NAME: _____

What Are Force, Motion, and Work?

Answer the questions in complete sentences.

3. Explain why carrying a ten-pound bag of groceries to the car is **not** work.

_____

_____

4. Write a sentence that tells what the words "**distance**," "**force**," and "**work**" have to do with each other..

_____

_____

Extension & Application

5. Nicole planted a new rosebush in her garden. This is what she had to do:

1) She carried the rose bush from her truck to the garden.
2) She dug a hole in the ground.
3) She shoveled the soil from the hole into a wheelbarrow.
4) She wheeled the wheelbarrow full of soil to the street.
5) She pushed the wheelbarrow up a board into the back of a truck and dumped the soil.

a) During which tasks did Nicole **do work**?

_____

b) For each task where she did work, tell what you would need to know to find out **how much** work she did.

_____

_____

_____

_____

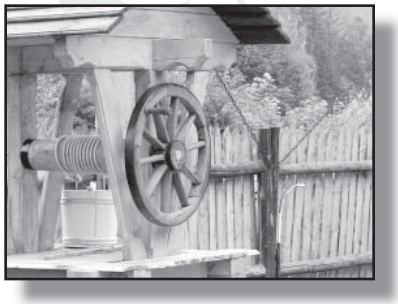
_____

NAME: _____

Reading Passage

What Are Simple Machines?

A **machine** is something that makes work easier by changing the force you apply to do work. A machine can change the amount of force you apply, and it can also change the direction of the force. A **simple machine** is a machine with only one kind of movement.



Wheel and Axle

There are six kinds of simple machines: **lever, wheel and axle, pulley, inclined plane, wedge,** and **screw.** Look at the pictures of the six simple machines. It's easy to see how most of these work and how they change the force. We will look at each of these machines later in this book.

Inclined Place

Pulley

It is important to understand that simple machines make work easier, but they don't change the *amount* of work you have to do. (That's the bad news.) What machines change is the **effort** you have to put out. (That's the good news.)

For example, you can use a kind of lever to pull a nail out of a board. You could never pull a nail out with your fingers. You might have to push the lever down ten inches to pull the nail up one inch. The nail comes right out because the pull on the nail is ten times the force of your push on the lever.

Wedge

Screw

Lever

How does a bottle opener change the force you apply to the handle of the opener?

_____

_____

Later, we will learn more about what you lose and what you gain when you use a simple machine.

Hands-On Activity #1

First-Class Levers

In this activity you will study how the DISTANCES and FORCES all work together for a first-class lever.

This is what you will need:

- A 12-inch wooden ruler
- Something to use for a fulcrum—a pencil will do
- A handful of pennies

All pennies have about the same weight. You can use the number of pennies to measure the amount of weight.

This is what you do:

1. Lay the ruler crossways on the pencil.
2. Put two pennies on one end of the ruler and one penny on the other end.
3. Slide the ruler across the pencil until it balances.
4. See how many inches are on each side of the fulcrum (the pencil).

Repeat these four steps with different amounts of pennies on each end. Each time you do it, write down the distances and numbers of pennies. Can you find a pattern to the weights and distances? See if your weights and distances fit this equation:

(pennies on left) X (left side distance) = (pennies on right) X (right side distance)

We can think of pennies as **weight,** and weight is **force**. So what all this means is that, "Resistance force times resistance distance equals effort force times effort distance." Even more simply, it means, "Work in equals work out."