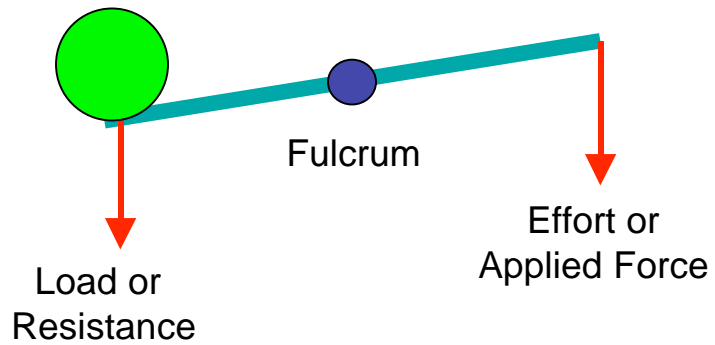
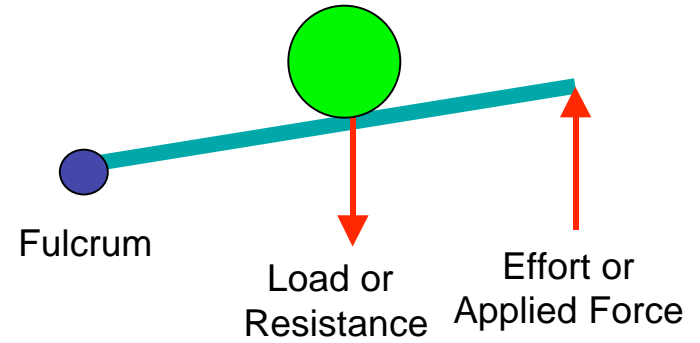


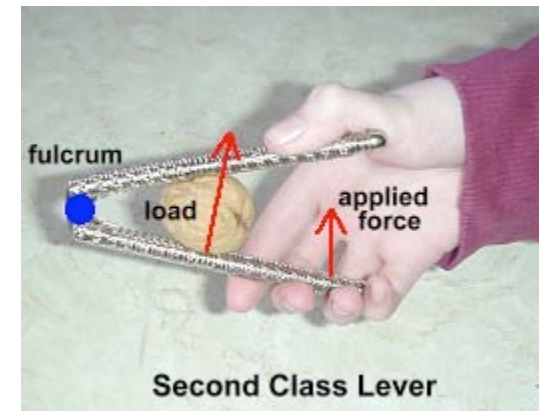
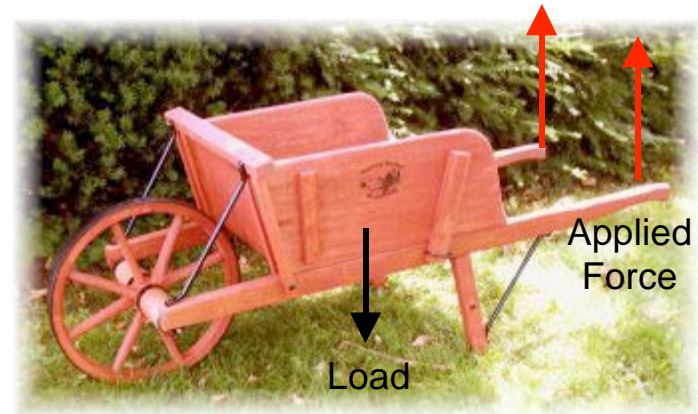
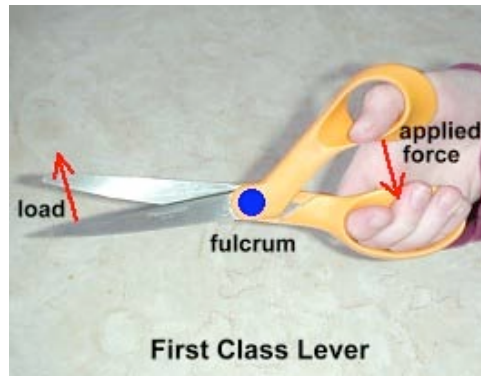
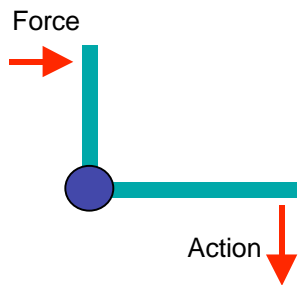
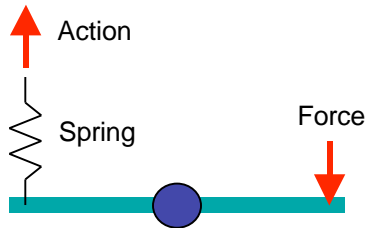
First Class Lever



