

Lesson 3.4: The Muscular System

Task	Page(s)	Learning Target
1	2	I can identify the major structures and explain functions of the muscular system.
2	3	I can draw microscope images to scale in order to compare the three types of muscle cell structures.
3	4-6	I can follow a multistep procedure and collect data in order to explain if blinking is a voluntary or involuntary muscle movement.

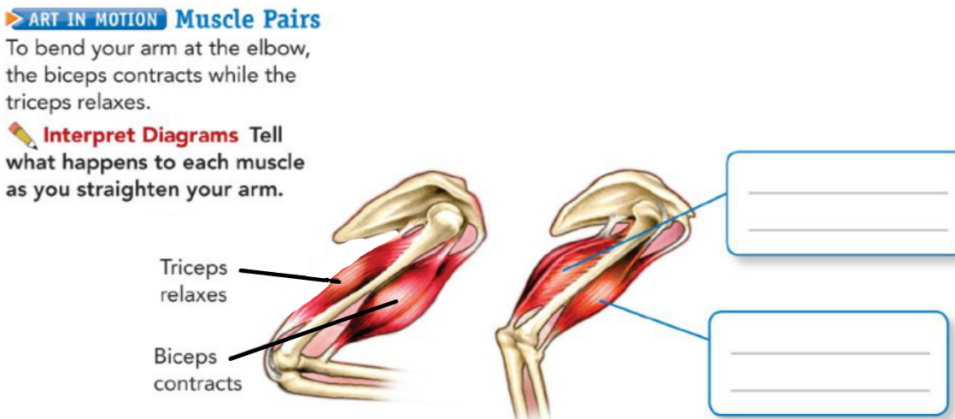
Task 1 Learning Target: I can identify the major structures and explain functions of the muscular system.

1. Movement

A. Muscles work together in _____.

B. As one muscle _____ (shortens), the other relaxes (lengthens).

**Draw and complete the following diagram:



****To see muscles working in pairs, visit the following link:** <https://sites.google.com/a/ps207tigers.org/207sci/chicken-muscle>

