Levers

Overview: Simple machines convert energy also, but help us do work. We'll explore the lever, a very common and surprisingly useful tool that helps us direct our energy to specific and helpful applications.

What to Learn: Today you'll discover how we can use machines to convert energy into meaningful, usable forms.

Materials

- A nice strong piece of wood. 3 to 8 feet long would be great if you have it.
- A brick , a thick book or a smaller piece of wood (for the fulcrum)
- Books, gallons of water or anything heavy that's not fragile

Lab Time

1. Put your fulcrum on the ground.
2. Put your lever on the fulcrum. Try to get your fulcrum close to the middle of the lever.
3. Put some weight on one end of the lever.
4. Now push down on the other side of the lever. Try to remember how hard (how much force) you needed to push to lift the heavy object.
5. Move the fulcrum under the lever so that it is closer to the heavy object.
6. Push down on the other side of the lever again. Can you tell the difference in the amount of force?
7. Move the fulcrum closer still to the heavy object. Feel a difference now?
8. Feel free to experiment with this. Move the fulcrum farther away and closer to the object. What conclusions can you draw? Write these on the worksheet below.

Lever Observations

1. What happened when you moved the fulcrum closer to the heavier object? Was it easier or harder to move the weight?

2. What can you say about the distance between the fulcrum and the object as it relates to the force that you must apply?

3. Keeping the answer to the last question in mind, what would theoretically be the most useful design for a lever?

Reading

Levers, being simple machines, have only three simple parts: the load, the effort, and the fulcrum. Let's start with the load. The load is basically what it is you're trying to lift. The books in the last experiment were the load. Now for the effort. That's you. In the last experiment, you were putting the force on the lever to lift the load. You were the effort. The effort is any kind of force used to lift the load. Last comes the fulcrum. It is the pivot that the lever turns on. The fulcrum, as we'll play with a bit more later, is the key to the effectiveness of the lever.

There are three types of levers. Their names are first-class, second-class and third-class. The only difference between the three different levers is where the effort, load and fulcrum are.

A first-class lever is a lever in which the fulcrum is located in between the effort and the load. This is the lever that you think of whenever you think of levers. Examples of first-class levers are the see-saw, a hammer (when it's used to pull nails), scissors (take a look, it's really a double lever!), and pliers (same as the scissors, a double lever).

Exercises Answer the questions below:

1. What is the best definition for a simple machine?
    a. A machine with less than three parts
    b. A machine with a simple name
    c. A machine that changes the direction or amount of a force
    d. A machine that helps you do work quickly
2. What are the three parts of a lever? Circle all that apply:
    a. Fulcrum
    b. Weight
    c. Load
    d. Effort
3. Name two examples of levers that you could find in your house:
    a.

    b.

4. What are the types of levers called?
    a. Three tiers
    b. First, second, and third class
    c. Poor, rich, and middle
    d. Forty-five and ninety-nine percenters

Answers to Exercises: Levers

1. What is a simple machine? (a machine that changes the direction or strength of a force)
2. What are the three parts of a lever? (load, fulcrum, and effort)
3. Name two examples of levers that you could find in your house. (scissors, hammer, crowbar, etc.)
4. What are the types of levers called? (first, second, and third class)