# **The Nervous System Discussion Guide (for use during or after reading)**

1. What is the nervous system’s main purpose? (Thinking Big, p. 4-5)
   1. The nervous system controls all the activities that take place in your body. It is in charge of coordinating the many organ systems in your body.
2. What is the difference between the central nervous system (CNS) and the peripheral nervous system (PNS)? (Parts of the Nervous System, p. 8-9)
   1. The central nervous system includes your brain and spinal cord. It is like the master controller. It decodes information, determines what to do, and releases messages and instructions to the body. The peripheral nervous system includes all the nerves that carry messages throughout your body.
3. Describe the three major components of the brain. (The Brain, p. 10-13)
   1. The cerebrum is the largest and most complex part of your brain. It controls your ability to think, use actions, and feel emotions. The cerebrum has two hemispheres that each have 4 lobes. The cerebrum also contains the corpus callosum, a bundle of nerves that connects the two hemispheres and relays signals.
   2. The cerebellum can be found at the back of the brain. It coordinates muscular movements with sensory information. The cerebellum also helps you maintain your balance.
   3. The brain stem is a stalklike organ that connects to the spinal cord. It relays information from your sense organs to the brain. It also regulates involuntary (automatic) functions like breathing.
4. What is the difference between voluntary and involuntary actions? (Voluntary and Involuntary Actions, p. 14-15)
   1. Voluntary actions are those your brain chooses to do. Actions you are aware your brain is choosing, like walking or talking, are considered voluntary. Involuntary actions are the opposite. Your body does them without being told. Involuntary actions include breathing, circulating your blood, digesting your food, and maintaining your body temperature.
5. What is the spinal cord and what is its main function? (The Spinal Cord, p. 16-17)
   1. The spinal cord is a ropelike bundle of nerves. It connects to the brain stem and is responsible for sending messages from the body to the brain. The brain can also send messages to the muscles and body through the spinal cord. The spinal cord is protected by a bony structure called the spine.
6. Describe the three basic parts of a neuron. (Neurons, From the Inside, p. 18-21)
   1. The cell body contains the nucleus and is a center for receiving and sending messages, called nerve impulses, out of the neuron.
   2. The axon is the nerve cell fiber. Its main job is to carry impulses down the neuron to the axon endings.
   3. The dendrites are located at the opposite end of the neuron as the axon endings. The dendrites receive messages from other neurons and pass them along to the cell body.
7. Explain how a nerve impulse travels through your body, to your brain, and back again. (Neurons, From the Inside, p. 18-21)
   1. First you receive information from the outside world. This information enters the dendrites of a neuron. It travels through the neuron and down its axon. It exits the axon endings and crosses a synapse as an electrical impulse. It continues this process through a chain of neurons until it reaches the brain. The brain then decodes the information, determines what to do next, and sends new message through the nerves back out to the body.
8. What is a reflex? Why do reflexes not involve the brain? (Reflexes, p. 22-23)
   1. A reflex is an involuntary action. It occurs when your body needs to respond quickly to a situation. The body does not have enough time to send electrical impulses through the neurons to the brain and back again. Instead, neurons follow a loop through the spinal cord and respond as a reflex, such as jerking your leg.
9. What myth about the brain stood out to you as the most interesting? Why? (Myths of the Brain, p. 26-27)
   1. Students’ answers will vary.
10. Who was Phineas Gage and why was his story important in the study of the brain at that time? (Who’s Who, p. 32-33)
    1. Phineas Gage was a railroad worker involved in a dangerous accident where the front part of his brain was damaged. He was lucky to be saved by a doctor, but his family and friends noticed the injury had caused major changes in his personality. His story was important to the study of the brain at that time because this was the first time scientists associated certain behaviors with certain parts of the brain.