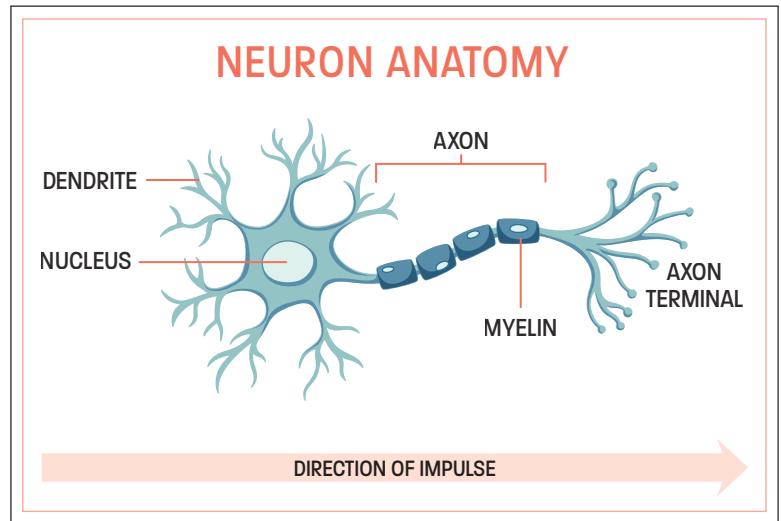


# THE NERVOUS SYSTEM PART 1

Read the text below. Then, answer the questions on pages 2 and 3.

Beep beep beep! An alarm clock sounds at 7:00 a.m. to wake you up. You turn over, check the time on the clock, and hit the snooze button. How does your body know what to do when your alarm rings? The **nervous system** is responsible for coordinating everything you do. It helps you respond and adapt to stimuli, which are changes that occur both outside and inside of the human body. The nervous system also helps maintain the body's internal environment by controlling things like breathing and body temperature.

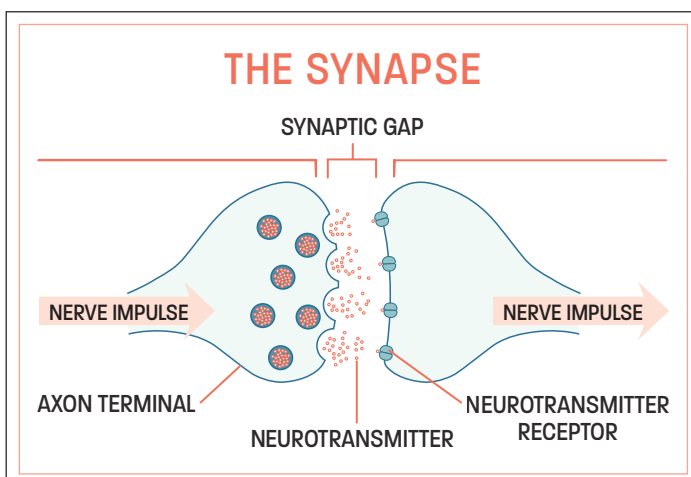
To understand how your body responds to your alarm clock, we need to understand how the nervous system is structured. Just like other systems in the human body, the nervous system has several levels of organization. **Neurons** are specialized cells that are the basic units of structure and function in the nervous system. A neuron is made up of a cell body, **dendrites**, and an axon. A message, or **impulse**, first reaches a neuron at its dendrites. Dendrites branch out in many directions to receive impulses from neighboring cells and send them to the **cell body**. The cell body contains the nucleus, which is the control center of the neuron. Then the **axon** carries impulses away from the cell body. The axon is coated in **myelin**, a material that allows an impulse to be transmitted as fast as 120 meters per second! At its end, or **terminal**, the axon branches out in many directions to send impulses to other cells.



Neurons are organized into cable-like networks known as **nerves**. Nerves work together in a system to send messages. Every day, billions of nerve impulses are sent through your nervous system. While neurons form a network, they are not actually attached to one another. Instead, messages travel between neurons through a **synapse**, which is a tiny gap between cells. Here, the electrical signal from the axon changes to a chemical signal that crosses the synapse. This

chemical signal is called a **neurotransmitter**. When a neurotransmitter binds to the receptor on the next neuron, it stimulates an impulse in that dendrite.

The messages transmitted between neurons in a nerve only travel in one direction. A nerve impulse from a neuron will travel along nerves to the central nervous system, which is made up of the brain and spinal cord. Some responses, like reflexes, are processed directly by the spinal cord. Most responses continue on to the brain, which interprets the incoming signals from the nerves.



