



JENN

Training and Consultancy
The path to enlightened education

**LIFE SCIENCES
ENDOCRINE SYSTEM AND HOMEOSTASIS
GRADE 12
CONTENT MANUAL
TEACHERS' GUIDE
SPRING CLASSES**

PAPER 1

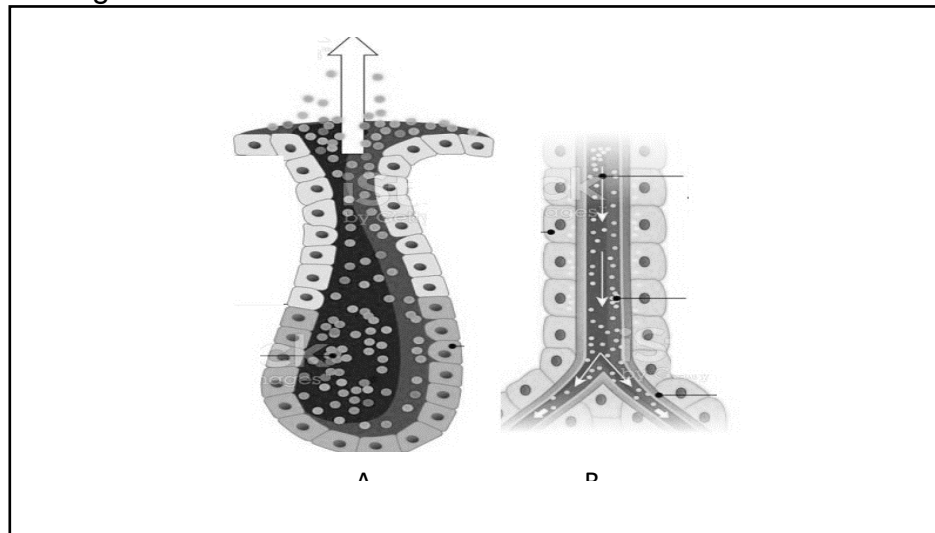
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ACTIVITY 1:(Hormones) MEMO

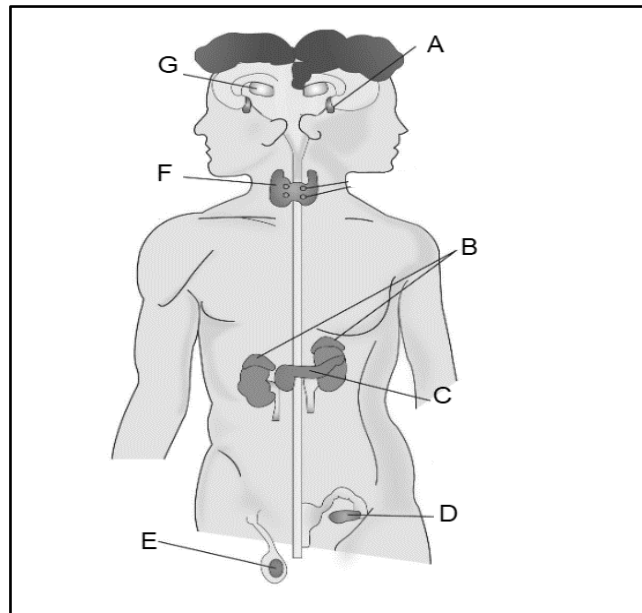
1. Study the diagrams below



- 1.1 Explain the term hormone. (2)
Hormones are organic chemical messengers and are protein in nature that brings about slow responses in some cases.
- 1.2 A is an exocrine gland and B is an Endocrine gland differentiate between these two glands. (4)
A is an exocrine gland and B an Endocrine gland differentiate between these two glands.
Exocrine gland discharges its secretions through a duct into a body cavity or onto the skin
Endocrine gland is a ductless gland that produces hormones and releases them into the bloodstream to act at a distance site
- 1.3 Tabulate 5 differences between the endocrine and nervous system. (10)

Endocrine system	Nervous system
<i>Chemical messengers</i>	<i>Electro-chemical impulses</i>
<i>Chemical is transported in the blood stream around the body</i>	<i>Impulses is transmitted along a nerve fil</i>
<i>Stimulates target organs</i>	<i>Stimulates particular organs</i>
<i>The response is brought about by the target organ</i>	<i>The response is brought about by the effector organ</i>
<i>Sometimes slow and long-term responses</i>	<i>Rapid ad short-term responses</i>

2.1. Use the diagram below, and complete the table that follows after the diagram.



	Endocrine gland	Hormone	Target organ	Function of hormone
A	<i>Pituitary gland</i>	<i>GH</i> <i>TSH</i> <i>FSH</i> <i>LH</i> <i>Prolactin</i>	<i>Many organs</i> <i>Thyroid gland</i> <i>Females ovaries</i> <i>Males testes</i> <i>Females ovaries</i> <i>Males testes</i> <i>Glandular tissue in the breast</i>	<i>Stimulates growth of body</i> <i>Simulate thyroid gland to secrete thyroxine</i> <i>Stimulates the formation of follicles in ovary and sperm in testis</i> <i>Brings about ovulation, oestrogen production and corpus luteum development.</i> <i>Stimulates the mammary glands into secreting milk</i>

	Endocrine gland	Hormone	Target organ	Function of hormone
B	<i>Adrenal</i>	<i>Adrenalin</i> <i>Aldosterone</i>	<i>Helps the nervous system prepare the body for an emergency</i> <i>Kidney distal tubules and collecting ducts</i>	<i>Prepares body for crisis by increasing</i> <ul style="list-style-type: none"> <i>Heart rate</i> <i>Breathing rate</i> <i>Glucose levels in blood</i> <i>Tone of skeletal muscles</i> <i>Promotes the re-absorption of Na⁺ and water from the loop of Henle and collecting ducts</i>
C	<i>Pancreas</i>	<i>Insulin</i> <i>Glucagon</i>	<i>Glucose in the blood</i> <i>Glycogen in cells</i>	<i>Decreases blood sugar levels</i> <i>Increases blood sugar levels</i>
D	<i>Ovary</i>	<i>Oestrogen</i> <i>Progesterone</i>	<i>Endometrium of the uterus</i> <i>Uterus</i> <i>Mammary glands</i>	<i>Stimulates the female sex organs and stimulates secondary sexual characteristics</i> <i>Prepares uterus to receive fertilised ovum</i> <i>Ensures endometrium does not disintegrate during pregnancy</i> <i>Together with prolactin prepares the breasts to produce milk</i>
E	<i>Testicles</i>	<i>Testosterone</i>		<i>Stimulates the male sex organs and stimulates secondary sexual characteristics in males</i>
F	<i>Thyroid</i>	<i>Thyroxin</i>	<i>All cells in the body, except for brain cells and parts of the reproductive organs</i>	<i>Regulates metabolic rate</i>
G	<i>Hypothalamus</i>	<i>ADH</i>	<i>ADH travels to the posterior pituitary gland and then into the blood to the collecting ducts of the kidney</i>	<i>Controls osmoregulation in kidneys</i> <i>Stimulates the re-absorption of water from the tubules back into the blood</i>



ACTIVITY 2: (Negative feedback TSH and Thyroxin)

2.1 Study the following passage and answer the questions that follow.

Messenger substances are produced in endocrine glands of the human body and then transported to other parts of the body where they are involved in regulating the activity of particular parts. Slow, sustained or ongoing responses to these substances complement or support the other more rapid and short-lived responses of the body.

2.1.1 Write a scientific name for each of the following phrases taken from the passage:

(a) Messenger substances (1)

Hormones ✓

(b) Particular parts whose activities are regulated (1)

Target organ ✓

2.1.2 Name ONE system in the human body involved in co-ordination. (2)

(✓)

2.1.3 Tabulate TWO differences between the way in which the systems named in QUESTION 2.1.2 operate. (5)

Endocrine system	Nervous system
<i>Chemical messengers✓</i>	<i>Electro-chemical impulses✓</i>
<i>Chemical is transported in the blood stream around the body✓</i>	<i>Impulses is transmitted along a nerve fibre✓</i>
<i>Stimulates target organs✓</i>	<i>Stimulates particular organs✓</i>
<i>The response is brought about by the target organ✓</i>	<i>The response is brought about by the effector organ✓</i>
<i>Sometimes slow and long-term responses✓</i>	<i>Rapid ad short-term responses✓</i>

ANY TWO

(8)



ACTIVITY 3: (GLANDS) MEMO

3.1. Answer the following questions on hormones.

3.1.1 Name the endocrine gland which secretes each of the following:

(a) TSH (1)

Pituitary gland

(b) Adrenalin (1)

Adrenal gland

(c) Thyroxin (1)

Thyroid gland

(d) Growth hormone (1)

Pituitary gland

3.1.2 It was found that the thyroxin concentration of a healthy adult remained very low for a period of three months.

- (a) Will the person gain or lose weight if he continued with his normal diet during this period? (1)
loose weight
- (b) Explain your answer in QUESTION 3.1.2 (a). (3)

Thyroid gland controls metabolic rate in a person
Therefore if the level of thyroxin is low metabolic process in the body is going to decrease

(8)



ACTIVITY4:(Disorders caused by under- and over secretion of and insulin) MEMO

Diabetes type 1 versus Diabetes type 2

The main difference between the type 1 and type 2 diabetes is that type 1 diabetes is a genetic condition that often shows up early in life, and type 2 is mainly lifestyle-related and develops over time. With type 1 diabetes, your immune system is attacking and destroying the insulin-producing cells in your pancreas.

