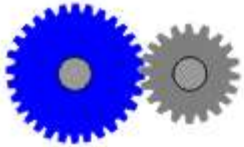
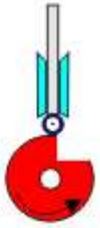
CHAIN AND SPROCKET SYSTEM - LEVERS - LINKAGES - SPUR GEARS - PULLEY - SYSTEM - DROP CAM - SCREW THREAD - RACK AND PINION - SPRING





Introduction

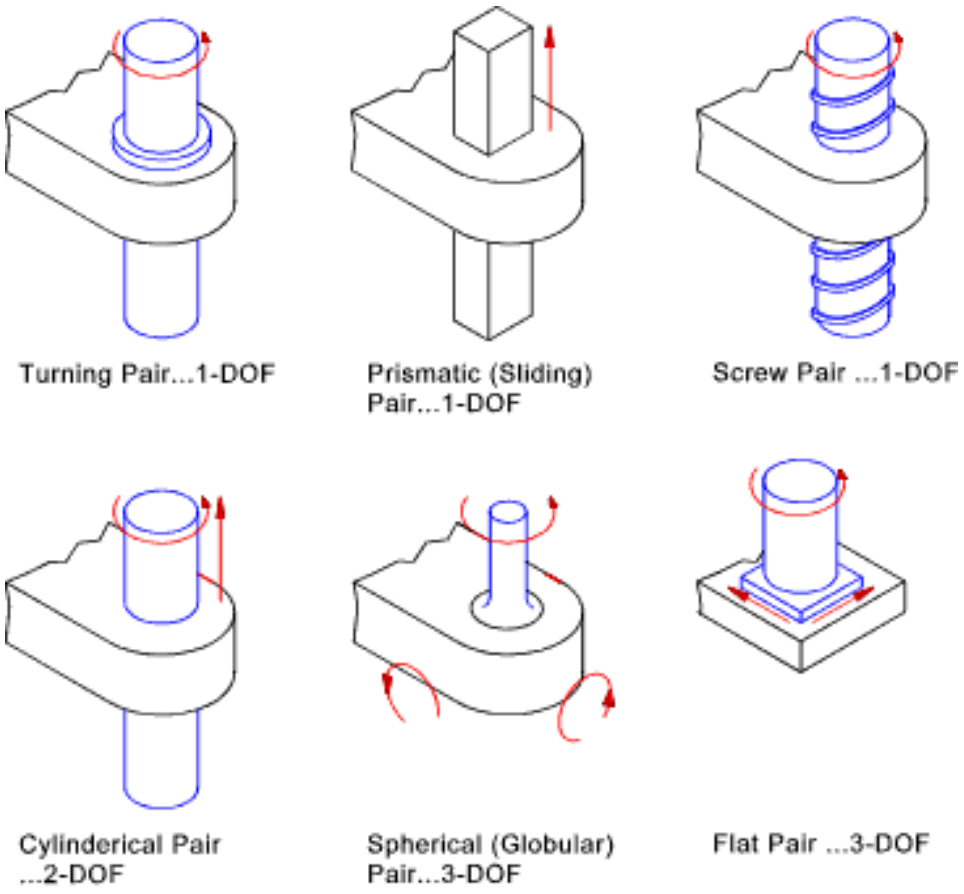
Linkages include garage door mechanisms, car wiper mechanisms, gear shift mechanisms. They are a very important part of mechanical engineering which is given very little attention...

A link is defined as a rigid body having two or more pairing elements which connect it to other bodies for the purpose of transmitting force or motion .

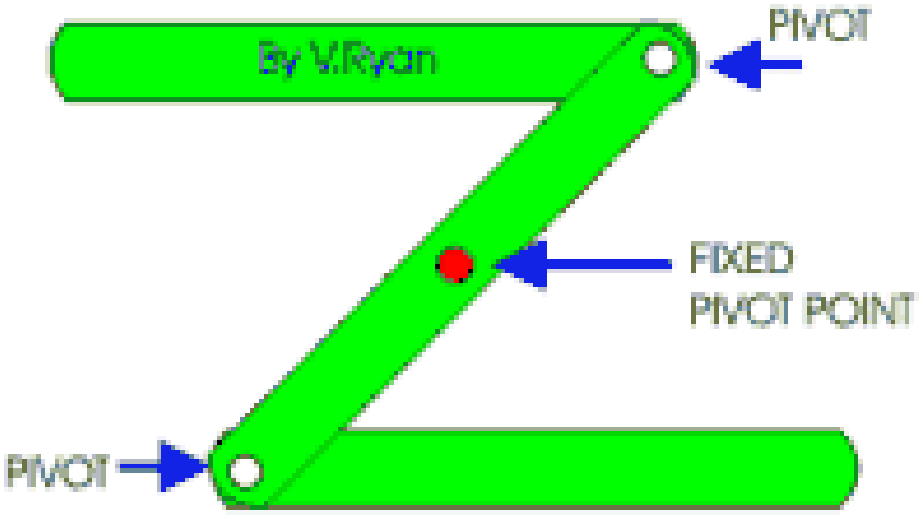
In every machine, at least one link either occupies a fixed position relative to the earth or carries the machine as a whole along with it during motion.

