Your notes

GCSE Biology: revision notes

The nervous system and reflexes

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Start here: how your body responds

- Your body has to respond to changes, called stimuli: a hot plate, a loud noise, a ball coming towards you.
- **Receptors** detect the change, the **central nervous system** (your brain and spinal cord) decides what to do, and **effectors** (muscles or glands) carry out the response.
- Messages travel along nerve cells (neurones) as electrical impulses, which is why nervous responses are so fast.

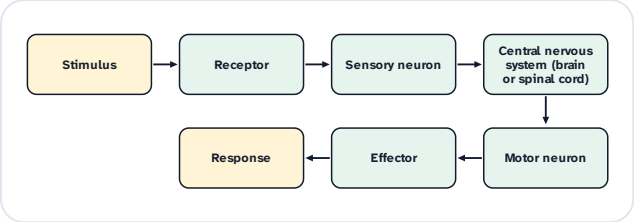
Homeostasis

- **Homeostasis** is the regulation of the internal conditions of a cell or organism to keep them at the best levels for function, whatever the changes inside or outside the body.
- In humans it controls blood glucose concentration, body temperature and water levels.
- Control systems have **receptors** (which detect stimuli), coordination centres such as the brain, spinal cord and pancreas (which process the information) and **effectors**, muscles or glands (which bring about responses).

The nervous system

- The nervous system lets humans react to their surroundings and coordinate their behaviour.
- Information travels as electrical impulses along neurones.

- The **central nervous system** (CNS) is the brain and spinal cord.
- **Stimulus** → **receptor** → coordinator → **effector** → response.

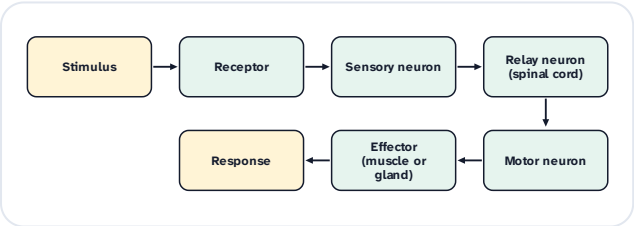


Neurones and synapses

- **Sensory neurones** carry impulses from **receptors** to the CNS. **Relay neurones** carry impulses within the CNS. Motor neurones carry impulses from the CNS to effectors.
- A **synapse** is a tiny gap between two neurones. When an impulse arrives, a chemical is released that diffuses across the gap and starts an impulse in the next neurone.

Reflexes

- **Reflex actions** are automatic and rapid; they do not involve the conscious part of the brain. They protect the body from harm.
- Reflex arc: **receptor** → **sensory neurone** → **relay neurone** (in the spinal cord) → motor neurone → effector.
- Example: touching a hot object makes a muscle contract to pull the hand away.



Required practical: reaction time

- One person drops a ruler between the other person's finger and thumb without warning; they catch it as fast as possible.
- Record the distance the ruler falls; a shorter distance means a faster reaction. Convert to reaction time using a table.
- Repeat several times and find the mean. Test the effect of a factor such as caffeine, keeping everything else the same.

Exam tip

- Learn the reflex arc in order: **stimulus**, **receptor**, **sensory neurone**, relay neurone, motor neurone, effector, response.
- At a **synapse**, say that a chemical diffuses across the gap.

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Common mistakes

- Saying a reflex goes through the conscious part of the brain.
- Saying an electrical impulse jumps across a **synapse**.
- Writing 'messages' instead of 'electrical impulses'.

Worked examples

In the ruler-drop test, a student's reaction times are 0.25 s, 0.21 s and 0.23 s. Find the mean.

Add the times together. **0.25 + 0.21 + 0.23 = 0.69 s**

Divide by how many there are. **0.69 ÷ 3**

Answer: 0.23 s

Key terms

Homeostasis	Keeping the internal conditions of the body at the best levels for function.
Stimulus	A change in the environment that is detected by a receptor.
Receptor	A cell that detects a stimulus.
Effector	A muscle or gland that brings about a response.
Central nervous system	The brain and spinal cord.
Sensory neurone	A neurone that carries impulses from receptors to the CNS.
Relay neurone	A neurone that carries impulses within the CNS.
Motor neurone	A neurone that carries impulses from the CNS to effectors.
Synapse	The gap between two neurones, crossed by a chemical.
Reflex action	A fast, automatic response that does not involve the conscious brain.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is homeostasis?
2. What makes up the central nervous system?
3. What is an effector?
4. What carries impulses from receptors to the CNS?
5. What crosses a synapse?
6. Why are reflex actions fast?

Your notes

7. What is the correct order in a reflex arc?
8. Where are relay neurones found in a reflex arc?

Answers

1. Keeping internal conditions at the best levels for function
2. The brain and spinal cord
3. A muscle or gland that responds to an impulse
4. Sensory neurones
5. A chemical
6. They do not involve the conscious part of the brain
7. Receptor, sensory neurone, relay neurone, motor neurone, effector
8. In the spinal cord

What to do next

Practise 11 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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