Although type 1 and type 2 diabetes both have things in common, there are lots of differences. Like what causes them, who they affect, and how you should manage them.

For a start, type 1 affects 8% of everyone with diabetes. While type 2 diabetes affects about 90%.

The main thing to remember is that both are as serious as each other. Having high blood glucose (or sugar) levels can lead to serious health complications, no matter whether you have type 1 or type 2 diabetes. So if you have either condition, you need to take the right steps to manage it.

- 4.1. What causes Diabetes? (1)
High blood levels of glucose in the blood ✓
- 4.2. Which type of Diabetes is the most common type that appear among people? (1)
Diabetes type 2✓
- 4.3. What is insulin? (1)
Insulin is a hormone produced by the pancreas to control blood sugar.✓
- 4.4. Name the insulin- producing cells in the pancreas? (1)
Alpha – cell of the island of Langerhans in the pancreas✓
- 4.5. What can lead to Diabetes type 2? (1)
Obesity and intake of high levels of sugar✓
- 4.6. What is the symptoms of Diabetes type 1? (4)

Blurry vision✓, Excessive thirst✓, hunger✓, fatigue✓, urinating often✓, Weight loss.✓

- 4.7. Explain why doctors can use a urine to test for Diabetes. (3)

Because of high levels of glucose in the blood,✓ reabsorbing of glucose in the kidney does not take place✓. Glucose is excreted with urine ✓

- 4.8. Name THREE ways in which Diabetes can be treated (3)

Medicine✓, Special diet✓, and exercise ✓

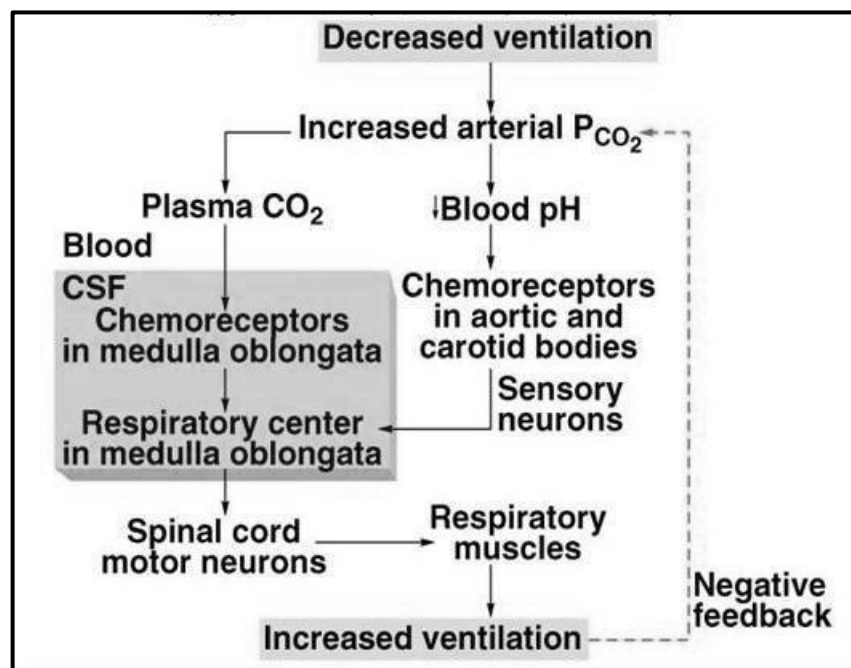
- 4.9. Name secondary risk factors that Diabetes can experience. (3)

Kidney disease✓, eye disease✓, stroke, heart attack✓



ACTIVITY 5: Negative Feedback of maintaining carbon dioxide MEMO

- 1.1. Study the diagram below and answer the questions that follow



- 5.2 Use the information in the diagram and explain in your words negative feedback of CO₂ (14)

Levels above normal levels

CO₂ levels in the blood increase above normal levels. Receptor cells in the carotid artery in the neck are stimulated. To send impulses to the medulla oblongata in the brain. Medulla oblongata stimulates breathing muscles and heart. Breathing muscles contract more actively-increases the rate and depth of breathing. The heart beats faster. More CO₂ is taken to and exhaled from the lungs. The CO₂ level in the blood returns to normal.✓

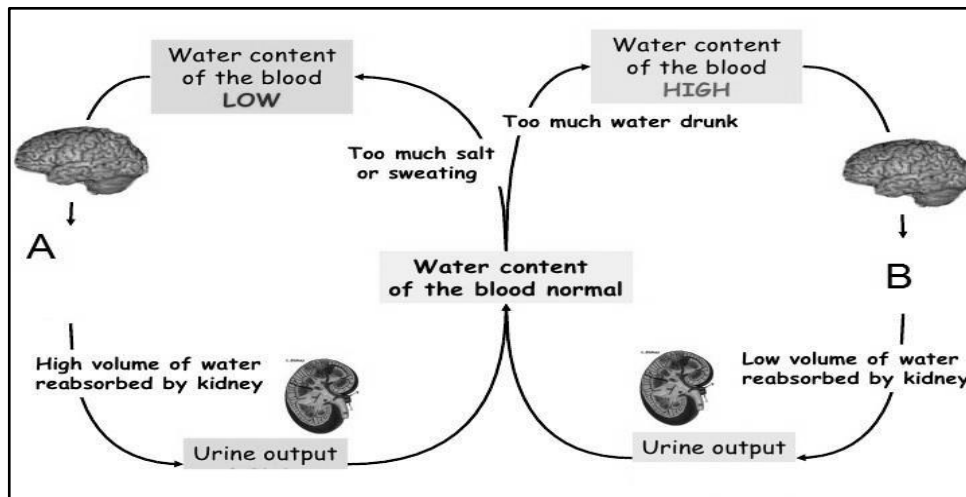
Levels below normal levels

CO₂ levels in the blood increase below normal levels. Receptor cells in the carotid artery in the neck are stimulated. To send impulses to the medulla oblongata in the brain. Medulla oblongata stimulates breathing muscles and heart, breathing muscles relax decreases the rate and depth of breathing. The heart beats normal.

Normal amount CO₂ is exhaled from the lungs. The CO₂ level in the blood returns to normal

ACTIVITY 6: Negative Feedback of maintaining and water and salt concentration)

6.1. Study the diagram below and answer the questions



Describe:

6.1. Process A

(1)

Blood has less water than normal. The hypothalamus is stimulated and sends impulses to the pituitary gland to secrete more ADH. ADH travels in the blood to the kidneys. ADH increases the permeability of the collecting ducts and the distal convoluted tubules of the kidney. More water is reabsorbed and passed to the surrounding blood vessels. The water level in the blood returns to normal.

6.2. Process B

(1)

Proses B: Blood has more water than normal. The hypothalamus is stimulated and sends impulses to the pituitary gland to stop secreting ADH/to secrete less ADH. No ADH/less ADH travels in the blood to the kidneys. The collecting ducts and the distal convoluted tubules of the kidney become less permeable to water. Less water is re-absorbed and passed to the surrounding blood vessels. More water is now lost. The water level in the blood returns to normal.

