A _______________ is a device that helps make work easier by changing the size or direction of the force.

See figure 6 in your book. It shows a can of paint being pried open by a screwdriver. Copy figure 6 down in your notes.

The work you apply on a machine is called the _______________. In figure 6 what is the input force?

The work done by the machine is called the _______________. In figure 6 what is the output force?

In figure 6 which arrow is thicker? This means the _______________ is larger.

In figure 6 which arrow is longer? This means the _______________ covers a larger distance.

You do _______________ amount of work on the screwdriver compared to the screwdriver acting on the lid.

Work output can never be _______________ than work input.

Machines do NOT save work they make work _______________. 
In Figure 7 a plank of wood is acting as a machine. In part A the boy lifts the box straight up into the back of the truck. Draw part A in your notes. Be sure to include the amount of force he applies and the distance he lifts it. You should be able to calculate work done with force and distance.

In part B the girl uses a plank of wood to make the work easier. She slides the box up the plank into the back of the truck. Draw part B in your notes. Make sure to include force and distance, so you can calculate the work done.

In figure 7 which part takes more work to do part A or B?

Which part takes more force?

Which one covers a greater distance?

Force-distance trade off: If a machine increases the force than the distance must ______. If a machine decreases the force than the distance must ______.
Machines Change the Size or Direction (or Both) of a Force

Work and Machines
Do some machines make work easier than others? ________

A machine’s ________________________ tells you how many times a machine multiplies force.

You can calculate Mechanical Advantage (MA) with the following equation:

MA=

In figure 8 a man uses a handcart to lift a bunch of boxes. He applies 50 N to the cart and the cart applies 500 N. What is the MA of the handcart?

In figure 8 the guy increased the force exerted on the boxes by using a machine what did he decrease?

Math Break

1. You apply 200 N to a machine, and the machine applies 2,000 N to an object what is the mechanical advantage?

2. You apply 10 N to a machine, and the machine applies 10 N to another object. What is the mechanical advantage? Can such a machine be useful? Why or Why not?

3. Which of the following makes work easier to do?
   a. a machine with a mechanical advantage of 15
   b. a machine to which you apply 15 N and that exerts 225 N

If a machine is only used to change the direction of a force what is the mechanical advantage of these machines?
Work output is never greater than work input. In fact work output is always ________ compared to work input. Why is this?

The less wok a machine has to do to overcome friction the more ________________ it is said to be.

You can calculate Mechanical Efficiency with the following equation:

Mechanical Efficiency =

If you multiply by 100 in the equation what does that mean mechanical efficiency should be expressed in?

No machine is 100% efficient. Why is that?

If a machine were 100% efficient it would be known as an ________________________.