This link is the frame of the machine and is called the fixed link.

An arrangement based on components connected by rotary or sliding interfaces only is called a linkage. These type of connections, revolute and prismatic, are called lower pairs. Higher pairs are based on point line or curve interfaces. Examples of lower pairs include hinges rotary bearings, slideways , universal couplings. Examples of higher pairs include cams and gears.

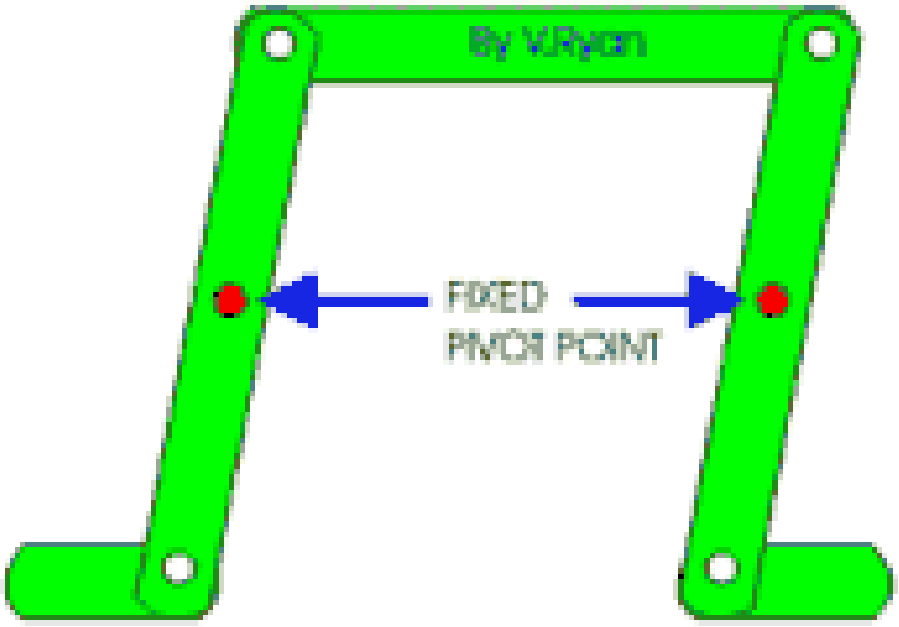


REVERSE MOTION LINKAGE: As the top rod moves to the left the bottom rod moves to the right. The bars move in opposite directions. Another way of describing this linkage is the the direction of movement in one rod is reversed in the other rod. The fixed pivot is the centre of rotation.



REVERSE MOTION LINKAGE

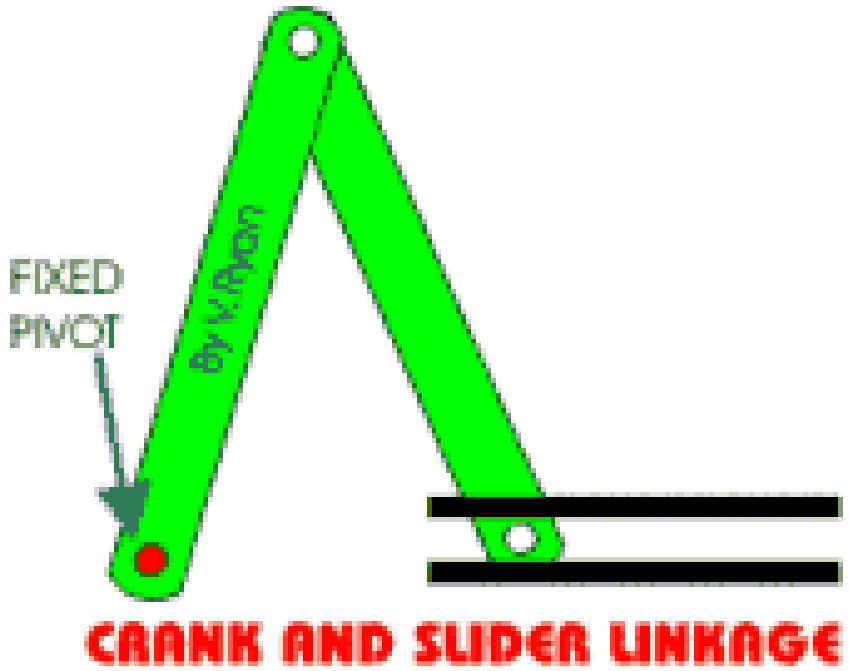
PARALLEL MOTION LINKAGE: As the large rod at the top of the diagram moves to the left the two small rods at the bottom move to the right. All the rods are parallel to each other.