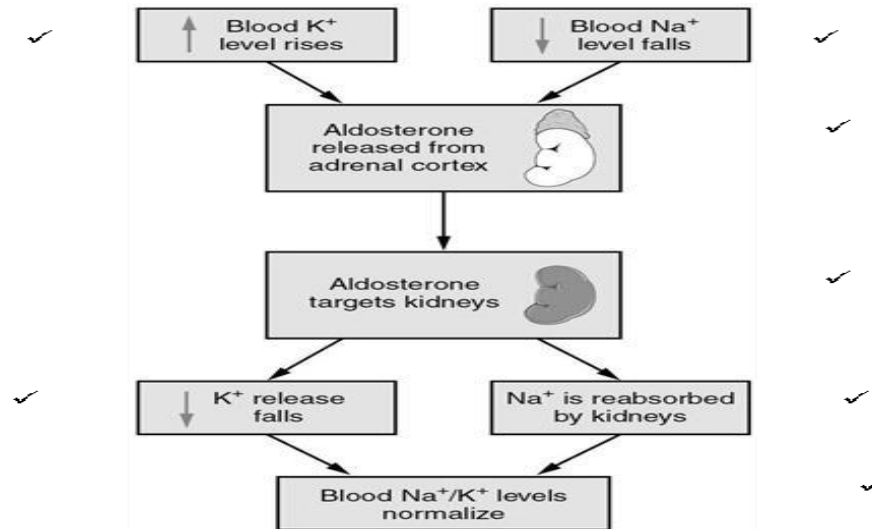
6.3. What is the urine output respectively at **A** and **B**? Give reasons for your answer. (4)

A: Urine will be more concentrated✓ because more water is absorbed from the tubules into the blood.✓

B: Urine is dilute ✓because less water is reabsorbed from the tubules✓.

6.4. Describe the negative feedback of salts in the human body by means of a flow diagram:

(7)



ACTIVITY 7: Temperature regulation

7.1. Define the term *homeostasis*.

(2)

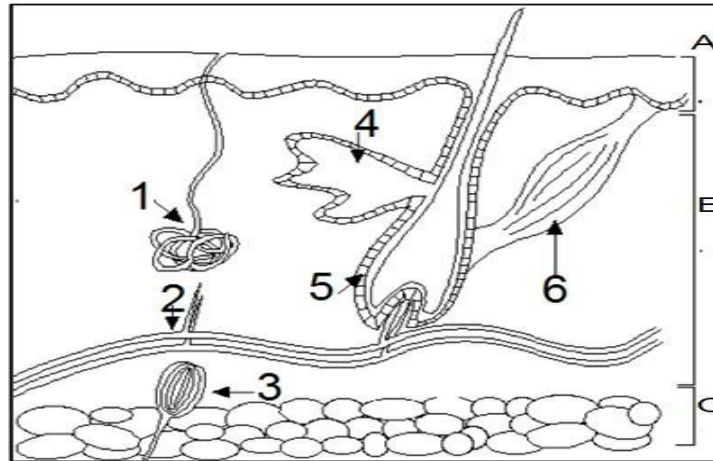
It is the process of maintaining a constant internal environment within the body. The internal environment refers to the blood and tissue fluid that surround the cells of the body. Homeostasis enables the body to function efficiently, despite changes that might occur in the external or internal environment. ✓✓

7.2. Name SIX important matters in our bodies that must be kept constant.

(6)

Temperature✓, glucose levels✓, carbon dioxide levels✓, water levels✓, salt levels✓ and thyroxin levels✓

7.3. Study the diagram below and answer the questions that follow



7.3.1. Identify the following labels on the diagram:

(9)

(1 to 6 and A to C)

1. *Sweat gland*✓
2. *Blood vessels*✓
3. *sensory corpuscle*✓
4. *Sebaceous gland*✓
5. *Hair follicle*✓
6. *erector muscle*✓

A *Epidermis*✓

B *Dermis*✓

C *hypodermis*✓

7.3.2. Name THREE adaptations of the skin for thermoregulation.

(3)

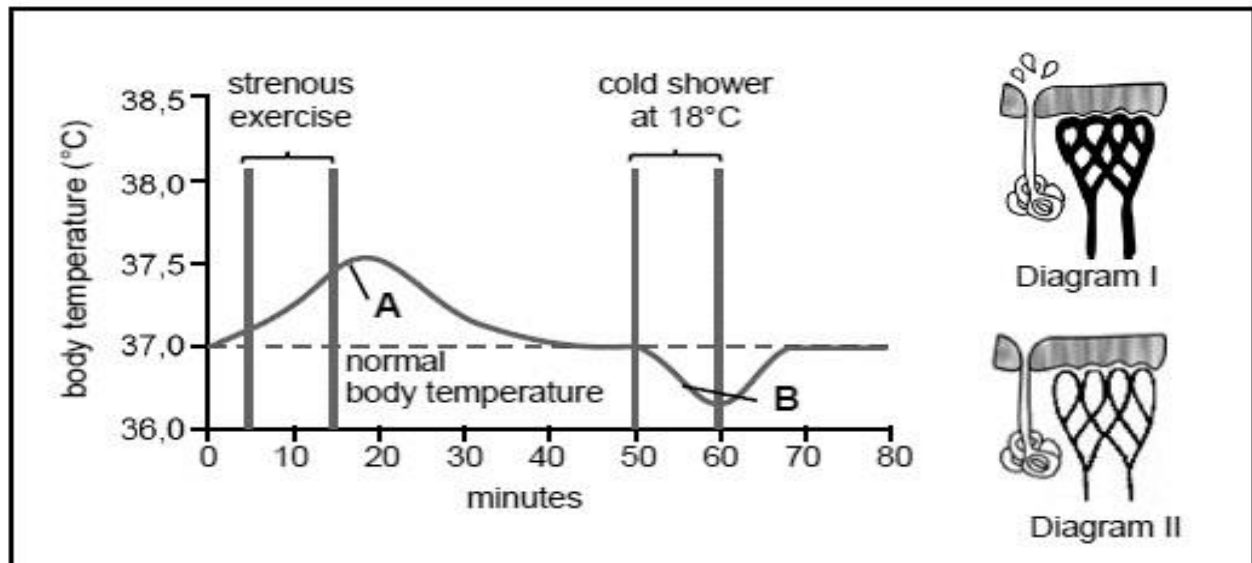
The fatty layer acts as an insulator✓

It has a circulatory system for content exchange✓

It has sweat glands and pores for heat loss✓

Consist of muscles for behavioural responses like shivering✓

7.4. Study the diagram and answer the questions follow.



7.4.1. What is the normal body temperature for humans? (1)

37°C✓

7.4.2. The term use to describe the body's ability to regulate temperature. (1)

Thermoregulation✓

7.4.3. Which part of the brain react to temperature changes taking place between A and B on the graph? (1)

Hypothalamus✓

7.4.4. What is the maximum temperature reached? (1)

38,1 °C ✓

7.4.5. For what duration is the person exposed to strenuous excersize? (1)

10 min✓

7.4.6. Differentiate between process A and B. (8)

Process A	Process B
Blood vessels constricts✓	Blood vessels dilate✓
Vasoconstriction✓	Vasodilation✓
Less blood flows to the skin✓	More blood flows to the skin✓
Less heat is lost from the skin✓	More heat is lost from the skin✓
Less blood is sent to the sweat glands✓	More blood is sent to the sweat glands.✓
Less sweat is secreted✓	More sweat is secreted✓
Less sweat evaporates✓	More sweat evaporates✓
Reduced cooling down✓	Increased cooling down✓

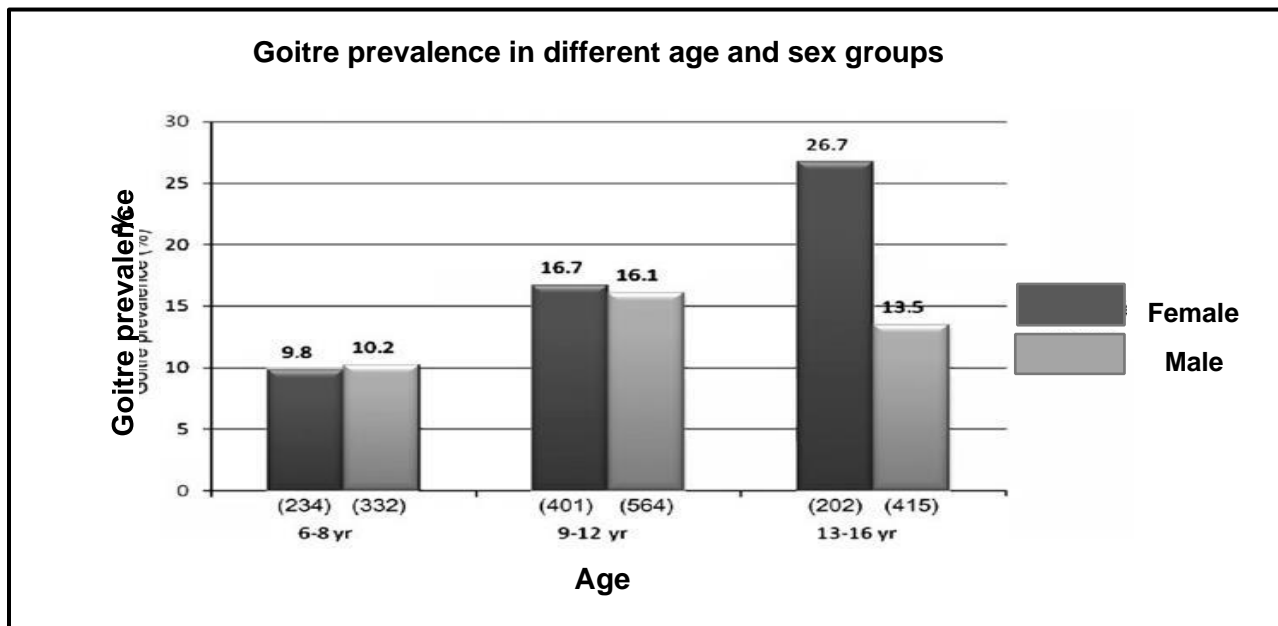


ACTIVITY 8: (Disorders caused by under- and over secretion of thyroxin)

