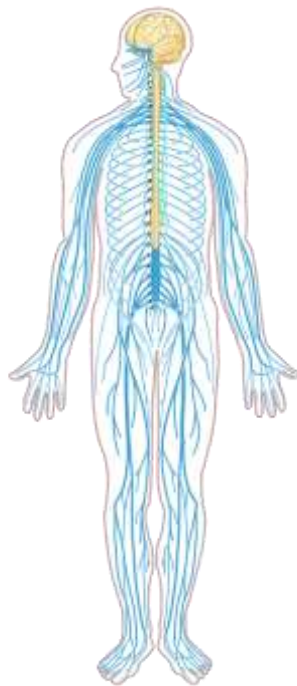




National 5 Biology

Unit 2 Multicellular organisms 2.2 Control and Communication

(a) Nervous Control



Name _____

Class _____

Teacher _____

Control and Communication

Internal communication is required to ensure the survival of multicellular organisms. The cells in a multicellular organism work together to control all of the essential processes taking place in the body.

Learning intention

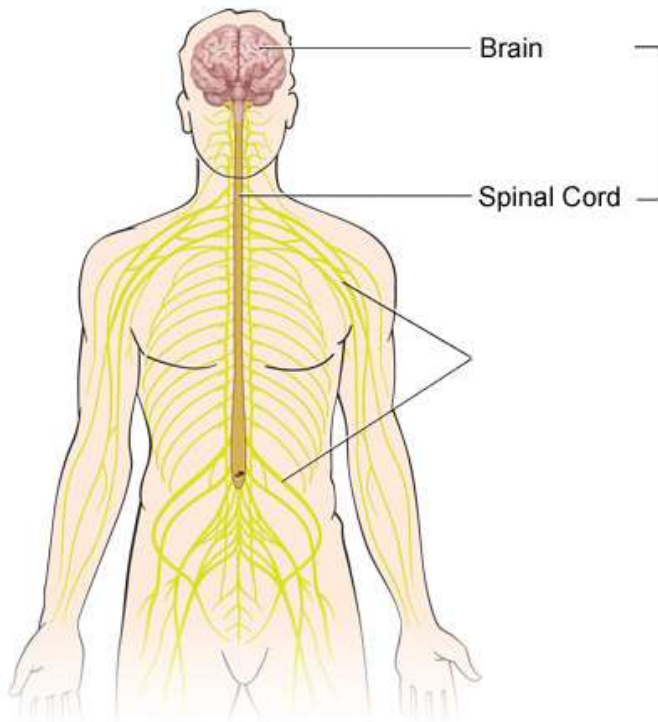
To find out about the structure of the nervous system.

The Nervous System

Our nervous system controls every action we make, although we may not be aware of it at the time. Most activities require us to move more than one part of our bodies at a time in a controlled way. The nervous system is responsible for processing information and making appropriate responses.

In humans, the nervous system is composed of the brain, spinal cord and nerves.

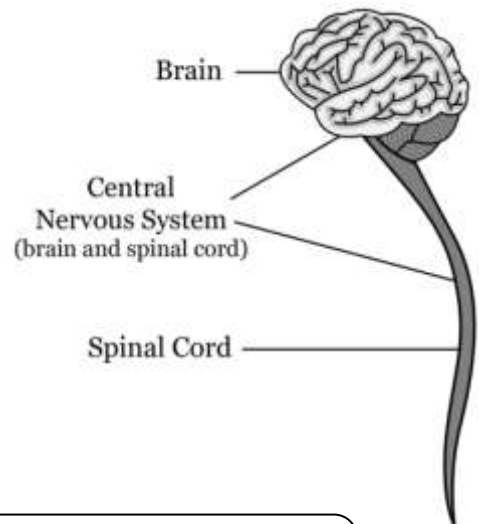
The central nervous system (CNS) is made up of the brain and spinal cord. Many peripheral nerves join with the CNS to carry nerve impulses from sense organs,



Complete the diagram by adding labels.

