Virtual Learning

9-12th PLTW® HBS

PLTW® 4.2.5 Rigor Mortis Modeling
Part 2: How Muscles Contract

April 15, 2020

Human Body Systems

9-12th PLTW® HBS
Lesson: April 15, 2020

Objective/Learning Target:

Students will be able to explain how the hydrolysis of ATP in muscles cause muscles to contract and relax during normal life processes, and how during rigor mortis, without ATP, the myosin molecules adhere to actin filaments and the muscles become rigid. *(Reference: PLTW® 4.2.5 Rigor Mortis Modeling)*

Let's Get Started/Warm Up Activities:

Watch Warm Up Videos:

- Rigor Mortis Animation
- Two Minutes on Rigor Mortis

Lesson/Activity:

Watch Video: Muscle Contraction Process*

*Watch only 1:47-4:24 min of the video

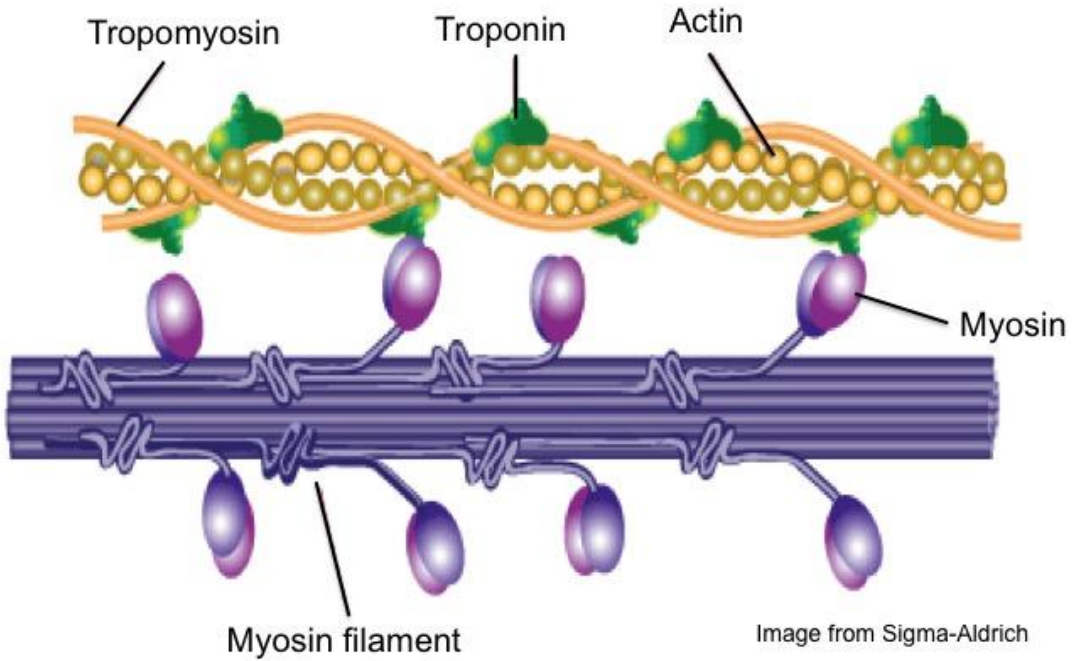
Activity #1: On a piece of paper or in your notebook, write notes over the following terms using the video above as a reference (only watch 1:47-4:24 min).

- Actin
- Myosin
- Cross-bridges
- Sliding-filament theory
- ATP
- ADP
- Myosin head
- Actin binding site
- Powerstroke
- Sarcomere
- Calcium
- Troponin
- Tropomyosin
- Sarcoplasmic reticulum
- T-tubules

Lesson/Activity continued:

