Lesson Description

In this lesson we:

- Consider the generalised structure of a neuron
- Look at the structure and functions of the three types of neurons
- Discuss the location and functions of the cerebrum, hypothalamus, cerebellum & medulla oblongata
- Discuss the structure and functions of the spinal cord
- Look at the difference between a reflex action and a reflex arc
- Look at the structure and functioning of a simple reflex arc, using an example
- Consider the significance of a reflex arc

Key Concepts

Co-ordination

For co-ordination to occur effectively, an organism must receive the stimulus, convert the stimulus to an impulse, send the impulse to a “control centre” for processing and interpretation, and then respond to the stimulus.
Organisation of the Nervous System

The Brain

- Protected by bone (cranium), membranes (meninges) and fluid (cerebro-spinal fluid)
Structure of the Brain

(Adapted from Life Sciences for All, Grade 12, Macmillan, Fig 2.11, Page 61)

Figure 2.12: The sensory, association and motor areas of the human brain – cerebrum
(Adapted from Life Sciences for All, Grade 12, Macmillan, Fig 2.12, Page 62)
The Spinal cord

Questions

**Question 1**

a.) Name the basic unit of the nervous system in humans.
b.) Draw labelled diagrams to illustrate the general structure of a neuron
c.) Illustrate the differences between neurons based on their structure.
d.) Distinguish between the different neurons, based on their functions.

**Question 2**

List the functions of the spinal cord.

**Question 3**

(Adapted from March 2012, NSC, P2, Question 2.2)

Study the diagram below showing a reflex arc.
a.) Identify the neuron labelled A. (1)
b.) Name the type of neuron that is connected to structure B. (1)
c.) Explain the effect on the body if the neuron mentioned in QUESTION (b.), is damaged. (3)
d.) Explain the significance of reflex actions in humans. (2)

**Question 4**

(Adapted from November 2012, NSC, Paper 2, Question 2.1)

Study the diagram representing the structure of the human brain below.

![Diagram of the human brain](image)

a.) Identify the parts labelled:
   i.) C (1)
   ii.) E (1)
b.) Write down the LETTER (A to F) of the part which controls body temperature. (1)
c.) Explain how the body would be affected if part A were to be damaged in an accident. (3)

**Question 5**

(Adapted from Life Sciences for All, Grade 12, Macmillan, Page 66, Question 1 - 2)

a.) Give the correct word or term for the following:
   i.) involuntary part of the nervous system
   ii.) the part of a neuron that insulates it
   iii.) the membranes that surround the CNS
   iv.) the liquid in the CNS that circulates nutrients and oxygen
   v.) part of the brain that regulates breathing
   vi.) part of the CNS made up of cell bodies
b.) The following diagram shows the structure of one kind of neuron.

i.) What kind of neuron is this?
ii.) Provide labels for parts A–E.
iii.) Explain how a nerve impulse gets from one neuron to another.

**Question 6**

*(Adapted from Life Sciences for All, Grade 12, Macmillan, Page 66, Question 5)*

Explain each of the following observations by referring to the structure and the function of the different parts of the brain.

a.) A blood clot in the left cerebral cortex at the position labelled A in Figure 2.17 may result in paralysis in the right arm.
b.) Damage to the part of the brain labelled B can lead to blindness, even though the eyes are working perfectly.
c.) A boy damaging the part of the brain labelled C when falling off his bicycle might never be able to ride his bicycle again.
d.) Damage to the part of the brain labelled D might result in death, even if all the other parts of the brain and body are working.