2. Classification

A. Voluntary: can control

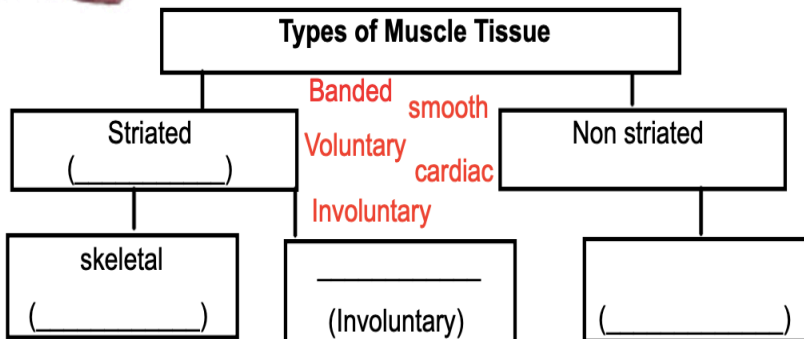
B. _____: cannot control

C. skeletal muscle- moves _____
 -tendons: tissue that attaches muscle to _____

D. _____ muscle- moves internal organs such as the intestines

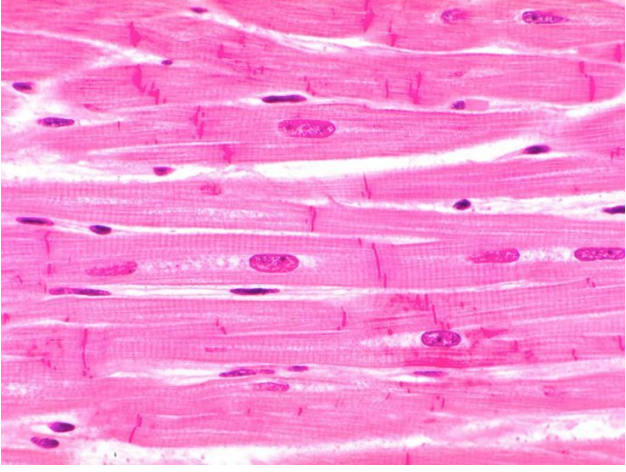
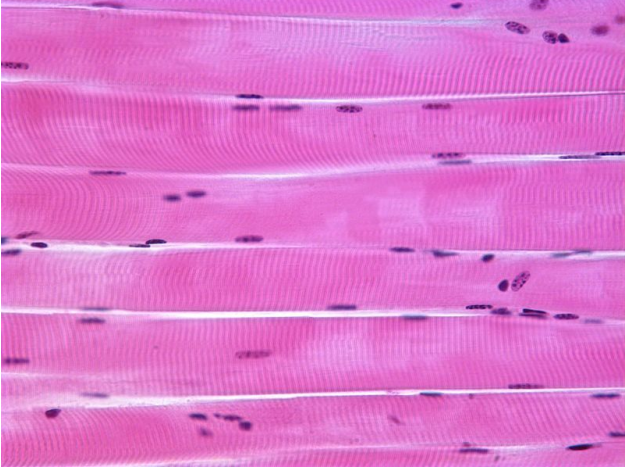
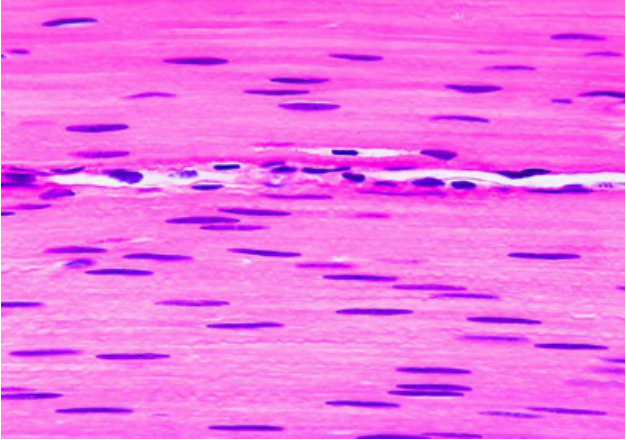
E. cardiac muscle- only moves the _____

***Draw and identify each muscle cell below and then copy and complete the graphic organizer:



Task 2 Learning Target: I can draw microscope images to scale in order to compare the three types of muscle cell structures.

- A. Draw the microscopic images in your notebook. *Be sure to be accurate in scale.
- B. Label each image and describe them using key vocabulary (striated; unstriated; nucleus)
- C. Use the text descriptions to find the identity of the unknown slide samples.

<p>Slide A</p>		<p>Skeletal Muscle: The faint lines that run across the cells are called striations. Skeletal muscle cells have multiple nuclei. Most nuclei (dark round circles) will be along the sides of the cells.</p> <p>Average Skeletal Muscle Size: 30,000 μm x 10-100 μm.</p>
<p>Slide B</p>		<p>Cardiac Muscle: The striations in cardiac muscle are not as obvious as those of skeletal muscle. A cardiac muscle cell typically has one nucleus but sometimes has two nuclei located near the center of the cell. Cells branch and attach to each other.</p> <p>Average Cardiac Muscle Size: 100–150 μm x 30–40 μm</p>
<p>Slide C</p>		<p>Smooth Muscle: Smooth muscle does not have striations and can be confused with cardiac muscle because the cells are often running in different directions, just as they are in cardiac muscle. Smooth muscle cells are often a lot smaller than cardiac muscle cells, and they do not branch or connect end to end the way cardiac cells do. Each smooth muscle cell has one nucleus and is located in the center of the cell. Even though you can't see the cell membranes or the edges of the cells, you can visualize their arrangement just by looking at the nuclei.</p> <p>Average Smooth Muscle Size: range from 10-600 μm x 1-12 μm</p>

Task 3 Learning Target: I can follow a multistep procedure and collect data in order to explain if blinking is a voluntary or involuntary muscle movement.

Background- Reviewing Content:

Muscles attached to your eyelids allow you to blink your eyes. Is it necessary to remind yourself to blink or does the muscle do its job automatically? Can you stop yourself from blinking if you think about it? Muscles that do not have to be reminded are called involuntary. Those muscles that you control are called voluntary muscles. Do the eyelid muscles ever behave as both voluntary and involuntary muscles? Do some experimenting to see if you can answer this and a few other questions about blinking.