The Central Nervous System

The central nervous system sorts information from the senses and sends messages to those muscles (or glands) which make the appropriate response.

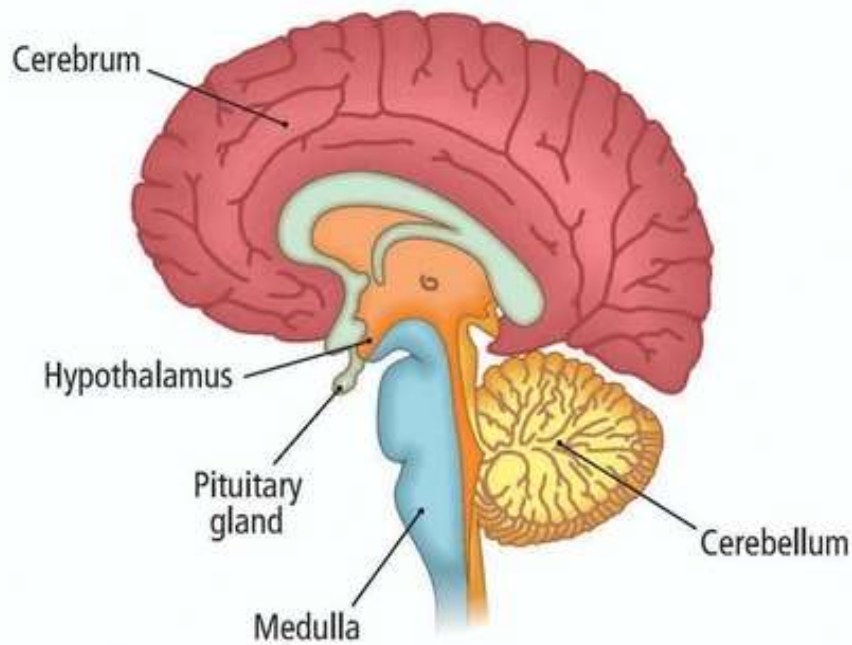


Learning Intention

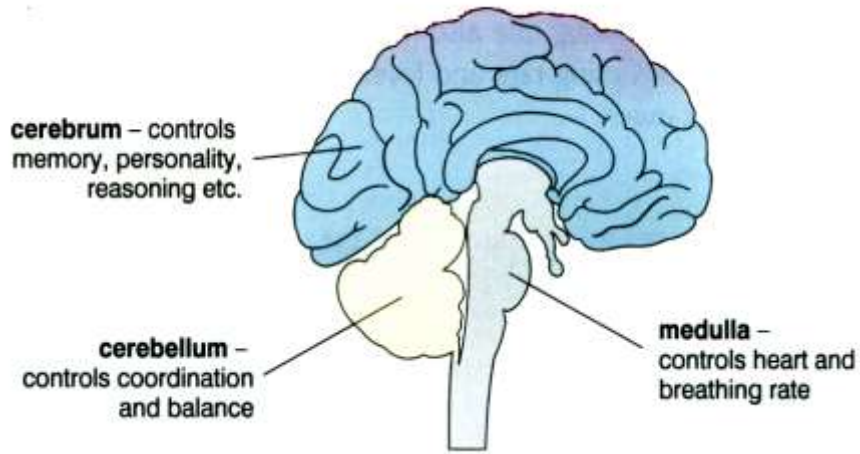
To find out about the structure and function of the brain.

