

## SIMPLE MACHINE

### What Are Simple Machines?

**Simple machines** are tools that make difficult tasks easier and have few or no moving parts. They make work **easier** by changing the direction of a force or by changing the amount of force needed.

**Work** is the amount of energy that is needed to move an object across a distance. Basically, when you pull, push or move something, you are performing work. The further you push, pull or move an object, the greater amount of work is needed.

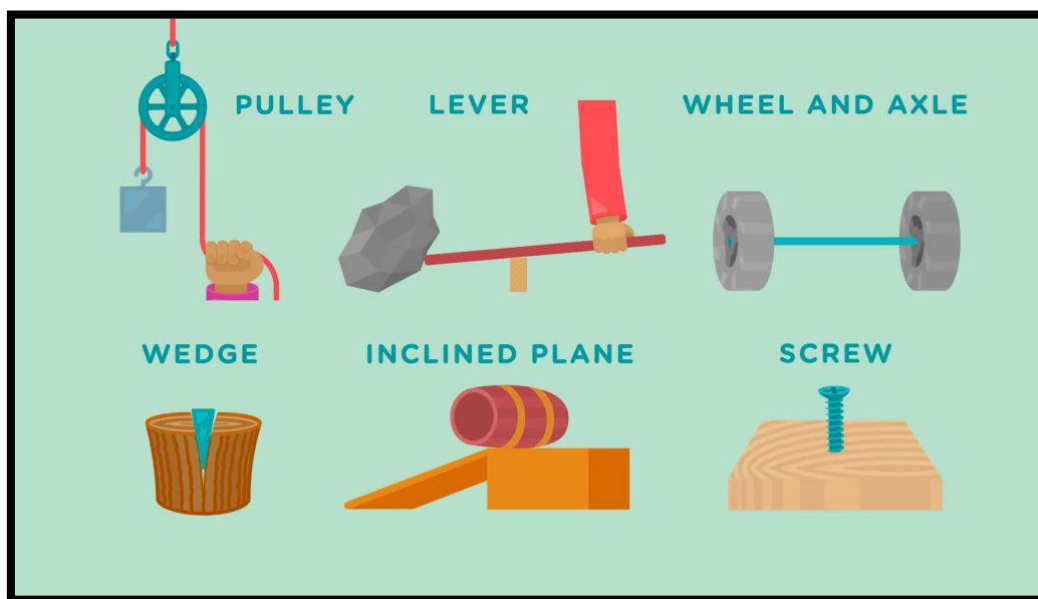
All simple machines either **alter the directions** of forces applied to them or **multiply their effects**.

It is important to note that simple machines **do not magically make work easier**; there is a trade-off, which is usually that the force needs to be applied over a longer distance. The inclined plane is a good example of this. To lift something straight up is a much shorter distance than rolling it up a long, gradual ramp. While the ramp takes longer due to the distance, it is easier.

**Complex machines** are made up of a **combination** of these simple machines.

Your bicycle makes use of nearly every kind of simple machine in order to make a more complex machine.

There are six different types of simple machines: the inclined plane, the wedge, the screw, the lever, the pulley, and the wheel and axle. Each simple machine has a special way to make work easier for humans.

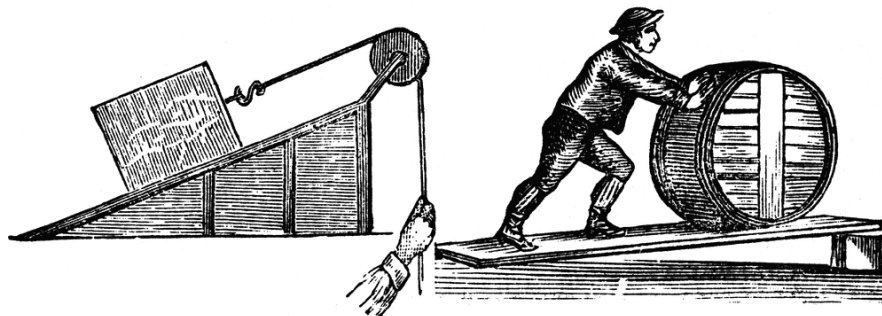
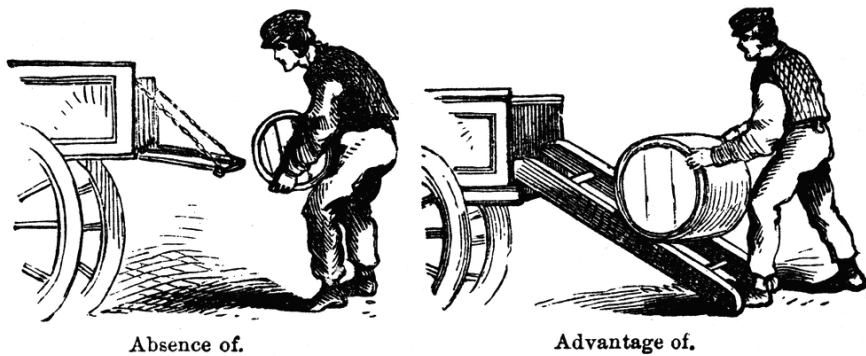
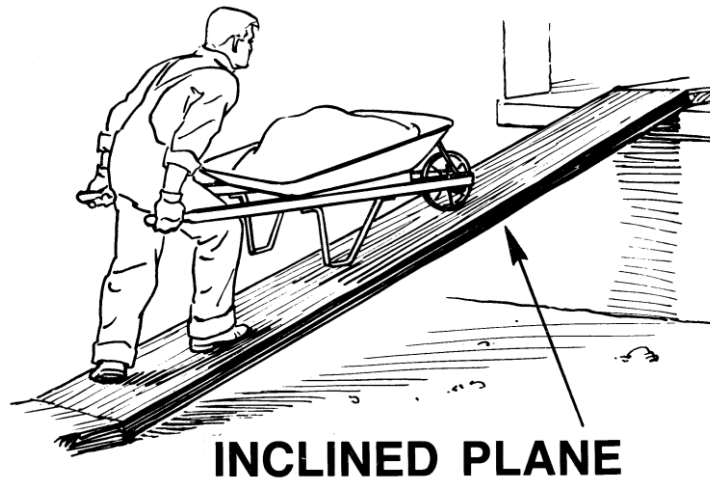


Let's take a look at three of them now...

