EXPLORING OUR HUMAN BODIES

Teacher Notes

The human body may be the most complex and versatile object in the world. Dozens of systems coordinate to perform the myriad operations that we require of it at all times. This module addresses the human skeleton, the heart and muscles that power the body.

Students will observe and investigate the human skeletal and muscle systems and become aware of the versatility of movement provided by our skeleton. They will gain experience through the use of diagrams and hands-on activities that will help them develop an awareness of human bone and muscle structure and their function. In addition, they will acquire the vocabulary associated with the human skeletal and muscle system.

Supplies (for a class of thirty students)

1. 15 stethoscopes
2. Classroom clock with a visible second hand
3. 30 heart beat calculation worksheets
4. 30 pencils
5. 30 scissors
6. Body parts chart with the bones easily identified (www.lakeshore.com)
7. Large diagram of human muscles
8. 30 small balls (Ball should be small enough to be easily held.)
9. plastic bendable Q-tips (some cut in half, some with just the tips, and a few that are whole), enough for the girls to make six Q-tip skeletons
10. Construction paper
11. 10 bottles of glue

Activity 1: Hearing a Heartbeat

In this exercise, we will listen to the sound and frequency of a heartbeat.

Have the girls pair up and listen for their partner's heartbeat by placing the stethoscope over their partner's heart. Ask them to count the number of beats per 30 seconds. Add this number together twice to find out how many times each minute their partner's heart beats. Next, have one partner run in place for one minute, then listen again. Have the students write down what they hear and calculate the new beats per minute. They will notice that the heart beats faster after the exercise (in order to pump more blood (oxygen) into the working muscles). Have the partners switch so that each girl gets a chance to participate.

HOW MANY TIMES DOES YOUR HEART BEAT EVERY MINUTE?

# of heartbeats standing still? x 2 =	# of heartbeats after exercise? X 2 =

Questions to ask:

Did you and your partner have the same heartbeats per minute? What did you notice about your heartbeat after you exercised? Why do you think your heartbeat increased?

Activity 2: Muscles and Movement- Let's Play Tag!

In this exercise, we will learn the names and locations of major muscles in the body.

The main function of muscles is to provide movement. Muscles provide coordination and structure for the body.

It takes a lot of work for muscles to pull on bones so that you can move. Along with muscles and joints, bones are responsible for you being able to move. Your muscles are attached to bones. When muscles contract, the bones to which they are attached act as levers and cause various body parts to move.

This simple activity will teach the girls the basic muscle groups with word association. As you say the name of the muscle group, point to where the muscle are located on your body. Here are some muscle groups, their definitions, and the words used to help remember them:

Trapezius -- The muscle that "traps" your head onto your shoulders.
(large flat triangular superficial muscle of each side of the upper back)
Deltoids -- The airplane muscles. Have the girls put their arms out like an airplane. Then they remember DELTA AIRLINES.
(a large triangular muscle that covers the shoulder joint and serves to raise the arm laterally)
Abdominals -- These are our DOMINOS PIZZA muscles. Students remember this is where the Dominos Pizza goes.
(the part of the body between the thorax and the pelvis)
Obliques -- These are the muscles where the girls put their hands on their waist and say "OH BOY, that pizza was good."
(any of the thin flat muscles forming the middle and outer layers of the lateral walls of the abdomen)
Gluteus Maximus -- The girls remember this with the phrase, "Glue your bottoms to your seat."
(the outermost muscle of the three glutei found in each of the human buttocks)
Gastrocnemius -- This is the place where your legs store the GAS to run faster.
(the largest and most superficial muscle of the calf of the leg arising by two heads from the condyles of the femur and attaching to a tendon that becomes part of the Achilles tendon)
Biceps-- These muscles help you to ride a BICYCLE.
(the large flexor muscle of the front of the upper arm and the large flexor muscle of the back of the upper leg)
Triceps- these muscles help you to ride a TRICYCLE.
(the great extensor muscle along the back of the upper arm)

Ask the girls to go through the rest of the major muscles and come up with interesting and unique associations to help learn them more easily and remember them.

Let's Play Tag!

If your group is able to go outside or has access to an auditorium, this activity is a great was to reinforce the location of the muscles in the body.

This game will work best after the girls have been taught several of the muscles of the body.

Have all the girls get a small ball and ask them to find a good space in the playing area. On your signal, the girls are to walk and try to tag anyone and everyone in the area until you tell them to stop. When tagged, the girls are to freeze, touch a muscle on their body that has been discussed in class (i.e., abdominals, biceps, triceps, etc.) with their ball. Then they are to wait for a classmate, who has not been tagged, to come over and guess which muscle they are touching. If she identifies the correct muscle, then the frozen girl is allowed to continue playing. If she guesses incorrectly, then she has to wait for another girl to come by and identify the muscle correctly. Start the girls off by having them walk, then change to a faster walk or skipping. Be sure to limit the time for tagging, perhaps to 30 second increments, so that each girl gets a chance to tag and be tagged during the course of this activity.

Questions to ask:

Ask the girls to name a major muscle in the human body. Ask the girls to show where the muscle is located and to explain its function. Why are muscles important?

Activity 3: Our Bones

In this exercise, we will learn that the human body has a skeleton, united by joints that is ready for action. The structure of a bone is related to its function.

