

THE NERVOUS SYSTEM

01 MAY 2013

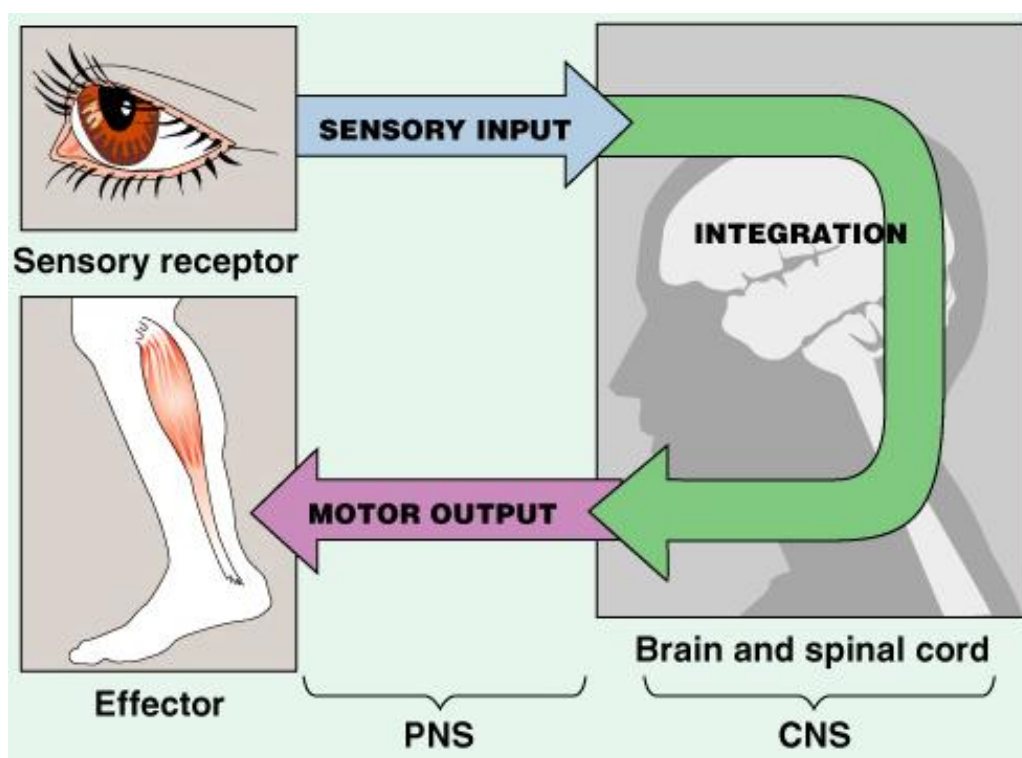
Lesson Description

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

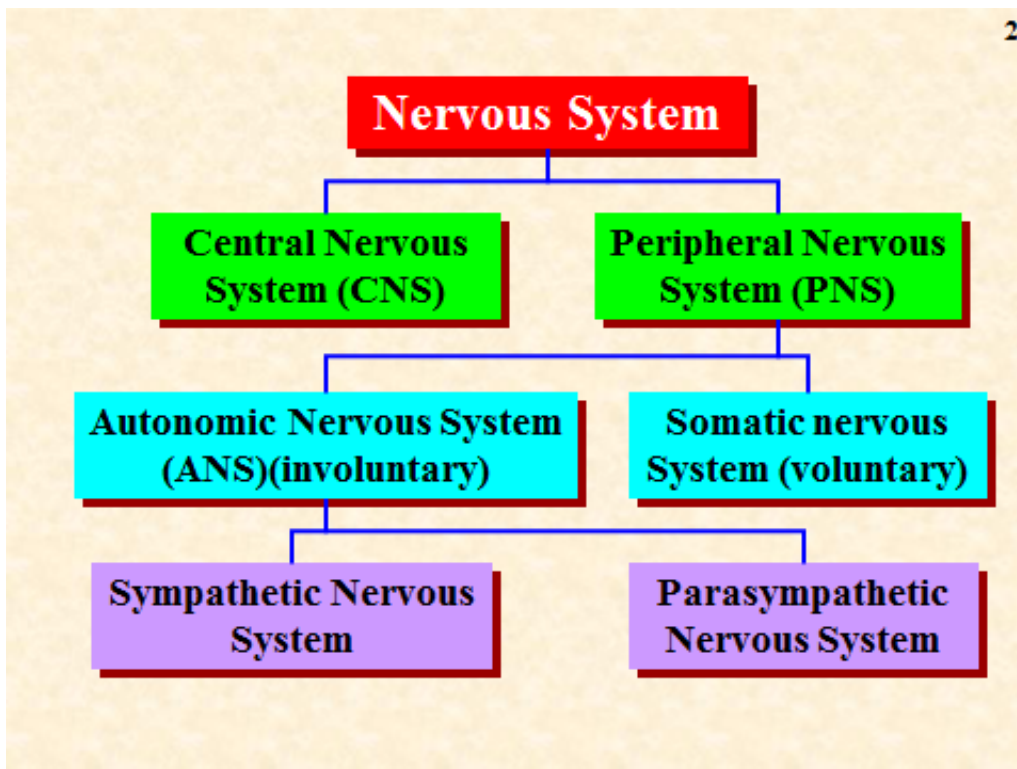
Key Concepts

Co-ordination



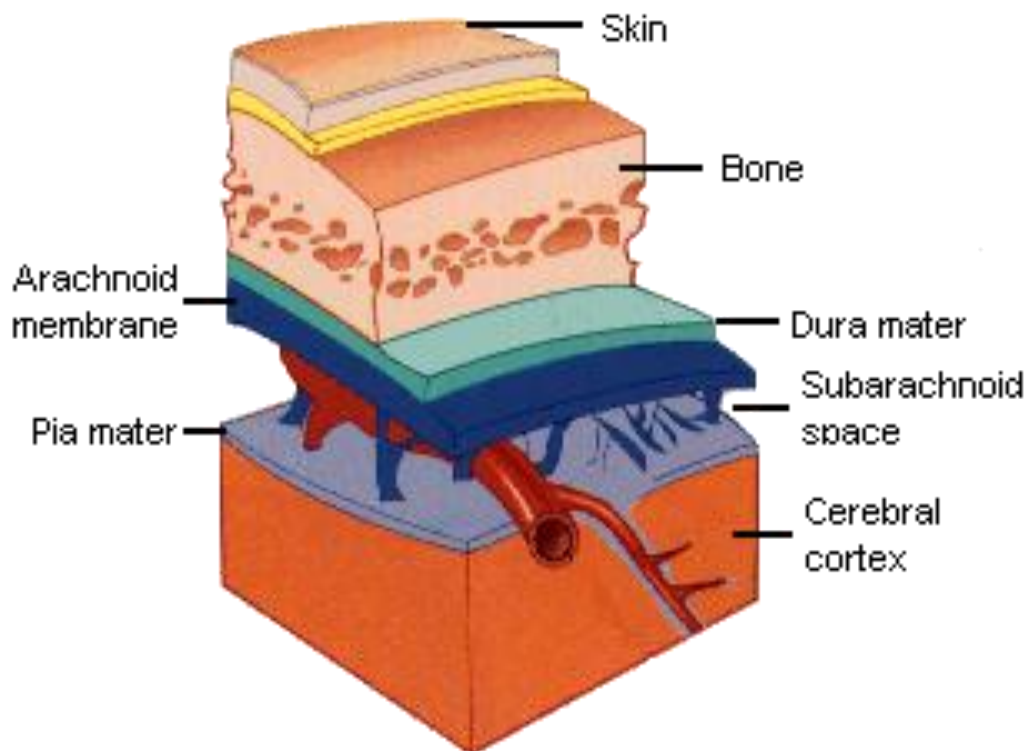
For co-ordination to occur effectively, an organism must receive the stimulus, convert the stimulus to an impulse, send the impulse to a "control centre" for processing and interpretation, and then respond to the stimulus.

