Work & Machines

by Ron Simmons

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Activities explore the effects of simple machines. Lessons focus on the concepts of force, friction, gravity, and inertia.

General background information, suggested activities, questions for discussion, and answers are included.

Encourage students to keep completed pages in a folder or notebook for further reference and review.

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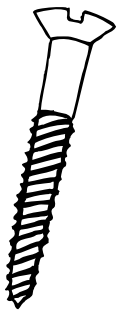
Name _____ Date _____

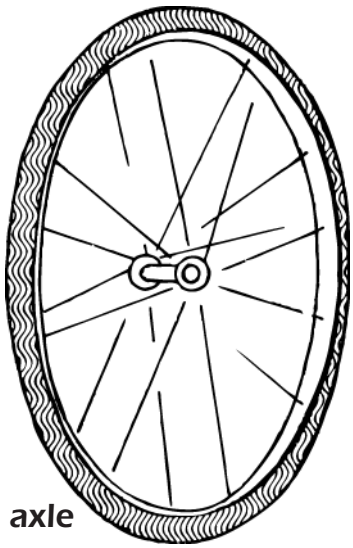
SIMPLE MACHINES

When you think about machines, you probably think of cars, trucks, and power tools like drills and saws. All these machines need motors to make them work. But there are machines that do not need motors, like bottle openers, scissors, nutcrackers, and pliers. These machines need only a person to make them operate. They are called simple machines, and like all machines, they help people do some kind of work.

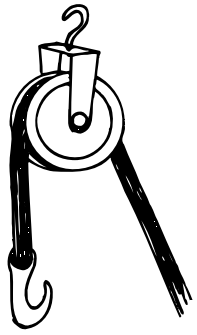
SIX TYPES OF SIMPLE MACHINES



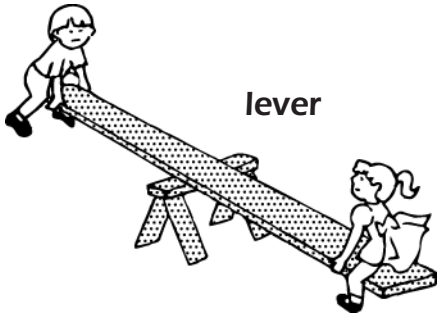
screw



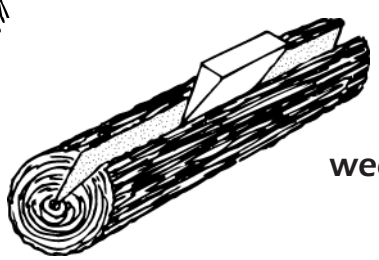
wheel and axle



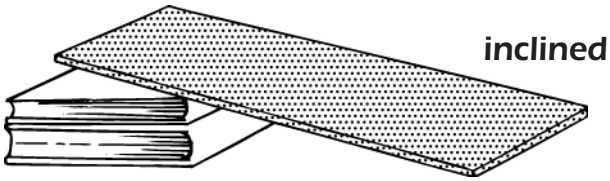
pulley



lever



wedge



inclined plane

When we talk about machines, we use the word "work" in a special way. Work has two parts: how much force or effort is needed to do the work, and how far the force or effort is used. The second part is called distance. Thus, work can be defined as the movement of force through distance.

If you lift a book from the floor to a table, you are doing work. If you lift the same book from the floor to a high shelf, you are doing more work. You are using the same force or effort for a longer distance.

There are many other types of simple machines. Create some simple imaginative machines of your own. You can use tongue depressors or craft sticks, rubber bands, spools, doorknobs, or string to make your own simple machines. Do not limit yourself to these materials only.

Name your machines. Describe the work they could do.

_____

_____

On another sheet of paper, make an outline describing your steps in making one of your simple machines.

