Physiology Class 4:
Muscular, Nervous and Skeletal Physiology

Activities

These activities are designed to be done at home. There is no grade given for these and they do not have to be turned in. The answer key has been emailed to your grown up.

Describe a muscle contraction

In your own words, describe how a muscle contraction happens when you decide you want to move a certain part of your body.

Answer:

When someone decides to move a body part — like raising an arm — the brain sends an electrical signal down the spinal cord and through a motor neuron to the muscles involved in that movement.

At the **neuromuscular junction** (where the nerve meets the muscle), the nerve releases a chemical messenger called **acetylcholine (ACh)** into the **synapse** (gap).

This triggers an electrical signal in the muscle cell, causing **calcium ions** to be released inside the muscle.

Calcium allows two proteins in the muscle fiber, **actin** and **myosin**, to slide past each other — this is what shortens the muscle and causes contraction.

When the contraction is over, calcium is taken back up, and the muscle relaxes.

Describe the reflex reaction when touching a hot stove

Describe what happens in the body when you reach out to touch something to find that it is really, really hot, like a stove.

Answer:

When someone touches a very hot object, like a stove, the heat is detected by **sensory receptors** in the skin.

These receptors send a signal through **sensory neurons** to the **spinal cord**, not the brain — this makes the response super fast.

In the spinal cord, the signal connects with an **interneuron**, which immediately activates a **motor neuron**.

The motor neuron sends a message to the **muscles in the arm or hand** to pull away quickly.

This whole process is called a **reflex arc** — it helps protect the body from harm by reacting quickly, without waiting for the brain to decide what to do.

The brain finds out what happened **after** the body has already moved.

Pre-Assessment Quiz:
Muscular, Nervous and Skeletal Physiology

1. What two molecules are needed for muscle contraction to occur?
A. Oxygen and Glucose
B. Actin and Myelin
C. Calcium and Myelin
D. Calcium and ATP

2. What is a motor unit made of?
A. One motor neuron and all the muscle fibers it controls
B. One muscle and one tendon
C. Two or more bones connected together
D. One motor neuron and all the muscle fibers it controls

3. What part of the nervous system controls voluntary movements like picking up a pencil?
A. Autonomic Nervous System
B. Central Nervous System
C. Somatic Nervous System
D. Reflex Arc

4. What part of a neuron sends messages away from the cell body?
A. Dendrite
B. Synapse
C. Axon
D. Soma

5. Which type of neurotransmitter increases the chance that the next neuron will fire?
A. Inhibitory
B. Reflexive
C. Excitatory
D. Passive

6. What are the two divisions of the autonomic nervous system?
A. Sympathetic and Parasympathetic
B. Somatic and Central
C. Motor and Sensory
D. Sympathetic and Parasympathetic

7. What is the main function of calcium in the skeletal system?
A. It builds fat tissue
B. It gives muscles energy
C. It helps with nerve signals and muscle contraction
D. It replaces water in bones

8. Which hormone helps raise blood calcium levels by breaking down bone?
A. Calcitonin
B. Insulin
C. Parathyroid Hormone (PTH)
D. Estrogen

9. What do osteoblasts do?
A. Break down bone
B. Transport calcium in blood
C. Build new bone
D. Control muscles

10. Which system sends electrical signals to control body functions?
A. Muscular System
B. Nervous System
C. Circulatory System
D. Digestive System