

Levers and Wedges in the Human Body

3rd Grade

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References:

- <http://www.pbs.org/teachersource/scienceline/archives/may98/may98.shtm>
- <http://www.dynamicscience.com.au/tester/solutions/hydraulicus/humanbody.htm>
- <http://teacher.scholastic.com/dirt/lever/index.htm>
- <http://www.turbosquid.com/HTMLClient/FullPreview/FullPreview.cfm/ID/162180/Action/FullPreview> (teeth image)
- www.us.novartis oncology.com/info/page/multiple-myeloma (skeleton image)

Benchmarks:

SLC 10: Explain the operation of a simple mechanical device

CPS Benchmark:

A) Student will compare how the 6 simple machines work and describe how they are used.

B) Students will identify and explain how simple machines help mechanical instruments operate (e.g. bicycles, pencil sharpeners, paper cutter).

Objectives:

Students will identify parts of the body that serve as wedges (teeth, nails) and levers (jaw, arm, leg). Students will identify the fulcrum for each body lever.

Materials:

- Bag with a wide strap, as a cloth tote bag.

For each student group:

- Pre-sliced baby carrots and apple slices
- Paper towels

Initial Demonstration:

Have the students take a bite of either the carrot or the apple. Ask them which teeth they used to bite the carrot/apple, and why.

Target Observations:

- Most students will use their front teeth or incisors to bite down. Third graders are often in the midst of losing teeth, so they may bite using teeth that are further back. Their observations may be helpful in the later discussion.

Target Model:

- We bite using the front teeth because they are closest to the food, because our cheeks don't get in the way, etc.

Procedure:

Have students take another bite, this time using their molars (back teeth).

Students should consider the following: How are molars shaped differently than incisors? Which teeth do we use to chew, before we swallow? When you lose your front teeth, is it harder to bite off a piece of food?

Target Revised Model:

- It is more difficult to take a bite of the apple with the back teeth (molars) than with the front teeth (incisors)

Procedure:

Have the students look at the handout "My body and Simple Machines." Ask students to describe the differences between the incisors and the molars. They should notice that the incisors are narrow on top. Have the students read the paragraph on wedges and answer the questions about teeth.

How are your incisors shaped like a wedge? If our incisors are good for cutting, why don't we use them to chew? (it's not efficient, because cutting only breaks the food into two pieces, the molars can mash the food without breaking the pieces apart). Are there any other body parts that are like wedges? (fingernails)

Target Revised Model:

- We use our incisors to bite food because they are a wedge, and wedges cut things into two pieces.

Procedure:

Place objects of moderate weight in the tote bags. Have the students try to lift the tote bag with their arm by doing a bicep curl (upper arm basically vertical, bending at the

elbow). This should be a relatively easy task. Now have students move the strap of the bag to midway up their forearm. Ask them to again lift the bag and describe the difference. The task should be somewhat more difficult this time. Look at the work sheet again and have the students identify the load (the tote bag), the fulcrum (the elbow), and the effort (the bicep, or upper arm—if they have trouble with this, ask them to lift the bag again and identify where they feel their muscles working).

Target Revised Model:

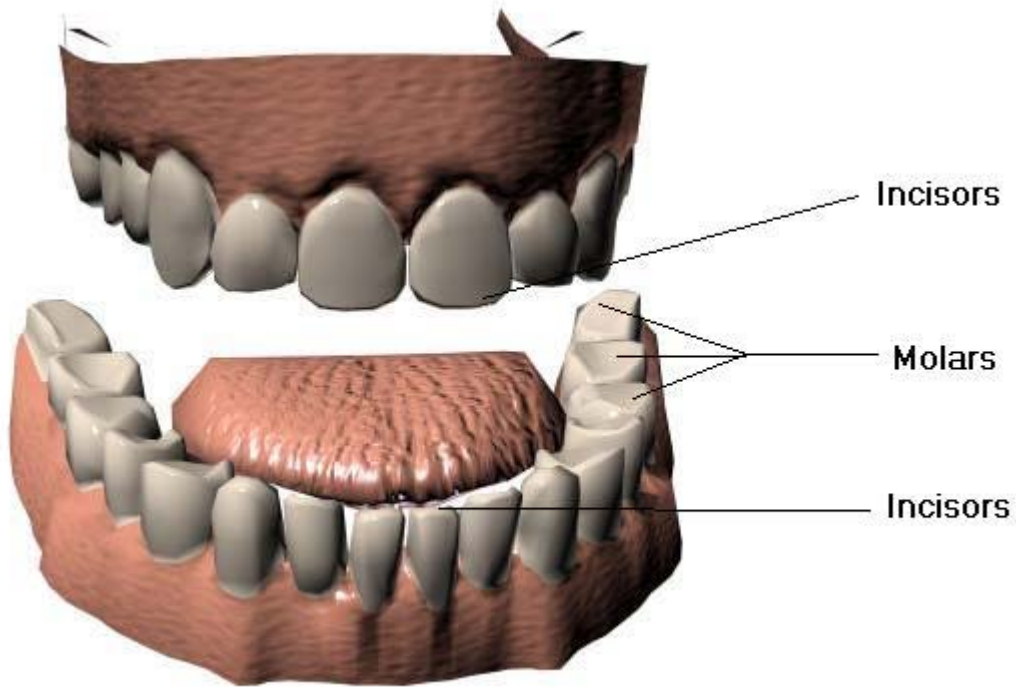
- It is more difficult to lift the tote bag when it is located in the middle of the forearms.

