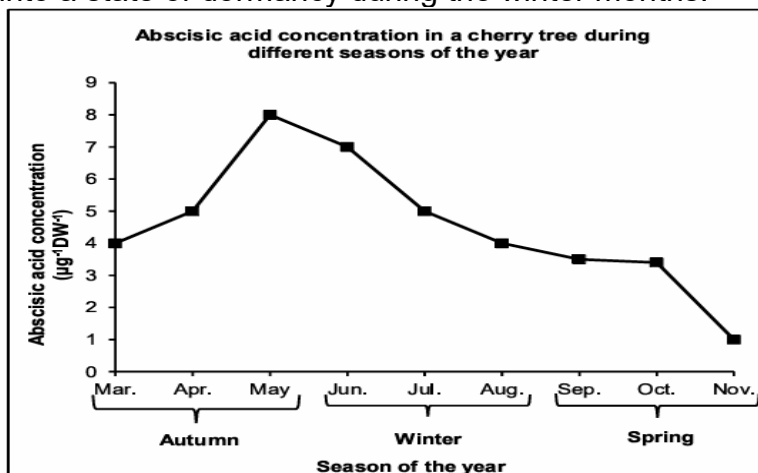
| | | |
|--|---------------|---------------|
| RESPONDING TO THE ENVIRONMENT (PLANTS) Paper 1: 13 marks | Term 3 | 1 week |
|--|---------------|---------------|

| CONTENT | ELABORATION |
|---------------------------------|---|
| Plant hormones | <input type="checkbox"/> General functions of the following: <ul style="list-style-type: none"> • Auxins • Gibberellins • Absciscic acid <input type="checkbox"/> The control of weeds using plant hormones <input type="checkbox"/> The role of auxins in: <ul style="list-style-type: none"> • Geotropism • Phototropism |
| Plant defence mechanisms | <input type="checkbox"/> Role of the following as plant defence mechanisms: <ul style="list-style-type: none"> • Chemicals • Thorns |

Activity 57

(NSC Jun 2023)

The graph below shows the concentration of absciscic acid in a cherry tree during different seasons of the year. This tree species loses all its leaves in autumn and goes into a state of dormancy during the winter months.



- 57.1 During which month was the absciscic acid concentration the lowest? (1)
- 57.2 Explain the trend of the graph from March to May. (3)
- 57.3 Suggest ONE reason for the dormancy in cherry trees during the winter months. (2)
- 57.4 Geotropism refers to the movement of a part of a plant in response to gravity. This tropism is controlled by auxins. (3)
- Describe the role of auxins in roots.
 - When a plant is placed horizontally, with light coming from all directions, the auxins will accumulate on the lower side of both the stem and the roots.

Explain the difference in the response of the stem and the roots after a few days. (4)

(13)

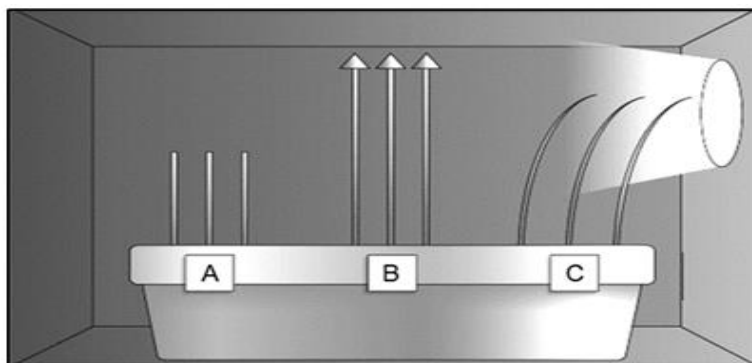
Activity 58

(GP 2023 Sep)

An investigation was conducted to determine the effect of a plant hormone and light on a plant's growth response.