The Brain

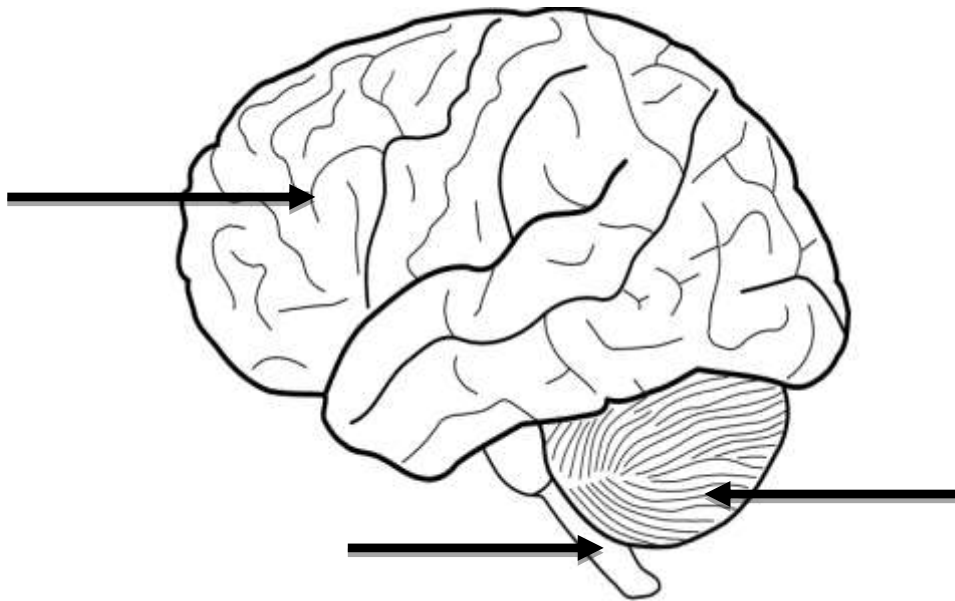
The brain is the most complex organ in your body. It is protected by the skull and controls the vital processes that occur in your body, keeping you alive. There are five different regions of the brain shown in the diagram below, each performing a different set of functions. The hypothalamus and pituitary gland are connected to each other and are important in hormonal control (you look at this in the next section).



* pay attention to the direction of brain diagrams when you are asked to label them.



Use the information on the diagram above to complete the diagram and table below.



Part of Brain	Function

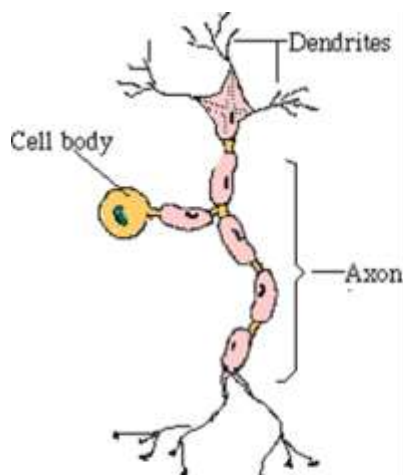
Try to think of a way to remember the difference between the location and functions of the Cerebrum and Cerebellum.

Learning Intention

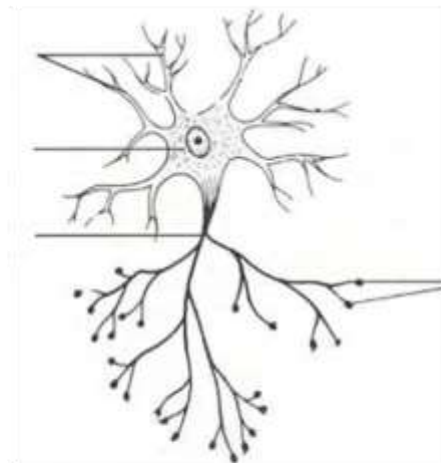
To find out about the cells of the nervous system.

