

**Section 1: 10 pt each**

1. Sketch a force-length curve and use the sliding filament theory to explain the different regions.
2. Sketch a force-velocity curve and use the crossbridge theory to explain the decline in force.
3. Outline the steps of the crossbridge cycle, being sure to identify the stages of ATP hydrolysis.
4. Outline the key events of excitation-contraction coupling, being sure to identify major channels and calcium-binding molecules.
5. Sketch a sarcomere, identify significant structures, and name the major molecular components.
6. Explain the functional or performance benefits of orderly recruitment

**Section 2: 5 pt each**

7. Explain the contribution of phosphocreatine, glucose, and pyruvate to cellular ATP.
8. Compare and contrast fast fatigable motor units and fast glycolytic muscle fibers.
9. Describe the "Hill" or "three element" model of muscle, and its explanation for the force velocity relationship.
10. What are the gating stimuli of DHPR and RyR? ie, what causes each of these channels to open?
11. Following repeated muscle contractions, there are many cellular-level processes that contribute to fatigue. Pick one of those processes and explain how it contributes to decline in force.
12. Do you think titin or extracellular collagen is the dominant source of passive tension in muscle? Why?
13. Describe one of the circumstances where the force-velocity relationship is violated.
14. How does mass action contribute to the rate of fatty acid metabolism during physical activity?