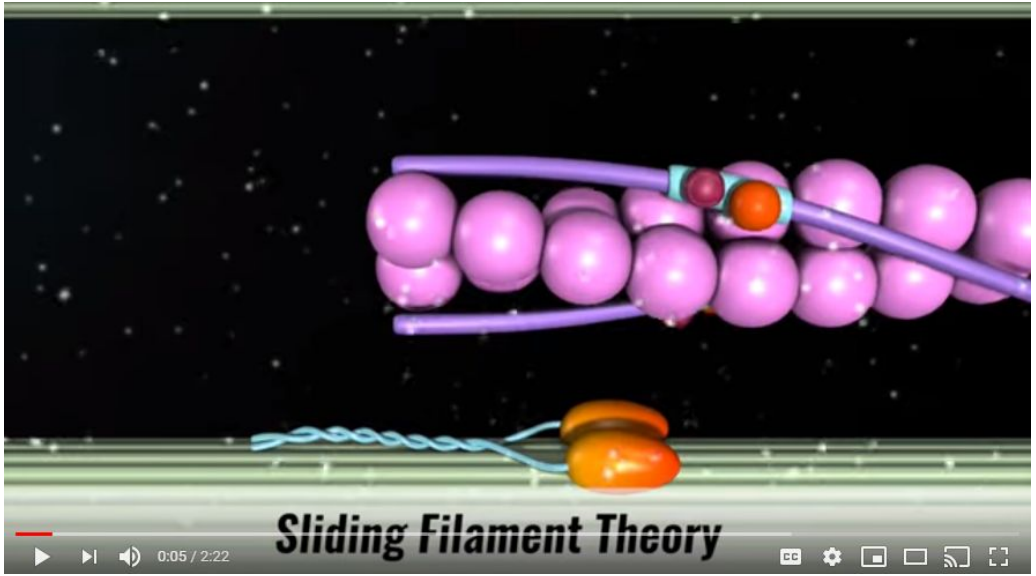
<u>Activity #2</u>: In your notebooks or on a piece of paper, draw the following diagram of the inside of a sarcomere.

- Label actin as the thin filament and myosin as the thick filament.
- Use arrows to indicate the filaments' movements.



Lesson/Activity continued:

Activity #3: Click HERE to view a video about the sliding filament theory. On your piece of paper or in your notebook, explain in simple terms (so a 6th grader could understand) how the sliding filament theory works.

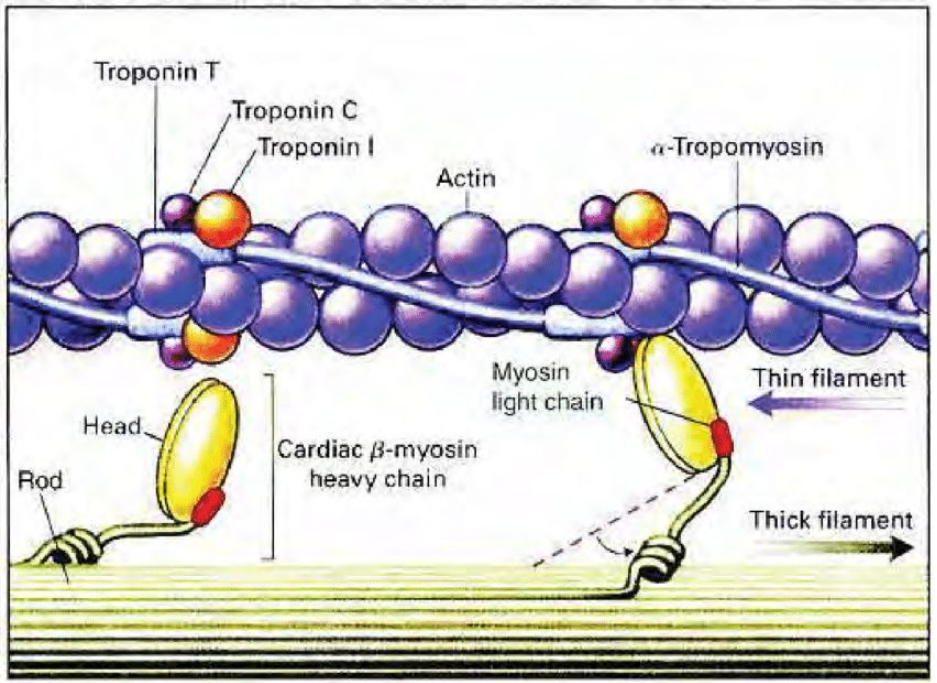


Lesson/Activity Answers:

Activity #1 Answers:
Click HERE to see how muscles contract and relax.

