

Sprains and Strains

Integration: Health (Personal Health, Safety and First Aid); Physical Education; Science

Grade Levels: 4-6

Time: 2-3 class periods

Materials:

- Diagram of the muscular system
- Close-up of a joint with muscles, tendons, and ligaments (optional)
- Music for exercise routines (optional)

Objectives:

Students will:

1. Name the main parts of the muscular system.
2. Explain the main function of the muscular system.
3. Explain the injuries to the muscular system that Antarctic explorers may experience.
4. Create an exercise routine.

Lesson:

Full Group

1. Ask students to answer the following questions:
 - a. What part of your body allows you to run and jump? (muscles)
 - b. What part of your body allows you to breathe? (Muscles expand and contract the lungs.)
 - c. What allows blood to be pumped throughout your body? (The heart is a muscle.)

Students may answer legs, lungs, and heart. Help them to the conclusion that the muscles are what is allowing the movement.

2. Explain that the muscular system is made up of muscles and tendons that support your skeleton, allowing your body to move.
 - a. Muscles are strong, flexible tissues that make the body move by tightening and relaxing.
 - There are more than 600 muscles connected to your skeleton.
 - They are of different shapes and sizes, according to the job that they do.
 - b. Tendons are strong bands of tissue that attach muscles to bones or other parts of the body.

3. Explain that ligaments are bands of strong tissue that connect bones or hold organs in place. They are part of the skeletal system.
4. Explain that exercise is important to good health of muscles and the entire body. Exercising muscles increases *balance*, *strength*, *agility*, and *flexibility*, which all help muscles to function better. It also helps to prevent injury to muscles and tendons, keeps the body healthy and strong, and helps the lungs and heart to work more efficiently.
 - a. Balance: the condition in which opposite sides or parts of something are the same in weight, force, or amount; a secure or steady position
 - b. Strength: the quality of being strong; energy, power, or force
 - c. Agility: the ability to move quickly and easily
 - d. Flexibility: ability to bend without breaking
5. Ask students to name some ways they can exercise their muscles (aerobic exercise, stretching, running, walking, swimming, weightlifting, jumping rope, playing sports, bike riding, etc.).
 - a. Tell students that exercises can fall into different groups. Inform them of the following or have them research.
 - Stretching helps muscles stay flexible and prevents them from becoming injured during other kinds of exercise. It is healthy to stretch before and after playing sports.
 - Aerobic exercise: Aerobic exercise increases the body's oxygen consumption, thereby improving circulatory and respiratory function. Regular aerobic exercise helps prevent heart disease. It must be done for 20 to 30 minutes without stopping.
 - Anaerobic exercise: Anaerobic exercise does not increase cardiovascular strength, but may be good for increasing muscle strength, flexibility, and balance.
 - b. Tell students that it is important to warm up before exercising and cool down afterward to avoid injury.
 - Warm-up and cool-down exercises are low-intensity exercises that can include a combination of aerobic exercise and stretching.
 - Warm-up exercises gradually increase blood flow to the muscles to prepare them for the exercise that will follow.
 - Cool-down exercises gradually decrease blood flow. This prevents blood from settling in the muscles and causing soreness and stiffness.
6. Lead a discussion about injuries.
 - a. Ask students if their muscles can be hurt. If so, how? (Muscles can be bruised or torn.)
 - b. Can ligaments and tendons be hurt? If so, how? (Ligaments and tendons can be stretched or torn.)
 - c. Two of the most common muscle injuries are sprains and strains. Ask if any students have experienced these injuries. Allow for responses.

7. Explain the injuries.
 - a. Sprain: an injury that occurs when ligaments or tendons near a joint are torn or stretched.
 - Sprains often result from violently twisting a joint, such as ankle, knee, wrist, etc.
 - Symptoms include pain on movement, swelling, and discoloration.

OPTIONAL: Give each student a diagram of a joint so that they have an understanding of the relationship between muscles, tendons, and ligaments.

EXTENSION: Integrate a lesson on different types of joints.

- b. Strain: an injury caused when a muscle or tendon is overstretched.
 - Strains often result from lifting heavy objects improperly.
 - Symptoms include intense pain, swelling, and difficulty moving or using that part of the body.
8. Remind students that many injuries can be avoided by exercising on a regular basis to keep muscles, tendons, and ligaments flexible and strong.
9. Ask students, “Do Ann Bancroft and Liv Arnesen have to prepare their muscles and joints for the Expedition?” (yes)
 - a. During the Expedition, Ann and Liv ski for long hours every day for weeks while pulling sleds that weigh over 250 lbs. (113 kg).
 - b. This requires a great deal of strength, flexibility, and endurance.
10. Ask students the following questions about the Expedition:
 - a. Do you think that muscle injuries can be a problem for the explorers? (yes.)
 - b. What types of muscle injuries are common? (sprains and strains)
 - c. What do you think Ann and Liv do to try to avoid these injuries? (They prepare for the Expedition by exercising every day before it begins to strengthen their muscles and to keep their tendons and ligaments flexible.)
 - The explorers “train” for the Expedition for two years before it begins.
 - In the warm months, they run and hike.
 - In the colder months, they ski and practice pulling heavy sleds.
 - During the last 4 months before the Expedition, they train for 4 to 6 hours every day.

Small group

11. Tell students that they will explore exercise.
12. Divide the class into small groups and ask students to review the reasons why we need to exercise (to prevent injury, to increase heart and lung efficiency, to strengthen muscles and improve flexibility and strength).

13. Instruct students to work in their small groups to make up a five-minute exercise routine that includes warm-up, aerobic exercise, and cool-down activities.
 - a. They can include dance steps, animal imitations, calisthenics, or free-style movements.
 - b. They should practice the routine together and be prepared to teach it to the rest of the class.

Assessment:

Teachers will assess:

1. Student's understanding of the relationship of exercise to good health.
2. Student's explanation of the importance of exercise for preventing muscle injuries.
3. Student's synthesis of information and inclusion of warm-up, aerobic exercise, and cool-down activities in the small group exercise routines.
4. Student's ability to work cooperatively.