Muscular and Skeletal Systems

Help your students bone up on the skeletal and muscular systems using the following activities and reproducibles.

Background for the Teacher

Human beings have an amazing network of bones and muscles. The skeleton supports the body and protects delicate organs. Bones and muscles work together to enable the body to move. Share these amazing facts about bones and muscles with your students:

- The skeleton is like a frame that supports the body. Without the skeleton, humans would be shapeless and limp like jellyfish.
- Besides supporting the body, bones protect the main organs, store minerals such as calcium and phosphorus, and produce blood cells in the marrow.
- Bones can be flat, long, short, or irregular.
- Babies have about 300 bones, which are softer than adult bones. As bones grow they become harder. Some fuse together so adults end up with 206 bones.
- There are about 656 separate muscles. The brain and spinal cord control the muscles by electrical signals that come into the muscles along nerves.
- Muscles are connected to bones by tendons. They pull the tendons to move the bones.
- The body's muscles weigh more than its bones.
- Skeletal muscles are usually voluntary, which means they can be controlled. Smooth and cardiac muscles are involuntary, which means they work automatically.

What Are You Looking At?

(Identifying Bones)

Give your students an opportunity to experience X-ray vision! In advance, visit a local radiology lab and request discarded X rays to share with students. Ask a technician to help you identify the major bones shown on each X ray. Then divide students into groups of three or four. Give each group a diagram of the skeletal system (see the example shown), other skeletal reference materials, and one X ray. (You may want to number the X rays for easy reference.) Instruct each group to use its reference materials to help identify and describe the functions of the bones on the X ray. Also direct students to note anything unusual that they observe, such as a break or fracture. Have students record their findings on a sheet of notebook paper. Allow time for the groups to swap and evaluate all of the X rays. Then have a volunteer from each group present its findings. If desired, invite the X-ray technician to visit your class and answer students' questions. Perhaps you'll see a group of budding radiologists!

A “Bone-anza” of Bone and Muscle Books

The Big Book of Bones: An Introduction to Skeletons by Claire Llewellyn (Peter Bedrick Books, 1998)
Dem Bones by Bob Barner (Chronicle Books, 1996)
The Skeleton Inside You (Let's Read and Find Out Series) by Philip Balestrino (HarperTrophy, 1989)
Build a Bone Burrito
(Making a Model)

Making these edible bone models will not only help your students visualize bone structure but tickle their funny bones as well! Show your class a diagram of the layers of long bone while discussing long bone structure. Then provide each student with the materials listed below, along with markers or crayons and a 9” x 12” sheet of white drawing paper. Guide students through the steps shown to construct their edible bone models. When the models are completed, discuss the parts of bone represented by each ingredient. Follow up the activity by having each student divide his drawing paper in half and then illustrate a labeled bone burrito model on one half of the paper and a labeled bone structure on the other half. For an added "bone-us," allow students to eat their bone burritos after sharing their work.

Materials for each student: one 5½” soft tortilla shell, 1 ladyfinger, 1 tsp. strawberry jam, 1 plastic knife, 1 Nutter Butter® cookie, 1 length red shoestring licorice

Steps:
1. Open the ladyfinger and spread it with jam.
2. Lay one end of the length of licorice on the jam and close the ladyfinger.
3. Open the cookie and sandwich the ladyfinger between the cookie halves.
4. Wrap the tortilla shell around the cookie layers and coil the remaining licorice around the tortilla shell.

Handy Noodles
(Creative Writing, Making a Model)

Here's a handy way to familiarize your students with the bones in the hand. Display an example diagram of the hand. Point out to students that the human hand has 27 bones, allowing it to perform many tasks. Direct students to feel and move the bones in their own hands and then brainstorm ways they use their hands every day, such as for clapping, waving, and holding pencils. Write their responses on the chalkboard. Next, provide students with a supply of medium shell-shaped pasta, three different sizes of tube-shaped pasta, a 9” x 12” sheet of tagboard, glue, and a variety of arts-and-crafts supplies. Challenge students to create realistic skeletal models of the hand on the tagboard using the glue and pasta. While their models are drying, have each student write a short rhyming poem titled "Handy Hands." (Encourage students to use the actions from the brainstormed list in their poems.) After the models are dry, direct each student to copy his poem onto the tagboard and add decorative borders with extra pasta, and the arts-and-crafts supplies. Display the poems and models on a bulletin board titled "Our Handiwork."
I’ll Have the Ribs, Please!
(Making a Model)