Organisation of the Nervous System

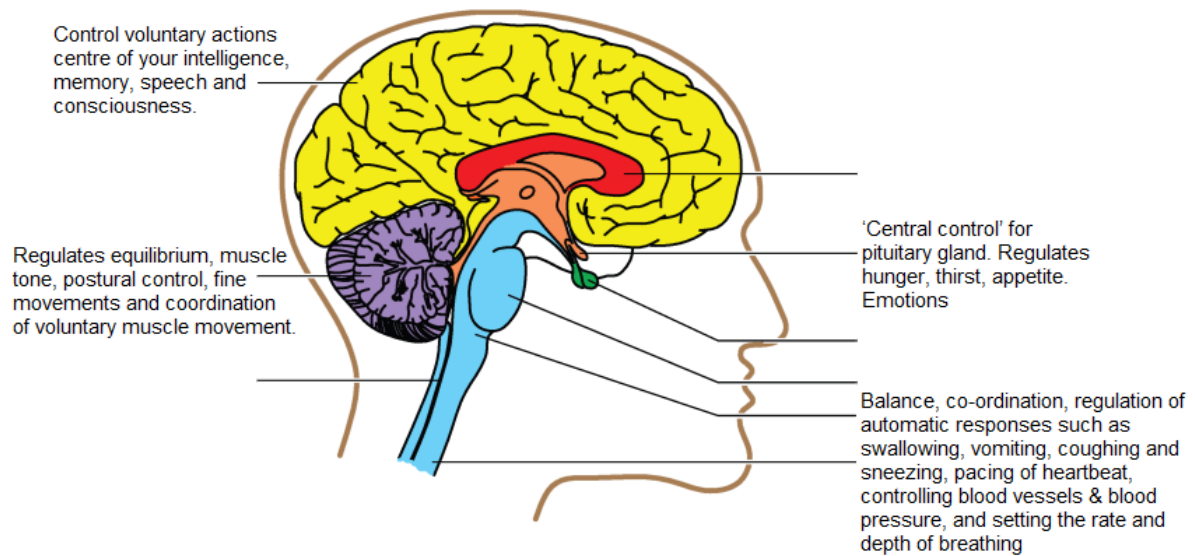


The Brain

- 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*)

