



Biology Scheme of Learning

Year 10 – Term 4/Unit 10 The Human Nervous System

Intent – Rationale

Students have studied the principles of homeostasis, and should be able to give some examples and outline the control system involved. They should link this work with studies on enzyme action in B3.2 The human digestive system and B3.4 Catalysts and enzymes. Students should recall details of the human nervous system and its structure and function. They should link this with work on nerve cells in B1.4 Specialisation in animal cells. They should be able to describe a reflex arc, with detail of synaptic transmission.

Students should appreciate that receptors detect a change in a stimulus and not the stimulus itself. They should be able to describe an electrical impulse accurately.

Students studying AQA GCSE Biology have studied the brain, linking each area with its function. There is a higher-tier topic of investigating the brain and the treatment of brain damage. Students should link this with the role of the brain in controlling body temperature, the role of the pituitary gland in the brain, and the role of ADH release in maintaining water and nitrogen balance in the body, studied in B12 Homeostasis in action.

Students studying AQA GCSE Biology have also studied the structure and function of the human eye and the process of accommodation. They should understand that the ciliary muscles contract in accommodation. These students should be able to describe common defects of the eye including myopia, hyperopia, and the role of new technology in the treatment of these conditions.

| Sequencing – what prior learning does this topic build upon? | Sequencing – what subsequent learning does this topic feed into? |
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| <p>Topic B7.1 Cells and Tissues GCSE B1 Cells and their specialisation, diffusion, osmosis and active transport. B1.4 Specialisation in animal cells GCSE B3 Organisation and the Digestive System B3.2 The human digestive system and B3.4 Catalysts and enzymes</p> | <p>GCSE B12 Homeostasis in action. A level Unit 1 Biological Molecules, Unit 2 Cells, Unit 6 Organisms respond to changes in their Environment</p> |
| What are the links with other subjects in the curriculum? | What are the links to SMSC, British Values and Careers? |
| <ul style="list-style-type: none"> • <i>Physics and light ray diagrams when learning about how the eye focusses light.</i> • Physics and use of Imaging technologies CT and MRI scanners | <ul style="list-style-type: none"> • SMSC SP 2 M1,2 When learning about and discussing how drugs affect the synapse • BV 2 When discussing the use of drugs • GB4 a) e) g) during required practical |
| What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading? | What are the opportunities for developing mathematical skills? |
| <p>FROM THE LIBRARY</p> <p><i>Complete Book of The Brain-612</i> <i>Inner Workings Of The Grey Matter-612</i> <i>Bulging Brains-500</i></p> | <ul style="list-style-type: none"> • Calculating reaction times |



Hormones-612.405

Biology Scheme of Learning
Year 10 – Term 4/Unit 10 The Human Nervous System

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

Know

Define homeostasis. Name some human internal conditions that are controlled. Show the pathway of a control system as receptor, coordination centre, effector. Identify the stimuli that sense organs detect. Describe what a neurone and a nerve are. Describe the pathway of impulses from receptor to effector. Describe how information is passed along neurones.
 Measure reaction times using repeats to increase accuracy. Identify reflex actions and explain why they are important. Order the events involved in a reflex action. Describe how reflex actions are fast and automatic. Describe the events involved in a reflex action.
 Describe the function of synapses. Describe the function of brain structures.
 Identify the main structures of the brain. Identify the main structures of the eye. Describe what happens to the eye in bright light. State that the lens changes shape to focus on near or distant objects. Describe what causes long- and short- sightedness.

Apply

Explain why internal conditions need to be maintained. Apply knowledge of enzymes and osmosis to explain in detail why internal conditions need to be maintained.
 Identify stimuli, receptors, coordination centres, and effectors in examples of nervous and chemical responses. Evaluate a method and describe how accuracy could be increased. Apply knowledge of synapses to explain the effects of drugs.
 Describe how regions of the brain have been mapped to particular functions. Relate the structures of the eye to their functions. Describe how the eye focuses light. Describe how the lens changes shape to focus on near or distant objects. Describe how lenses and surgery can help with long and short sightedness.

