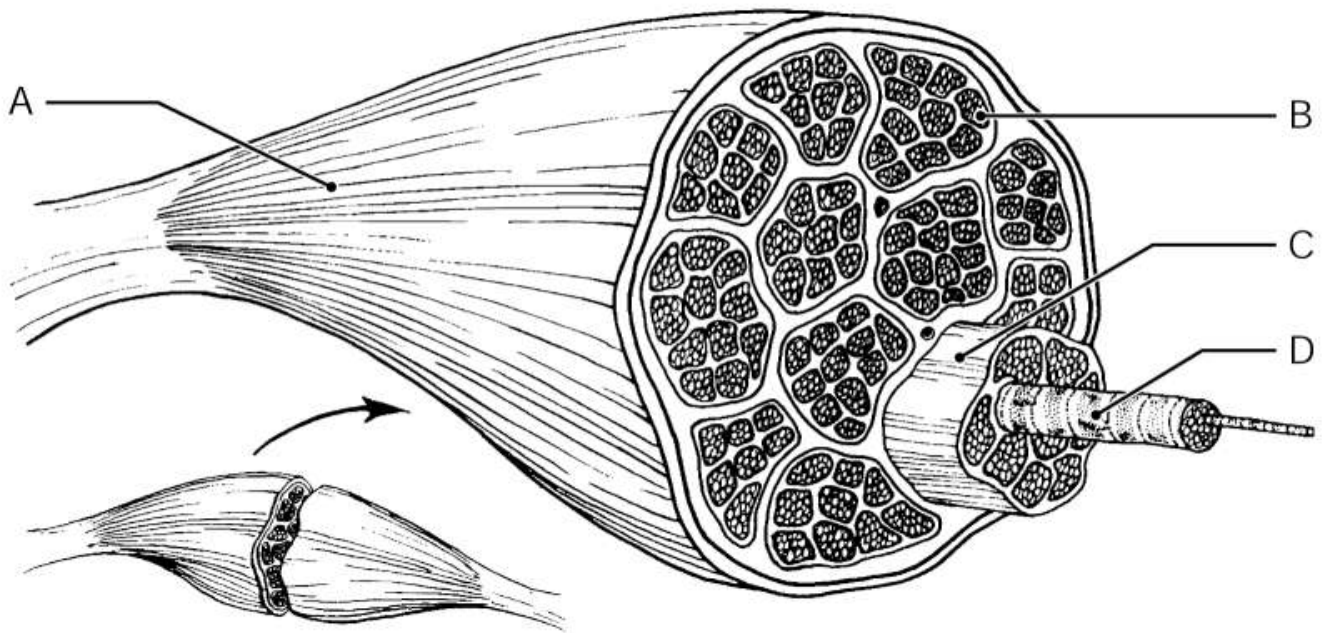


## Muscle Questions

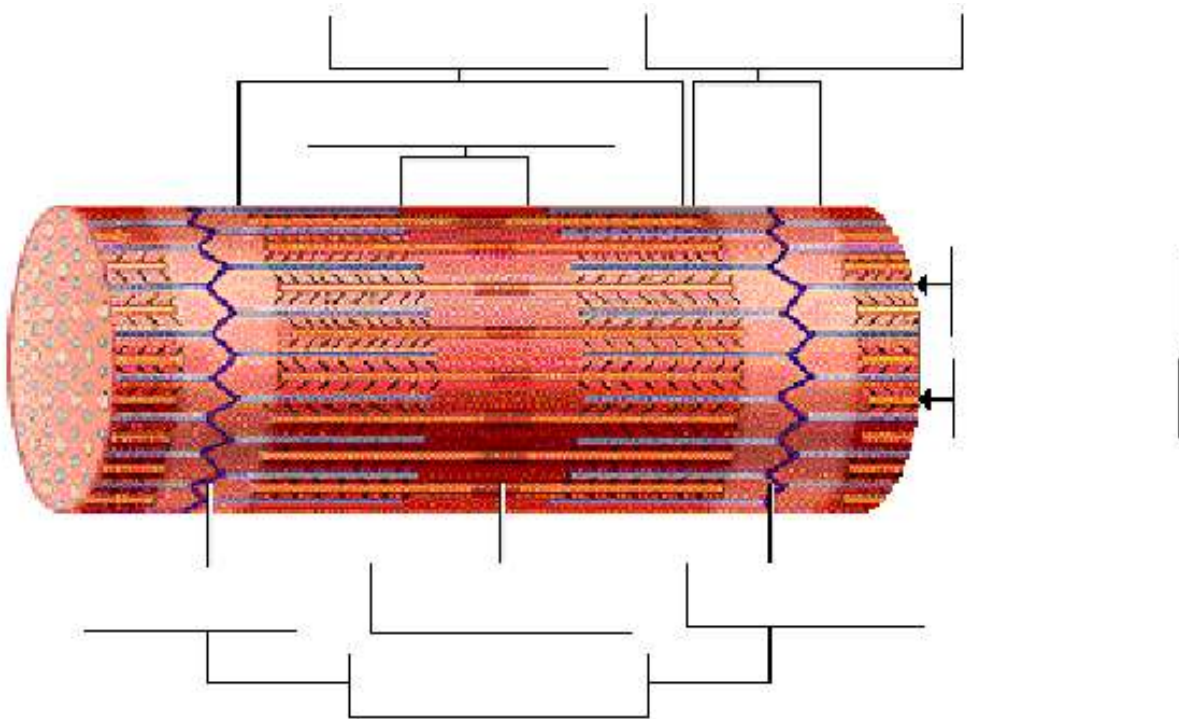
1. What is the main function of skeletal muscles?
2. List the three types of contractile cells of the body.
3. Compare the shapes of the three types of contractile cells.
4. Compare the visible appearance of the three types of contractile cells.
5. What is the name of the structure that attaches skeletal muscles to bones?
6. Bundles of skeletal muscle cells are called \_\_\_\_\_.
7. The connective tissue which immediately surrounds a muscle is called \_\_\_\_\_ and the connective tissue around the fascicles is called \_\_\_\_\_.
8. What is the function of endomysium?
9. Describe the following features associated with skeletal muscles.
  - a. Sarcolemma
  - b. Muscle fibers
  - c. Mitochondria
  - d. Sarcoplasmic reticulum
  - e. Myofibril
10. What are the names for the two types of filament in a myofibril?
11. What creates the skeletal muscle cell's striated appearance?
12. Perpendicular to the myofilaments are the Z lines and the M lines. The Z lines connect the \_\_\_\_\_ filaments and the M lines connect the \_\_\_\_\_ filaments.
13. The region of the myofibril between two Z lines that is the contractile unit of a muscle cell is called a \_\_\_\_\_.
14. Arrange the following from smallest structure to largest structure:
  - a. Muscle cell or muscle fiber
  - b. Fascicle
  - c. Myofilaments
  - d. Whole skeletal muscle
  - e. Myofibril
15. What happens at the neuromuscular junction when the action potential arrives at the axon terminal.
16. What happens to acetylcholine after it is released into the synaptic cleft?
17. What happens after the acetylcholine binds to the acetylcholine receptor on the motor end plate (sarcolemma)?
18. What happens to the acetylcholine after it diffuses away from its receptor on the motor end plate?
19. What happens when calcium ions are present in the cytosol of the muscle cell?
20. According to the sliding filament theory, when a muscle cell contracts, the \_\_\_\_\_ filaments slide past the \_\_\_\_\_ filaments and the \_\_\_\_\_ shortens.
21. List the six most important chemicals involved in muscle contraction.
22. Where is myosin found in skeletal muscle cells?
23. What are the two parts to a myosin molecule?
24. Which part moves providing the power stroke for muscle contraction?
25. Which part of the myosin molecule has a hinge which allows vertical movement so that the cross-bridge can bind to actin?
26. What two important binding sites are found on the cross bridges (heads) of myosin?
27. What three protein molecules are the thin filaments made of?
28. Each subunit on actin contains binding sites for \_\_\_\_\_.
29. What is the function of tropomyosin?