A human body can move in many ways. Movements are aided and limited by bone and point structures. Bones have a variety of forms and have three major functions-support, protection and locomotion.

What would happen if you didn't have bones? You would be floppy like a rag doll. Bones have two purposes. Some, like your spine, provide the structure, which enables you to stand tall instead of being floppy. Other bones protect the delicate, and sometimes soft, insides of your body. Your skull, a series of fused bones, acts like a hard helmet for your brain so that is protected. Your rib cage protects your heart and lungs. The bones, or vertebrae, of your spinal column surround and protect your spinal cord.

You also need joints. which provide flexible connections between these bones. Your body has different kinds of joints. Some, such as those in your knees, work like door hinges, enabling you to move back and forth. Those in your neck enable bones to pivot so you can turn your head. Still other joints like the shoulder enable you to move your arms 360 degrees like a showerhead. You have over 230 working joints in your body!

When you are born, you had over 300 bones. As you grow, some of these bones began to fuse together. The result is that as an adult, you have only 206 bones!

This activity will help the girls learn bones of the body using fun and active visual and auditory cues. As you say the name of the bone, be sure to point to it on your own body. There are many bones and you can come up with your own cues for each of them. Here are some examples:

Phalanges – have the girls wiggle their fingers in the air
(small bones in the fingers or toes of land vertebraes)
Radius - show the "thumbs up"
(the bone on the thumb side of the human forearm)
Vertebrae - Say "bend this way."
(one of the bony or cartilaginous segments composing the spinal column)
Ribs - Place hands on the ribs and take a big breath
(any of the paired curved bony or partly cartilaginous rods that stiffen the walls of the body of most vertebrates and protect the viscera)
Patella - Say "Knees" and put hands on patella.
(a thick flat triangular movable bone that forms the anterior point of the knee and protects the front of the joint)
Metacarpals - Clap out a beat
(a bone of the part of the hand or forefoot between the carpus and the phalanges that typically contains five more or less elongated bones when all the digits are present)
Metatarsals - Stomp out a beat

(any of several tubular bones between the ankle (tarsal) bones and each of the hindlimb digits)
Femur - Say and place hands on femur, "I've got the femur!"
(the proximal bone of the hind or lower limb -- called also thighbone)
Carpals - Say, "yes" using sign language
(carpal element or bone)
Pelvis - Say, "Wiggle it just a little bit."
(a basin-shaped structure in the skeleton of many vertebrates that is formed by the pelvic girdle and adjoining bones of the spine)
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Q-Tip Skeleton

This activity will help the girls to better understand the bones that make up the human skeleton. The girls will be able to point and identify some of the major bones in the body by making a Q-tip skeleton.
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Have the girls work in teams of five. Before beginning, have them brainstorm about different bones and write their responses on the board. Using the skeletal diagram, ask the girls to locate any bones that they have just learned. Show them the major bones on the skeleton (keep the basic bone name - thigh bone, spine, ribs, arm bone, leg bone). Show the girls how all the bones come together to form the skeleton.

Each team will receive a piece of construction paper along with several plastic bendable Q-tips. (Please cut the Q-tips in varying lengths prior to the lesson -- several cut in half, some with just the tips, etc.) Each team should also have one plastic bendable Q-tip to serve as the spine. Have the girls follow these directions:

Glue the uncut plastic Q-tip in the middle of the construction paper. This will be the spine of the Q-tip skeleton. Everything else will build off of the spine. Take two of the half Q-tips and glue each of them off of the spine facing down -the fuzzy tips pointing down will be the knee joints. Repeat this process for the leg bone; connect another half Q-tip with the fuzzy end of the thigh bone to complete each knee joint. (If you want, you can cut off little chunks of Q-tips for the girls to add feet.) To make the skeletal ribs, put half of a Q-tip on each side of the spine up by where the head will go. (For the next rib, you can cut each side a little smaller to make a tapering effect to the ribs. Repeat this process for a couple of ribs.) If your group is younger girls, you don't need to go to this extreme – just whole and part q-tips works fine. The process for the arms is similar to the legs. Be sure to use the fuzzy tips to make an elbow. (Again, if you want, you can cut five little chunks of Q-tip to make fingers.) To make the head, the girls can use cut pieces of Q-tip to make an octagon type head. Each team can now add in any bones that they feel might add to the skeleton, as well as drawing a face on their skeleton.

Interesting Facts:

- The human hand has 27 bones; your face has 14!
- The longest bone in your body? Your thigh bone, the femur -- it's about 1/4 of your height.
- The smallest is the stirrup bone in the ear, which can measure 1/10 of an inch.
- Did you know that humans and giraffes have the same number of bones in their necks? Giraffe neck vertebrae are just much, much longer!

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Questions to ask:

Ask the girls to identify two major bones on the skeleton. Ask them to name a bone and its function in the human body. What is the longest bone in the body? What is the smallest? Did you expect your bones to look like the bones in the diagram? Why or why not?

Related Reading

Hear Your Heart, Let's Read and Find Out Science, Stage 2, ISBN: 0064451399

The Skeleton Inside You, Let's Read and Find Out Science, Stage 2, ISBN: 0064450872