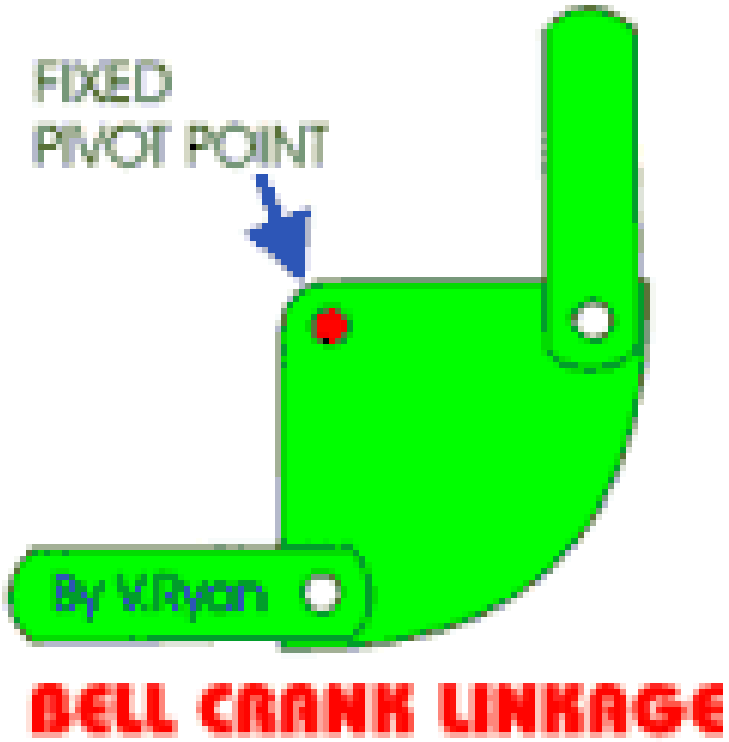


PARALLEL MOTION LINKAGE

MECHANISM INSIDE
A TOOL BOX

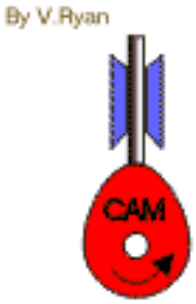
CRANK AND SLIDER LINKAGE: The rods move forwards and backwards in slider. The fixed pivot anchor the linkages to one place.

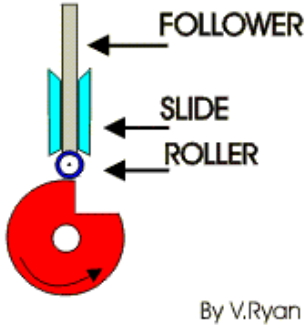


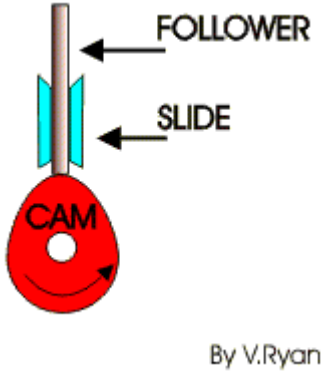


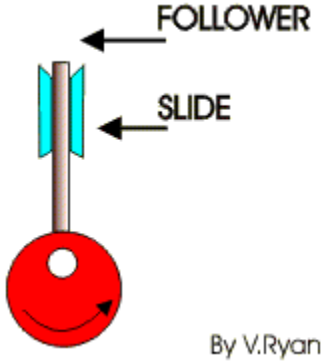
BELL CRANK LINKAGE: This linkage allows horizontal movement to be converted to vertical movement. It also works the opposite way round. A practical example of this is the brake mechanism on a bicycle.