The investigator placed nine plants (in groups of three) in a dark box with light entering on one side (unilateral light). The plants were all at the same height at the start of the investigation. In group **A** he removed the apical meristems, in group **B** he covered the apical meristems with foil and in group **C** the apical meristems remain untouched.

The diagram below represents what was observed after a week.



- 58.1 Give the term used to describe the plant growth response being investigated. (1)
- 58.2 Name the plant hormone involved in the growth response mentioned in QUESTION 2.1 (1)
- 58.3 Give the letters (A, B or C) of the groups which are NOT affected by unilateral light. (2)
- 58.4 Explain why the plants in group C bent towards the light. (4)
- 58.5 Explain ONE way in which the removal of the apical meristem of a plant is financially beneficial to a citrus farmer. (3)
- (11)**

Activity 59

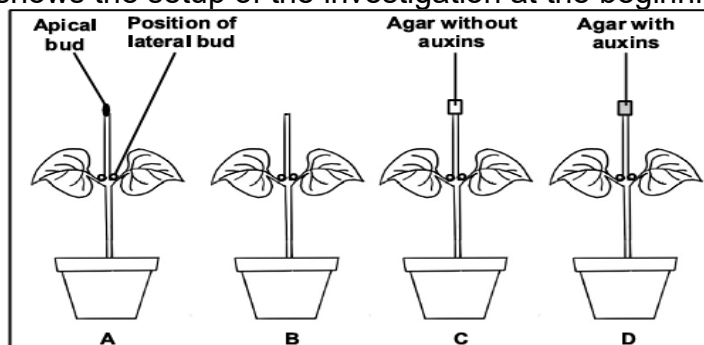
(DBE/November 2023)

An investigation was done to determine the effect of auxins on the growth of lateral branches. (The elongation of lateral buds results in the growth of lateral branches.)

The procedure was as follows:

- Four potted plants (A, B, C and D) of the same species were used.
- Plant A was left untreated.
- The apical bud of plant B was removed.
- The apical bud of plant C was removed and replaced with agar jelly (a jell y-ike substance through which other substances can diffuse).
- The apical bud of plant D was removed and replaced with agar jelly containing auxins.
- The plants were exposed to the same environmental conditions.
- The length of the lateral buds of each plant was measured at the beginning of the investigation and again after three weeks.

The diagram below shows the setup of the investigation at the beginning.



The results are shown in the table below

| Plant | Length of the lateral buds (mm) | |
|-------|---------------------------------|-------------------|
| | At the beginning | After three weeks |
| A | 7,0 | 7,3 |
| B | 6,9 | 10,4 |
| C | 7,2 | 10,3 |
| D | 7,1 | 7,2 |

- 59.1 For this investigation state the:
- Independent variable (1)
 - Dependent variable (1)
- 59.2 Explain why all the plants were exposed to the same environmental conditions. (2)
- 59.3 Explain why agar without auxins was used in plant C. (3)
- 59.4 State a conclusion for this investigation. (2)
- (9)**

Activity 60

LIMPOPO DoE/ Sep 2024

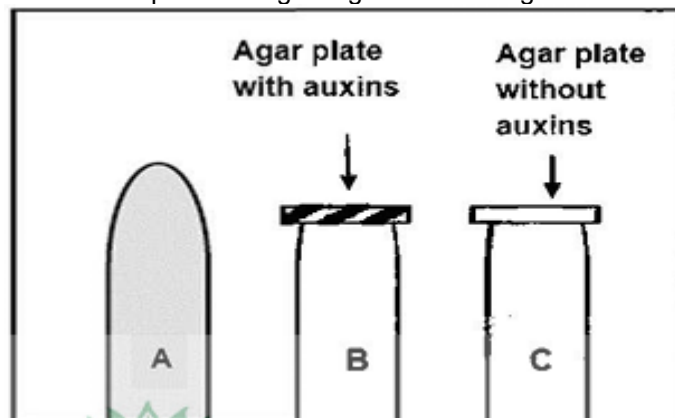
Dale did an investigation to determine the effect of auxins on the growth of three plant shoots (A, B and C). The plant shoots were treated as follows:

- Shoot A - Tip of the shoot was not removed
- Shoot B - Tip removed and an agar plate with auxins placed on top
- Shoot C- Tip removed and agar plate without auxins placed on top

(Agar is a jelly-like substance that allows auxins to diffuse through it)

All shoots were exposed to the same light conditions.

