WORK AND MACHINES

What Is Work?

Work is the exertion of force through a distance. The formula for its calculation is: work =force x distance. For an example, if 5 newtons of force were applied for 5 meters, the amount of work done would be 25Nm.

Simple Machines

Simple machines are devices designed to make work easier for us. Normally, a machine takes the effort force put into it and multiplies it to produce a greater output force. A machine can also make work a lot easier b **distance** through wh s, the total work l amount of work pu

Name tw r for us.

Mechanical Advantage

How much help the machine gives is measured by the **mechanical advantage** of the machine. As indicated before, a machine sometimes multiplies the amount force put into it, and the number of times it does this is the mechanical advantage. The formula for calculating mechanical advantage is:

Mechanical advantage = output force/input force

For example, if a machine takes the force coming in and multiplies it three times, the mechanical advantage would be 3.

Ideally, the total amount of work done by the machine is supposed to equal the total amount of work put into it. However, because of friction, in many cases this is not true. Machines with greater **efficiency** do a better job overcoming the resisting force of friction. The formula for calculating the efficiency of a machine is:

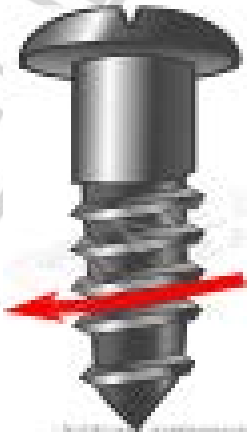
Efficiency=work output/work input x 100%

Therefore, a machine having a 90% efficiency rating is using only 10% of its work output to overcome the force of friction.

Types of Simple Machines

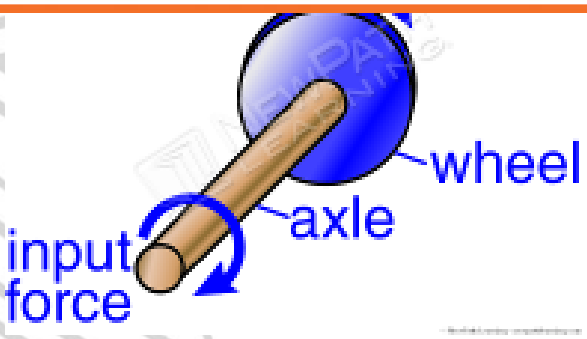
There are several types of simple machines. The first is the **inclined plane** or ramp. By increasing the distance over which the input force is applied, it reduces the amount of input force needed.

A **wedge** is a moving inclined plane and it helps in the same manner. A **screw**, which is an inclined plane wrapped around a cylinder, also works in the same way.

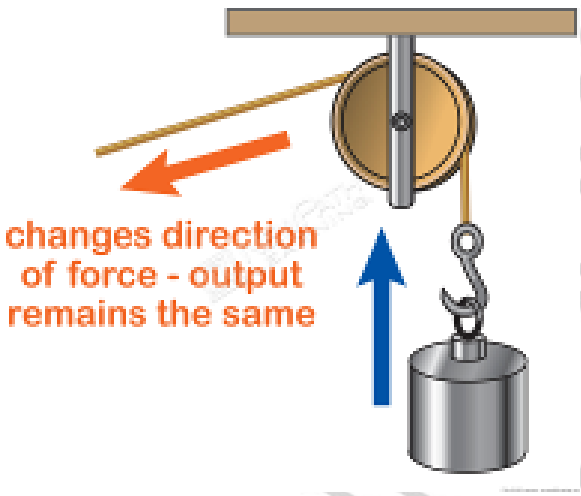


A **lever** is a bar the pivots around a fixed point called a **fulcrum**. Since the position of the fulcrum can vary, there are three classes of levers. In a first class lever, like a crowbar, the fulcrum is between the resistance and the effort. In a second class lever, like a wheel barrel, the resistance is between the effort and fulcrum. A third class lever, like a broom or hockey stick, has the effort in between the fulcrum and the resistance. See the pictures below.

Next, is the **wheel and axle**. This simple machine is made up of one larger cylin aller cylinder, th common machine re distance the effort i



The final simple machine is the **pulley** which consists of a cable placed around a grooved wheel. The different types are shown below. The mechanical advantage of this machine is simply the number of ropes or cables in the pulley system which support the weight being lifted. <use the diagrams on the top half of page 431 of Prentice Hall.



Lesson Checkpoint:
Describe three types of simple machines.

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are also pa evers
where the th work as
wedges.

When simple machines are put together, this combination is now called a **compound machine**. One of the best examples of this would be a sewing machine.

Lesson Checkpoint:
Name two simple machines in your body.