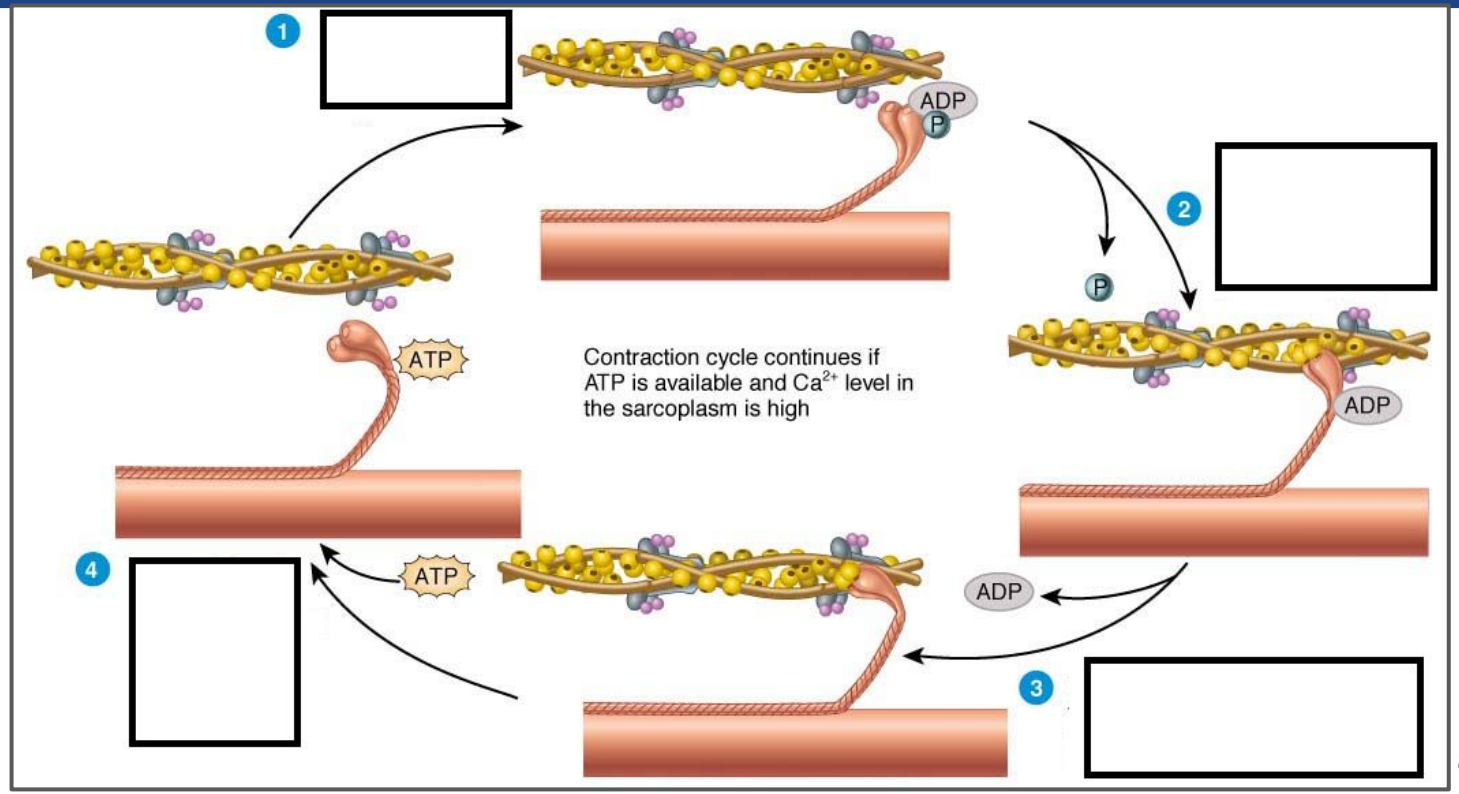
Activity #2 Answers:
See diagram to the right.

Activity #3 Answers:
Click HERE to see how the sliding filament theory works.

