



## ***Passports: Adventures in Learning The Human Body Series: Skeletal and Muscular Systems Curriculum Guide grades 4-6***

### **Lesson Outcomes:**

The student will be introduced to the following concepts:

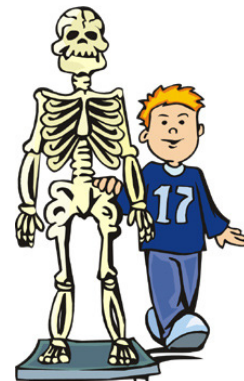
- The function of the skeletal system
- The function of the muscular system
- Activities and resources for teachers and students on the muscular and skeletal systems

### **Challenge Questions:**

- 1. What is the function of the skeletal system?*
- 2. What is the function of the muscular system?*
- 3. How do the muscular and skeletal system work together?*

### **Responses:**

1. Gives the body structure and support, protects vital organs and produces blood.
2. Allows the body to move.
3. Muscles are attached to bones, they contract to pull the bones together, and this causes the body to move.

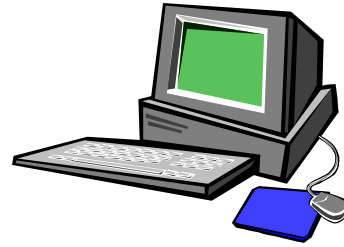


### Vocabulary Words:

- Skeleton: All of the bones in the body
- Joint: Area where two bones meet
- Cartilage: smooth, slippery substance. Provides cushion and protection for bones
- Ligament: holds bones together
- Tendon: holds muscle to bone
- Marrow: squishy, fatty tissue found in centers of long bones
- Voluntary muscle: muscles that you can move whenever you want to
- Involuntary muscle: muscles contract and relax automatically inside your body
- Smooth muscle: Controls movement of internal organs
- Cardiac muscle: Controls contractions of the heart.
- Skeletal (striated) muscle: muscles that move bones.



## Web Resources:



<http://www.kidport.com/Grade5/Science/BodyMuscles.htm>

Information and virtual activities about the muscular system

<http://yucky.kids.discovery.com/flash/body/pg000123.html>

Fun information and facts about muscles for elementary students

<http://www.stemnet.nf.ca/CITE/muscular.htm>

Information and activities on the human body systems for elementary students

<http://www.about-humanskeleton.info/>

Information on the skeletal system for elementary students

<http://www.newtonsapple.tv/>

This page from Newton's Apple explains how bones get strong, how the human body and a house are alike, and what our skeletal system does. Student activities are included.

<http://www.medtropolis.com/VBody.asp>

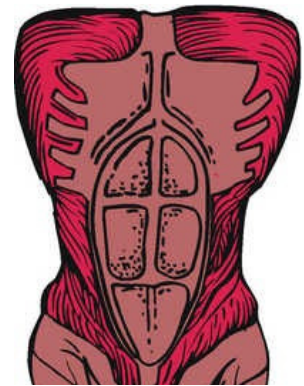
MEDtropolis site allows students from the upper elementary grades to: listen to a narration about what the different bones do; try to reconstruct a skeleton puzzle from a pile of bones; and search for a picture of one of the body's bones. (Requires Shockwave)

## Suggested Reading:

The Internal Adventures of Marcus Snarkis: Ray Nelson, Jr., Douglas Kelly, Ben Adams, Julie Hansen

The Incredible Human Body: Esther Weiner

The Human Body (Scienceworks for kids): Elissa Dosik Weinroth, Alexander Cruz, Jo Larsen, and Nancy Schoefl



## Writing Prompts:

- The skull is important because...
- My muscles help me...
- Why do skeletons seem scary?
- Muscles can't work without bones because...



## Activity: Make Your Own Skeleton

Scary. Creepy. Weird. Cool. That's what you may say about skeletons on Halloween. Now you can easily make one in your classroom. Close your eyes and think of yourself as a skeleton. Imagine all your bones from the top of your head down to your toes. Did you know that when fully grown, you will have 206 bones in your body?

### Materials

- poster board
- brads, medium and small
- glue
- scissors
- tape measures
- metric conversion charts
- anatomy book illustration of skeletal system
- chalkboard and chalk
- string

1. Make a list of all the bones that should be included in your skeleton. 2. Next, take measurements of all the bones on your list, using yourself as a model. Write measurements next to the appropriate bone on the list. 3. Either working in a small group or individually, start drawing your bone pieces on your poster board, using your measurements. Label all your pieces. Then, cut out the pieces. Finally, connect the various bones using brads or glue. 4. When you have completed your skeleton, insert a string near the top of its head and hang your masterpiece in the classroom.

### Questions

1. What things did you notice about your skeleton that is different from the real you? How could this skeleton move?
2. What did you notice about the bone sizes? Where are big bones? Little ones? Why?
3. What do the brad connectors and your joints have in common? Why is it necessary to use brads for joining some bone but not others?

## Activity: Test Your Reflexes

Pit your reflexes against the clock in this reaction-time challenge. How fast do your nerves send and receive messages? Involuntary reflexes are very fast, traveling in milliseconds. The nerve impulses in the neurons that control these reflexes travel an express route. In fact, the fastest impulses reach 520 kilometers (320 miles) per hour! Our conscious muscular response to a stimulus takes a much longer route. See just how fast your brain and nerves respond to stimuli in this experiment.

### Materials

- meter stick (yardstick)
- table and chair
- chart to record results



1. Sit with your forearm on a table surface so the hand extends over the edge.
2. Have your partner hold the meter stick with the zero end between, but not touching, your thumb and fingers.
3. Ask your partner to release the meter stick without warning.
4. Catch the stick as quickly as you can between your thumb and fingers.
5. Record the centimeter mark where you caught the stick.
6. Repeat steps 3, 4, and 5 ten times. Have your partner vary the waiting time before each drop. Record the results on a chart.
7. Cross out the highest and lowest numbers on your chart, so only eight numbers are left. Find the mean (average) of these numbers and record it.
8. Repeat this experiment with your partner catching the stick. Record the results.
9. Then switch hands and perform the same experiment. Record these results as well. Is there a difference in reaction time between your writing hand and your other hand?
10. See if an auditory stimulus affects your reaction time. Close your eyes and have your partner say, "go" when he or she releases the stick. React as soon as possible. Record your results.
11. Does distraction affect your reaction time? Have your partner ask you simple math questions and repeat the experiment. Again, record your results.
12. Compare your reaction time averages with those of your classmates. Derive a class average. Questions 1. Are there differences in reaction times between right- and left-handed people? Between genders? Between younger and older people? Experiment with test groups. What accounts for any differences? 2. How can you improve your reflex reactions? Test your theories. What can you conclude about the effects of practice and fatigue on reaction time? Adapted in part from *A+ Projects in Biology* by Janice VanCleave. Published by John Wiley & Sons, Inc. (1993).