

**Required Practical - Reaction Time**

**The Sense Organs**

| Sense Organ     | Receptors sensitive to...                 |
|-----------------|---|
| ears            | Sound and changes in position for balance |
| eyes            | Light                                     |
| skin            | Touch, pressure, pain, temperature        |
| nose and tongue | Chemicals for smell and taste             |

**Homeostasis** is the **regulation** of the **internal conditions** of a cell or organism to **maintain optimum conditions** for function, in response to internal and external changes. Homeostasis maintains optimal conditions for enzyme action and all cell functions. Human control systems include:

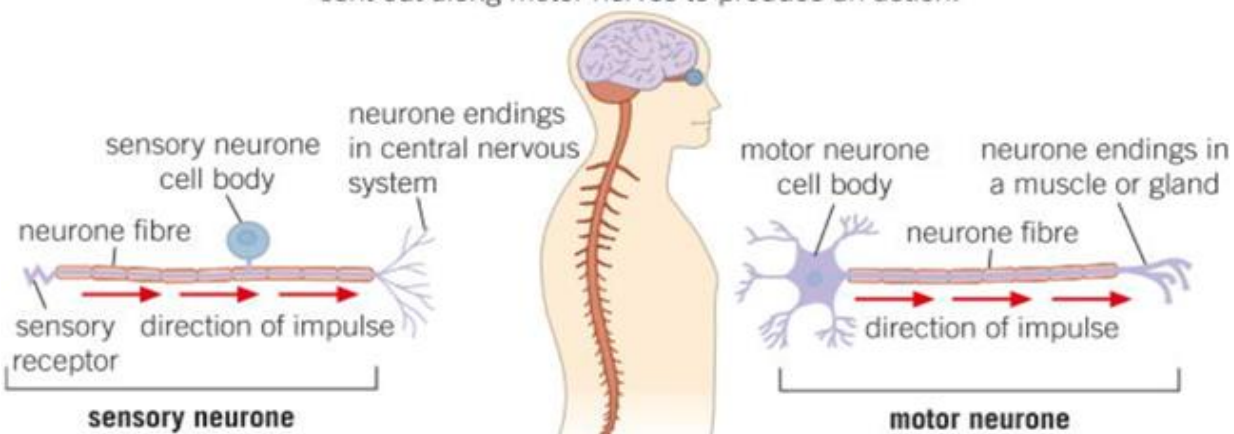
| Receptor cells                                    | Coordination centres   | Effectors   |
|---|--|---|
| These detect stimuli (changes in the environment) | E.g. brain, spinal cord and pancreas that receive information from receptors | Muscles or glands, which bring about a response to restore optimum levels |

**Reflex actions** are **automatic** and **rapid**; they do not involve the conscious part of the brain and can **protect** humans from harm. They involve a **relay neurone** instead of the CNS.

**The Nervous System**

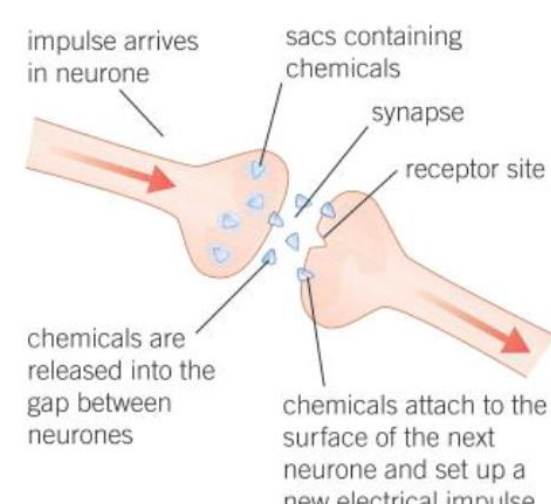
This system enables humans to react to their surroundings and coordinate their behaviour.

Sensory nerves carry impulses to the CNS. the information is processed and impulses are sent out along motor nerves to produce an action.



**Synapse**

This is a gap where neurones meet. A chemical message is used involving a neurotransmitter.