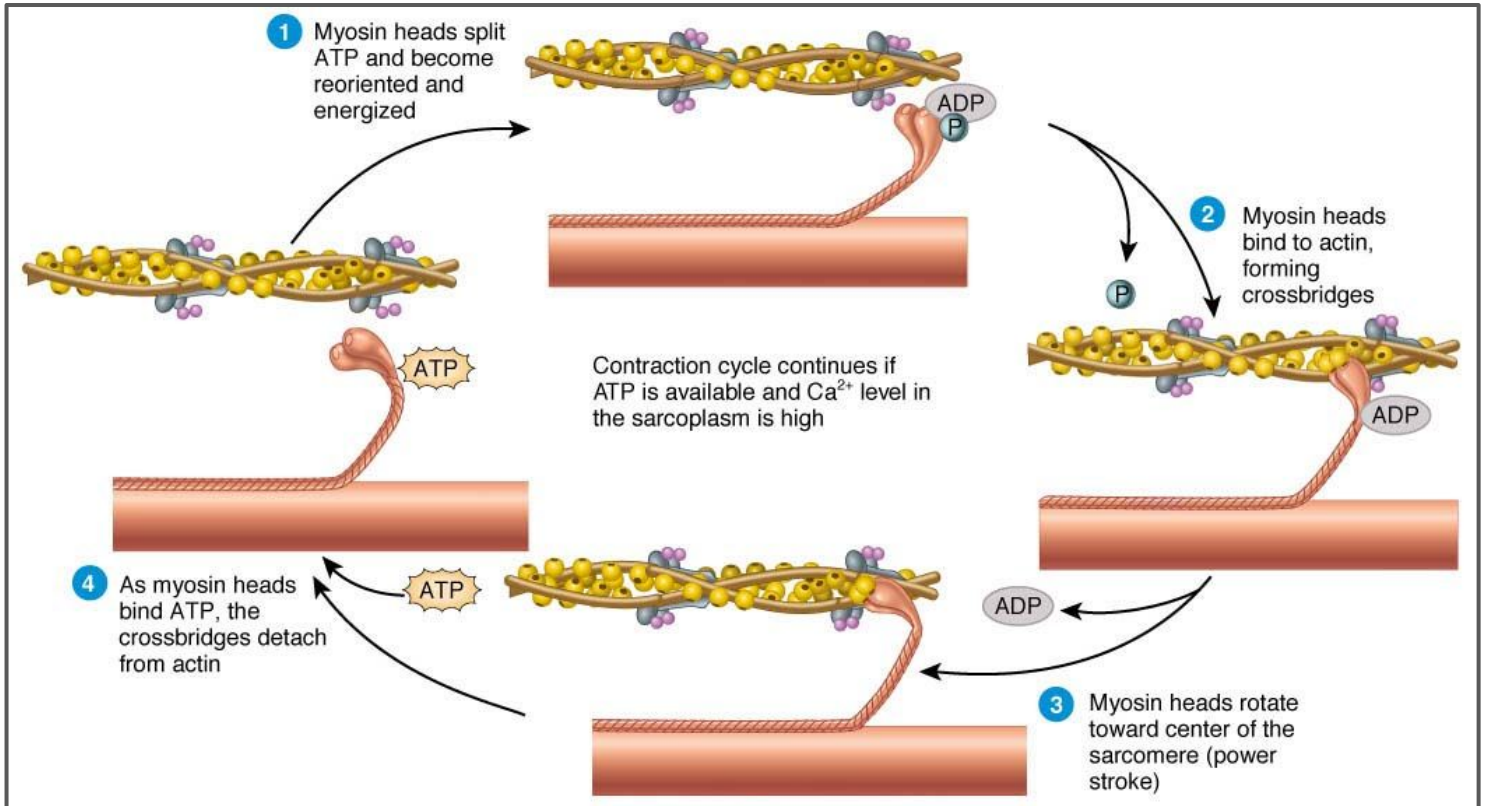


Practice:

Practice Activity:
In you notebook or on your piece of paper, draw the flowchart and write a description for each step (Steps #1-4).



Practice Answer(s):



Additional Practice and/or Resources:

Resource websites:

Muscle Contraction & Rigor Mortis Flashcards

Test your knowledge by clicking on the link above.

What Causes Rigor Mortis?

A few hours after a person or animal dies, the joints of the body stiffen and become locked in place. This stiffening is called rigor mortis. Read this article to learn more.

These Worms Experience Rigor Mortis Before They are Dead

Humans and other animals usually experience rigor mortis – the stiffening of the body – hours after they have died. But that doesn't seem to be the case with all organisms. Read this article and watch the video within the article to learn more!