Muscle Questions

1. Consider muscle tension:  
   a. Describe the two different mechanisms we can use to increase muscle tension.
   b. Draw a graph that describes one of the above mechanisms.
   c. When muscle tension does not exceed the resistance and a muscle does not change length, what type of contraction is occurring?

2. Consider energy conversion and use in a skeletal muscle cell:  
   a. What molecule (call it molecule X from now on) provides the energy necessary to do work?
   b. What two metabolic pathways can skeletal muscle cells use to produce molecule X?
   c. Where in the cell does each pathway occur?
   d. How much (lots or little) of molecule X does each pathway produce?
   e. Which pathway(s) requires O2?

3. Working muscles fatigue either because they lack something (like a car running out of gas), or because they’ve got too much of something.  
   a. Tell me what two things muscle cells might lack.
   b. What one thing they might have too much of.

4. The muscle I use to do a pull-up and the muscles I use to sneer at you are very different in size and shape. Please tell me:  
   a. What muscle would I mainly use to squint?
   b. How many motor units (qualitatively) do you expect that muscle to have?
   c. How many muscle fibers (qualitatively) do you expect each motor neuron to control & why?
   d. What muscle would I mainly use to do a pull-up?
   e. How many motor units (qualitatively) do you expect that muscle to have?
   f. How many muscle fibers (qualitatively) do you expect each motor neuron to control & why?

5. Consider a muscle contraction:  
   a. What ridiculously important ion is used in both the pre-synaptic motor neuron AND the post-synaptic muscle cell when an action potential stimulates a muscle contraction?
   b. What does the ion do in each case?