

The Nervous System

This worksheet addresses the general outcome that students will explain how the nervous system controls physiological processes ([Topic](#)), within the Biology 30 unit on equilibrium and systems ([Topic](#)). Exercises cover neuron function, the central and peripheral nervous systems, reflex arcs, the eye and ear, and the interaction between nervous and endocrine control.

Exercises

1. Neuron structure and the action potential

Answer the following in complete sentences.

a) Describe the general structure of a neuron, including the role of the myelin sheath.

b) Explain what is meant by the "all-or-none" response of an action potential.

c) Name the three chemicals or transmitters involved in synaptic transmission and state the role of each.

Transmitter 1: _____ Role: _____

Transmitter 2: _____ Role: _____

Transmitter 3: _____ Role: _____

([Outcome](#))

2. Matching: structures of the central and peripheral nervous systems

Match each structure in Column A to its function in Column B by writing the correct letter in the blank.

Column A	Blank	Column B
1. Cerebellum	_____	A) Regulates heart rate, breathing and other involuntary functions
2. Hypothalamus	_____	B) Coordinates balance and muscular coordination
3. Medulla oblongata	_____	C) Prepares the body for "fight or flight" responses
4. Sympathetic nervous system	_____	D) Links the nervous and endocrine systems and regulates body temperature
5. Parasympathetic nervous system	_____	E) Returns the body to a resting state after a stress response

([Outcome](#))

3. Multiple choice: reflex arcs

Circle the letter of the best answer for each question.

- The patellar reflex is an example of a reflex arc that involves:
A) the brain making a conscious decision before the response occurs
B) a signal that bypasses the brain, travelling directly through the spinal cord

- C) the endocrine system releasing a hormone to trigger the response
 - D) the cerebellum coordinating a delayed motor response
2. The correct sequence of components in a typical reflex arc is:
- A) motor neuron !' sensory receptor !' interneuron !' effector
 - B) sensory receptor !' sensory neuron !' interneuron !' motor neuron !' effector
 - C) effector !' interneuron !' sensory neuron !' sensory receptor
 - D) sensory receptor !' motor neuron !' effector

([Outcome](#))

4. Structure and function of the eye

Label the function of each structure listed below.

Cornea: _____

Iris: _____

Retina: _____

Fovea centralis: _____

Optic nerve: _____

([Outcome](#))

5. Structure and function of the ear

Fill in the blank with the correct structure from the word bank.

Word bank: pinna, ossicles, cochlea, organ of Corti, semicircular canals, Eustachian tube

- a) The _____ collects sound waves and directs them into the auditory canal.
- b) The _____ are three small bones that amplify and transmit vibrations from the tympanum to the cochlea.
- c) The _____ contains the receptors that convert fluid vibrations into nerve impulses.
- d) The _____ detect rotational movement of the head and contribute to balance.
- e) The _____ equalizes air pressure between the middle ear and the outside environment.

([Outcome](#))

6. Comparing nervous and endocrine control

Using the example of the stress response and the adrenal gland, compare how the nervous system and the endocrine system each contribute to maintaining homeostasis. In your answer, address speed of response, duration of effect, and the way each system transmits its signal.

([Outcome](#))

Answer key

- 1. a) A neuron consists of dendrites, a cell body, and an axon; the myelin sheath insulates the axon and allows saltatory conduction, increasing the speed of impulse transmission. b) An action potential either fires completely or not at all; it does not fire partially, though the frequency of impulses can vary with stimulus intensity. c) Norepinephrine (transmits signals across certain

synapses), acetylcholine (transmits signals across synapses, notably at neuromuscular junctions), cholinesterase (breaks down acetylcholine to stop the signal) ([Outcome](#)).

2. 1-B, 2-D, 3-A, 4-C, 5-E ([Outcome](#)).
3. 1. B, 2) B ([Outcome](#)).
4. Cornea: refracts light entering the eye; Iris: controls the size of the pupil to regulate light entry; Retina: contains photoreceptors (rods and cones) that detect light; Fovea centralis: area of sharpest vision, densely packed with cones; Optic nerve: carries visual information from the retina to the brain ([Outcome](#)).
5. a) pinna, b) ossicles, c) organ of Corti, d) semicircular canals, e) Eustachian tube ([Outcome](#)).
6. The nervous system responds rapidly to stress through electrical impulses that produce short-lived, localized effects, while the endocrine system releases hormones such as adrenaline from the adrenal gland into the bloodstream, producing a slower but longer-lasting, widespread effect on target organs ([Outcome](#)).