**Reflex Arc Pathway**

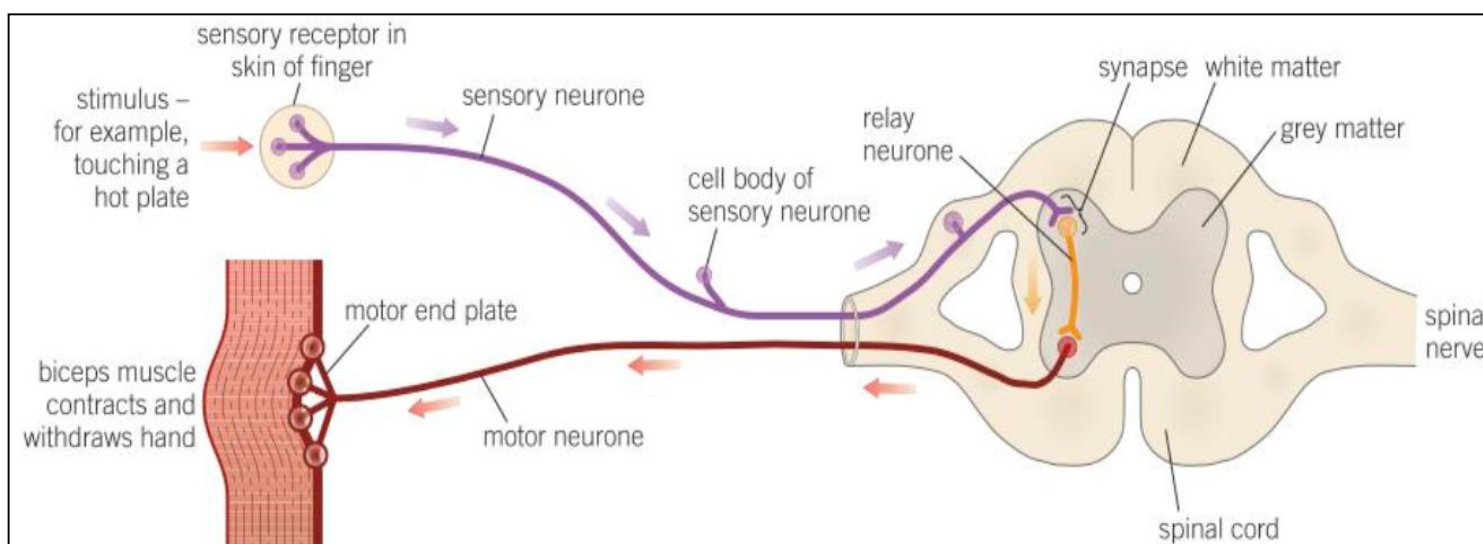
| Pathway         | Example  |
|-----------------|--|
| stimulus        | Touch hot plate  |
| receptor        | Cells in finger  |
| sensory neurone | Long - carries impulse from receptor to relay neurone in spinal cord                           |
| relay neurone   | Allows impulses to travel between the sensory neurone and the motor neurone in the spinal cord |
| motor neurone   | Long carries impulse to effector   |
| effector        | Biceps muscle contracts  |
| response        | Withdraw hand  |

**The Nervous System Voluntary Response Pathway**

Information from receptors passes along cells (neurones) as electrical impulses to the central nervous system (CNS). The CNS coordinates the response of the effectors which may be muscles contracting or glands secreting hormones.

| Pathway                    | Example   |
|----------------------------|---|
| stimulus                   | Lights switch on                                    |
| receptor                   | Cells in retina (eye)                               |
| sensory neurone            | Carries impulse to coordinator                      |
| coordinator                | Central nervous system (CNS) – brain or spinal cord |
| motor neurone (very long)  | Carries impulse to effector                         |
| effector (muscle or gland) | Muscles connected to iris                           |
| response                   | Pupils get smaller                                  |

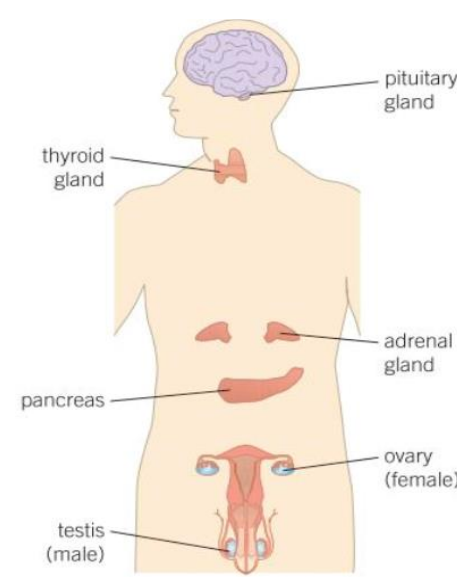
**The Reflex Arc**



**AQA B5 Homeostasis and Response: Hormonal Control**  
**COMBINED FOUNDATION (page 2 of 2)**

The human **endocrine system** is made of glands, which release chemicals called **hormones** directly into the **bloodstream**. The blood carries the hormone to a **target organ** where it produces an effect. Examples of these controls include blood glucose concentration, body temperature and water levels. Compared to the nervous system the effects are slower but act for longer.