Iodine deficiency is the most common cause of goitre. The body needs iodine to produce thyroid hormone. If you do not have enough iodine in your diet, the thyroid gets larger to try and capture all the iodine it can, so it can make the right amount of thyroid hormone.

Goitre may be associated with an irregular amount of thyroid hormone in your body (hyperthyroidism or hypothyroidism) or with normal levels of thyroid hormone.

The graph below shows the prevalence of goitre in different age groups and sex groups.



8.1 What is goitre? (1)

Goitre is a condition where your thyroid gland grows larger.✓

8.2. What is iodine? (1)

Iodine is a mineral found in some foods.✓

8.3. Why is the intake of Iodine necessary for humans? (2)

The body needs iodine to make thyroid hormones.✓ These hormones control the body's metabolism and many other important functions.✓

8.4. What is hyperthyroidism ? (1)

*Also called **overactive thyroid**, is a condition where your thyroid makes and releases high levels of thyroid hormone.✓*



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**LIFE SCIENCES
RESPONDING TO THE ENVIRONMENT (HUMANS)
GRADE 12
CONTENT MANUAL
TEACHERS' GUIDE
SPRING CLASSES
2023**

Nervous System

- 1. Type of nerves**
- 2. Reflex Action**
- 3. Eye and Ear**



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ACTIVITY 1(Multiple choice questions)

- 1.1. Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.6) in the ANSWER BOOK, for example 1.1.7 D.
- 1.1.1 Which part of the brain interprets the information from the cristae?
A Cerebellum ✓✓
B Cerebrum
C Medulla oblongata
D Corpus callosum
- 1.1.2 A person can feel pain in his toe but cannot move his legs. The neuron that is damaged is the ...
A sensory neuron.
B sensory and motor neuron.
C motor neuron. ✓✓
D sensory and interneuron
- 1.1.3 After an accident a person can no longer interpret sensations such as smell and taste. Which part of their brain was most probably damaged in the accident?

A Cerebellum
B Corpus callosum
C Medulla oblongata
D Cerebrum ✓✓

QUESTIONS 1.1.4 AND 1.1.5 REFER TO AN INVESTIGATION WHICH WAS CONDUCTED TO DETERMINE THE EFFECT OF A DRUG ON REACTION TIME IN HUMANS

- 1.1.4 What was the independent variable in the investigation?
A The drug in the body ✓✓
B Time after taking the drug
C Reaction time
D Number of volunteers
- 1.1.5 The following factors were considered during the investigation:
(i) Number of volunteers
(ii) Time of day
(iii) Age of volunteers
(iv) Tools used to measure reaction time
Which ONE of the following combinations of factors will affect the validity of the investigation?
A (i) and (ii) only
B (i), (iii) and (iv) only
C (i), (ii), (iii) and (iv)
D(ii), (iii) and (iv) only ✓✓

- 1.1.6 The part of the brain that regulates breathing is the ...

- A medulla oblongata.** ✓✓
 B cerebrum.
 C corpus callosum.
 D cerebellum.

6 x 2 (12)

1.2. Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.2.1 to 1.2.7) in the ANSWER BOOK.

- 1.2.1 The part of the brain that coordinates voluntary muscle movement
Cerebellum ✓
- 1.2.2 A disease characterized by a loss of the myelin sheaths of neurons, affecting their ability to transmit impulses to the central nervous system
Multiple sclerosis ✓
- 1.2.3 A rapid, automatic response to an external stimulus
reflex action ✓
- 1.2.4 A collective name for the membranes that protect the brain
Meninges ✓
- 1.2.5 The part of the brain that controls the heart rate
Medulla oblongata ✓
- 1.2.6 The structure that connects the left and right hemispheres of the brain, allowing communication between them
Corpus callosum ✓
- 1.2.7 The part of the brain that controls body temperature
Hypothalamus ✓

(7)

1.3. Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	The part of the brain that connects the left to the right hemisphere	A: Corpus callosum A only ✓✓ B: Medulla oblongata
1.3.2	A part of the neuron that degenerates to cause multiple sclerosis	A: Axon B: Myelin sheath B only ✓✓
1.3.3	The structure that receives a stimulus and converts it into an impulse	A: Motor neuron B: Receptor B only ✓✓

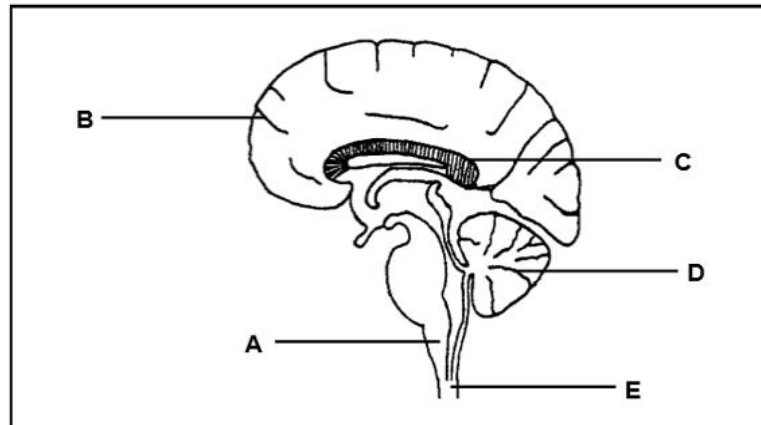
3 x 2 (6)

TOTAL: 25



ACTIVITY 2 (Structure of the brain and functions)

2.1 The diagram below represents the central nervous system in a human.

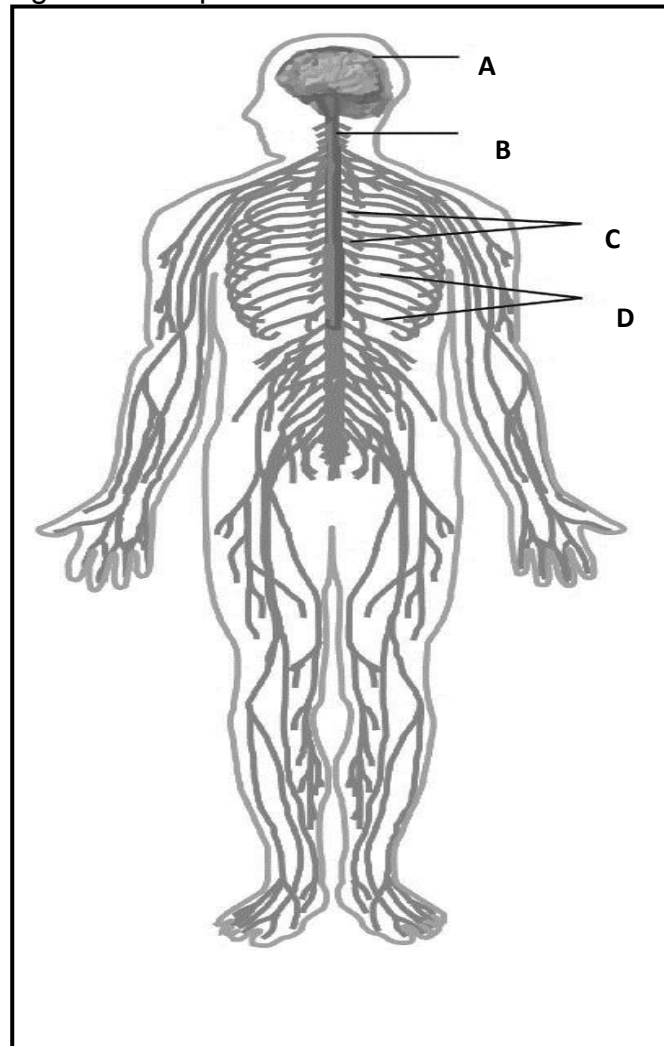


- 2.1.1 Identify part: (1)
a) A - *Medulla oblongata* ✓
b) D - *Cerebellum* ✓ (1)
- 2.1.2 State THREE functions of part B. (3)
- *Controls all voluntary activities* ✓/ *example*
- *Contains centres that receive and interpret all sensations* ✓/ *example*
- *Is the seat of higher mental functions* ✓/ *example*
- *Influences emotional behavior* ✓/ *example*
- 2.1.3 Name the part that joins the two hemispheres. (1)
Corpus callosum ✓
- 2.1.4 Name the system of membranes that surround the brain. (1)
Meninges ✓ (7)