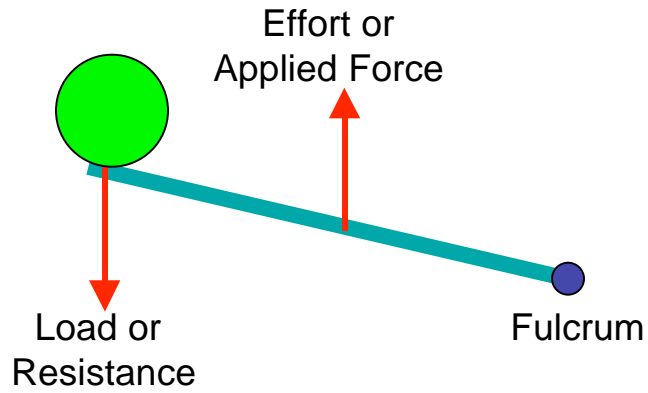
Second Class Lever



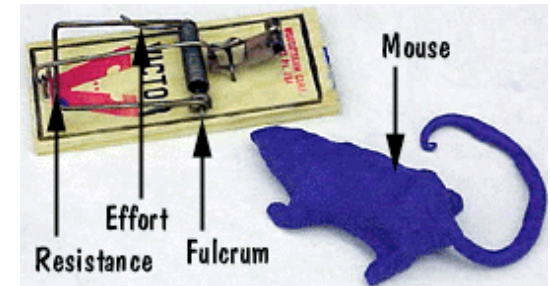
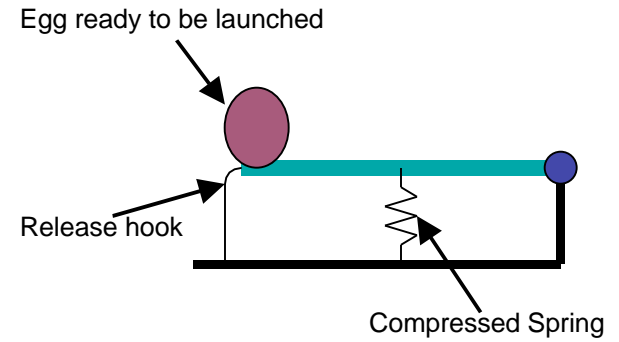
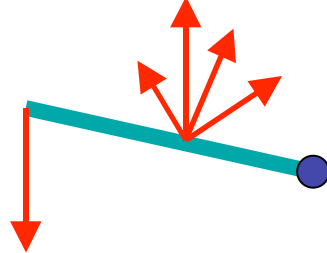
Other First Class Lever Examples



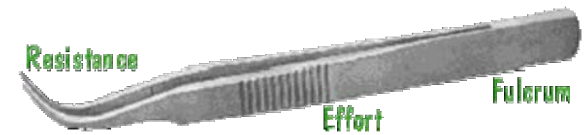
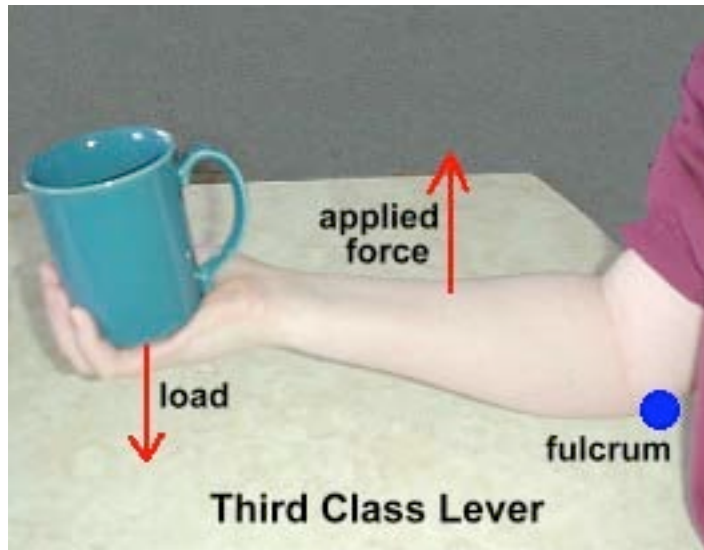
Third Class Lever