Need an activity to give your students a closer look at the role ribs play in breathing and in protecting critical organs? These student-made models are made to order! Enlarge and make a class supply of the patterns below. Display and discuss the “Fascinating Facts” at the right with your students. Guide your students through the steps below to create their own rib cage models. Then have each student write a paragraph describing the rib cage and explaining its importance and function.

Steps:
1. Cut out the patterns along the bold lines. Label the breastbone, the backbone, and the ribs.
2. Label and color both sides of the heart, lungs, and diaphragm.
3. Carefully cut out the intercostal muscles on the right side of the front rib cage. Color the remaining intercostal muscles.
4. With the back rib cage facedown, glue the diaphragm pattern in front of the floating ribs.
5. Glue the lungs just above the diaphragm.
6. Glue the heart slightly to the right of the backbone, just above the diaphragm.
7. Glue the rib cage pieces together so the organs are caged in between.

Fascinating Facts:
- Humans have 24 ribs, which are all attached to the backbone.
- The seven pairs of upper ribs join the breastbone and are called true ribs.
- The next three pairs, the false ribs, are attached to the breastbone by cartilage.
- The two lowest pairs connect only to the backbone and are called floating ribs.
- Intercostal muscles are attached between the ribs and help move the rib cage during breathing.
- Ribs protect the heart and lungs and work with a muscle called the diaphragm to move air in and out.

Pattern
‘Use with “I’ll Have the Ribs, Please!” on this page.'
Simon Says... A Lot About Muscles!

**Directions:** Read the instructions below. Use the word bank to fill in each blank with the muscle action being described. Then, follow Simon's directions to discover the mystery muscle action.

<table>
<thead>
<tr>
<th>Action Word Bank</th>
<th>1. You got nervous or ate too fast. A stream of air rushed into your lungs through your vocal cords. Your diaphragm pulled air into your lungs. You started to cough. Your action is voluntary or involuntary.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. You received a ten-speed bicycle for your birthday. Two facial muscles pulled up the corners of your mouth. You started to smile. Your action is voluntary or involuntary.</td>
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<tr>
<td></td>
<td>3. You got out of the pool and felt cold. The muscles in your skin contracted, causing the hair on your skin to stand on end. You started to shiver. Your action is voluntary or involuntary.</td>
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<td></td>
<td>4. Your best friend gave you a gum before class. Powerful muscles in your cheeks and at the side of your head moved your jaw and you started to chew. Your action is voluntary or involuntary.</td>
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<td></td>
<td>5. A tiny particle of food got caught in your windpipe. A muscle contraction sent it out of your lungs and you started to cough. Your action is voluntary or involuntary.</td>
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<td></td>
<td>6. You moved from a dark hallway into the bright sunshine. Muscles known as sphincter muscles in your skin contracted, causing the amount of light to the skin. You started to sneeze. Your action is voluntary or involuntary.</td>
</tr>
<tr>
<td></td>
<td>7. Pepper irritated some nerve endings in your abdomen. Chest vocal cords, throat, and eyelids contracted. You started to cry. Your action is voluntary or involuntary.</td>
</tr>
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<td></td>
<td>8. Your vocal cords moved as air was forced through them. As the muscles got longer and higher-pitched sounds and you were voluntarily moving.</td>
</tr>
<tr>
<td></td>
<td>9. You laughed so hard that muscles around the abdominal muscles tightened. This caused salty fluid to be squeezed out and involuntarily passed.</td>
</tr>
</tbody>
</table>

**Classifying muscles**

- **Voluntary** - muscles you can control—actions like writing, running, and talking. Involuntary muscles—muscles that work without your having to think about them—control actions like breathing and blinking.

- **Involuntary** - muscles that are squeezed and released involuntarily.