ACTIVITY 3: (Peripheral nervous system)

3.1. The following diagram is a representation of the CNS and PNS.



3.1.1 State the term that the following abbreviations represent:

(2)

- a) CNS *Central nervous system*✓
- b) PNS *Peripheral nervous system*✓

3.1.2. Give the LETTERS represent the:

(4)

- a) CNS *A✓ and B✓*
- b) PNS *C✓ and D✓*

3.1.3. Tabulate FIVE differences between these two nervous systems mentioned above

(11)

CENTRAL NERVOUS SYSTEM	PERIPHERAL NERVOUS SYSTEM
<i>Consists of the brain and spinal cord</i>	<i>Sensory receptors, sensory neurons and motor neurons</i>
<i>Nerve axons consist of slender projections and carry significantly short nerve impulses</i>	<i>Composed of long nerve fibres with a length up to 1 meter</i>
<i>Major function is to organise and analyse the information obtained from sensory organs</i>	<i>Major function is to transmit sensory information to the central nervous system and pass out motor impulses to the effector organs</i>

<i>A damage causes a global effect on the body</i>	<i>A damage causes a local effect on the body</i>
<i>Most of the nerves are incapable of regenerating its nerve fibres</i>	<i>Most of the nerves can be regenerated.</i>

3.1.4. Name the TWO divisions that we get with the PNS. (2)

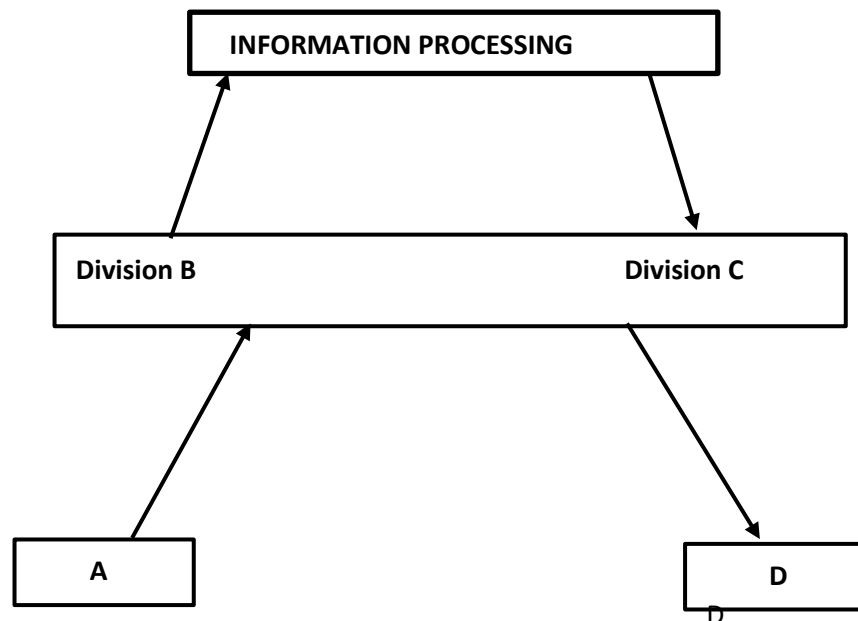
Sensory and motor nerves

3.1.5. Name ONE function of each of these divisions. (2)

Sensory carries impulses from senses to CNS

Motor nerves receives messages from CNS to muscles or glands

3.2. Study the diagram below.



3.2.1. A is a type of input that must go to the CNS give one word for this input. (1)

Receptors

3.2.2. D is a type of output that received a message from the CNS, give one word for this output. (1)

Effectors

3.2.3. Identify divisions B and C. (2)

B sensory division

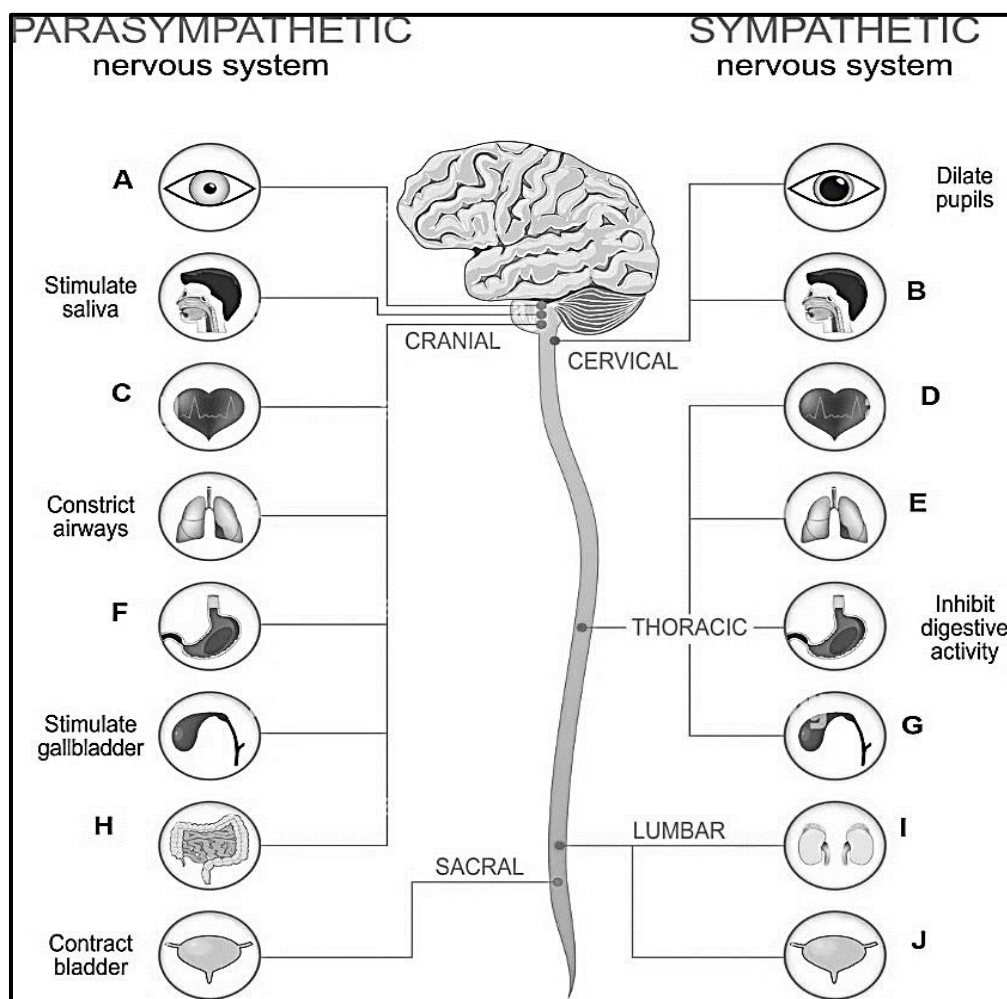
C motor division

3.2.4. What does the label information processing represent? (1)

Brain

- 3.3. 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.

