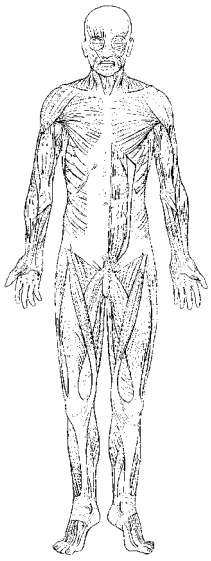
Lesson 2
—*Day 1*

Materials:
SP Lesson 2 Day 1 Pages 1 and 2
Skeletal and Muscular Systems
Shutter Fold
2 pieces of 8.5"x11" paper

Vocabulary Words:
Hand out the vocabulary strip for this lesson. Encourage your students to use the words while talking about the material and in their written work.

muscles
voluntary
muscle fiber
contracts
biceps
triceps
ligaments
tendons
involuntary
cardiac



Hand out **Skeletal and Muscular Systems** Shutter Fold.

What do you remember about joints? Review what we learned in our last lesson about the skeleton and joints.

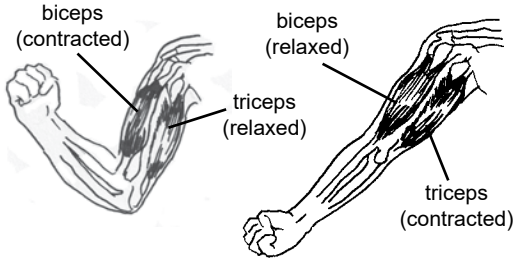
Joints are important for the movement of the body, but that movement would not be possible without **muscles**. The human skeleton is covered with over 600 muscles that vary in size and shape depending on how and where they are used.

The muscular system consists of three types of muscles: skeletal, smooth, and cardiac (heart).

Skeletal muscles are called **voluntary** muscles because you choose to control them. They are used every day to perform movements such as lifting your arm or nodding your head.

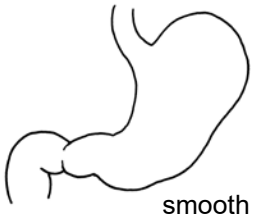
Skeletal muscles are made up of long, thin strands called **muscle fibers**. The fibers are grouped together and contain blood vessels and nerves.

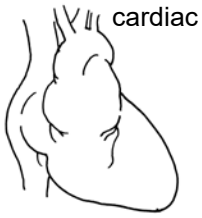
Skeletal muscles are attached to bones, and they work in pairs. While one muscle contracts the other muscle relaxes. To raise your forearm, the **biceps contracts** and shortens as the **triceps** relaxes. To lower your forearm, the triceps contracts as the bicep relaxes.



Bones are held together at the joints with ligaments and tendons. **Ligaments** are tough strands of elastic tissue located in joints to allow movement. **Tendons** are tough, flexible bands of dense fibrous tissue that connect muscles to bones. When the muscle contracts, the tendon pulls the bone resulting in movement.

Smooth muscles are located in the walls of internal organs and arteries. These muscles are used to force food through the intestines, pump blood through the arteries and control the size of the iris in the eye. Smooth muscles are also called **involuntary** muscles because we do not control them.





Cardiac muscles are located only in the heart. The heart is also an involuntary muscle. Cardiac muscle is incredibly strong, and it never stops working. The heart pumps blood to every part of the body 24 hours a day.

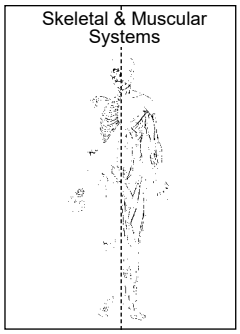
More than forty muscles are found in the face and neck. These muscles help you express your emotions through facial movements. Make different facial expressions and try to feel the muscles that are used to make them.

Muscles need oxygen which is carried throughout the body by blood. When your body works hard it requires more oxygen, so the heart beats faster. When you run, more blood is sent to your leg muscles.

Bones and muscles require good nutrition and exercise to be healthy. Muscles can become weak if they are not used regularly. To keep the heart muscle at its best requires activities that make your heart work hard. Running, bicycling, and swimming strengthen all muscles including the heart.

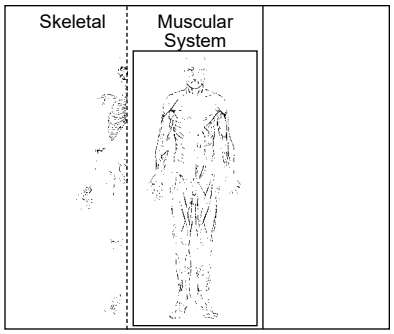
Skeletal and Muscular Systems Shutter Fold

Hand out SP Lesson 2 Day 1 Pages 1 and 2, **Skeletal and Muscular Systems** Shutter Fold, and 2 pieces of 8.5"x11" paper.