30. What is the function of troponin?
31. What causes the tropomyosin to move away from the myosin binding sites on the actin?
32. Which of the following will attach to myosin?  
actin                      tropomyosin                      troponin                      ATP                      calcium ions
33. Which of the following will attach to actin?  
actin                      tropomyosin                      troponin                      ATP                      calcium ions
34. Which of the following will attach to troponin?  
myosin                      tropomyosin                      actin                      ATP                      calcium ions
35. What causes the release of calcium ions into the cytosol from the terminal cisternae?
36. What causes the myosin binding sites on actin to be exposed?
37. What happens after the tropomyosin moves over, exposing the binding sites on the actin?
38. What is it called when the cross bridge flexes, pulling the filament inward toward the center of the sarcomere?
39. What causes the myosin heads (cross bridges) to disconnect from the actin?
40. What causes the myosin cross bridges to go from their tilted state to their upright, high energy state?
41. What is required to move the calcium ions from the cytosol back into the sarcoplasmic reticulum?
42. List the following steps in the order they would occur in a single cross bridge cycle.
  - a. ATP binds to the cross bridge and the cross bridge disconnecting from actin.
  - b. Myosin bind to actin.
  - c. Calcium ions are transported back into the sarcoplasmic reticulum.
  - d. Presence of calcium ions in the cytosol trigger the exposure of binding sites on actin.
  - e. The power stroke occurs.
  - f. ATP is hydrolyzed, leading to the re-energizing and repositioning of the cross bridge.
43. During the contraction of a muscle cell, what is happening to
  - a. the length of the sarcomere?
  - b. the position of the Z lines with respect to one another?
  - c. the length of the thin filament?
  - d. the length of the thick filament?
  - e. the width of the H zone?
44. Compare skeletal, smooth, and cardiac muscles as to their body location, microscopic anatomy, regulation of contraction, speed of contraction, and rhythmicity.
45. List the seven criteria that are used in naming muscles and give an example of each.
46. Discuss the importance of calcium in skeletal muscle contraction.
47. Discuss the role of the myosin heads in sliding filament theory.
48. Describe the events that occur from the time that a motor neuron releases acetylcholine at the neuromuscular junction until muscle cell contraction occurs.
49. Explain the steps in the sliding filament theory of muscle contraction, following the spreading of an action potential along the sarcolemma.
50. What is the primary functional difference between an origin and an insertion?

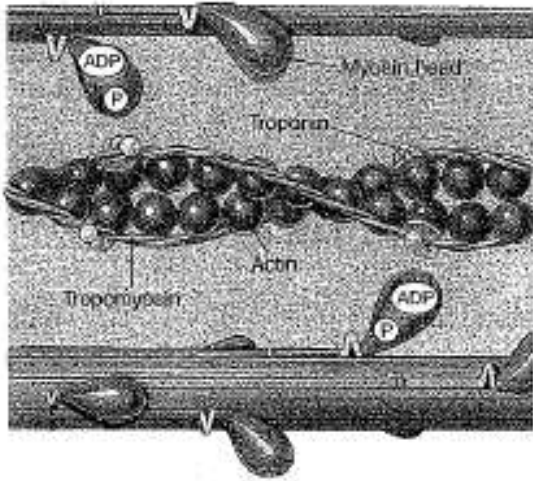
51. Identify the labeled features on the muscle below.



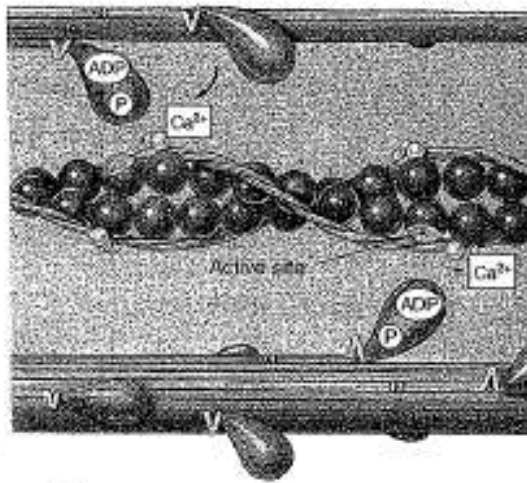
52. Label the regions of the sarcomere below.