The diagram below indicates the set-up at the beginning of the investigation.



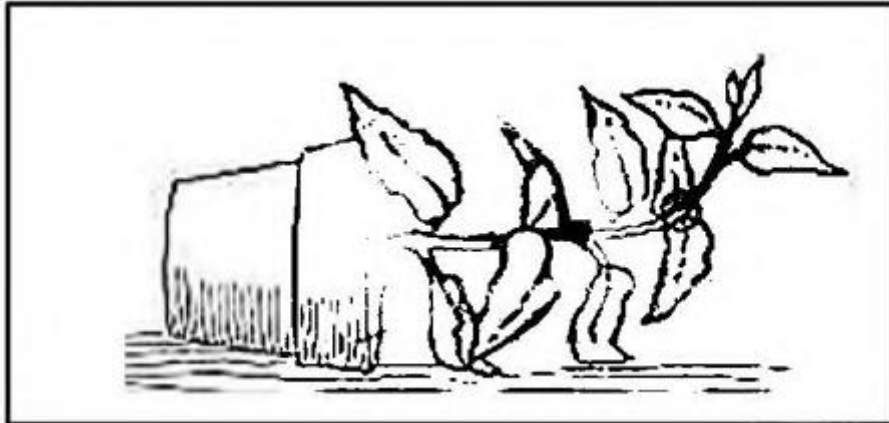
- 60.1 Explain the results as observed in:
- Shoot B after a few days (2)

- (b) Shoot **C** after few days (2)
- 60.2 State TWO factors that must be kept constant in this investigation. (2)
- 60.3 State TWO ways in which Dale could have improved the reliability of her investigation. (2)
- (8)**

Activity 61

(WC Sep 2024)

A pot plant was placed onto its side in a dark box. After 2 weeks, the stem started to grow upwards.



- 61.1 Name the growth response which is indicated by the stem's upward growth. (1)
- 61.2 Name the plant hormone which is responsible for the stem's upward growth. (1)
- 61.3 Explain the growth response observed in the stem. (5)
- 61.4 Explain ONE way in which the stems upward growth benefits the plant. (2)
- (9)**

Activity 62

Scientists investigated to determine the effect of different concentrations of auxin on the cell elongation of coleoptiles (young stems). The following steps were followed:

- Fifty (50) coleoptiles from the same species of bean plants were used.
 - All the coleoptiles were the same length.
 - The tips of the coleoptiles are removed. These coleoptiles were then placed into five groups.
 - Each group was injected at the cut surface with a different concentration of auxin.
- Group B was injected with 2 arbitrary units of auxins
- Group C was injected with 4 arbitrary units of auxins
- Group D was injected with 6 arbitrary units of auxins
- Group E was injected with 8 arbitrary units of auxins
- Group A was included but was not injected with auxin.
 - After four days the length of the coleoptiles in each group was measured and the average was calculated.

Table showing the results of the investigations

| Group | Average increase length of coleoptiles (mm) |
|-------|---|
| A | 0 |
| B | 20 |
| C | 25 |
| D | 57 |
| E | 68 |

- 62.1 Identify the independent variable (1)
62.2 Explain why group A was included in this investigation (2)
62.3 State TWO factors that were kept constant during the investigation. (2)
62.4 State ONE conclusion that can be drawn from the results. (2)
62.5 Draw a bar graph to represent the data in the table. (6)
(13)

