

MAKING A WORKING ARM MODEL

Based on model demonstrated at: <https://blog.sonlight.com/muscle-science-activity.html>

The arm is made up of three bones - Radius, ulna, and humerus. The joint that will be demonstrated will be the elbow.

Materials needed:

- Three sheets of 11 x 14 inches posterboard
- Masking tape
- 2 long balloons (and pump)
- Marker
- Straight pin
- Large paperclip



STEP 1: Roll two posterboard sheets along the narrower side and secure them into tubes using the masking tape. Roll the third posterboard along the wider side. This will create two 11 inch bones, the radius and ulna bones, and one 14 inch bone, the humerus. Label the bones using the marker.



STEP 2. Line up the radius and ulna on either side of the humerus.



STEP 3. Use a long straight pin to pierce a hole through the humerus, about half an inch from the right end. Similarly, pierce a hole through the ends of the radius and ulna about half an inch from the left end. Wiggle the pin a bit to enlarge the hole.



STEP 4. Straighten a paperclip to create a long flexible wire. Bend the hook at the bottom end.



STEP 5. Place the three bones on the table. The humerus should be on the left, the radius on the upper right, and the ulna on the bottom right. Line up the pierced holes and thread the paperclip wire through the holes to create a joint. Make sure the wire is bent at each end to keep the wire from pulling out. Place tape over the sharp ends to keep the wire from popping the balloons.



STEP 6. Partially inflate two long balloons, leaving a tail at both ends. Label one as bicep and one tricep.



STEP 7. Tie the end of the bicep balloon to the top of humerus.

STEP 8. Tie the other end of the bicep balloon around both the radius and ulna. It should be tied closer to the elbow joint than shown in the photograph.



STEP 9. Tie one end of the tricep balloon to the right end of the right side of the elbow joint.

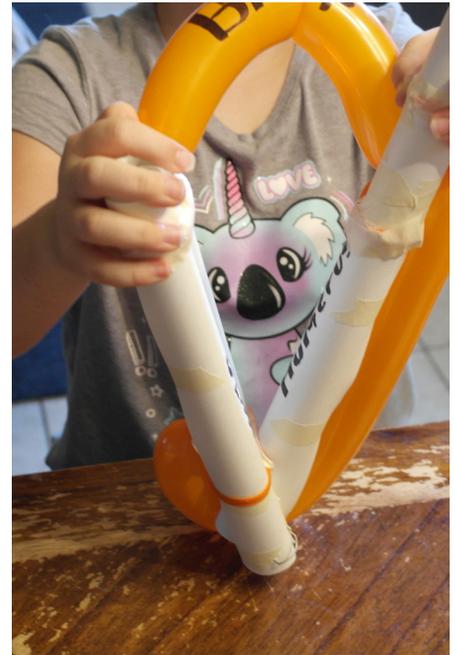
STEP 10. Bring the balloon around the back of the elbow and tie the other end of the tricep balloon to the top of the humerus.





When the arm is extended it is because the bicep has relaxed and elongated and the tricep has contracted (gotten shorter)

When the arm is bent, the bicep contracts and the tricep relaxes.



So when you show off your 'muscles,' the bicep is what you are trying to show.

QUESTIONS:

Q1. Would the model arm work properly if only one balloon muscle was used?

Answer: No. Skeletal muscles like the ones in your arm must work in pairs. These are called flexor and extensor muscles.

Q2. In this model, which muscle is the flexor and which is the extensor?

Answer: In this model the bicep is the FLEXOR and the tricep is the EXTENSOR.

Q3. When you straighten your model arm, what happens to the tricep (extensor) muscle?

Answer: Even though it is called an extensor, to 'extend' the arm, the tricep must contract in order to straighten the limb.

Q4. When you bend the elbow joint, what happens to the bicep (flexor) muscle?

Answer: The bicep contracts to bend the limb at the joint.

Q5. Is the arm the only place where muscle pairs are found?

Answer: No. Skeletal muscles are found attached to your bones and are important for making your bones move at the joints. Can you name some?

MUSCLE Map