| Endocrine Gland | Role of its Hormones   |
|-----------------|--|
| pituitary       | The 'Master Gland'; secretes several hormones into the blood to stimulate other glands to release hormones |
| thyroid         | Controls metabolic rate  |
| pancreas        | Controls glucose levels  |
| adrenal         | Prepares body for stress   |
| ovaries         | Involved in menstrual cycle  |
| testes          | Involved in sperm production   |



**Hormones in Human Reproduction**

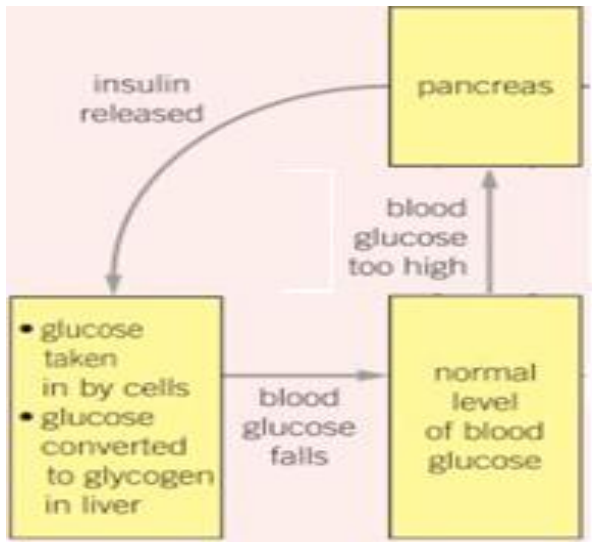
During puberty reproductive hormones cause secondary sexual characteristics to develop

| Hormone      | Role of the Hormone   |
|--------------|---|
| testosterone | Main male reproductive hormone. Stimulates sperm production in testes.  |
| oestrogen    | Main female reproductive hormone produced in the ovary. At puberty eggs begin to mature and one is released every 28 days approx. This is called ovulation. |

Several hormones are involved in the menstrual cycle of women:

|                                    |   |
|------------------------------------|---|
| follicle stimulating hormone (FSH) | Matures an egg in the ovary.                      |
| luteinising hormone (LH)           | Stimulates release of an egg ( <b>ovulation</b> ) |
| oestrogen                          | Stimulates uterus lining to develop.              |
| progesterone                       | Maintains uterus lining.                          |

Blood glucose concentration is monitored and controlled by the **pancreas**.

|                               |   |
|-------------------------------|---|
| <b>Blood glucose too High</b> | <p>Pancreas produces the hormone <b>insulin</b>, glucose moves from the blood into the cells. In liver and muscle cells excess glucose is converted to <b>glycogen</b> for storage.</p>  |
| <b>Type 1 diabetes</b>        | <p>Pancreas fails to produce enough insulin leading to uncontrolled blood glucose levels.<br/> <b>Treatment:</b> by insulin injection.</p>  |
| <b>Type 2 diabetes</b>        | <p>Obesity is a risk factor. Body cells no longer respond to insulin. <b>Treatment:</b> changing diet and increasing exercise.</p>  |

**Contraception** – fertility can be controlled by a variety of hormonal and non-hormonal methods of contraception

| Name                                 | How it works  |
|--------------------------------------|---|
| oral contraceptive (pill)            | Contains hormones to inhibit FSH so no eggs mature  |
| injection, implant, patch            | Releases progesterone slowly to inhibit the maturation and release of eggs                  |
| barrier methods - condoms/diaphragms | prevent sperm from reaching egg   |
| intrauterine devices                 | Prevent implantation of an embryo   |
| spermicidal agents                   | Kill or disable sperm   |
| abstinence                           | Avoiding sex when an egg may be in the oviduct  |
| surgery                              | Male or female sterilisation (surgery to stop you having offspring e.g. vasectomy in males) |