Applied force can be in any direction



<http://www.usoe.k12.ut.us/curr/science/sciber00/8th/machines/sciber/lever3.htm>



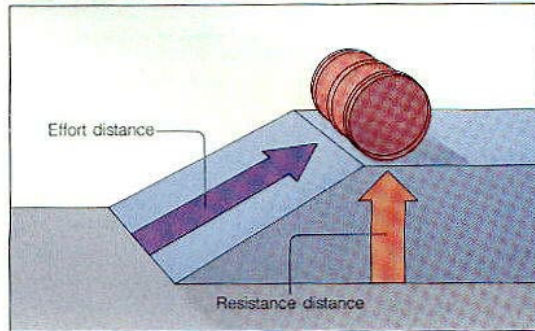
<http://www.usoe.k12.ut.us/curr/science/sciber00/8th/machines/images/tweezer.gif>



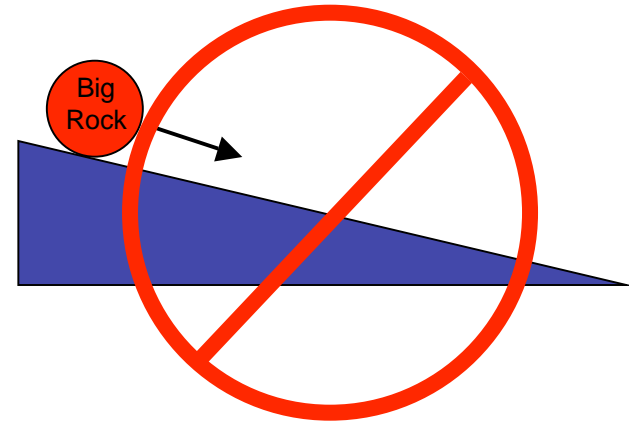
<http://www.usoe.k12.ut.us/curr/science/sciber00/8th/machines/images/base.jpg>

Inclined Plane

An inclined plane is a slanted surface used to raise an object. An inclined plane decreases the size of the effort force needed to move an object. However, the distance through which the effort force is applied is increased.



The Big Rock rolling downhill with gravitational force IS NOT an example of an inclined plane. The inclined plane gives you mechanical advantage AGAINST gravity.

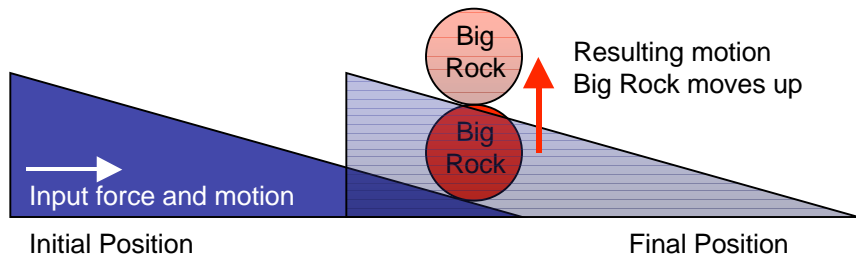


An example of how an Inclined Plane can be used to raise a mass to activate another simple machine

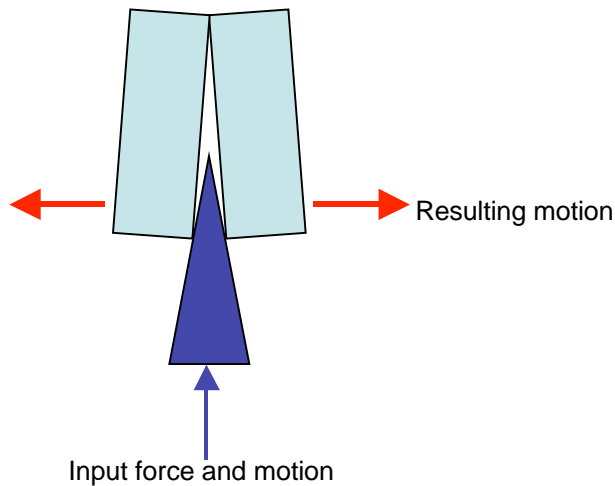


Wedges

Wedges are moving inclined planes that are driven under loads to lift...



