

## **PAL Intro to Muscle Worksheet**

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1. Describe the characteristics unique to each of the three types of muscle tissue.

<b>muscle type</b>	<b>location in the body</b>	<b>unique characteristics</b>

2. Draw a diagram of a sarcomere. Make sure to include the following elements.
  - a. Actin, myosin, titin, Z-line, M-line, zone of overlap.

3. Muscles generate movements by exerting force and motion through a lever system. There are three different lever systems, and all muscles fall into two of those categories.
  - a. Draw the three classes of levers below. Be sure to include the fulcrum, point where the load is applied or input, and point where force is output. Label in-lever and out-lever.
  - b. Give a non-example for each one.
  - c. Determine which lever class represents the biceps and elbow, and which represents the triceps and elbow.

In nearly all circumstances, levers are arranged with the muscle using a very short lever arm. Discuss why, even though the muscle must generate very large amounts of force relative to the force needed.

4. Muscles come in a variety of architectures (shapes), and that shape determines the function of the muscle. In the case of muscles that are organized in a way that pull on a single distal tendon, different architectures represent a tradeoff between force and velocity.
  - a. Draw an example of the following muscle shapes
    - i. Parallel
    - ii. Unipennate
    - iii. Bipennate
    - iv. Multipennate
  - b. Give 2 examples of each muscle type
  - c. Arrange the muscles in order of increasing strength, assuming equivalent muscle mass.