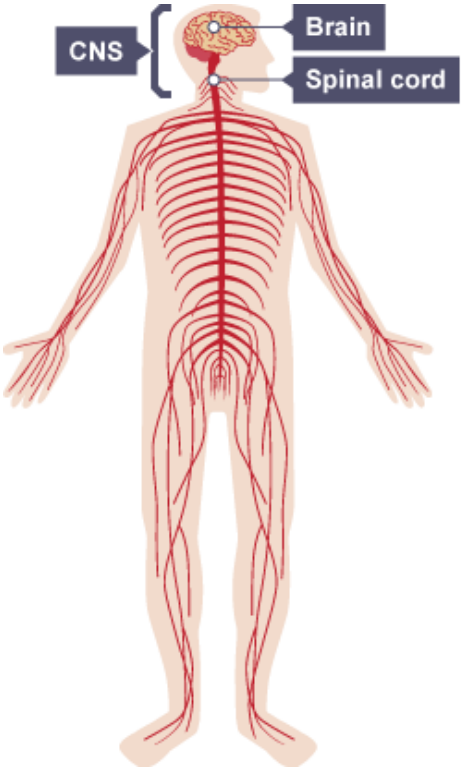
Knowledge Organiser Y7 Sensitivity

The Nervous System



The nervous system enables humans to react to their surroundings and to coordinate their behaviour.

The human nervous system consists of:

- the **central nervous system** (CNS)– the brain and spinal cord
- the **peripheral nervous system** (PNS)– nerve cells that carry information to or from the CNS.

Neurones

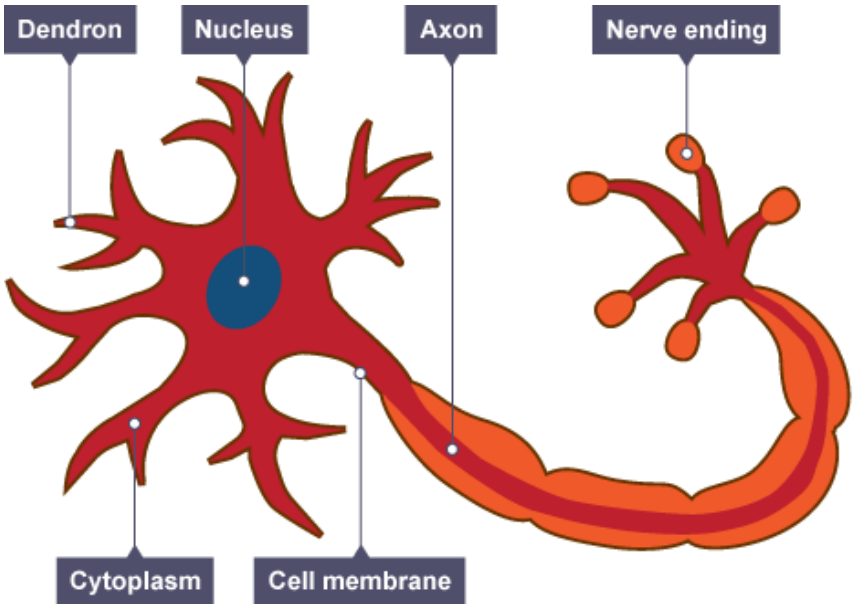
Nerve cells are called **neurones**. They are adapted to **carry electrical impulses** from one place to another.

A bundle of neurones is called a **nerve**.

There are three main types of neurone: **sensory, motor and relay**.

They have some features in common:

- A **long fibre (axon)** which is insulated by a **fatty (myelin) sheath**. They are **long** so they can carry messages up and down the body.
- Tiny **branches (dendrons)** which branch further as **dendrites** at each end. These receive incoming impulses from other neurones.



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Receptors

Receptors are groups of **specialised cells**. They detect a change in the environment (stimulus) and stimulate electrical impulses in response. **Sense organs** contain groups of receptors that respond to specific stimuli.