Color the muscles on image 2A red. Cut out and glue the image on the right-hand side of the *Skeletal and Muscular Systems* Shutter Fold cover.

Fold one of the 8.5"x11" sheets of paper into a Hot Dog. Place the Hot Dog so that the fold is on the left side. Cut out and glue image 2B on the front and label it *Muscular System*.



Open the Shutter Fold and glue the Hot Dog on the right side of the middle section, being sure to place the fold on the left side.

Open the Hot Dog.

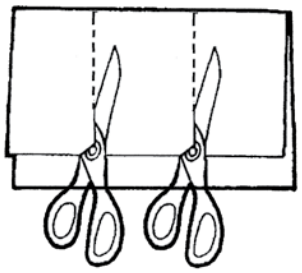
- Draw a picture that shows you using your muscles.
- Write words about the muscular system. Ex: over 600 muscles, muscles make bones move, muscles need oxygen

Define muscles, ligaments and tendons. Explain voluntary and involuntary muscles and give examples of each. *Ex:*

muscles—*Muscles vary in size and shape depending on how and where they are used. There are three types of muscles: skeletal, smooth, and cardiac (heart).*

ligament/tendons—*tough strands of elastic tissue located in joints to allow movement. Tendons are tough, flexible bands of dense fibrous tissue that connect muscles to bones. When the muscle contracts, the tendon pulls the bone resulting in movement.*

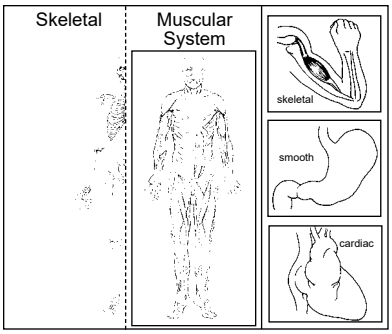
voluntary and involuntary muscles—*Voluntary muscles are muscles we choose to control, such as lifting your arm or nodding your head. Involuntary muscles are muscles we do not have to think about controlling. They are used to force food through the intestines, pump blood through the arteries and control the size of the iris in the eye.*



Using the other 8.5"x11" sheet of paper, make a 3 Tab Book by making a Hot Dog fold. Fold this into thirds. Open and cut the top creases to the fold to make three tabs.

Cut out images 2C–E and, with the fold on the right, glue an image on each tab. Label it *Three Types of Muscles*.

Open the *Skeletal and Muscular Systems* Shutter Fold. Glue the *Three Types of Muscles* 3 Tab Book on the right side.



Open the tabs.

On the Skeletal tab, draw muscle attached to a bone. On the Smooth tab, draw a tube representing a blood vessel. On the Cardiac tab, draw a heart.

Under each tab, write words about each type of muscle. *Ex:*

skeletal muscles—*you control these muscles, used to move, are long, thin, strands*

smooth muscles—*found in walls of internal organs and arteries, you do not control*

cardiac muscles—*in the heart, strong, works 24 hours a day*

Under each tab, describe each muscle and give examples. Ex:

skeletal muscles—*Skeletal muscles are made up of long, thin strands called muscle fibers. They are attached to bones by ligaments and tendons and they work in pairs. Skeletal muscles are called voluntary muscles because you choose to control them.*

smooth muscles—*Smooth muscles are located in the walls of internal organs and arteries. Smooth muscles are also called involuntary muscles because we do not control them.*

cardiac muscles—*Cardiac muscles are located only in the heart. The heart is also an involuntary muscle. Cardiac muscle is incredibly strong, and it never stops working, The heart pumps blood to every part of the body 24 hours a day.*

This completes the *Skeletal and Muscular Systems* Shutter Fold. Present it to at least one person and tell them everything you have learned about the skeleton and muscles.

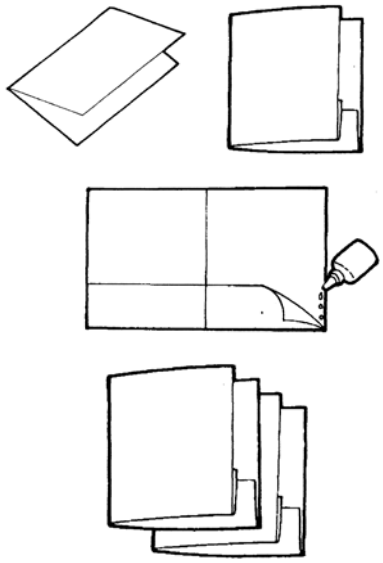
Lesson 2 —*Day 2*

Materials:
SP Lesson 2 Day 2
2 pieces of 8.5"x11" paper
Lab Cards (index cards)

Hand out 2 sheets of 8.5"x11" paper.