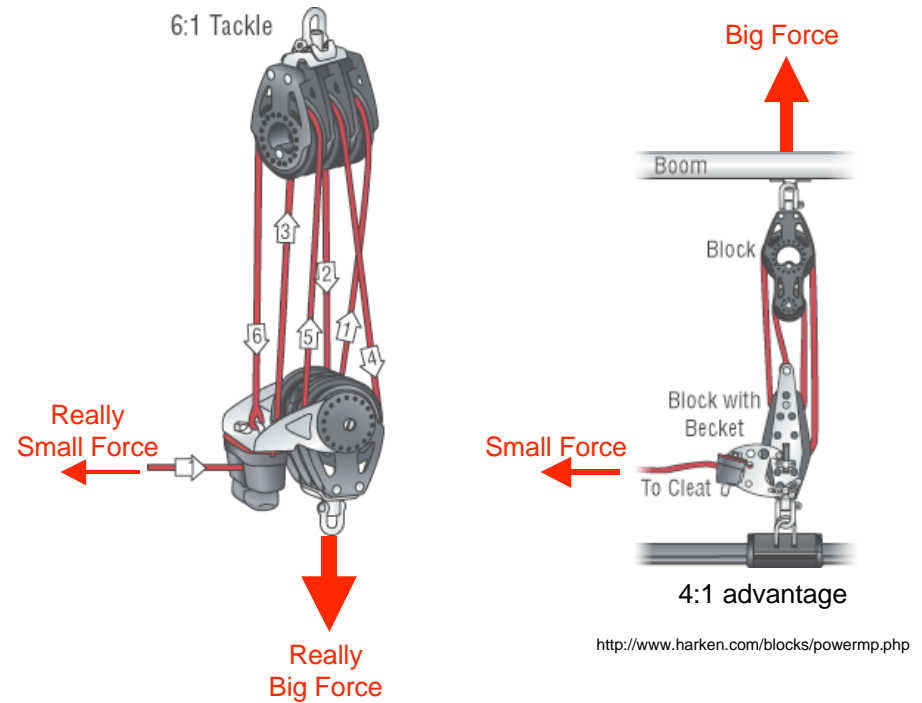
...or into a load to split or separate



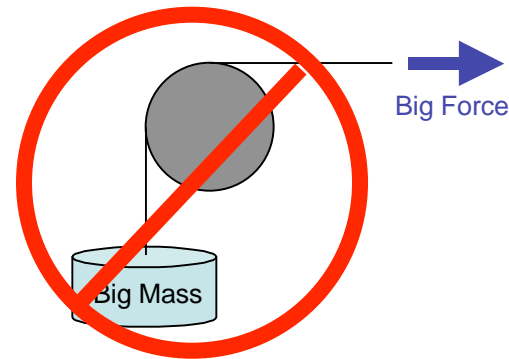
Could be pulled by a string, pushed by a lever, raised by a screw, or other motion machines.

Pulleys

Pulleys use a wheel or set of wheels around which a single length (not a continuous loop) of rope or string passes to move a load with a smaller force. The more times the rope is run between the pulleys, the greater the mechanical advantage.



<http://www.harken.com/blocks/powermp.php>

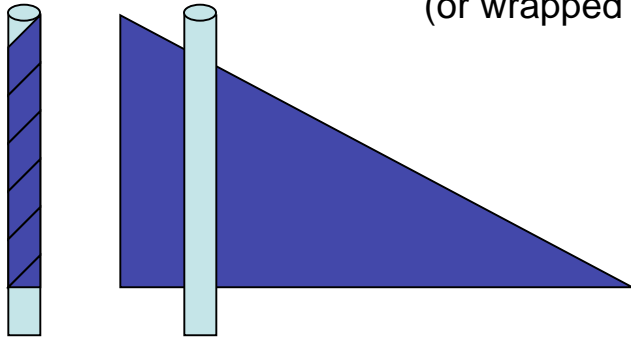


There is no mechanical advantage gained here since the force required to pull the mass is the same as the force of the mass itself!

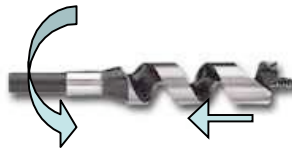
All you do here is change direction of the force.

Screws

A screw is simply an inclined plane wound around a central shaft. Rotational motion of the central shaft causes a linear motion up the screw (or wrapped inclined plane).



Rotating the drill bit...



...makes the chips move up the bit.

<http://doityourself.com/store/6108641.htm>



Rotating the screw shaft on the scissors jack causes the two sides to move towards the center. This is a classic example of using a screw to change rotary motion into linear motion.

Archimedes screw

A special use of a screw is the Archimedes screw, a spiral screw turned inside a cylinder. It was invented in the 3rd century B.C. and was used to lift water from canals. The screw is still used today to lift water in the Nile delta in Egypt, and is often used to shift grain in mills and powders in factories.