A CAM changes the input motion, which is usually rotary motion (a rotating motion), to a reciprocating motion of the follower. They are found in many machines and toys







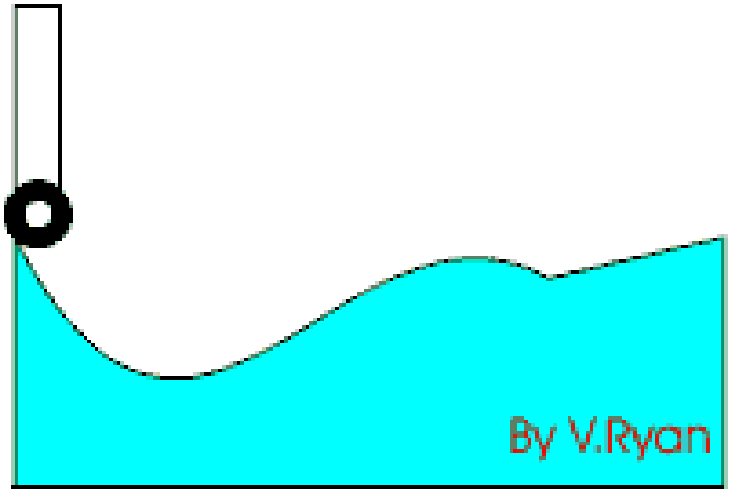


ONE CYCLE One rotation/revolution of the cam.

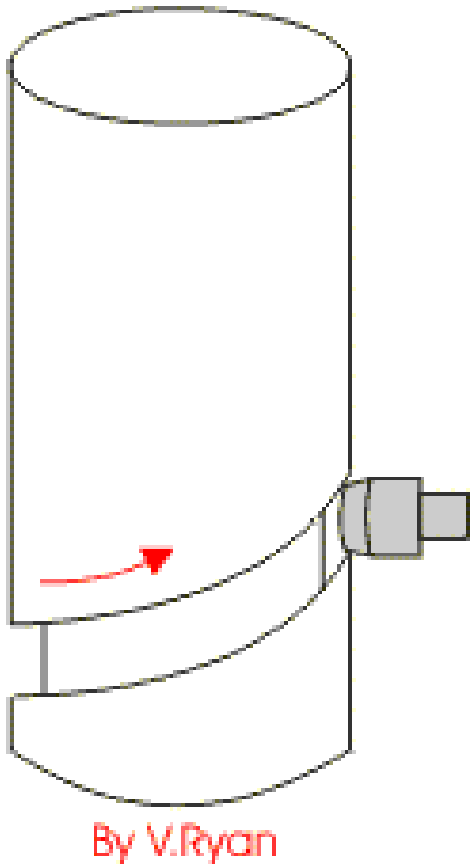
DWELL When the cam rotates but the follower does not rise or fall.

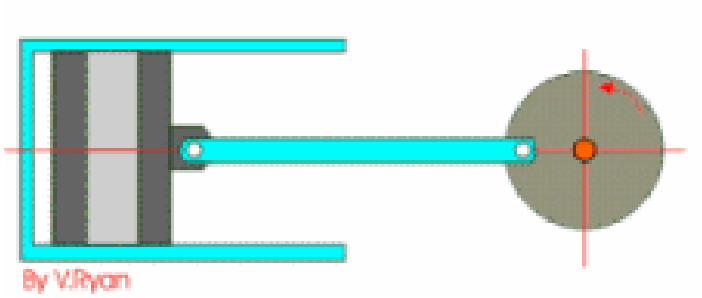
THE RISE That part of the cam that causes the follower to rise.

The Flat Plate Cam / Linear Cam: As the flat plate cam profile moves to the left the follower drops down the slope and then eventually rises up at the other end. The flat plate cam then reverses in the opposite direction and the follower drops and rises again.

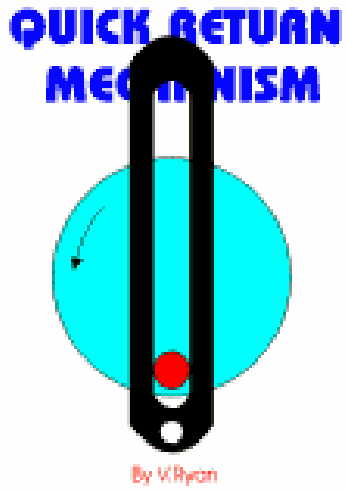


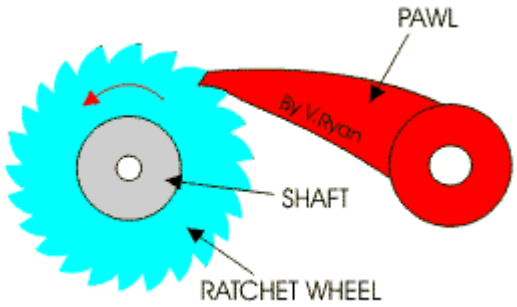
The Cylindrical Cam / Barrel Cam: As the cylinder cam profile rotates the follower moves upwards. When the follower reaches the top, the cylinder cam rotates in the opposite direction and follower moves back down.



