

## Muscular System

### Required:

1. Describe the “connective tissue harness” or wrappings of all skeletal muscles using the terms:  
epimysium, perimysium, endomysium, fiber, fascicle, entire muscle.
2. Explain the interrelationships among the following muscle anatomy terms: muscle cell/myofiber, myofibrils, and myofilaments.
3. Draw and label a myofibril of at least (2) sarcomere lengths, labeling and defining the following terms: Z-line, A-band, I-band, H-zone, myosin, actin.
4. Describe the specialized structures of the muscle cell: sarcolemma, peripheral, multiple nuclei, sarcoplasmic reticuli, sarcoplasm, T-tubule triads, and SR cisternae. Be able to locate and identify as well as describe the function of each cellular component.
5. Describe how a muscle is stimulated to contract by a neuron.
6. Define and explain the significance of the term “motor-end unit” or neuromuscular junction.
7. Explain how motor end units, recruitment and force of contraction are inter-related.
8. List and discuss the five factors that determine the force of a muscle contraction.
9. Describe the roles of  $Ca^{+2}$ , troponin and tropomyosin in excitation-contraction coupling.
10. Explain the events that occur during cross bridge cycling and the roles of ATP in muscle contraction and relaxation.
11. Explain the sliding filament theory of muscle contraction.
12. Describe the events that lead to muscle relaxation.
13. Describe the effects of stretching skeletal muscle on the subsequent force of contraction and relate these effects to the action of actin and myosin filaments.
14. Describe the staircase effect (treppe) and indicate why the force increases progressively with each of the first several contractions in a previously inactive muscle.
15. Define tetanus and explain why it is possible in skeletal muscle but not in cardiac muscle.
16. Describe muscle tone. Explain the terms hypotonic/flaccidity vs., hypertonic/spasticity in muscles.

17. Distinguish between anaerobic and aerobic pathways of ATP production in skeletal muscle.
18. Explain the role of creatinine phosphate in muscle metabolism.
19. Explain the role of stored glycogen(carbohydrate loading) in muscle metabolism.
20. Describe the function of myoglobin in muscle.
21. Describe the factors associated with muscle fatigue.
22. Describe the effects of aerobic (endurance) training and contrast these effects with those of weight training.
23. Relate the weight training terms “progressive overload” and “burn” to the graded strength principle of muscle contraction.
24. Distinguish between isometric and isotonic contractions in skeletal muscle.
25. Describe the concepts of muscle atrophy and hypertrophy, including the main contributing factors to both processes.
26. Differentiate between slow and fast twitch/ red vs. white muscle cells/fibers both structurally and functionally.
27. Describe how the CNS controls voluntary muscle contraction (hierarchy of muscle control).
28. Compare and contrast the structure and function of cardiac and skeletal muscle tissue
29. Describe the structure and function and location of smooth. visceral muscle tissue.
30. Distinguish between single-unit and multi-unit smooth muscle both structurally and functionally.