Neurons

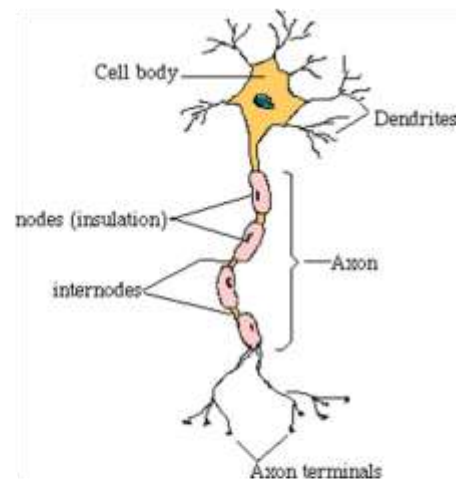
Like all parts of the body, the nervous system is made up of cells. A neuron is the term used to describe a nerve cell. There are three different types of nerve cell. They each have a different structure because of the functions that they carry out.



Sensory neuron



Inter neuron

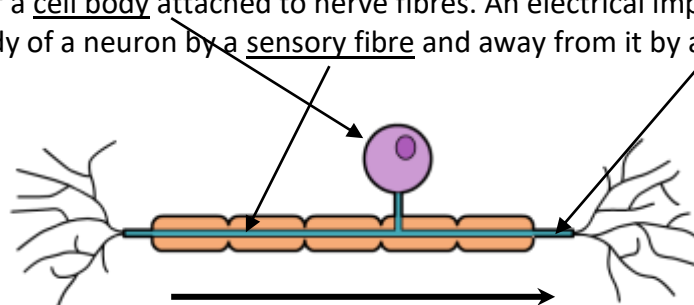


Motor neuron

The central nervous system sorts information from the senses and sends messages to muscles and other parts of the body to stimulate the appropriate response.

Neurons are specialised cells of the nervous system that conduct electrical impulses through the body, to and from the CNS.

A neuron consists of a cell body attached to nerve fibres. An electrical impulse is carried towards the cell body of a neuron by a sensory fibre and away from it by an axon fibre.



The fatty myelin sheath acts as insulation and speeds up the impulse.



Complete the table below to show the function of each type of neuron.

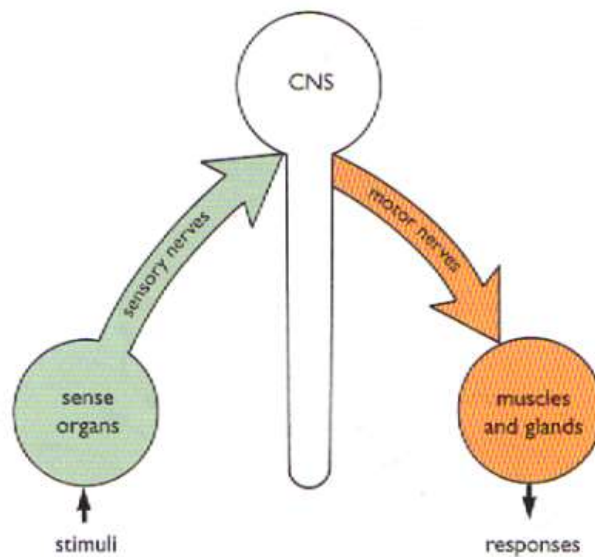
Type of Neuron	Function

Learning Intention

To find out how information flows through the CNS to bring about a conscious response.