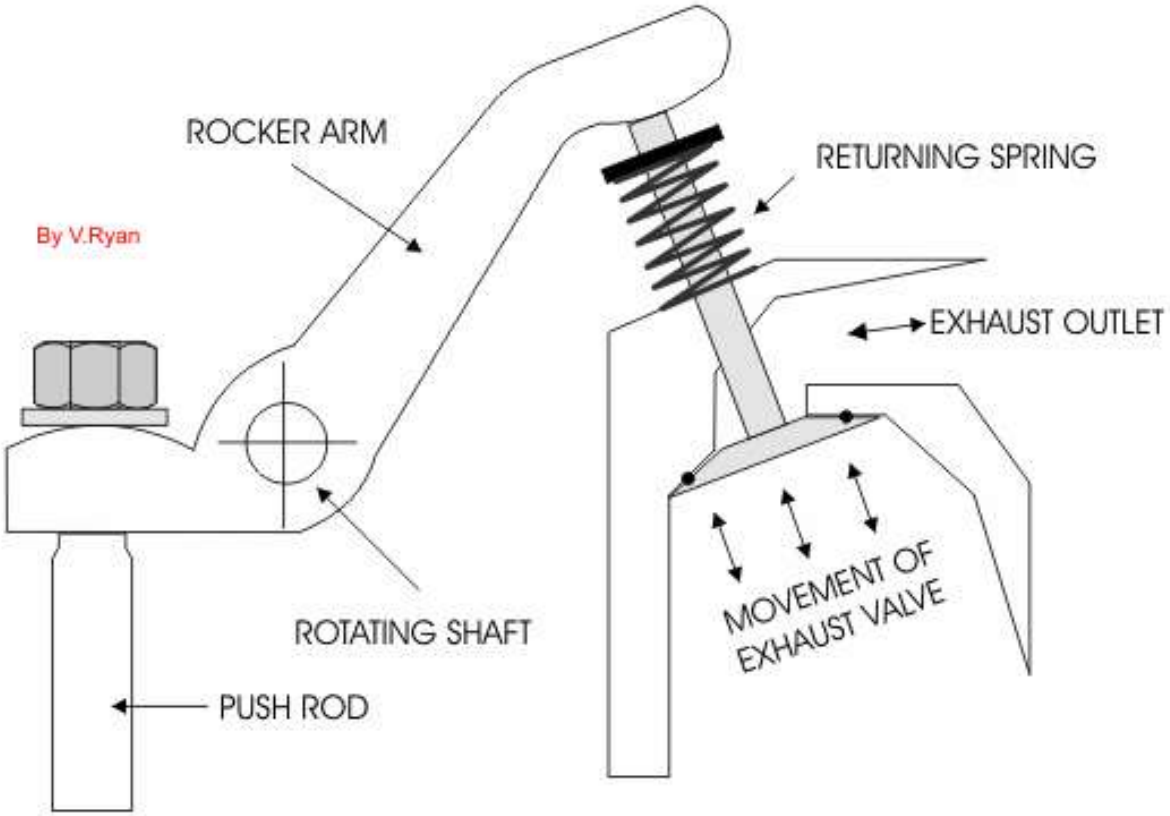


CRANK AND SLIDER MECHANISM

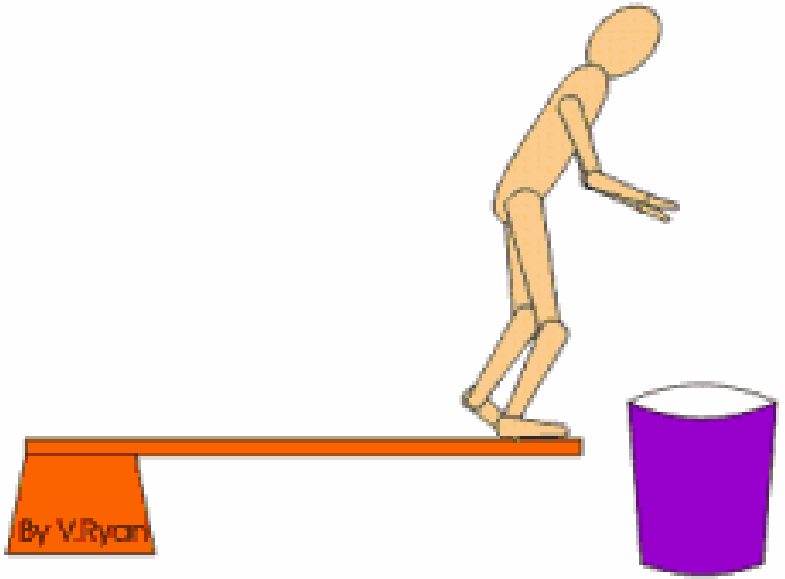




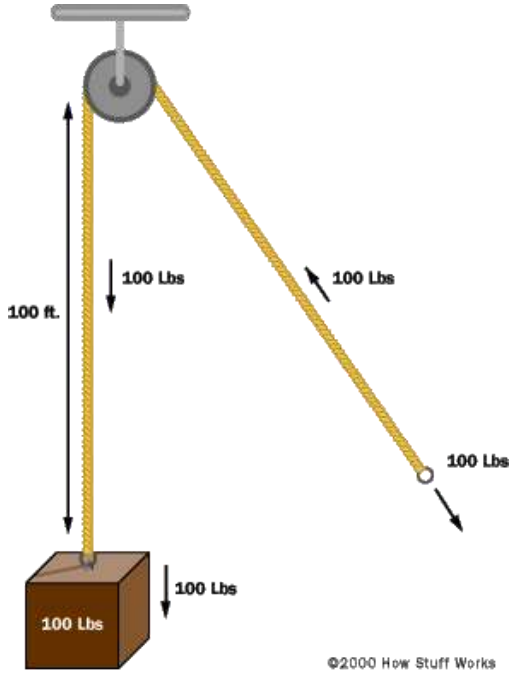
RATCHET MECHANISMS

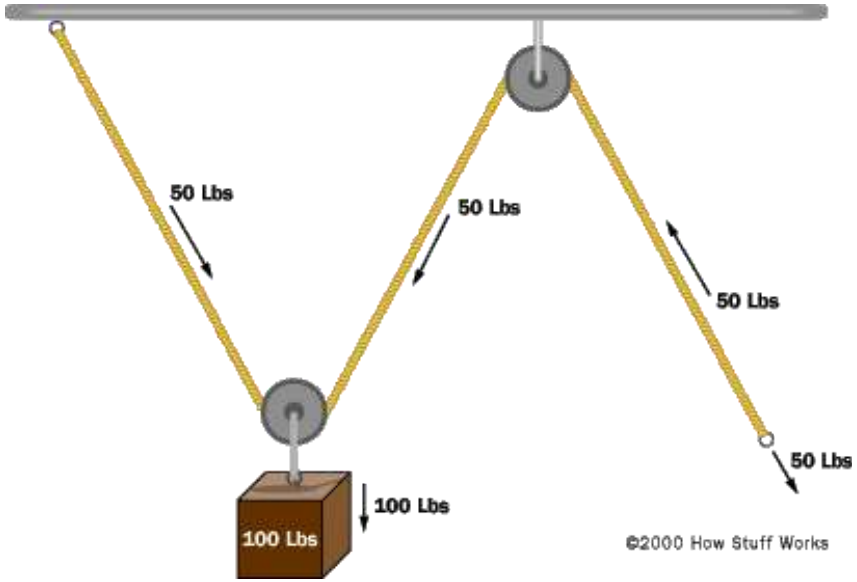