Today, we are going to make a Lab Book to record our labs. Use two sheets of 8.5"x11" paper to make a Pocket Book by folding each sheet in half like a Hamburger. Open the paper and fold one of the long sides up two and a half inches to form a pocket. Glue the outer edges of the two and a half-inch fold with a small amount of glue.

Refold along the Hamburger fold so that the newly formed pockets are on the inside. This will make a book with two pockets.



Make another Pocket Book and glue the front page to the back of the first book.

Throughout the course you will be adding more pages to this book.

Muscles and Rest Lab 2-1

Write the name of the lab and the date on a Lab Card.

Do muscles need rest to function at their best? Discuss what you think with your teacher. Dictate or record your prediction on the Lab Card.

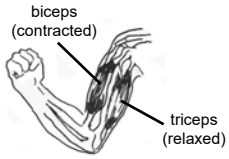
Make a fist and open it with your fingers extended. Do this as many times as you can within 15 seconds. With no rest in between, complete five more times. Take a 15-minute rest period. Describe how your muscles felt before and after the rest.

Repeat the exercise by making a fist and opening it with your fingers extended five more times. Draw a picture or write your feelings before and after your rest on the card.

What does this tell you about muscles and rest? Do your muscles work easier with or without rest? Write your conclusions on the Lab Card.

Cut out and glue Lab Image 2-1 on the first left pocket and put the Lab Card for this lab in the pocket.

Muscle Pairs Lab 2-2



Write the name of the lab and the date on a Lab Card.

Sit in front of a table. Place one hand under the table, palm up. Press up on the table. Which muscles do you think will be used to do this activity, triceps or biceps? Discuss your ideas with your teacher.

With your free hand, feel the biceps and triceps in your working arm. Which muscles are harder? Record what you observed. *The biceps were harder, which means they are contracted and the triceps are relaxed.*

Now, place your hand on top of the table, palm down. Press down on the table. Use your other hand to feel your biceps and triceps. When you pressed down on the table, which muscle was harder, the biceps or triceps? Record your observations on your Lab Card. *The triceps were harder which means they are contracted and the biceps are relaxed.*

What does this tell you about muscle pairs? Write your conclusion on the back of your Lab Card. Cut out and glue Lab Image 2-2 on the right pocket of your Lab Book and put the Lab Card in the pocket.

Involuntary and Voluntary Muscles Lab 2-3

Write the name of the lab and the date on a Lab Card.

Raise your right arm. Extend your left arm in front of you. Jump. Are the muscles you are using involuntary (do they move on their own) or voluntary (do you control their movements)? On the Lab Card, draw or write about the activity and the type of movement you used to complete it. *Voluntary muscle movement*

Now, place your hand over your heart. Can you feel your heart beating? Is your cardiac muscle moving on its own or did you decide to make it move? *Involuntary muscle movement*

Discuss similarities and differences between arm muscles and cardiac muscles. Write your conclusion about these muscles. *Some are voluntary muscles that move when I move them, and some are involuntary and move when they need to move.*

Cut out and glue Lab Image 2-3 on the next pocket and put the Lab Card in the pocket.

Lesson 2 *—Day 3*

Collect materials for the activities you choose:
mirror
measuring tape

Choose one or more activities to complete:

1. Make a list of voluntary and involuntary muscles.
2. There are over 600 muscles in the human body! Some are voluntary muscles and others are involuntary muscles. If you are teaching multiple students, assign students a region of the body, such as the face, head, chest, abdomen, hands, feet, or even the ears. Then have them research to find about different muscles in their region and present information to the whole class. What muscles help you wiggle your toes? What muscles help you hear? If you are working with one student, ask him/her to choose a region or two to research and present.

3. When focusing on the muscular system, it's easy to forget about the smaller muscle groups, like those found in the face. Let students see how the muscles in their faces affect their facial expressions. Supply the children with small, hand-held mirrors and ask them to make facial expressions—sad, happy, surprised, scared and so on. Ask children to note the way the muscles in their faces contract and move. You can also talk about the muscles in the tongue by getting children to stick out their tongues and move them around.
4. Measuring biceps—Get a measuring tape and a buddy.

   Have your buddy help you measure the circumference of your biceps while relaxed.

   Contract your muscles and have your buddy measure the circumference while contracted.
5. Read *The Magic School Bus: Inside the Human Body* by Joanna Cole (gr. K-3).
6. Read and discuss *Emmanuel's Dream: The True Story of Emmanuel Ofosu Yeboah* by Laurie Ann Thompson (gr. K–3).

Body Blurbs

The largest muscle in the human body is the gluteus maximus, which is the muscle you sit on.