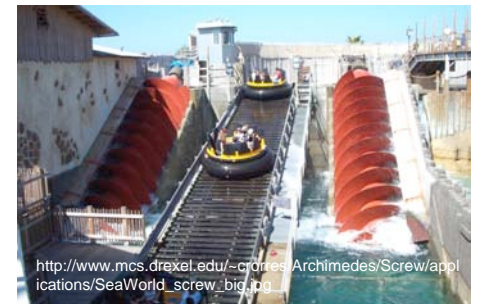
<http://www.tiscali.co.uk/reference/encyclopedia/hutchinson/m0002929.html>

An Archimedes Screw being used to transfer liquid from one glass to another...

http://www.mcs.drexel.edu/~corres/Archimedes/Screw/application/Barbarians_screw_big.jpg



...or a pair of them being used to lift the river on a water ride at SeaWorld.



http://www.mcs.drexel.edu/~corres/Archimedes/Screw/applications/SeaWorld_screw_big.jpg

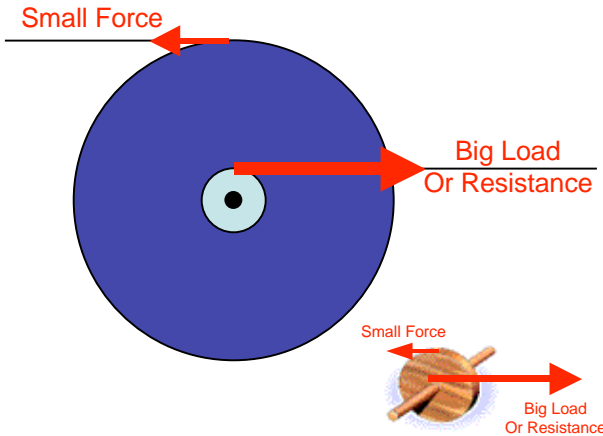
The Tornado Slide IS NOT an example of a screw being used as a simple machine—gravity is just pulling you down a spiral plane. It would be a simple machine if the center post rotated so that you or a beach ball could start at the bottom and be raised to the top.



<http://staff.harrisonburg.k12.va.us/~mwampole/1-resources/simple-machines/tornado-slide.html>

Wheel & Axle

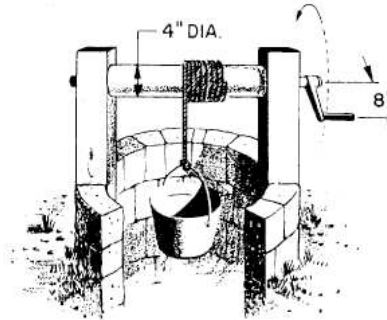
In this simple machine, a wheel or spoke or handle is locked to a central axle so that when one is turned the other must turn. Unlike a single pulley which only changes the direction of the force, the wheel & axle can change both the direction of the force AND the magnitude of the force (mechanical advantage). In this simple machine you are making work easier by trading force for distance.



The input force and resulting load MUST be at different radii to have mechanical advantage.

<http://sln.fi.edu/qa97/spotlight3/spotlight3.html>

Turning the crank on the water well allows you to use a smaller force along a larger diameter (the crank arm length) to raise a larger force using a smaller diameter (the water-filled bucket and rope wound around the spindle diameter).



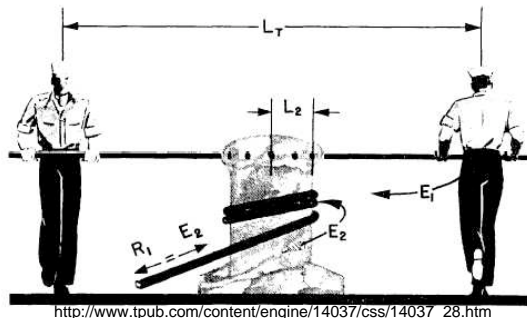
http://www.tpub.com/content/engine/14037/css/14037_26.htm

If the wheel turns and the axle does not (like the front wheel of your bicycle or a wheelbarrow), it is not a simple machine. A wheel on an axle that rotates to reduce friction has no mechanical advantage—it simply reduces friction.



The mechanical advantage comes from the ratio of the wheel and axle diameters multiplying the input force; the bigger the wheel, the more force applied to the axle.

A longer motion at the edge of the wheel is converted to a shorter more powerful motion at the axle—like the steering wheel of your car or boat, a door knob, or like the drawing below. The men are putting a smaller force on the outside of the wheel which results in a much larger force on the axle (rope spool).



http://www.tpub.com/content/engine/14037/css/14037_28.htm

In reverse, a short powerful force at the axle will move the wheel's edge a greater distance—like the large input force of the chain to the rear wheel of your bicycle.