ROCKER ARM
By V.Ryan
RETURNING SPRING
EXHAUST OUTLET
ROTATING SHAFT
MOVEMENT OF
EXHAUST VALVE
PUSH ROD

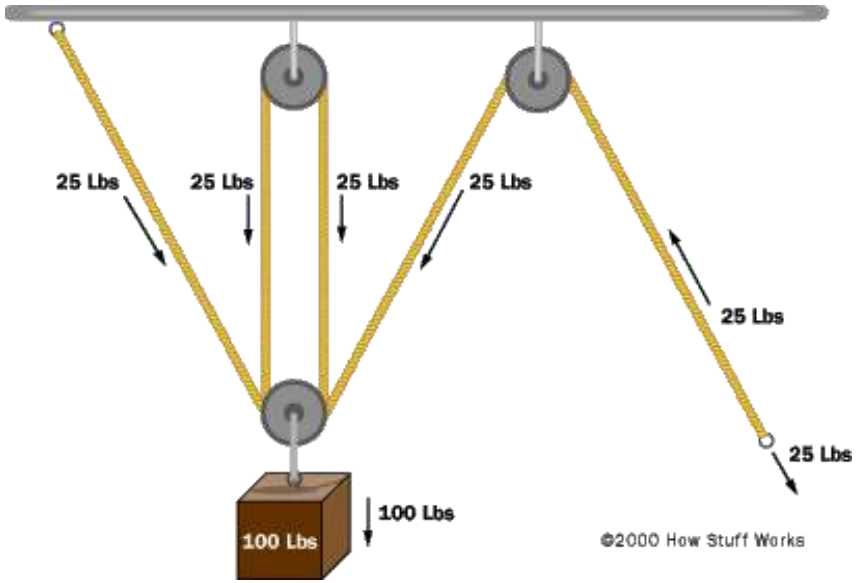
SPRINGS



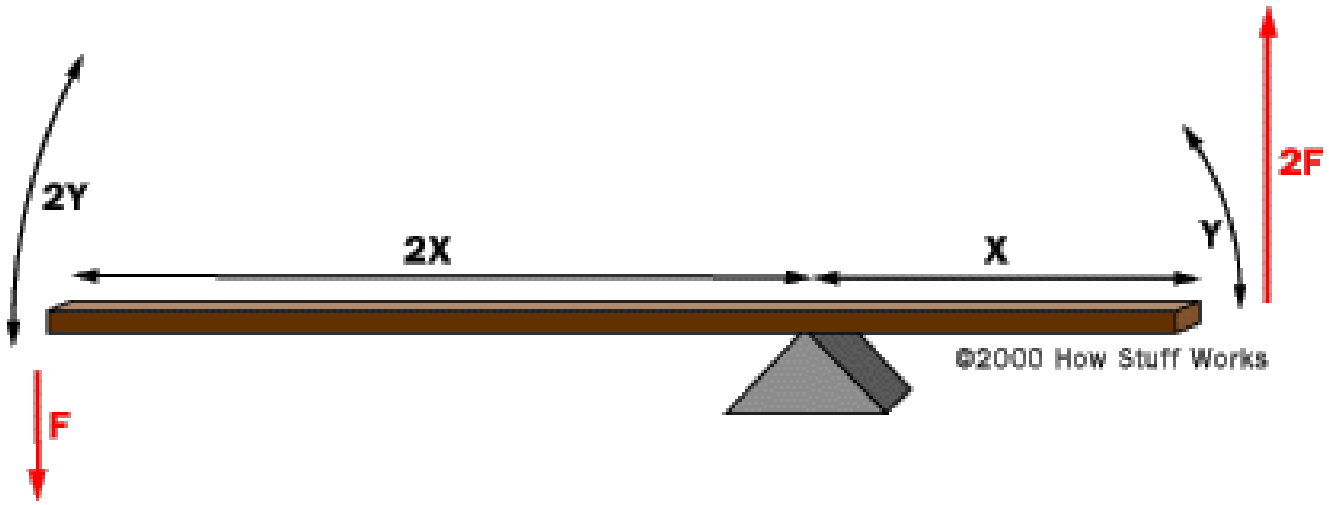