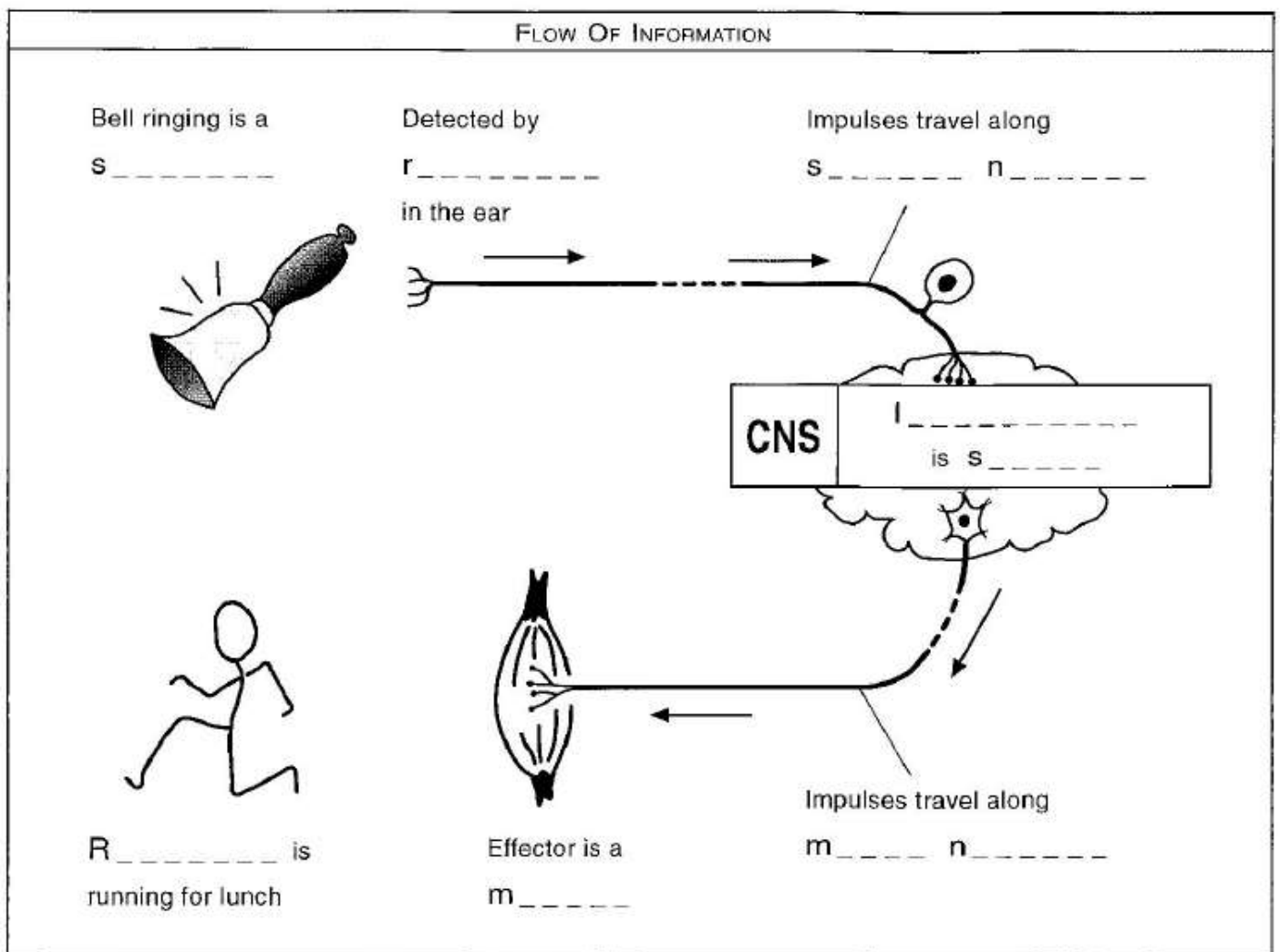
Add information to the diagram below. Give some examples of stimuli, sense organs and responses.





Flow of information

- Our _____ (receptors) detect information from sensory input /stimuli from our surrounding environment.
- The information is the stimulus which triggers off an _____ impulse.
- This impulse carries messages along a _____ neuron to the central nervous system.
- Within the CNS electrical impulses travel along a _____ neurons.
- The CNS processes the information from the senses and another impulse is then sent along a _____ neuron to produce a _____.
- This can be a rapid action from a _____ or a slower response from a gland.



Learning Intention

To find out about reflex actions and the reflex arc.

Reflex Response

Sometimes the nervous system can make responses very quickly without processing the information in the brain. This is called a reflex response and usually happens when a stimulus is potentially harmful. These responses happen without you needing to think- they are involuntary. This is because the central nervous system (CNS) sends electrical signals to the muscles before the brain can pick up the message.