Discussion/Summary:

Our bodies are designed to help us do work. To do this, our body has levers, like our arms, and wedges, like our front teeth. Wedges work by putting a narrow end into something we want to come apart, and applying force to the wider end. Levers use a pivot to help us lift things. The closer the load is to the pivot, the harder the work is to do.

My Body and Simple Machines

Name _____ Room _____ Date _____



A wedge is a simple machine that is narrow on one end and wide on the other. Often wedges look like triangles. When you put force on the wide end, all the force goes into a tiny area on the narrow end. This makes it easier to break things into two pieces.

Look at the picture of the teeth above. Which teeth are like wedges?

Explain how you know this.

Can you think of another body part that is like a wedge?



A lever is used to help lift things. There are three parts. The **fulcrum** is the pivot point. It stays in place and the lever rotates around it. The **load** is the thing being lifted. The **effort** is the energy that you put into doing the lifting.

Think of your arm as a lever. Try lifting a bag by bending your arm. Can you identify the three parts of the lever? (Hint: read the paragraph above).

The bag is _____

My elbow is _____

My upper arm muscles are _____

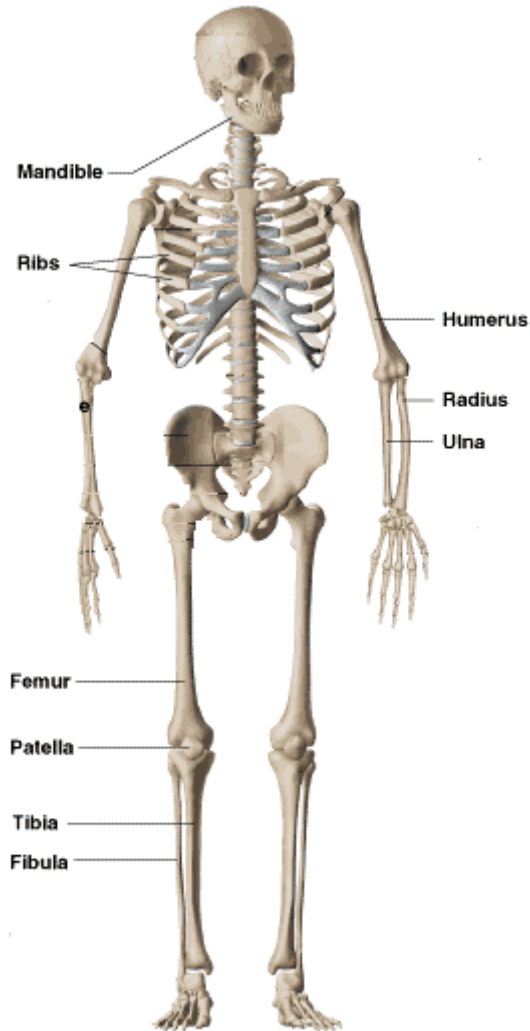
Try moving the bag to the middle of your forearm. Now lift it. Is it easier or harder to lift?

Did you move the load closer to the fulcrum or farther from it?

Can you think of any other parts of your body that act like a lever?

Simple machine body hunt

Name _____ Room _____ Date _____



Find as many levers and wedges as you can on this skeleton. Draw an arrow pointing to the part, and write “wedge” or “lever”. Remember, not all body parts are simple machines!