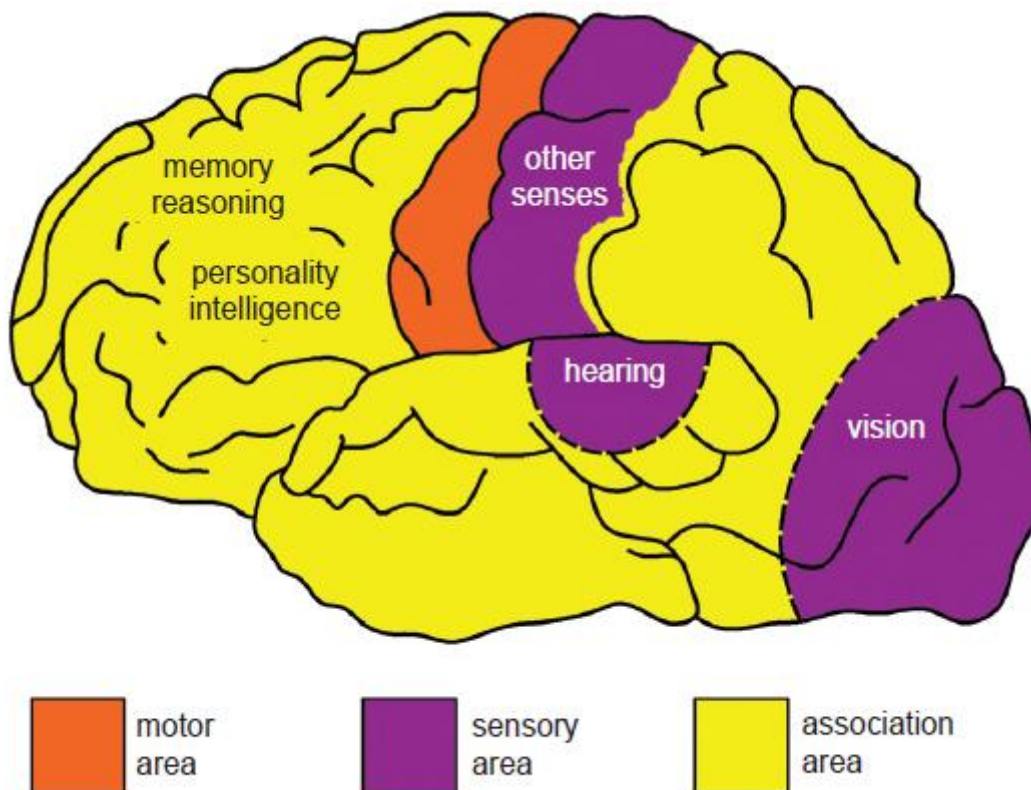
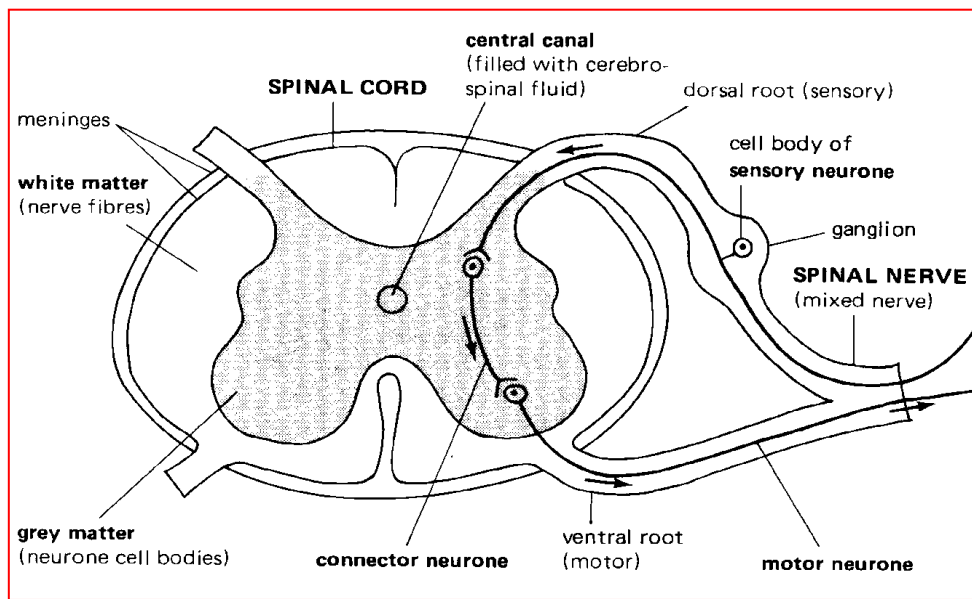


Figure 2.12: The sensory, association and motor areas of the human brain – cerebrum

(Adapted from *Life Sciences for All, Grade 12, Macmillan, Fig 2.12, Page 62*)

The Spinal cord



Questions

Question 1

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

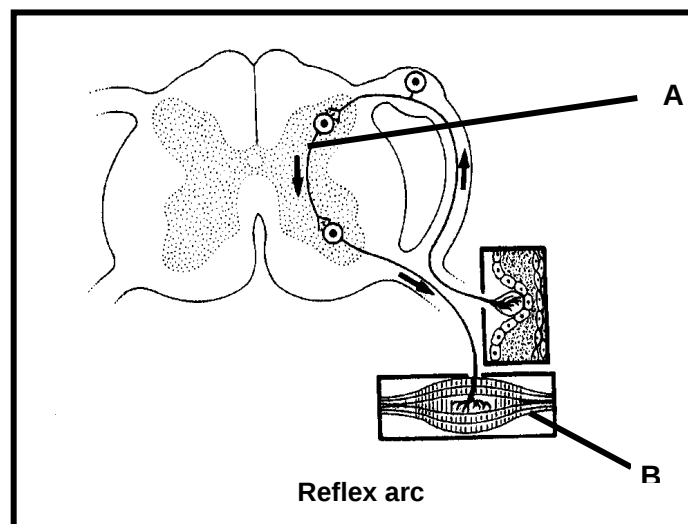
Question 2

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.