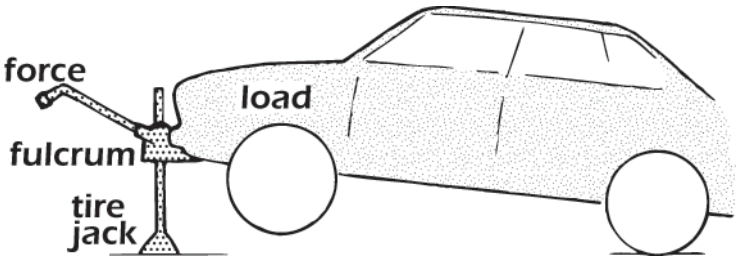
Name _____ Date _____

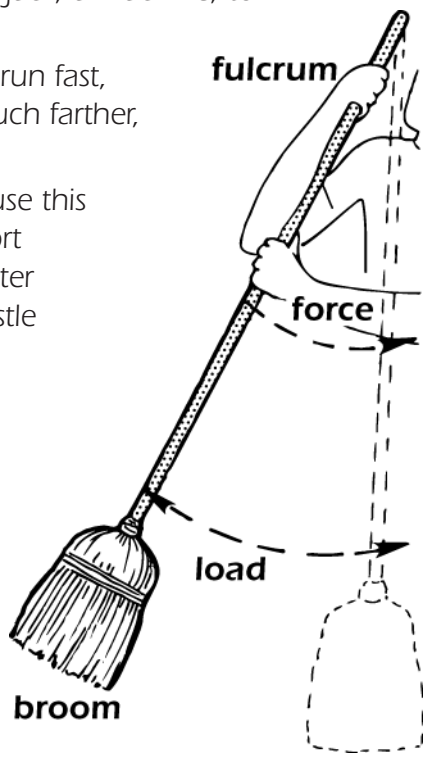
EVERYDAY MACHINES

Most of the work we do everyday is not difficult. We lift some books to the table or even to a high shelf without a machine. But there are many things we do that we cannot do by ourselves. For example, we cannot lift a car by ourselves to fix a flat tire. We need a jack, a machine, to give us more force.

A bicycle is another kind of machine. Even though you can probably run fast, you can go much faster on a bike. With this machine, you can go much farther, or more distance, in the same amount of time.

A broom is a simple machine that is used to sweep the floor. As you use this machine, the top part of the handle moves back and forth only a short distance. But the bottom part, or bristles, move through a much greater distance. Therefore, the force you apply on the handle causes the bristle end of the broom to cover a greater distance.





Simple _____ help do _____ by making work _____.

Force and _____ are always involved in doing _____. With a

_____ machine, to do the same amount of work with less force, you have to move

an object a greater _____.

List a dozen simple machines. On another page sort them into columns under the six types of simple machines.

_____ _____

_____ _____

_____ _____

_____ _____

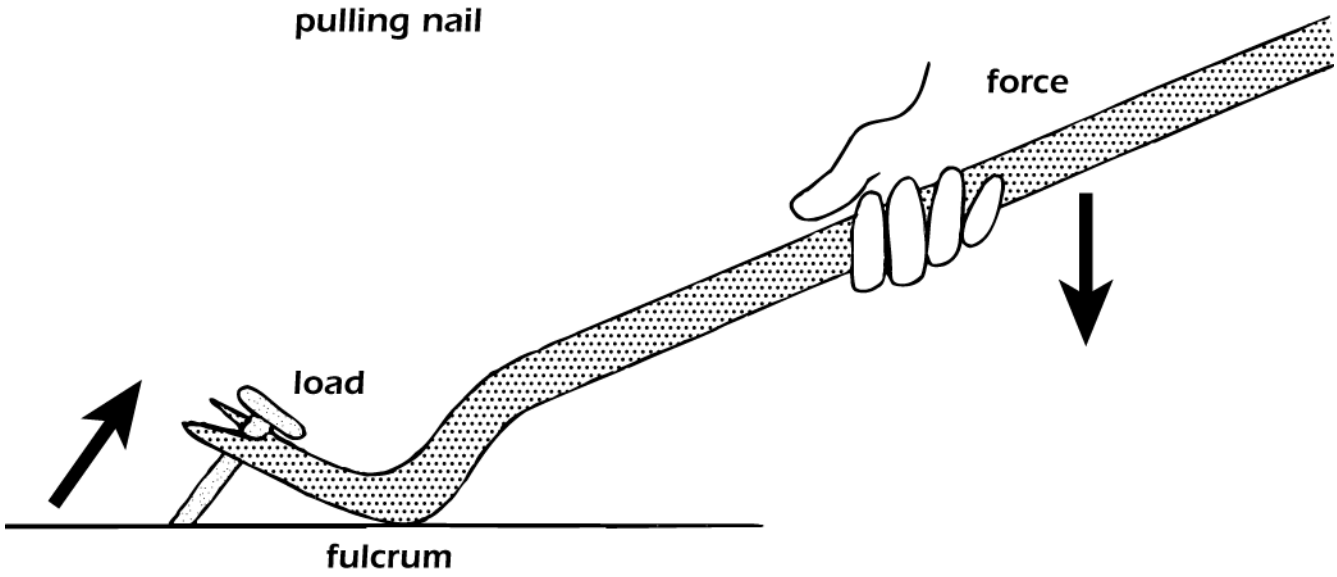
_____ _____

_____ _____

Name _____ Date _____

Common Building Machines

Without machines, some things could not be done! Did you ever try cracking a nut with your bare hands, or pulling a nail out of a board with your fingers? You try as hard as you can but you just cannot do it. If you had a simple machine called a crowbar to help you pull the nail from the board, the task would be easy. When you pull down on the handle of this simple machine, the small force that you use on the handle becomes a much larger force at the place where the crowbar hooks around the nail. You use less force with the crowbar than you used with your hand. And when you used only your hand, you could not do the job at all. The crowbar increased the force that you applied so you did not have to work so hard.



Other common building machines we use as tools are a _____, _____, _____, and a pair of _____.

Name the six types of simple machines.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Give two more examples of building tools that are simple machines.

_____

_____