Extend

Explain how drugs affect homeostasis. Explain how nervous and chemical responses differ. Explain in detail how the nervous system coordinates a response. Evaluate results in detail in order to discuss precision and accuracy. Explain in detail how impulses travel across a synapse. Evaluate in detail the benefits and risks of investigating and treating brain disorders. Consider ethical dilemmas surrounding brain research.
 Draw an accurate ray diagram to show how the eye focuses light. Explain in detail the changes to the eye in response to changes in light intensity.
 Draw accurate ray diagrams to explain what happens during accommodation and what causes long and short sightedness. Evaluate the risks and benefits of surgery to treat long and short sightedness.

What subject specific language will be used and developed in this topic?

What opportunities are available for assessing the progress of students?



- B10 LAQ after B10 L3
- B10 End of Topic Test

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| Accommodation | the process of changing the shape of the lens to focus on near or distant objects. |
| Central Nervous System | CNS - the part of the nervous system where information is processed. It is made up of the brain and spinal cord. |
| Cerebellum | region of the brain concerned with coordinating muscular activity and balance. |
| Cerebral cortex | region of the brain associated with consciousness, memory and language. |
| Ciliary muscles | muscles that contract and relax to change the shape of the lens of the eye. |
| Effector | The part of a control system that brings about a change to the system. |
| Homeostasis | the regulation of the internal conditions of a cell or organism to maintain optimum conditions for function, in response to internal and external changes. |
| Hyperopia | When you can focus clearly on distant objects but close objects appear blurred. |
| Medulla | region of the brain concerned with unconscious activities such as controlling the heart rate and breathing rate. |
| Motor neurone | carry impulses from the central nervous system to the effector organs. |
| Myopia | When you can see close objects in clear focus but distant objects looked blurred. |
| Nerve | bundle of hundreds or even thousands of neurones. |
| Neurone | basic cells of the nervous system that carry minute electrical impulses around the body. |
| Receptor | cells that detect stimuli, which are changes in the internal or external environment. |
| Reflex arc | brings about a reflex action. They involve the sense organ, sensory neurone, relay neurone and motor neurone. |
| Reflexes | rapid automatic responses of the nervous system that do not involve conscious thought. |
| Sensory neurone | neurone that carries impulses from the sensory organs to the central nervous system. |
| Stimulus | a change in the external or internal environment that can be detected by receptors. |
| Suspensory ligaments | the ligaments that connect the lens of the eye to the ciliary muscles. |
| Synapse | a tiny gap between neurones that transmits nerve impulses from one neurone to another by means of chemicals diffusing across the gap. |





Intent – Concepts

| Lesson title | Learning challenge I can/I know | Higher level challenge I can | Suggested activities and resources |
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| B10 L1 Principles of Homeostasis | a) Why it is important to control your internal environment. b) The key elements of control systems | Apply knowledge of enzymes and osmosis to explain in detail why internal conditions need to be maintained. Identify stimuli, receptors, coordination centres, and effectors in examples of nervous and chemical responses | |
| B10 L2 The structure and function of the human nervous system | a) Why we need a nervous system b) How the nervous system is adapted to its function c) How receptors enable you to respond to changes in your surroundings <i>Required practical: Measuring Reaction times</i> | Explain in detail how the nervous system coordinates a response. Evaluate results in detail in order to discuss precision and accuracy. | |
| B10 L3 Reflex actions | a) What reflexes are b) How reflexes work c) Label a reflex arc d) Why reflexes are important to your body e) The structure and function of synapses | Explain in detail how impulses travel across a synapse. Apply knowledge of synapses to explain the effects of drugs. | |
| B10 L4 The Brain (Triple only) | a) What the main areas of the brain do b) How scientists find out about the structure and function of the brain | Evaluate in detail the benefits and risks of investigating and treating brain disorders. Consider ethical dilemmas surrounding brain research. Independently plan a method to test a hypothesis. | |
| B10 L5 The eye (Triple only) | a) The main parts of the human eye and how the structures are related to function b) How the eye focuses light | Draw an accurate ray diagram to show how the eye focuses light. Explain in detail the changes to the eye in response to changes in light intensity. | |
| B10 L6 Common problems of the eye (Triple only) | a) How the eye focuses near and distant objects b) What happens in short sightedness and long sightedness and how these problems can be solved | Describe how the lens changes shape to focus on near or distant objects. Describe how lenses and surgery can help with long and short sightedness. | |

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| B10 L7 | TEST | | |
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