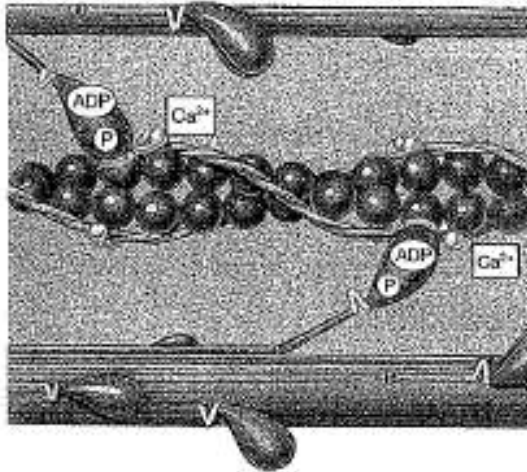
53. Identify the steps in the contraction process.



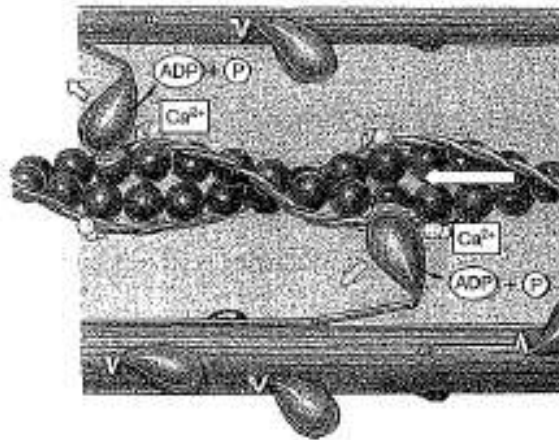
1. \_\_\_\_\_



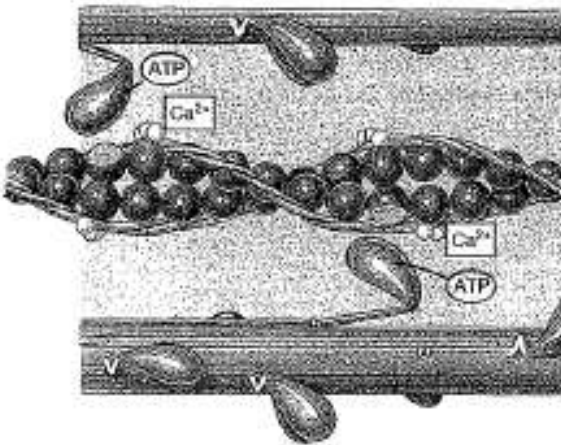
2. \_\_\_\_\_



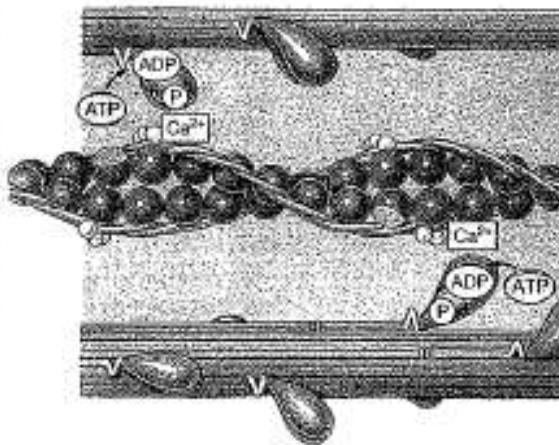
3. \_\_\_\_\_



4. \_\_\_\_\_



5. \_\_\_\_\_



6. \_\_\_\_\_