Materials:

- timer
- clear plastic sheet/wrap (30 x 30 cm)
- large cotton ball

Procedure A:

1. Have your partner watch your eyes. Your partner should count the number of blinks you make in 1 minute. **NOTE:** Do not try to reduce or increase the number of normal blinks. Record the number in Table 1.
2. Repeat step 1 two more times.
3. Complete the table by determining the average number of blinks (rounded to the nearest whole number).
4. You will repeat steps 1-3 for your colleague.

Procedure B:

1. Have your partner watch your eyes. Your partner should time in *seconds* how long you can go without blinking. (You are purposely trying NOT to blink.) Notice and remember the feeling of your eyes during this time. Record the number of *seconds* in Table 2.
2. Change roles. You will time in *seconds* how long your partner can go without blinking. (He or she is purposely trying NOT to blink.) Your partner should notice and remember the feeling of his or her eyes during this time. Record the number of *seconds* in Table 2.
3. Repeat steps 1 and 2 two more times.
4. Complete the table by determining the average number of seconds each person went without blinking (rounded to the nearest tenth).

Procedure C:

1. Have your partner hold a sheet of clear plastic in front of his/her face. NOTE: The plastic sheet should not touch your partner's face.
2. As you throw a cotton ball at the plastic, notice and record if your partner does or does not blink. Use a checkmark to record this information in Table 3.
3. Have your colleague repeat steps 1 and 2 of Part C two more times and record the results each time.
4. Change roles and repeat steps 1 -3.

Name: _____ Date: _____ Class: _____ #: _____

Learning Target: I can follow a multistep procedure and collect data in order to explain if blinking is a voluntary or involuntary muscle movement.

Hypothesis:

Data and Observations:

Data Table 1 (Procedure A): Number of Blinks in 1 Minute		
Trial	Name: _____	Name: _____
1		
2		
3		
Average		

Data Table 2 (Procedure B): Time without Blinking (_____)		
Trial	Name: _____	Name: _____
1		
2		
3		
Average		

Data Table 3 (Procedure C): Blinking as a Reaction				
Trial	Name: _____		Name: _____	
1	<input type="radio"/> Blink	<input type="radio"/> Did Not Blink	<input type="radio"/> Blink	<input type="radio"/> Did Not Blink
2	<input type="radio"/> Blink	<input type="radio"/> Did Not Blink	<input type="radio"/> Blink	<input type="radio"/> Did Not Blink
3	<input type="radio"/> Blink	<input type="radio"/> Did Not Blink	<input type="radio"/> Blink	<input type="radio"/> Did Not Blink

Conclusions Questions:

1. Does Procedure A show that blinking is voluntary or involuntary? Explain.

2. Does Procedure B show voluntary or involuntary muscle action? Explain.

3. It is important for your eyes to remain moist. Describe how your eyes felt after not blinking. Explain how blinking might help to keep your eyes moist.

4. What does the activity with the cotton ball and plastic help prove? Explain.

5. Enrichment: Other than blinking, describe 3 voluntary and 3 involuntary muscle actions. Are there any other muscle actions that are both voluntary and involuntary?

Voluntary Muscle Actions	Both	Involuntary Muscle Actions

Participation					
I often contributed good ideas that were relevant to the topic and task. I came to meetings prepared. I did my share of the work.	4	3	2	1	I seldom contributed good ideas. Sometimes I was talking off-task. I did not come to meetings prepared. I did not do my share of the work.
Working with Others					
I often compromised and cooperated. I did take initiative when needed and/or listened and respected the ideas of others.	4	3	2	1	I seldom compromised and cooperated. I did not take initiative when needed and/or did not listen and respect the ideas of others.
Product					
My part of the task is complete and accurate. My work was submitted on time.	4	3	2	1	I did not complete my part of the task. The information I presented was inaccurate and/or not done correctly. It was not completed on time.
Understanding Content					
I can speak about the topic and group work knowledgeably. I can sum-up the lesson.	4	3	2	1	I do not understand what I did in my group. I did not ask or answer questions. I cannot sum-up the lesson.