Mechanical advantage with a simple pulley.







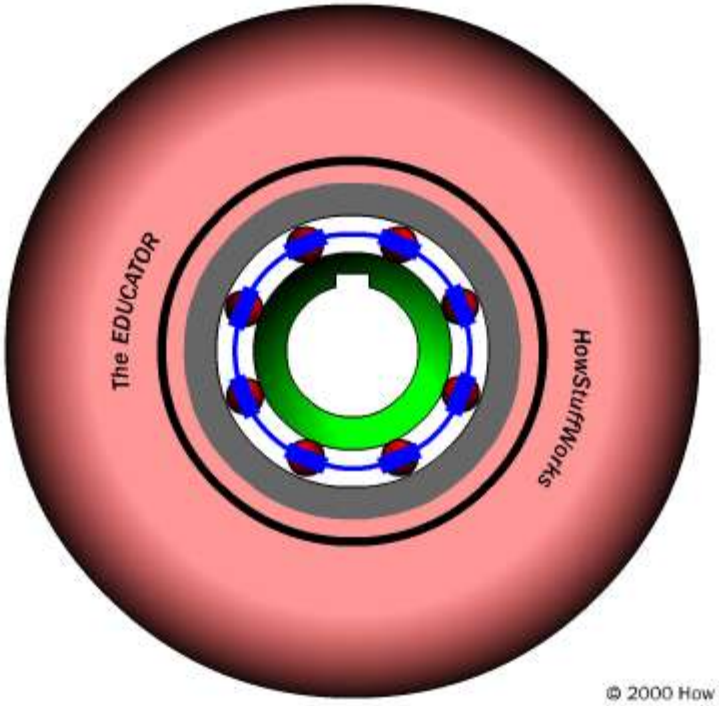
You come into contact with force/distance tradeoffs in all sorts of simple machines. For example, a lever is an example of this phenomenon:



