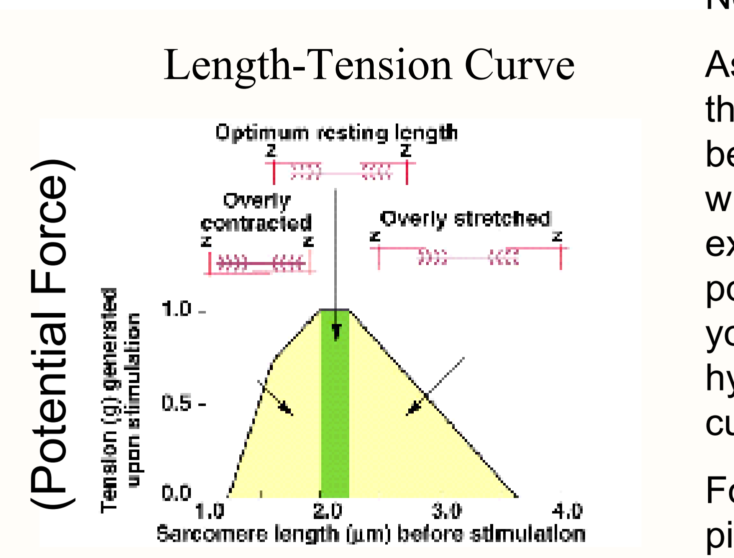
1105 and Anatomy and Physiology I topic: "Length Tension Curve"

Learning Objectives:

The student will be able to:

- Read a graph.
- Find the domain and range given a graph.
- Find intervals on which the function is increasing, decreasing, or constant and discuss the significance of that in the given context.
- Write the equation of a line.
- Write a piecewise defined function by limiting the domain.
- Evaluate a piecewise defined function.
- **Graph a piecewise defined function.**



(Muscle Length)

Notes for the non-A&P instructor:

As we read from left to right on the x-axis: as the length of the muscle lengthens (relaxes) the potential force that can be generated will increase until the normal resting position where the maximum potential force lies. As the muscle over-extends (lengthens past the resting position) the amount of potential force will decrease. (Think of the starting point as your fist up by your shoulder and the ending point as being hyper-extended.) In reality, it would be smoothed out (a curve.)

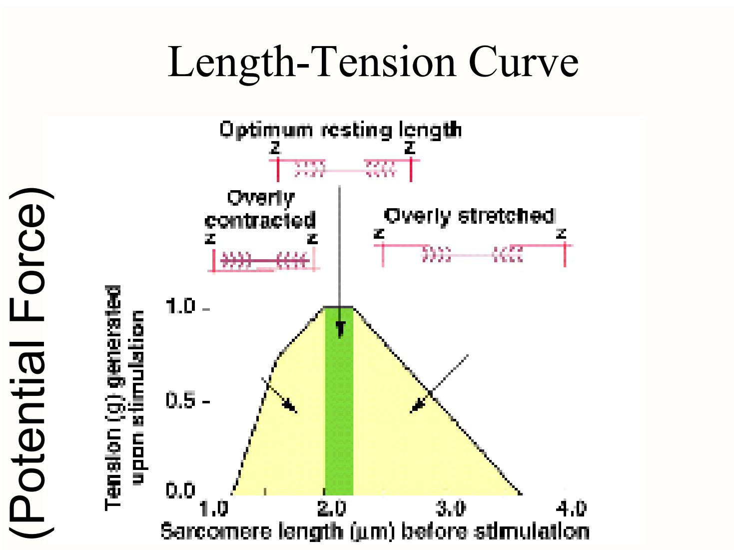
Follow up by having the students evaluate and graph a piecewise function.

Answers are attached as notes at the bottom of the corresponding slide.

Anatomy and Physiology Length-Tension "Curve"

- Given that the horizontal axis goes from muscles that are "balled up" (shortened) to those that are hyper-extended (lengthened). Where do you have the greatest potential to create force? Write this as an interval.

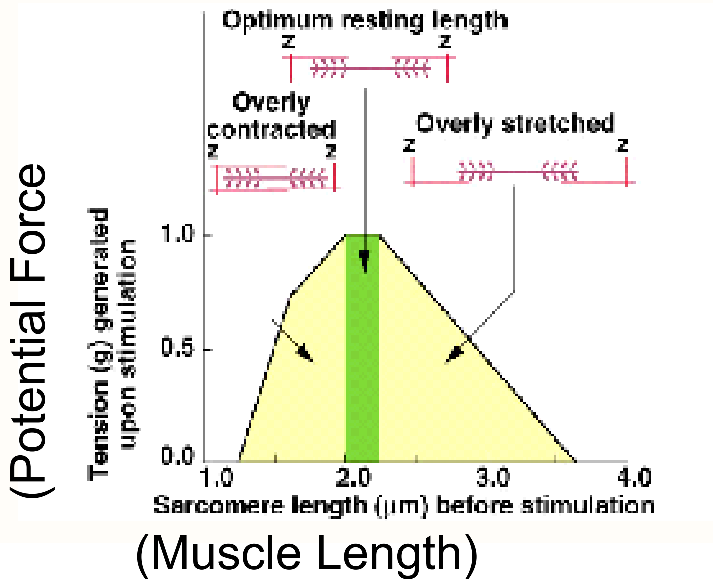
(Potential Force)



(MuscleLength)

- On what intervals is the potential decreasing and increasing? What does that mean?

Length-Tension Curve



How many different "pieces" are there? Write the domain for each.

Now given the equation for each "piece", use what you know about slope to match the segment with its domain. How could you write this as a single function? Discuss the importance of domain in this problem.

$f(x) = 1$

$f(x) = .667x + .75$

$f(x) = 1.765x – 2.118$

$f(x) = -0.702x + 2.545$

Calculate the approximate tension generated for a sarcomere length of 2.7?