Sense organ	Stimulus
Skin	Touch, temperature and pain
Tongue	Chemicals (in food and drink, for example)
Nose	Chemicals (in the air, for example)
Eye	Light
Ear	Sound and position of head

The Coordination Centre

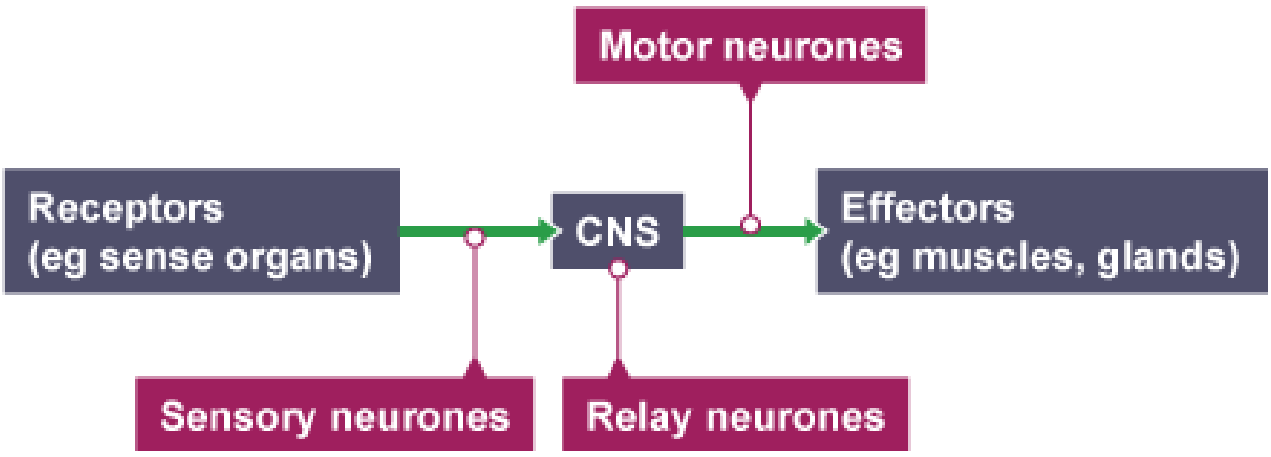
The coordination centre, such as the **brain, spinal cord or pancreas**, receives and processes information from receptors around the body.

Effectors

Effectors bring about responses, which restore optimum levels, such as core body temperature and blood glucose levels. Effectors include **muscles and glands**, and so responses can include **muscle contractions** or **hormone release**.

Receptors to effectors

The diagram summarises how information flows from receptors to effectors in the nervous system:



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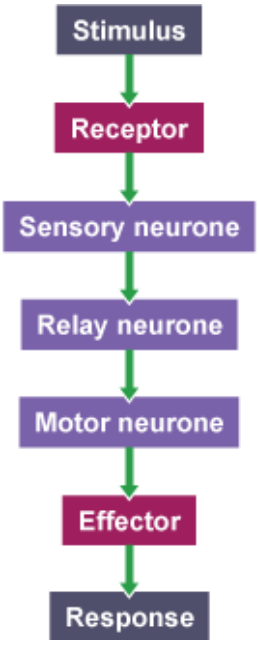
Reflex Actions