Complete the table to show the stimulus and resulting reflex action.

Stimulus	Reflex action	Protective value
		Clears the windpipe.
		Clears nasal passages.
		Clears the eye surface.
		Removes body from extreme heat and pain.

Reflex arc

The reflex response involves the three neurons linked together in an arc- this arrangement is often called a reflex arc. The transmission of a nerve impulse through a reflex arc results in a reflex action. This is a rapid, automatic, involuntary response to a stimulus.

Reflex action

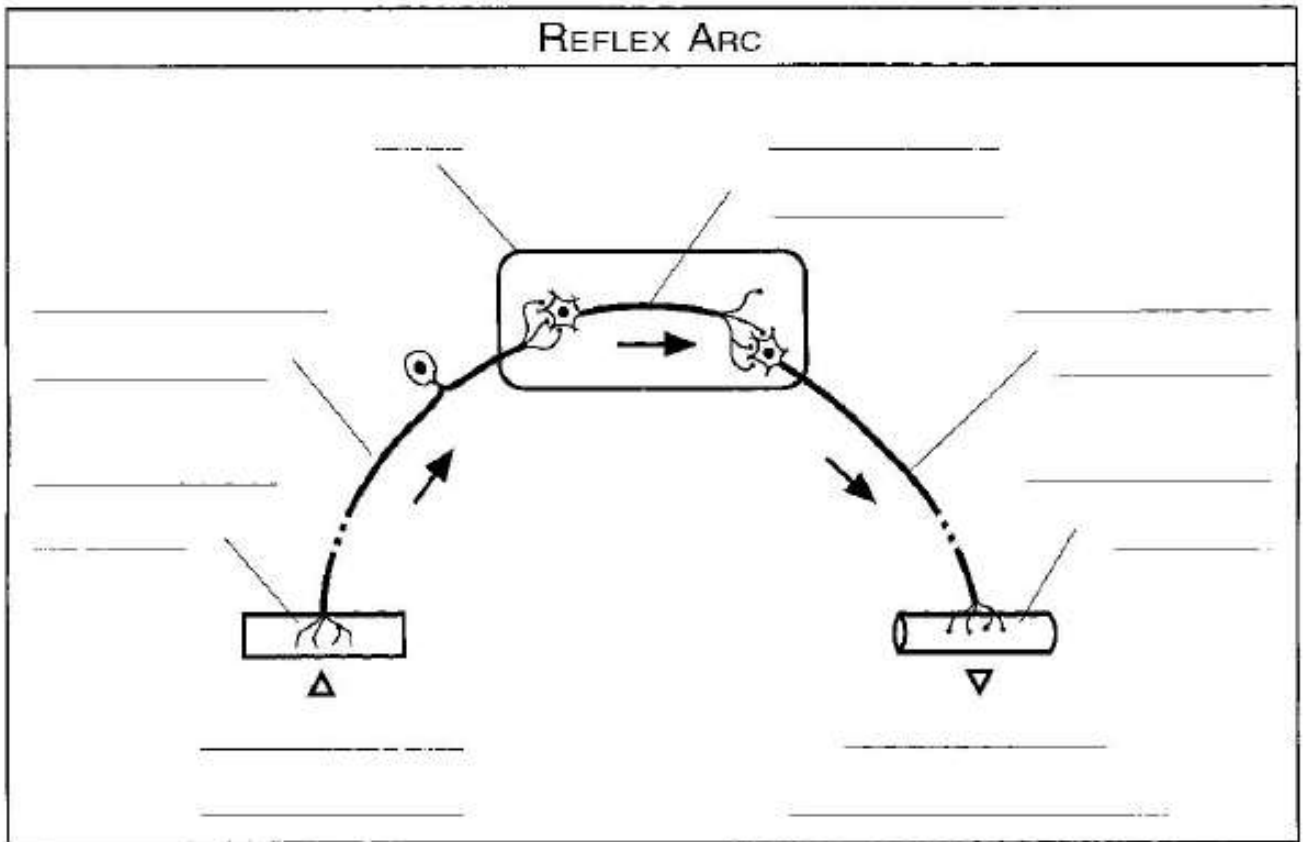
THINK- RAP

- **R**apid response to a stimulus.
- **A**utomatic, involuntary action, which does not always involve the brain.
- **P**rotective allows the body to react quickly to dangerous stimuli.