## INCLINED PLANE - RAMPS, WEDGES AND SCREWS

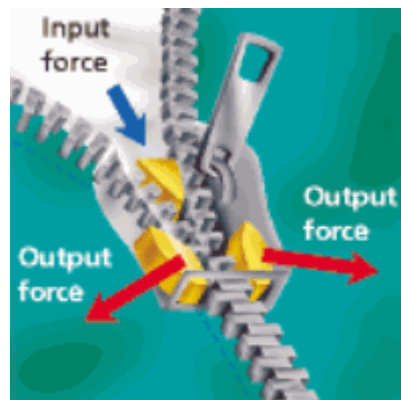
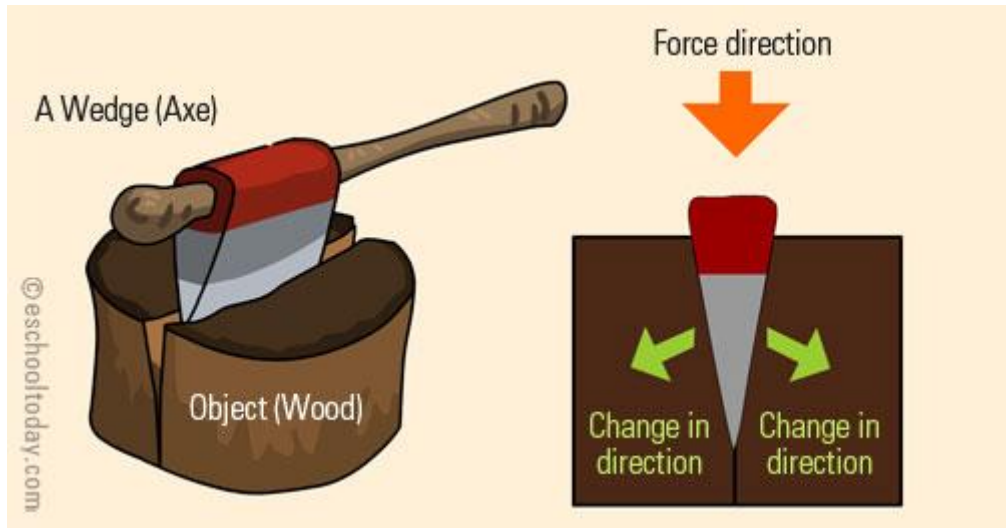
**Inclined plane** is a simple machine that has a gently sloped surface so it can be used to move objects upwards with less force. **Ramps** are examples of inclined planes.

A ramp is the simplest type of machine – as simple as a plank of wood placed between the ground and a higher level (such as the back of a truck). Ramps are machines because they make the task of raising an object easier. It requires less effort to push or pull a load to the top of a ramp than to lift it up directly. Although a smaller effort is needed, the load must be moved over a longer distance. It is much easier to push an object up a ramp than lift it straight up.



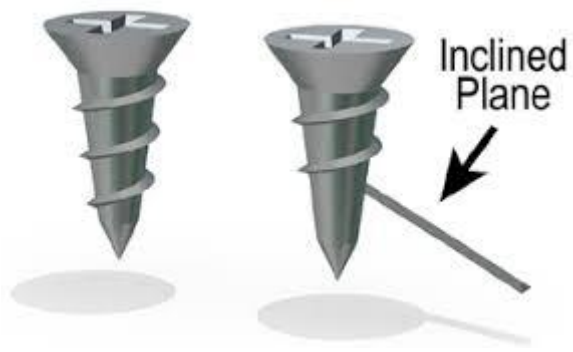
**Wedge** is a simple machine that gets thinner at one end that is used to split material such as wood. A knife/axe (also a zipper) is an example of a wedge.

A wedge is an object with two inclined planes set against each other in a 'V' shape: The blade of an axe, chisel, or knife, and your front teeth are all examples. Wedges reduce the effort needed to separate, or split objects – compare cutting an apple or potato with the sharp knife blade instead of a blunt edge. Wedges can change a vertical force into a horizontal one – you push down, and the wedge pushes sideways.



**Screw** is a pointed nail with grooves in it. It is an inclined plane wrapped around a centre rod. This thread of grooves is actually an inclined plane.

Screws are curved ramps that have been wrapped around a cylinder or cone – like a road winding around to the top of a mountain, instead of going straight up. Corkscrews, screw top jars, nuts and bolts are all examples of screws. A screw also magnifies an effort force, but again, the effort must be applied over a larger distance. A good example is a car jack. You can lift a huge load with little effort, but must turn the screw many times around to lift the load a small way. The inclined plane that is wrapped around or cut into the screw is called the thread; the distance between two turns of the thread is called the pitch.



**Wedge + Ramp = Screw!**

Ramps, Wedges and Screws are different types of inclined planes.