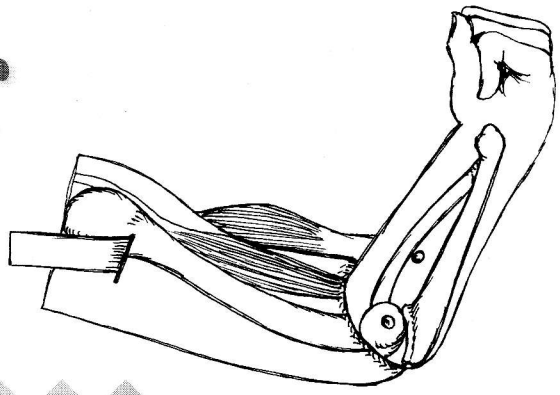
Muscle Maker

Students make a model that shows how muscles pull on bones.



Body Basics

Muscles are what move the body. The *muscular system* is made up of more than 600 individual muscles. Muscles attach to the bones they move with stringy *tendons*. Some muscles move under our direction, like arm and leg muscles. These are voluntary, or *skeletal* muscles. Skeletal muscle tissue is made up of bundled muscle fibers, which are in turn made up of long, striped muscle cells. Other muscles work by themselves. Organ and blood vessel muscles are examples of involuntary, or *smooth* muscles. *Cardiac*, or heart muscle has characteristics of both of smooth and skeletal muscle.

Skeletal muscles work by contracting, or shortening, and then relaxing, or lengthening. When you "make a muscle," the muscle in your upper arm (the biceps) contracts and shortens and thickens into a bulge. This bends the elbow and pulls the bones of the arm toward each other. When you relax the muscle, it lengthens and the arm unbends at the elbow. Nerves send signals to muscles that make them relax or contract. The nerves carry messages from the brain. Skeletal muscles can be controlled just by thinking about them. Smooth and heart muscle cannot.

Materials

- reproducible page 57
- scissors
- 2 brass fasteners
- crayons, colored pencils, or markers (optional)

Making the Model

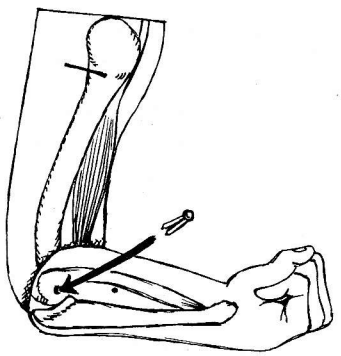
1. Photocopy page 57. Color the page if desired.
2. Cut out the three pieces along the solid black lines.

Explore More!

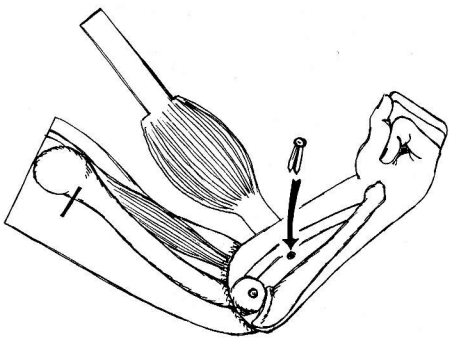
Muscle Power

Many of our muscles work in pairs: When one muscle contracts, the other muscle relaxes. Ask students to put one hand, palm up, against the underside of the their desk and push upward. With their other hand, have them feel the front and back of their upper arm. Ask: Did the muscle in front or back get hard? Explain that the hard muscle in the front is called the *biceps*. When it bunches up, the muscle in the back of the arm (the *triceps*) relaxes. Now have students press on the desktop with their palm and feel their muscles again. What happens? (The triceps contracts and hardens and the biceps relaxes and softens.) Challenge students to find out whether their leg muscles work in the same way.

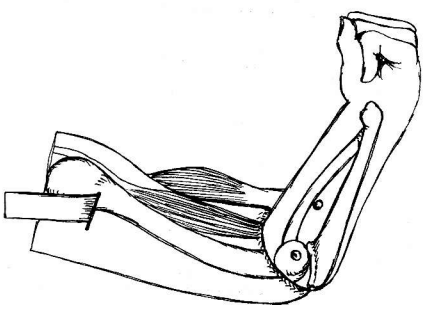
3 Cut open the slit along the solid black line of the upper arm piece. Punch holes at the four black dots using the tip of the scissors or the fasteners.



4 Set the two arm pieces at right angles to each other with the lower arm on top. Feed one fastener through the lower arm's end hole and the upper arm's hole, as shown.



5 Set the muscle piece behind the arm pieces. Match up its hole to the other hole of the lower arm and feed the second fastener through. Fold back the fastener's ends.



6 Slide the end of the muscle labeled PULL through the slit so it can be pulled from the front of the model.

Teaching With the Model

1 Ask students to make a muscle by bending their elbows. Then ask them to work the model by pulling up on the PULL tab to contract the muscle and then pulling down on the lower arm to relax the muscle. Ask them to describe the process.

2 Ask students if muscles pull or push—or both. (only pull)

3 Challenge students to name what kind of muscle makes the arm move. (skeletal muscle)

4 Ask: What are the three kinds of muscle and where are they found? (skeletal muscle in muscles you move yourself; smooth muscle in organs and blood vessels; heart, or cardiac muscle in the heart)

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