Elbow in Motion

Build a model of how muscles pull bones at a joint.

HAP.5.1 "Develop and use models to illustrate muscle structure, muscle locations and groups, actions, origins, and insertions."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each muscle's origins, circle its insertion, and write 1 beside the flexor group and 2 beside the extensor group to plan an accurate elbow model.

A Cup, an Elbow, and Two Muscles

1. Imagine reaching for a cup, then bringing it to your mouth. At the elbow, muscles pull on bones to change the angle between the upper arm and forearm. To model this motion on paper, draw the humerus on the upper-arm side of a hinge and the radius and ulna on the forearm side. Sketch a muscle as a thick band beside the bones and a tendon as a narrow cord connecting muscle to bone. A whole skeletal muscle contains bundles called fascicles; each fascicle holds muscle fibers, which are long cells. The simple band stands for many fibers working together.

2. On the front of the upper arm, the biceps brachii is part of the elbow flexor group. Its two heads begin on the scapula, the shoulder blade. These attachments are its origins, relatively stable ends during this elbow movement. A tendon attaches the biceps to the radius, a forearm bone, at its insertion. When its fibers contract, the muscle shortens and pulls the radius toward the upper arm. The elbow flexes: the angle between upper arm and forearm gets smaller. A model should show the biceps crossing the elbow joint, not stopping above it.

3. On the back of the upper arm, the triceps brachii belongs to the elbow extensor group. One head begins on the scapula, and two heads begin on the humerus; these attachments are its origins. Its tendon reaches the olecranon, the bony tip of the ulna at the elbow, where it inserts. When the triceps shortens, it pulls the ulna and straightens the elbow, increasing the angle between upper arm and forearm. The biceps and triceps form an opposing pair: one can bend the elbow, while the other can straighten it. Neither muscle pushes a bone.

2 ANSWER WITH EVIDENCE

Use the passage

1. How would you place and connect the biceps in a model that shows the elbow bending?

2. Where would you mark the triceps origins and insertion on a model of the arm?

3. A model shows the biceps ending on the humerus above the elbow. What must you change so the model can show elbow flexion?

4. When the triceps shortens, how does the elbow angle change? Use the muscle's location and insertion to explain.

3 YOUR TURN

Your own words

Draw two side-by-side models: first, reach toward a cup by straightening your elbow; second, bring the cup toward your mouth by bending your elbow. In each panel, label the scapula, humerus, radius, ulna, and both muscles; mark the shortening muscle's group, origins, insertion, and an arrow showing elbow motion.

ANSWER KEY

Elbow in Motion

PART 1 · READ AND MARK

Underline each muscle's origins, circle its insertion, and write 1 beside the flexor group and 2 beside the extensor group to plan an accurate elbow model. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How would you place and connect the biceps in a model that shows the elbow bending?	**Place it on the front of the upper arm, with origins on the scapula and an insertion on the radius. Show it crossing the elbow and shortening as the angle decreases.**
2	Where would you mark the triceps origins and insertion on a model of the arm?	**Mark one origin on the scapula and two on the humerus. Mark the insertion on the olecranon of the ulna.**
3	A model shows the biceps ending on the humerus above the elbow. What must you change so the model can show elbow flexion?	**Extend its tendon across the elbow to its insertion on the radius. Then it can pull the forearm toward the upper arm.**
4	When the triceps shortens, how does the elbow angle change? Use the muscle's location and insertion to explain.	**The angle increases. The triceps is on the back of the upper arm and pulls on its insertion at the ulna, straightening the elbow.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Panel 1 shows an elbow moving from bent toward straight, with an arrow showing the angle increasing. The biceps is labeled on the front and the triceps on the back. The triceps is marked as the shortening extensor, with one origin on the labeled scapula, two on the labeled humerus, and its insertion on the labeled ulna. Panel 2 shows an elbow moving from straight toward bent, with an arrow showing the angle decreasing. Both muscles are labeled in the same locations. The biceps is marked as the shortening flexor, with origins on the scapula and its insertion on the labeled radius.

Accept simplified muscle shapes if they cross the elbow on the correct side and connect to the correct bones. The motion arrows must show an increasing angle for extension and a decreasing angle for flexion.