(10)

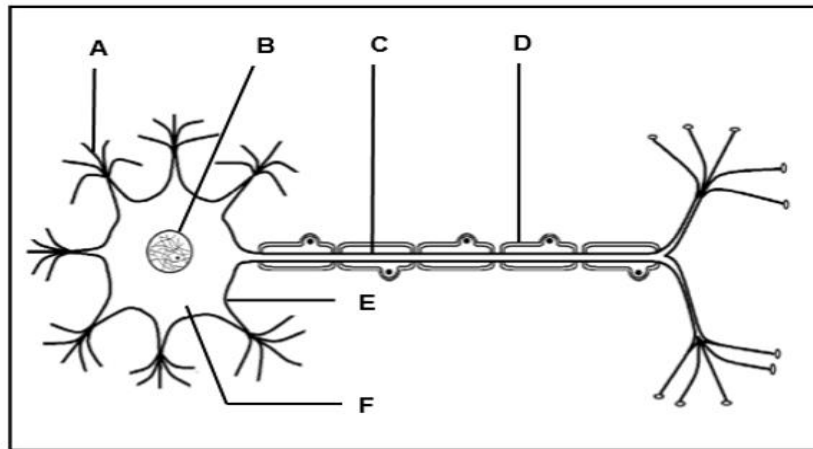


A	<i>Constricts pupils✓</i>
B	<i>Inhibits saliva✓</i>
C	<i>Decrease heartrate✓</i>
D	<i>Increase heartrate✓</i>
E	<i>Relax airways✓</i>
F	<i>Stimulates digestive activity✓</i>
G	<i>Inhibits gall bladder✓</i>
H	<i>Stimulates activity of intestines✓</i>
I	<i>Secretes adrenalin and noradrenalin✓</i>
J	<i>Relaxes bladder✓</i>



ACTIVITY 4 (Structure of the neuron)

4.1. The diagram below represents the structure of a neuron.

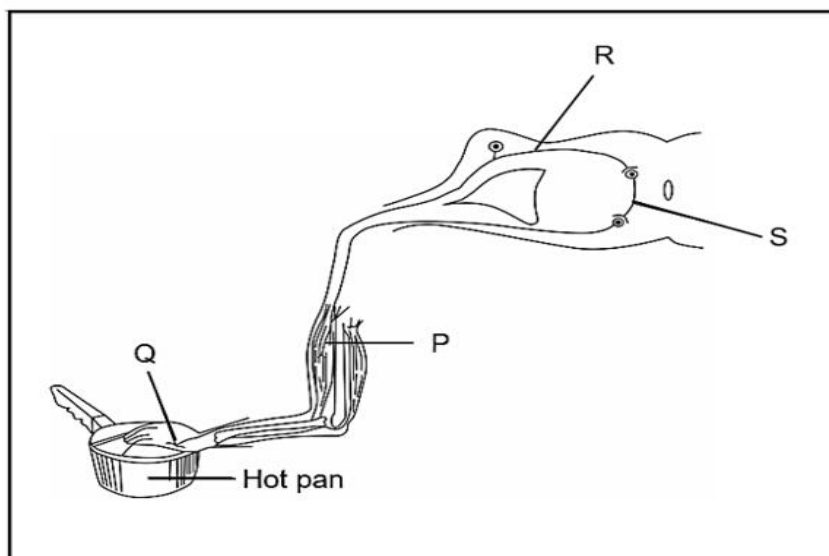


- 4.1.1 Name the type of neuron in the diagram above. (1)
Motor✓/ multipolar/ efferent neuron
- 4.1.2 Identify part (1)
a) B - Nucleus✓/ nuclear membrane (1)
b) F - Cytoplasm✓/ cell body (1)
c) A - Dendrites✓ (1)
- 4.1.3 Give the LETTER and NAME of the part that: (2)
a) C✓ - Axon✓ (2)
b) D✓ - Myelin sheath (2)
- 4.1.4 Name the condition caused by the progressive degradation of part D (1)
Multiple sclerosis✓ (9)



ACTIVITY 5 (Reflex arch)

5.1. The diagram below shows a reflex arc.

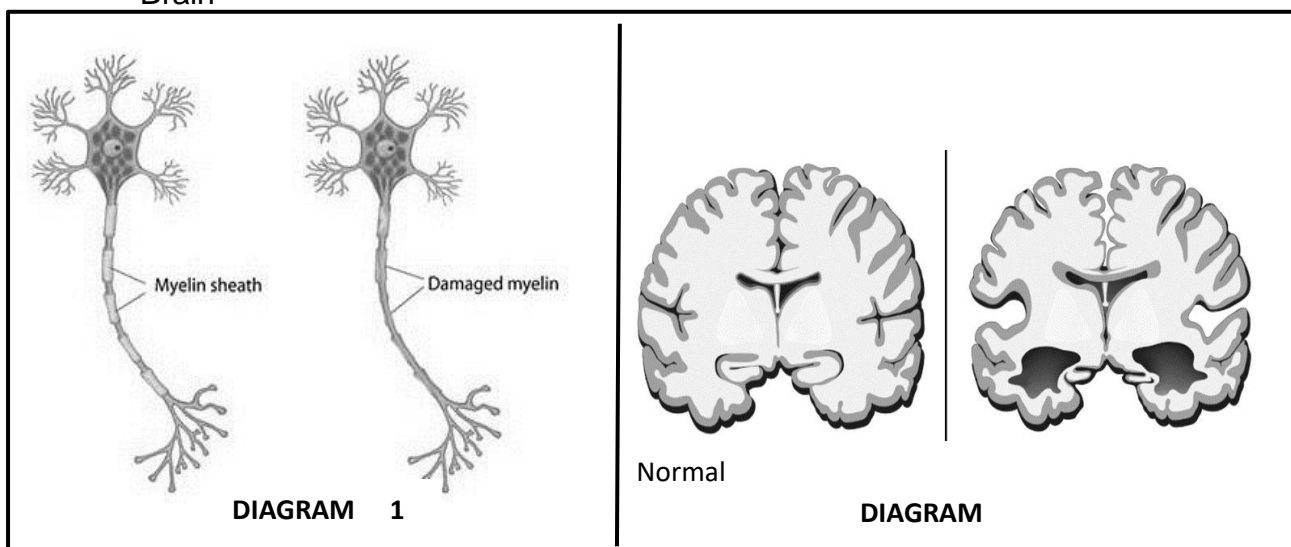


- 5.1.1 What is a *reflex action*? (2)
Is a rapid, automatic response to a stimulus✓✓
- 5.1.2 Name the following: (1)
 a) *Synapse✓*
 b) *Interneuron✓/ connector neuron* (1)
- 5.1.3 State the significance of the functional connection between **R and S** (1)
-It ensures that the impulse moves in one direction only✓
-It prevents continuous stimulation of the neurons✓
-It ensures that the impulse is transmitted from the sensory neuron to the motor neuron✓
ANY ONE
- 5.1.4 Explain the movement of the impulse from **Q** until it reaches **P**, Ensure the correct order of LETTERs in your explanation. (8)
-The receptors in the skin of the hand(Q) ✓
-receive the heat stimulus✓
-The stimulus triggers an impulse✓
-in the sensory neuron(R) ✓
-which transmits the impulse to the spinal cord (S) ✓
-The impulse is passed to the interneuron(S) ✓
-which passes it to the motor neuron✓
-The motor neuron passes the impulse to the muscles/ effectors of the arm (P) ✓
-The muscles contract and pull the hand up✓
- 5.1.5 Explain the consequences for a reflex action if the neuron that leads to **P** is damaged. (2)
The person will be able to receive the stimulus✓ but will not be able to respond to it✓
- 51.6 Explain how neuron **R** differs in structure from the one that transmits the impulse to **P**. (3)
- Has only one dendrite✓
- Has a short axon✓
- Cell body on side✓ (18)



ACTIVITY 6 (Disorder)

6.1. Study the diagrams below that shows structural damages in neurons and the Brain

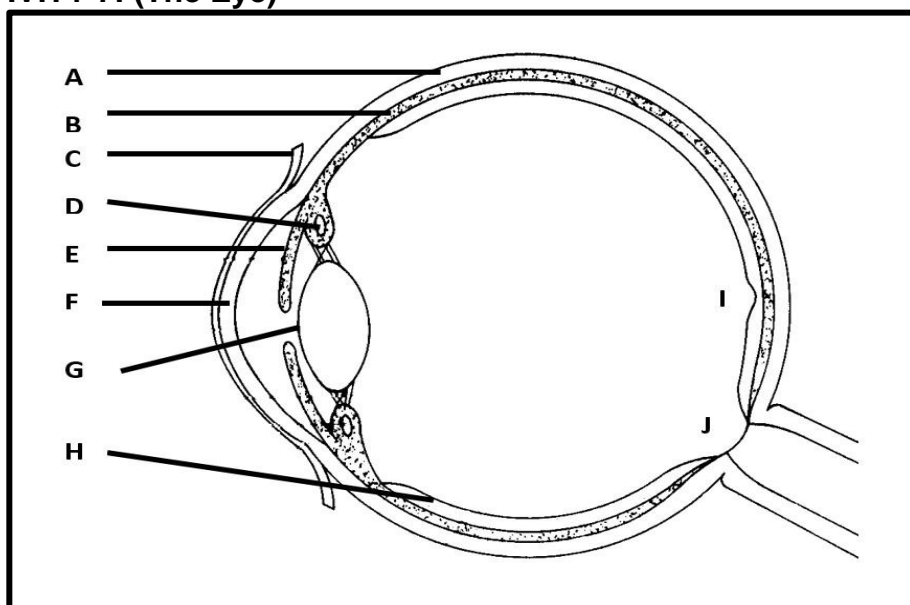


- 6.1.1. Identify the disorder illustrated by the structural damages in: (1)
- Diagram 1 *Multiple sclerosis* ✓ (1)
 - Diagram 2 *Alzheimer's* ✓
- 6.1.2. Explain how a myelin sheath gets damaged that causes this disorder in diagram 1. (2)
- The immune system attacks the myelin sheath's covering neurons which prevent them from transmitting impulses properly*
- 6.1.3. What are the symptoms of Multiple sclerosis? (5)
- Loss of speech and vision, Difficulty walking, Pain, Fatigue, and memory loss*
- 6.1.4. Diagram 2 indicates progressive brain cell death overtime and causes Alzheimers. Explain other conditions that can contribute to this disorder. (3)
- *Plaque forms between neurons*
 - *Fibre become tangled inside the cell bodies of the neuron*
 - *A shortage of neurotransmitters*
- 6.1.5. Give two symptoms of Alzheimer's. (2)
- Memory loss and confusion*