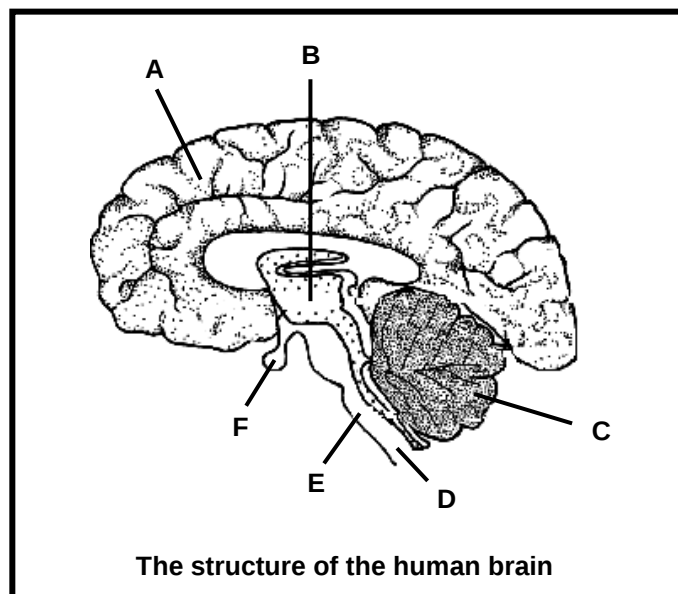
- a.) Identify the neuron labelled **A**. (1)
- b.) Name the type of neuron that is connected to structure **B**. (1)
- c.) Explain the effect on the body if the neuron mentioned in QUESTION (b.), is damaged. (3)
- d.) Explain the significance of reflex actions in humans. (2)

[7]

Question 4

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

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



- 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)

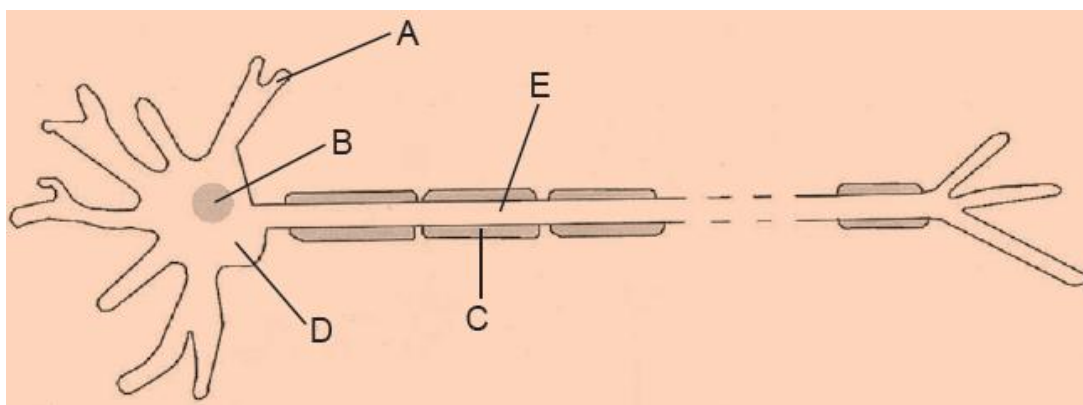
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Question 5

(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.

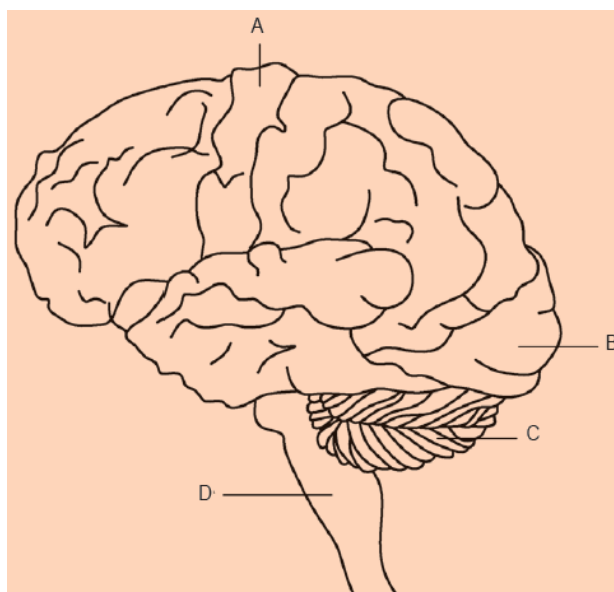


- i.) What kind of neuron is this?
- ii.) Provide labels for parts A–E.
- iii.) Explain how a nerve impulse gets from one neuron to another.

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.