# THE NERVOUS SYSTEM PART 1

Keep going! Read the text below. Then, answer the questions that follow.

The brain also coordinates the body's responses. A message from the brain will travel through the spinal cord. Then it will travel through nerves in the **peripheral nervous system**. This system includes all of the nerves outside of the central nervous system. The nerves in the peripheral nervous system are the communication pathway between the brain and spinal cord and the other parts of the body.

## NEURONS AND RECEPTORS

There are three different types of neurons in the human body. They work together to detect, transmit, and send impulses to coordinate your response to stimuli.

- **Sensory neurons** pick up a stimulus in the environment, convert it into a nerve impulse, and send a message to the brain.
- **Interneurons** make up the majority of the neurons in the body. As the "middle man" of the nervous system, interneurons transmit impulses to and from the central nervous system.
- **Motor neurons** send messages from the brain to the other cells in the body to initiate movement.

Sensory neurons, sometimes called sensory **receptors**, can be further classified by the type of stimuli they detect. **Mechanical** receptors found in the skin and ears detect touch and sound. These receptors detect the sound of your alarm clock ringing. **Electromagnetic** receptors in the eyes detect changes in light, helping you see the time on your alarm clock. **Chemical** receptors in the nose and mouth detect substances and allow you to smell and taste.

Now let's consider what happens when your alarm clock sounds. Sensory neurons detect the sound of your alarm, which is converted to a nerve impulse. This impulse travels from the sensory neurons to interneurons and then to the brain. The brain sends a message via the motor neurons to your eyelids and body, causing you to turn over, open your eyes, and reach out and press the snooze button on the alarm.

**Show what you know! Use the reading to answer the questions below.**

1. What is the primary function of the nervous system? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. Neurons are made up of three main parts. Describe the function of each part.

a. axon: \_\_\_\_\_

b. cell body: \_\_\_\_\_

c. dendrite: \_\_\_\_\_

# THE NERVOUS SYSTEM PART 1

Keep going! Use the reading to answer the questions below.

3. What is myelin, and what is its function in the neuron?

---



---

4. What is the role of a neurotransmitter in the nervous system? Use the vocabulary words axon, dendrite, and synapse in your answer.

---

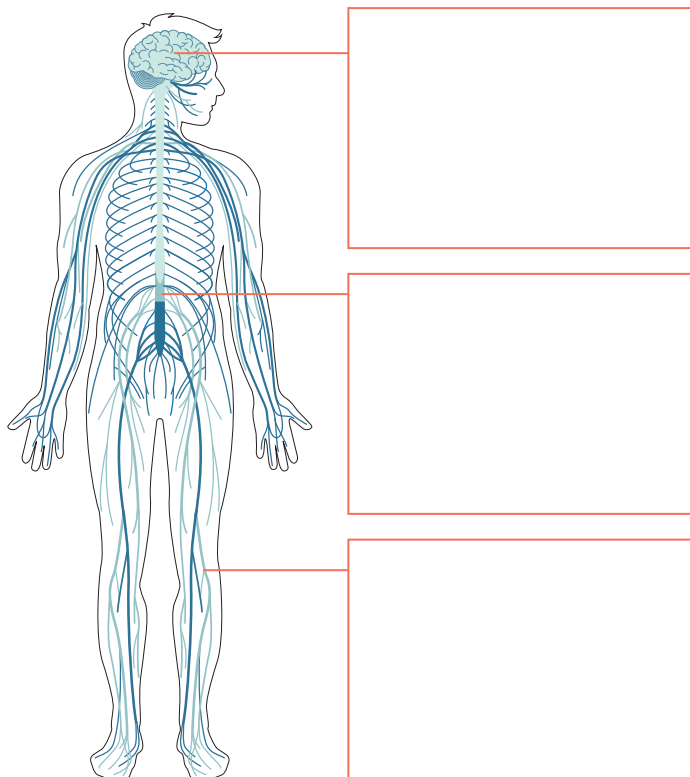


---

5. List the three main types of sensory receptors in the body. Describe what each receptor does, and provide an example of where the receptor is found in the body.

SENSORY RECEPTOR	FUNCTION	LOCATION IN THE BODY

6. Identify the major components of the nervous system on the diagram below.



7. Breakfast smells good! You follow the smell and walk to the kitchen. Describe how a nervous impulse, or message, travels along a network of neurons from your nose to your brain and back out to your muscles, causing movement. Identify the types of receptors involved in detecting the stimulus, transmitting the nerve impulse, and generating a response.

---



---



---



---



---



---



---



---