ANY TWO



ACTIVITY 7: (The Eye)



- 7.1. Identify parts A to J. (10)
- Sclera* ✓
 - Choroid* ✓
 - Conjunctiva* ✓
 - Ciliary body* ✓
 - Iris* ✓
 - Cornea* ✓
 - Lens* ✓
 - Retina* ✓
 - Yellow spot* ✓
 - Blind spot* ✓

- 7.2. Give the LETTER for the part that:
- Protects the inner structures of the eye **A** ✓ (1)
 - Contract or relax to alter the tension on the suspensory ligaments **D** ✓ (1)
 - Supply nutrients and oxygen to the cells of the retina **B** ✓ (1)
 - Gives the clearest vision **I** ✓ (1)
 - Changes shape to allow the eye to focus on near and distant objects **G** ✓ (1)
 - Contain rods and Cones **H** ✓ (1)
- 7.3. Explain the function of:
- The iris (2)
 - Controls the amount of light entering the eye through the pupillary mechanism*
 - Cornea (2)
 - Transparency to allows light to pass through*
 - Causes refraction (bending) of the incoming light to create an image on the retina*
 - Choroid (2)
 - Pigments absorb light to prevent the reflection of light*
 - Blood vessels supply nutrients and oxygen to the cells of the retina*
 - Aqueous humour (2)
 - Watery fluid found in the space between the cornea and the lens*
 - Maintains the shape of the eye*
- 7.4. Describe how the following structures are adapted for their function.
- The lens (4)
 - Elastic and biconvex structure - it changes shape to allow the eye to focus on near and distant objects.*
 - Transparent - allows light to pass through.*
 - Sclera (2)
 - Tough, white*
 - inelastic layer to protect the eye*
 - Iris (2)
 - The iris contains two types of muscles: radial muscles and circular muscles*
 - to control the size of the pupil*
 - Choroid (4)
 - Dark pigments absorb - light to prevent the reflection of light.*
 - Blood vessels - supply nutrients and oxygen to the cells of the retina*



ACTIVITY 8: (Eye accommodation)

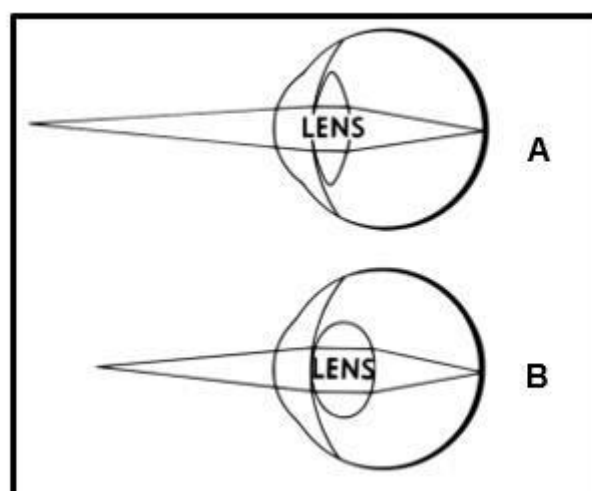
8.1. Complete the table below on eye accommodation.

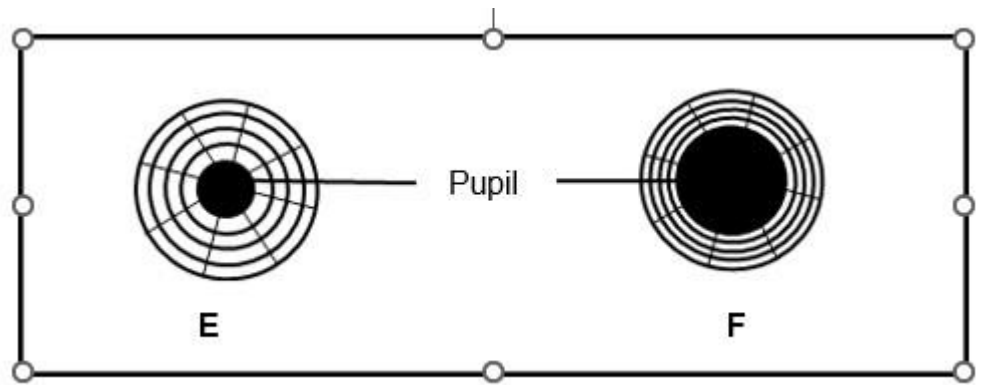
	Near vision (<i>less</i> than 6 m from the object)	Distant vision (<i>more</i> than 6 m from the object)
Ciliary muscles	Contract	8.1.1 Relax✓
Suspensory ligaments	8.1.2 Slacken/ loosen✓	Tighten/ become taut (Not contract)
Tension on the lens	Decreases	8.1.3 Increase✓
Shape of the lens	Become more convex	8.1.4 Less convex/flatter✓
Light rays	8.1.5. Bend more✓	Bend less
Image	A clear image is focused on the retina	A clear image is focused on the retina

8.2. Complete the table below on pupil mechanism.

	Bright light conditions	Dim light conditions
Radial muscles	Relax	8.2.1. Contract✓
Circular muscles	8.2.2. Contract✓	Relax
The pupil	Constricts/get smaller	8.2.3 Widen/get bigger✓
The amount of light entering the eye	8.2.4. Reduce✓	Increased

8.3. The diagram below shows structures in the human eye.



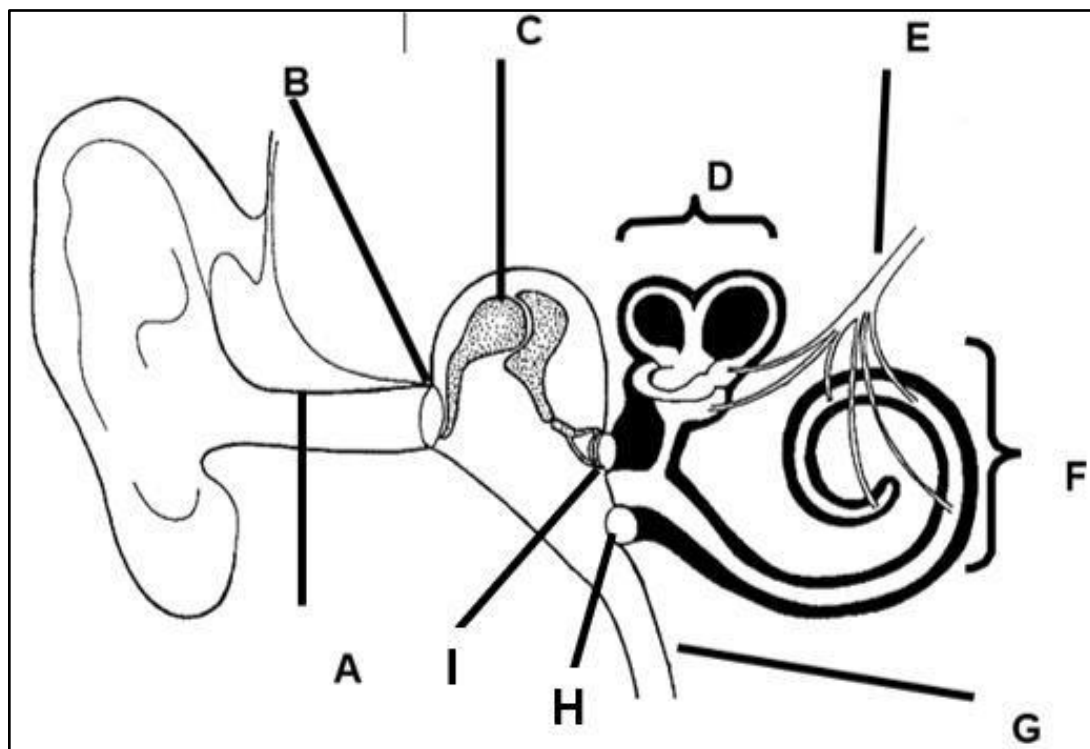


- 8.4. Give the LETTER only of the diagram that represents the eye in:
- conditions of bright light (1)
 - looking at an object less than six metres away (1)
- 8.5. Name the muscle that:
- Contract in E (1)
 - Became taut in A (1)
- 8.6. Describe the changes that take place in the eye in diagram **B**. (6)
- 8.7. Describe the changes that take place in the eye in diagram **E**. (4)



