



## Let's Work Together

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## Teacher Section

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<b>Purpose</b>	To have students build a working model of the relationship of the skeletal and muscular systems in the arm.
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. The student will be able to construct a model to support scientific investigations.</li> <li>2. The students will communicate scientific procedures and explanations by creating drawings and diagrams.</li> <li>3. The students will be able to label and understand how the skeletal and muscular system works.</li> <li>4. The students will be able to construct a working model of the skeletal and muscular system.</li> <li>5. The students will be able to use an Internet web site to find information.</li> </ol>
<b>Grade Level</b>	5 <sup>th</sup> – 7 <sup>th</sup> grade
<b>National Science Education Standards Alignment</b>	<p><b>Grades 5–8</b>  <u>Science as Inquiry:</u>            Abilities necessary to do scientific inquiry            Understandings about scientific inquiry  <u>Life Science:</u>            Structure and function in living systems</p>
<b>Time Required</b>	<p>The entire activity should take about 4 or 5 class periods to complete. The assessment portion could be given to work on at home to help shorten the number of classes needed.</p> <p><b>Day One:</b> KWL and Chicken Wing Lab  <b>Day Two:</b> Design a working model  <b>Day Three:</b> Construct models  <b>Day Four and Five:</b> Prepare presentation reports</p>
<b>Prior Knowledge</b>	<p>Students should have been introduced to the bones and muscles in the body prior to introducing this material.</p> <p><b>Suggested Terms</b>            Humerus, Radius, Ulna, Deltoid, Biceps, Tendon, Ligament, Muscle</p>

<b>Including All Students</b>	<p>All students can get involved in this design lab. The students can be assigned roles in the lab if needed, but the best suggestion is that the teacher observes and encourages everyone to participate. Students with limited mobility may still participate as well. They could work on individual components of the final design and be involved in the discussion of the initial design.</p> <p>For various reasons students should be asked if they have any problem working with the raw meat involved in the lab. A suggestion could be made to send home a notice about this lab project.</p>
<b>Safety</b>	<p>Students should already be familiar with how to conduct a lab and the traditional lab safety. Students will be using sharp objects to remove the skin of the chicken. If this is an issue with your students they may also use scissors to remove the skin. The students should wear gloves for the experiment. Also require hand washing. Students should be reminded that chicken could carry bacteria that will make them sick. The teacher should be the only one to handle the bleach solution.</p>
<b>Materials</b>	<p>Chicken wings (1 for 3–4 students) uncooked and treated with bleach Small scissors Styrofoam meat tray Rubber gloves for Students Paper Towels Ring Stands Duct tape Assorted sizes and widths of rubber bands Styrofoam meat trays (to make bones) or wooden dowels Brass brads Assorted nuts and bolts Other materials brought in by students</p>
<b>Questions to Ask Along the Way</b>	<ol style="list-style-type: none"><li>1. Why do skeletal muscles have to work in pairs?</li><li>2. What role do the tendons and ligaments play in the human arm?</li><li>3. What role(s) do the muscles play in the arm?</li></ol>

**Preparation**

This lab involves a pre-activity to introduce the concept to the students. The teacher will have to gather up materials before both activities. Following is a list for the teacher of advance planning.

**“Winging It” Chicken Wing Lab:** The chicken wings need to be soaked for a period of couple of hours in a mild bleach solution. The solution should be 10% bleach to 90% water. It is important to keep the wings moist. It might be helpful to place the wings in a refrigerator when they are removed from the bleach solution.

**Inquiry Based Design Lab:** The teacher will need to set up the ring stands in advance.

**Procedure**

**Day One**

The teacher engages the lesson by beginning with a **KWL** chart. This chart needs to be displayed and referred to at the end of the lab.

**Chicken Wing Lab**

“Winging It” Problem: **How to bones and muscles work together?**

Students will work in groups of three or four.

1. Teacher passes out the chicken wings. Teacher reminds students to look for similarities between the chicken wing and a human arm. Students need to be encouraged to use the correct terms in referring to their chicken part as an arm.
2. Students are to put on gloves and leave them on for the whole experiment.
3. Have students dry off wings.
4. Using the scissors, carefully remove the skin and discard.
5. Move the leg in various positions, observe what is happening as both the bones and muscles are involved in the movement.
6. Follow the directions on the data table and record your observations.

At this point take time to review your **KWL Chart**, followed by a computer-based treasure hunt. A strategy that I sometimes use is to take the questions generated from the KWL chart or you can provide the questions.

<b>Procedure</b>	<p><b>Day Two:</b> Inquiry–Based Model Construction Lab</p> <p>Purpose: To have students design a working model of the skeletal and muscular system of the arm to show the working relationship of the two systems.</p> <p>Procedures: Students will design and diagram a working model of the arm focusing on the bones and muscles. The students will describe what materials they are going to use and how they are going to build their model. The teacher must approve this design before they can begin.</p>
<b>Suggestions for Assessment</b>	<p>A test may be given on the terms and explanations of the systems.</p> <p>Students can design a Power Point or a poster presentation of their design and how their design works. The students would present their Power Point or poster project to the class. A rubric could be developed and used. I would share the rubric with the students before they design and build their model.</p>
<b>References &amp; Resources</b>	<p>Prentice Hall Science Explorer, <u>Human Biology and Health</u> – “Winging It” was adapted from a lesson in this book.</p> <p>Web Site: <a href="http://www.discoveryschool.com">www.discoveryschool.com</a></p>

## Internet Treasure Hunt

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<b>Student research questions</b>	What are the three main kinds of muscles? How do muscles and bones work together? What are the names of the bones inside of the arm? What is a bone composed of? (materials)
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<b>Resource #1</b>	
Topic/Title of Resource	Skeletal and Muscular Systems
Web address	<a href="http://www.innerbody.com">www.innerbody.com</a>
1-2 sentence description of the resource/site	Provides good diagrams for the students and working definitions.
<b>Resource #2</b>	
Topic/Title of Resource	Muscular System
Web address	<a href="http://www.discoveryschools.com">www.discoveryschools.com</a>
1-2 sentence description of the resource/site	This is an interactive site on which students can observe the use of muscles.

# WINGING IT

Name \_\_\_\_\_

Date \_\_\_\_\_

Class \_\_\_\_\_

Explanation of what to observe	Record your observations (be specific)
<p>Examine what the muscles look like at the top and bottom parts of the wing. Move the wing back and forth write down what you observe.</p>	
<p>Examine the white tendons that are attached to the muscles. Carefully remove the tendons, and observe.</p>	
<p>Draw a diagram of the wing. Label the kinds of muscles and the tendons.</p>	
<p>Carefully remove (using a plastic knife) the muscles and observe the bones. Draw a picture of one bone and describe it.</p>	