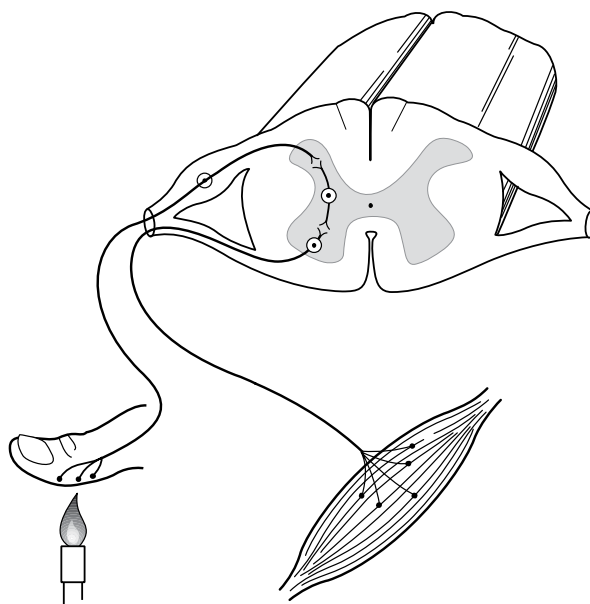
Stimulus → receptor → sensory neuron → inter neuron → motor neuron → effector → response



Complete the reflex arc diagram.



Label the neurons in the diagram.





Add arrows to show the direction of nerve impulses and describe what happens at each stage.

REFLEX ACTION AT WORK

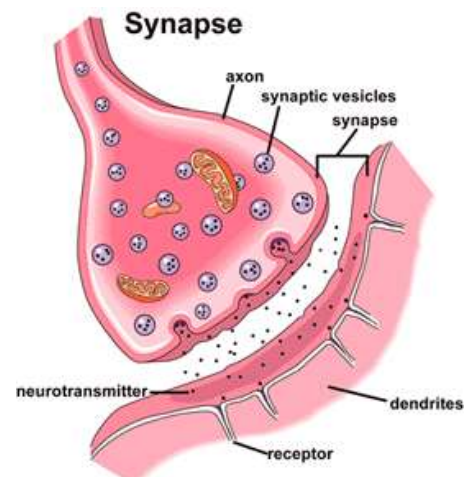
Location	Description of event
1	
2	
3	
4	
5	
6	

Learning Intention

To find out the importance of synapses in the nervous system.

Synapse

A **synapse** is a gap that occurs between neurons. Chemical transmitter substances released from tiny vacuoles at the end of one neuron diffuse across the synapse to generate an electrical impulse in the next neuron. This allows messages to pass between neurons.



I can:	
State that internal communication is required for the survival of a multicellular organism.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that cells in a multicellular organism do not work independently.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that the nervous system consists of the central nervous system (CNS) and nerves.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that the central nervous system (CNS) consists of the brain and spinal cord.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Identify (on a diagram) the three main parts of the brain: cerebrum, cerebellum and medulla.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe the functions of the cerebrum, cerebellum and medulla.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that there are three types of neurons: sensory, inter and motor.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe the role of the sensory, relay and motor neurons.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that receptors (sense organs) detect input/stimuli.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe the different responses brought about by the CNS.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that electrical impulses carry messages along neurons.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Explain the role of sensory, relay and motor neurons in a reflex arc.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Explain what a reflex action is and give some examples.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Explain the importance of reflex actions.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that synapses occur between neurons.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that chemicals transfer messages between neurons, at synapses.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>