ACTIVITY 9:(The Ear)

9.1. The following diagram represents the human ear.



9.1.1 Give the LETTER and the NAME of the part that ...

- a) transmits sound waves to the tympanic membrane. (2)
A – Auditory canal
- b) amplifies the vibrations (2)
C - Ossicles
- c) equalises the pressure on both sides of the tympanic membrane. (2)
I - Oval window
- d) transmits the vibrations from the middle ear to the inner ear. (2)
D - Semi-circular canals
- e) has cristae to detect changes in the speed and direction of the head. (2)
D - Semi-circular canals
- f) transmits sound waves to the middle ear. (2)
B – tympanic membrane
- g) absorbs excess pressure waves from the inner ear. (2)
H - Round window
- h) Converts the stimulus of sound into an impulse. (2)
F – Cochlea

9.1.2. Distinguish between the three different membranes in the middle ear. (6)

Tympanic membrane - thin membrane separating the inner ear from the middle ear

Oval window - membrane separating the middle ear from the inner ear

Round window - membrane situated below the oval window

9.1.3. Explain the function of the pinna. (2)

Directs sound waves into the auditory canal.

9.1.4. Name the three regions of the ear (3)

Outer ear

Middle ear

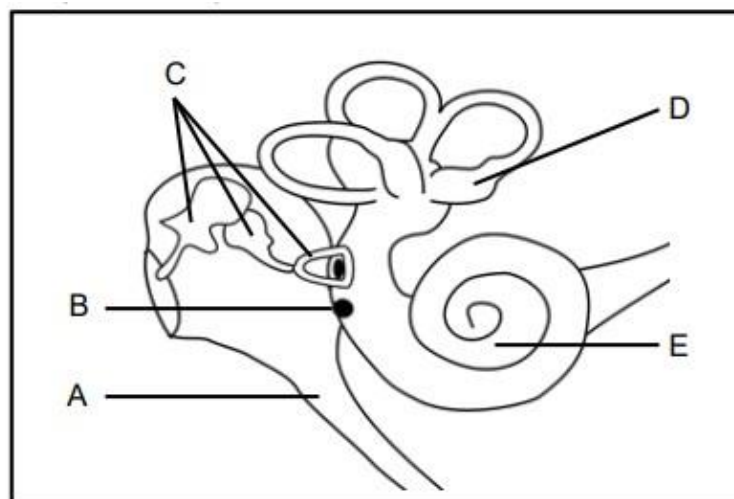
Inner ear

9.1.5. Name the receptor/s found in part:

a) D *Cristae and Maculae* (2)

b) F *Organ of Corti* (1)

9.2. Study the diagram below. .



8.2.1. Identify **A** to **E**.

(5)

- A – Eustachian tube✓*
- B - Round window✓*
- C - Ossicles✓*
- D - Semi-circular canals/ Ampulla✓*
- E – Cochlea✓*

8.2.2. Identify the THREE different irregular shaped bones in **C**.

(3)

- (malleus) – largest, connected to tympanic membrane ✓*
- (incus) – middle bone, joining the malleus to the stapes✓*
- (stapes) – smallest, connected to the round window✓*

9.2.2. Name the parts of the inner ear.

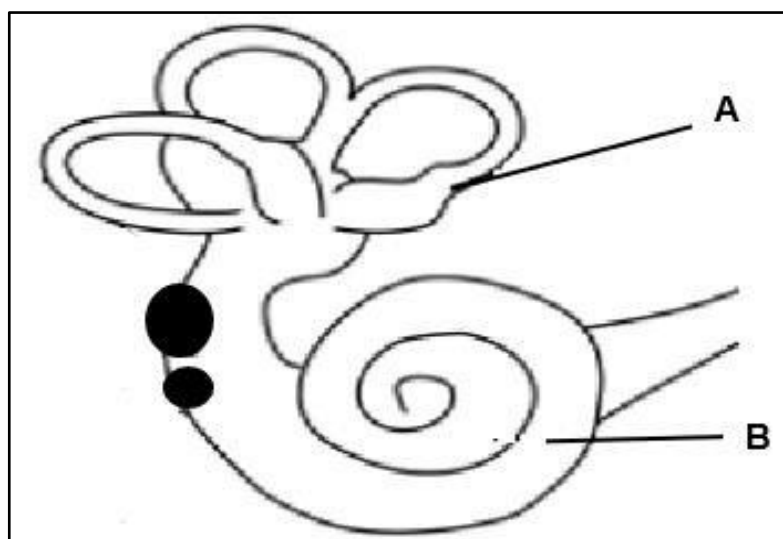
(3)

- Semi-circular canals✓*
- Vestibula✓ Cochlea✓*



ACTIVITY 10:(Hearing and Balance)

8.1. Study the following diagram and answer the questions that follow



10.2.1. Identify parts labelled **A** and **B**.

(2)

- A– Semi-circular canals*
- B– Cochlea*

10.2.2. Give the name/s of the receptors in ...

- a) **A** *Maculae and Cristae*
- b) **B** *Organ of Corti*

(1)

(1)

10.2.3. Give the LETTER of the part that is responsible for:

- a) Hearing **B**
- b) Balance **A**

(1)

(1)

10.2.4. Explain how the sound is intensified in the middle ear.

(4)

Tympanic membrane has a larger surface area ✓ than the oval window ✓

Therefore, the incoming sound is concentrated ✓ on the smaller surface area

which intensifies the sound ✓

10.2.5. Explain the role that the semi-circular canals play in balance.

(12)

Changes in the direction and velocity of the movement of the head

- *causes the endolymph to move in the semi-circular canals ✓*
- *The cristae ✓*
- *found in the ampullae is stimulated and*
- *converts the stimulus into an impulse ✓*
- *which is transmitted via the auditory nerve ✓*
- *to the cerebellum ✓ in the brain from where*
- *impulses are conducted via motor neurons*
- *to the skeletal muscles ✓ / effectors to restore balance in the body*

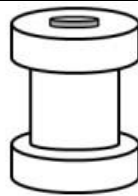
Changes in the position of the head



- *causes the endolymph to move in the semi-circular canals ✓*
- *which stimulates the maculae ✓*
- *found in the utricle and saccule ✓ leading to*
- *conversion of the stimulus into an impulse ✓*
- *which is transmitted via the auditory nerve ✓*
- *to the cerebellum ✓ of the brain from which*
- *impulses are conducted via motor neurons*
- *to the skeletal muscles ✓ / effectors to restore balance in the body*



ACTIVITY 11:(Hearing defects and management)

11.1. Match the hearing defects in Colom **A** with the correct treatment in Colom **B**.

Colom A	CoLom B
1. Deafness <i>B and C</i>	A. Grommet 

2. Middle ear infection <i>A</i>	B. Hearing Aid 
	C. Cochlear Implantation 

11.2. What is the cause of ...

a) middle ear infection? (2)

- *It is caused by pathogens entering through the Eustachian tube.*
- *The fluid cannot drain through the Eustachian tube due to the infection from the pathogen which causes it to become inflamed.*

b) deafness (2)

- *Injury to parts of the ear, nerves or parts of the brain responsible for hearing*
- *Hardening of ear tissues such as the ossicles*

11.3. How do you treat ...

a) middle ear infection? (2)

- *Medication*
- *Grommets.*

b) deafness? (2)

- *Hearing aid*
- *Cochlear implants*

11.4. How can grommets help with the treatment of middle ear infection? (2)

- *Draining tube which is put into the tympanic membrane through surgery which allows moisture from behind the tympanic membrane to drain out.*

11.5. What is the role of cochlear implants in hearing? (3)

Receives sound vibrations and converts them into an electrical impulse which is transmitted directly to the auditory nerve.