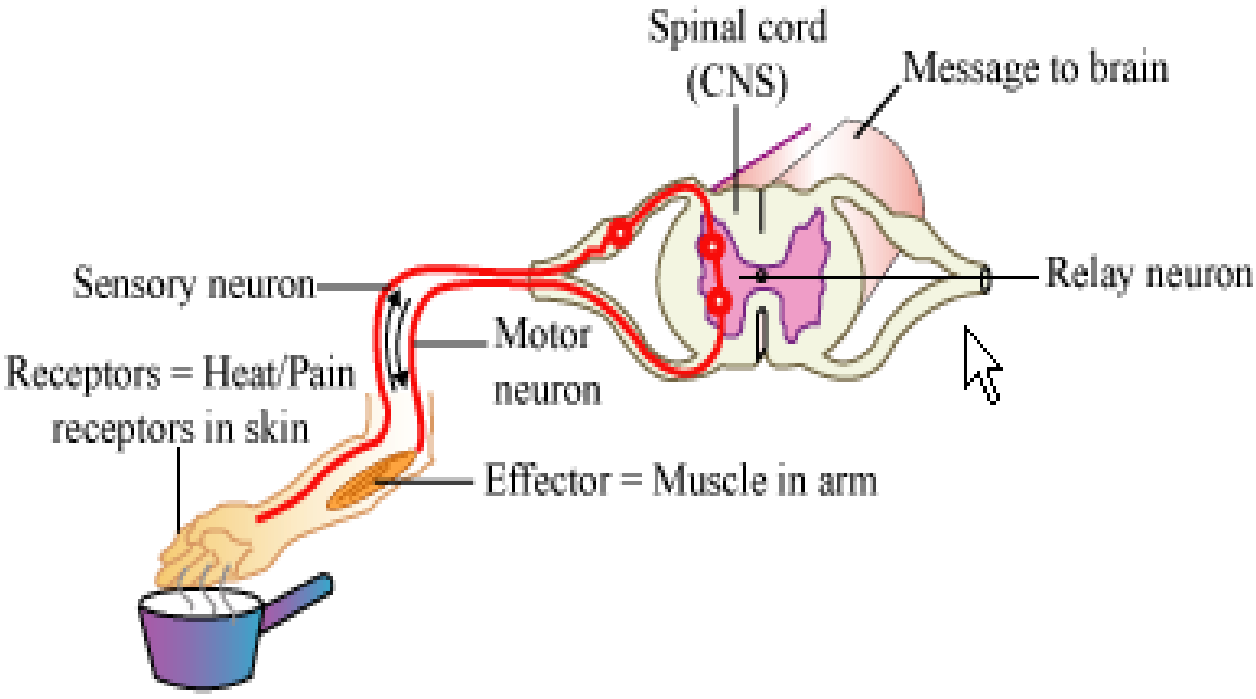
A reflex action is an **automatic** (involuntary) and **rapid response** to a stimulus, which minimises any damage to the body from potentially harmful conditions, such as touching something hot. Reflex actions are therefore **essential to the survival of many organisms**.



A reflex action follows this general sequence and <u>does not involve the conscious part of the brain</u>. This is why the response is so fast.

Reflex arcs

The nerve pathway followed by a reflex action is called **a reflex arc**. For example, a simple reflex arc happens if we accidentally touch something hot.



1. **Receptor** in the skin detects a stimulus (the change in temperature).
2. **Sensory neuron** sends electrical impulses to a **relay neuron**, which is located in the **spinal cord of the CNS**. Relay neurons connect sensory neurons to **motor neurons**.
3. Motor neuron sends electrical impulses to an **effector**.
4. Effector produces a **response** (muscle contracts to move hand away).

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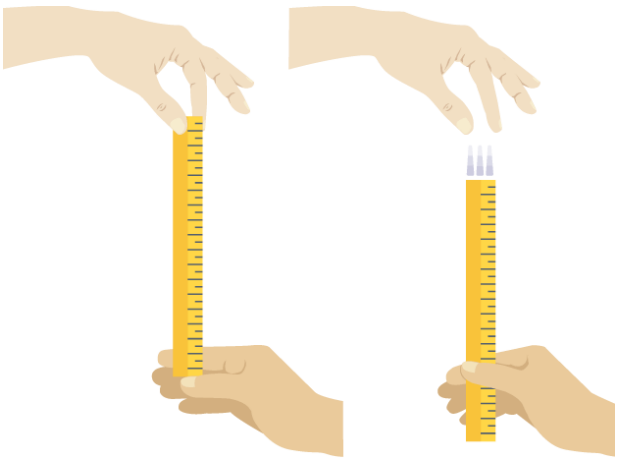
Investigating reflex actions

You can carry out a number of investigations to determine the effect of a specific factor on human reaction times.

A suitable investigation could be the effect of caffeine or the amount of background noise in the room. A simple method to measure the effect is to use the ruler drop test.

Ruler drop test

1. Work with a partner.
2. Person A holds out their hand with a gap between their thumb and first finger.
3. Person B holds the ruler with the zero at the top of person A's thumb
4. Person B drops the ruler without telling Person A and they must catch it.
5. The number level with the top of person A's thumb is recorded in a suitable table. Repeat this ten times.
6. Swap places, and record another ten attempts.
7. You can use the conversion table to help convert your ruler measurements into reaction time or just record the catch distance in cm.



Catch distance (cm)	Reaction time (ms)
1	50
5	90
10	140
15	170
20	200
25	230
30	250

Important: 1 millisecond (ms) is one thousandth of a second. (1/1000 s)