Activity 63

NW/September 2024

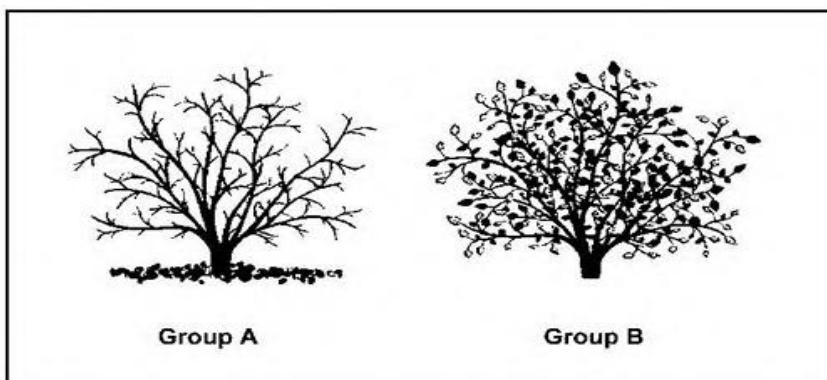
The Grade 12 learners investigated the effect of abscisic acid on plant dormancy.

The procedure was as follows:

- A greenhouse was set up with a constant temperature of 28 C and a 30% humidity level.
- 16 pear trees of similar age and size were placed in the greenhouse.
- The trees were divided into group **A** and group **B** with 8 trees in each group.
- In group **A**, the 8 trees were treated with abscisic acid for 5 days.
- In group **B**, the 8 trees were treated with water only for 5 days.
- The shedding of leaves by the plants was observed.
- The learners recorded their observations for seven days.

The diagram below shows the observation made at the end of the seven days.

The diagram does NOT represent all the trees that were investigated nor the actual size of the trees.

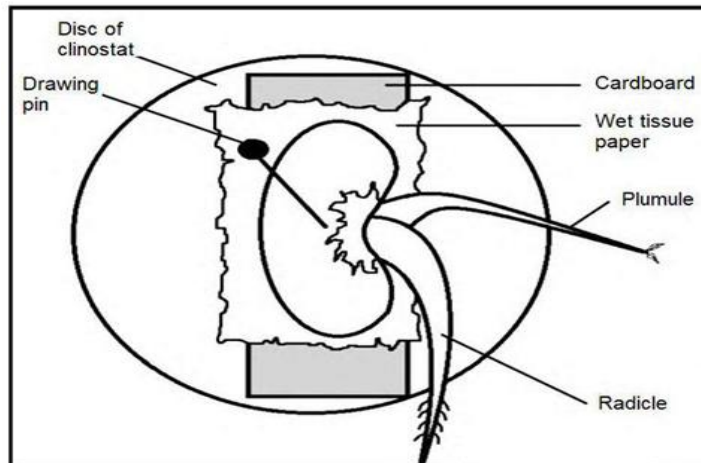


- 63.1 State the aim of the investigation. (1)
63.2 Identify the following: (1)
(a) Independent variable. (1)
(b) Dependent variable. (1)
(c) ONE controlled variable. (1)
63.3 What is meant by abscission? (1)
63.4 State TWO other functions of abscisic acid in plants. (2)

Activity 64

MDE/September 2024

An experiment was conducted to investigate the direction of plumule growth when the germinating seed was placed vertically on a stationary clinostat as shown in the diagram below. The growing tips of the germinating seed were exposed to light from all directions. The wet tissue paper was periodically sprayed with water to keep the seed moist. The seed was kept in this position for four days. The tip of plumule began to bend and grew in an upward direction after four days.



- 64.1 Name the hormone that controls the direction of plumule growth in a germinating seed. (1)
 - 64.2 Give a reason for exposing the germinating seed to light from all directions. (1)
 - 64.3 Explain the direction of plumule growth as observed after four days. (3)
 - 64.4 How does the control differ from the experiment? (1)
- (6)**

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 [2] J. Doe and J. Smith, "The History of Mathematics," *The Journal of Mathematics*, (Jan. 1, 2018).
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