



Lesson 3 – Pre-Visit Strong, Healthy Muscles

Objective: Students will be able to:

- Review prior knowledge of body systems, especially the muscular system.
- Identify positive ways that a person can keep (or make) his or her muscles strong and healthy.
- Understand that some athletes choose risky ways to strengthen their muscles, which can lead to muscle injury.

Time Required: One class period

Materials Needed:

- *Optional* Anatomical chart showing muscles of the human body
- Space for students to move around comfortably
- 1 regular rubber band
- 1 rubber band that appears intact, but has been partially cut
- 1 book or notebook

Vocabulary:

Circulatory system - System of the human body that controls the flow of blood through the body

Digestive system - System of the human body that helps process food into fuel

Involuntary muscles – Muscles controlled without thought or will

Muscular system - System of the human body that allows the body to move

Nervous system - System of the human body that helps the body communicate with the brain and vice versa

Performance-enhancing substances - This term covers a variety of substances including drugs that improve an athlete's strength and muscle mass

Respiratory system - System of the human body that controls breathing and the exchange of air in the lungs

Tendon - A tough cord or band of connective tissue that attaches a muscle to bone

Tissue - A mass or layer of cells that form the basic structural materials of a plant or an animal

Voluntary muscles - Muscles that can be controlled by will



Health Science: Be a Superior Example (BASE) - Level 1

Applicable Common Core State Standards:

CCSS.ELA-Literacy.SL.3.1, SL.4.1, SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade-appropriate topics and texts*, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.

CCSS.ELA-Literacy.W.4.1, W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

Additional Relevant National Learning Standards:

(Based on Mid-continent Research for Education and Learning)

Health. Standard 5. Knows essential concepts and practices concerning injury prevention and safety

Health. Standard 6. Understands essential concepts about nutrition and diet

Health. Standard 7. Knows how to maintain and promote personal health

Health. Standard 9. Understands aspects of substance use and abuse

Physical Education. Standard 4. Understands how to monitor and maintain a health-enhancing level of physical fitness



Lesson & Activity

1. Before beginning the activity, review that the human body is made up of many different systems, each with a different function.
 - The **digestive system** helps process food into energy fuel for the body.
 - The **respiratory system** controls breathing and the exchange of air in the lungs.
 - The **circulatory system** controls the flow of blood through the human body.
 - The **muscular system** allows the human body to move.
 - The **nervous system** helps the body communicate with the brain and vice versa. Nerves conduct messages, control activity, and stabilize the body.
2. Discuss that each system of the human body works together with every other system to help make a strong, healthy human being. None of the systems act independently of one another.
3. Explain that today, you will be taking a closer look at the muscular system.
4. *Optional* If you have access to an anatomical chart showing the muscles of the human body, post it where students can see it, or pass it around.
5. Review that muscles are everywhere in the human body, not just in the arms, legs, or torso. There are muscles in the feet and hands. There are muscles in the neck. There are small muscles in the face that help you smile or frown, and there are even muscles that control blinking. There are more than 600 muscles in the human body.
6. Have students demonstrate how muscles work by making fists. Ask students to squeeze their fists, and then relax them. Explain that muscles are made of a special kind of **tissue** that can contract and relax, just like students' fists. Depending on what activity a person wants to do, muscles contract and relax in different ways.
7. Ask students to stand up and take a minute to move around without bumping into anyone else. They might hop, jump, run in place, do jumping jacks, twist, or dance.



8. Have students return to their seats and give you some examples of which muscles they moved during their activities.
9. *Optional* If you have access to an anatomical chart, you may point out particular muscles such as the quadriceps, biceps, triceps, etc.
10. Review that the muscles we think of most often are **voluntary muscles**. They are controlled by will. For example, during the last activity, students' thought about which activity they wanted to do, and their muscles responded accordingly. Most voluntary muscles are attached to bones, so that the muscles and bones move together. The muscles are attached with the help of **tendons**, which are basically tough cords.
11. Other types of muscles don't require any thought. **Involuntary muscles** work all by themselves. For example, there are muscles in the digestive system that help push food through the body, but they work without a person thinking about them.
12. Ask students, "How can muscles get (and stay) healthy and strong?" Write down students' ideas on the board or on a sheet of chart paper. Then discuss the ideas mentioned.
13. Discuss that exercise helps build strong, healthy muscles. The more you use a muscle, the stronger it gets. Activities such as running, jumping rope, riding a bike, and swimming build strong muscles and help the heart stay healthy. Even lifting light weights can help build muscles, but only adults should lift heavy weights. Young people could get seriously hurt by lifting weights that are too heavy.
14. Explain that having a good diet is also important for building healthy muscles. Foods from the protein group, such as lean meats, fish, tofu, and beans help the body grow and repair muscle. Fruits and vegetables contain energy that muscles use to function.
15. Lastly, discuss that part of keeping muscles healthy is keeping them safe from injury. This means that athletes who participate in certain contact sports, such as football or hockey, should wear protective gear like padding.
16. Now ask students, "How can muscles get hurt?" Again, write down students' ideas on the board or on a sheet of chart paper. Then discuss the ideas mentioned.



17. Discuss that muscles can get hurt for a variety of reasons:
- Lack of use - Muscles that are not used through frequent exercise become smaller and weaker. They will stop working the way they should.
 - Overuse - When you put a lot of pressure on a muscle or you push it too far, a muscle can get a strain. When your arms or legs hurt after exercising or lifting something very heavy, your muscles may be strained.
 - Disease - There are some diseases that attack a person's muscles and cause them to become weak or even paralyzed (that means the muscles can't move at all).
 - Harmful substances - There are some substances (drugs that people might swallow, inject with a needle, or rub onto their muscles) that will cause muscles to grow very large, very quickly. These substances are referred to as **performance-enhancing substances** (or PESs for short). While PESs will make an athlete stronger, they also have many other negative effects.
18. Demonstrate how PESs can injure muscles in the following manner: Stretch the good rubber band around a book or notebook.
19. Explain that the rubber band shows how the tendons in the human body work - they can stretch in order to help muscles move.
20. Now attempt to stretch the modified rubber band around the same book or notebook. You may want to warn students that the rubber band might snap, so they should be careful.
21. In most cases the rubber bands should snap, or at the very least tear. Explain that the rubber band shows what can happen to tendons in the human body when a person uses PESs. Performance-enhancing substances make muscles grow, but the tendons and ligaments that connect the muscles to bone do not grow. Unnaturally big, heavy muscles put extra stress on tendons and ligaments which can lead to injuries - the tendons and ligaments may actually snap just like the rubber bands.
22. Discuss the experiment. Why would an athlete want to use PESs?

Conclusion:

To conclude this lesson, have students write a letter to an athlete of their choice persuading them to build strong, healthy muscles the right way. Their letters should also include a strong argument with evidence for why athletes should not use PESs based on this lesson.