

C11.1

1. Why is a skeletal muscle cell called a muscle fiber?
2. What prefix is used to describe skeletal fiber's organelles? Give three examples.
3. What is the sliding filament theory? Significance? General concept?
4. What is the difference between myofibrils and myofilaments?
5. What is a triad?
6. What glucose polymer is stored inside the muscle fibers' sarcoplasm as a source of energy to make ATP?
7. What is stored inside the sarcoplasmic reticulum? What do you know because it is "concentrated" inside the sarcoplasmic reticulum? What do you know about its release?
8. What phase of the cell cycle are skeletal muscles "locked into"? What happens if you destroy a muscle fiber? What is this process called? Explain this phenomena using a baseball pitcher.
9. What is the functional unit of a muscle fiber? What structures define the margins of this functional unit? Draw and label a picture of this functional unit.
10. What are the contractile proteins in skeletal fibers called? How do we describe these proteins?
11. What are the regulatory proteins in skeletal fibers called? Functions of each protein?
12. What are the structural proteins in the muscle fiber? What is the function of these structural proteins? What disease is caused by a genetic mutation to one of these structural protein? What is the name of this protein?
13. What happens to the Z disc when a muscle fiber contracts? What happens to the length of the thick and thin protein myofilaments?
14. What are the subunit called that are used to construct thick myofilament? What sport metaphor maybe used to describe the appearance of this protein polymer? How are these "clubs" arranged along the myofilament?
15. What are the monomers of the thin myofilament? How is the thin filament constructed? What regulatory protein rest in the thin myofilament "groove"? What structure on the actin molecule is "hidden" by the regulatory protein?
16. What binds to the smaller regulatory protein to make the larger regulatory protein expose the myosin binding head receptor?
17. What is the function of titin? Location

18. What is the skeletal muscle voluntary motor pathway? From where to where? Name of two neurons in the pathway?
19. What is a synapse? What are the three components of a synapse? What is the name of the synapse between a nerve and muscle fiber called? Draw a simple picture and label.
20. What is the significance of acetylcholine at the skeletal muscle's synapse? Where is it made? Where is it stored? When released, what will acetylcholine bind to?
21. What are the four phases of a skeletal muscle contraction cycle? What occurs at each phase?
22. What is the difference between a local potential and an action potential? Where do these events occur at the neuromuscular junction?
23. What are the steps between acetylcholine being released from the presynaptic knob to the calcium binding to troponin?
24. What occurs during excitation contraction coupling?
25. What occurs during contraction? What happens to the "cocked" myosin head when it binds to the actin binding site? What is this union called? What must happen before this union is broken? What phrase describes this event?
26. What must occur to allow a muscle fiber may relax? (Hint: what started the muscle contraction?)
27. What is a motor unit? How are motor units used? Do eye or leg muscles have smaller motor units? Significance?

C11.3

28. What happens to the length of a muscle fiber during an isometric muscle contraction? What happens to the length of a muscle fiber during an isotonic muscle contraction? Describe the phase "shift" as you try to lift a heavy object.
29. Why should you use your legs and not your back to lift a heavy object off the floor? Explain using the sliding filament theory. What is this principle called?
30. What two muscle fiber types may determine if a child prefers to run sprints or cross country races? What enzymes and metabolic pathways underlie this choice?
31. What changes occur in a skeletal muscle fiber as a result of endurance training, resistance training, and disuse?

C11.4

32. What are the two metabolic pathways used by a muscle fiber to make ATP? What is the fast and slow pathway?
33. What is the function of creatine phosphate? Location? When is it formed and how?

34. How do muscle fibers use the glycogen and myoglobin in their sarcoplasm? Explain this in terms of the respiratory and cardiovascular system functions.

35. Assume you are running a long distance race. You will need ATP throughout the race.

>What is the two sources of ATP in the first two seconds of the race?

>What is the source of ATP during the next eight seconds of the race?

>What is the source of ATP between eight seconds and 40 seconds?

>What is metabolized and from where using what metabolic pathway during the next 90 minutes?

>If you continue to run then where will the fuel come from to support what metabolic pathway?

>After you stop running, you continue to breath heavily, why? What is this called?

C11.5

36. How may smooth muscles be induced to contract? What must occur inside the cytoplasm before the smooth muscle will contract?

37. What nervous system regulate smooth muscle contractions?

38. Are smooth muscle able to regenerate?

39. What is the difference between multiunit smooth muscle and single unit smooth muscle? Which form have gap junctions? Give examples where you find each type of smooth muscle.