The Basics

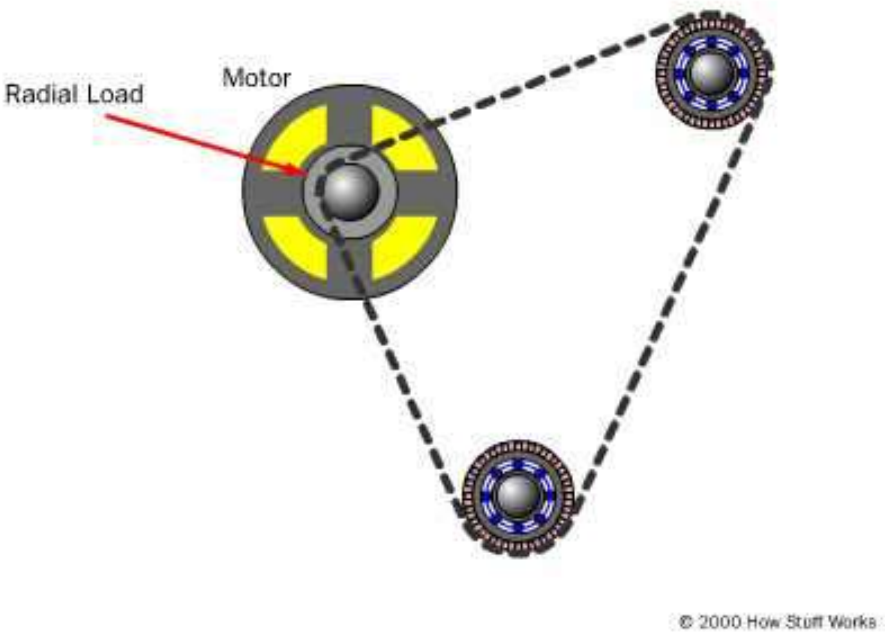
The concept behind a bearing is very simple: Things roll better than they slide. The wheels on your car are like big bearings. If you had something like skis instead of wheels, your car would be a lot more difficult to push down the road.

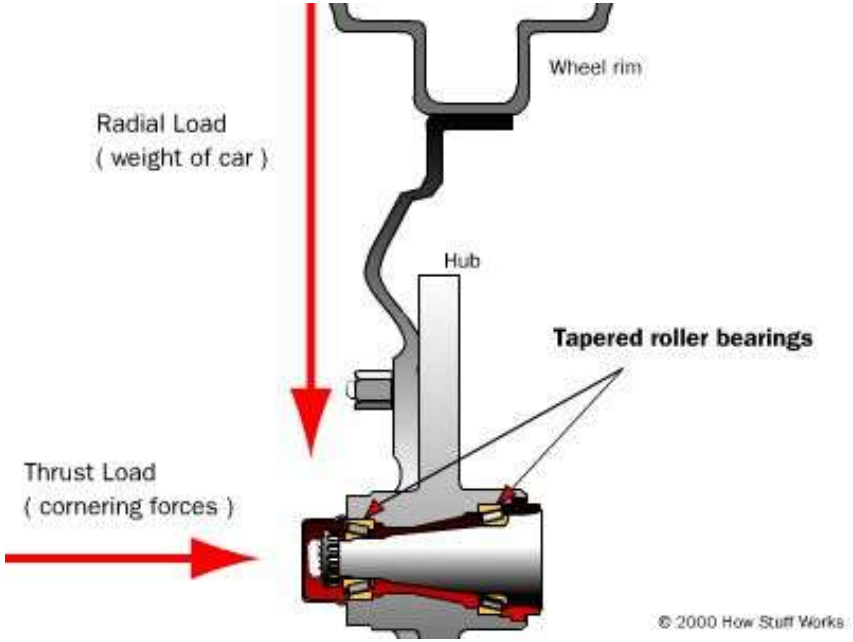
That is because when things slide, the **friction** between them causes a force that tends to slow them down. But if the two surfaces can roll over each other, the friction is greatly reduced.



Bearing Loads

Bearings typically have to deal with two kinds of loading, **radial** and **thrust**. Depending on where the bearing is being used, it may see all radial loading, all thrust loading or a combination of both.





Brake Basics

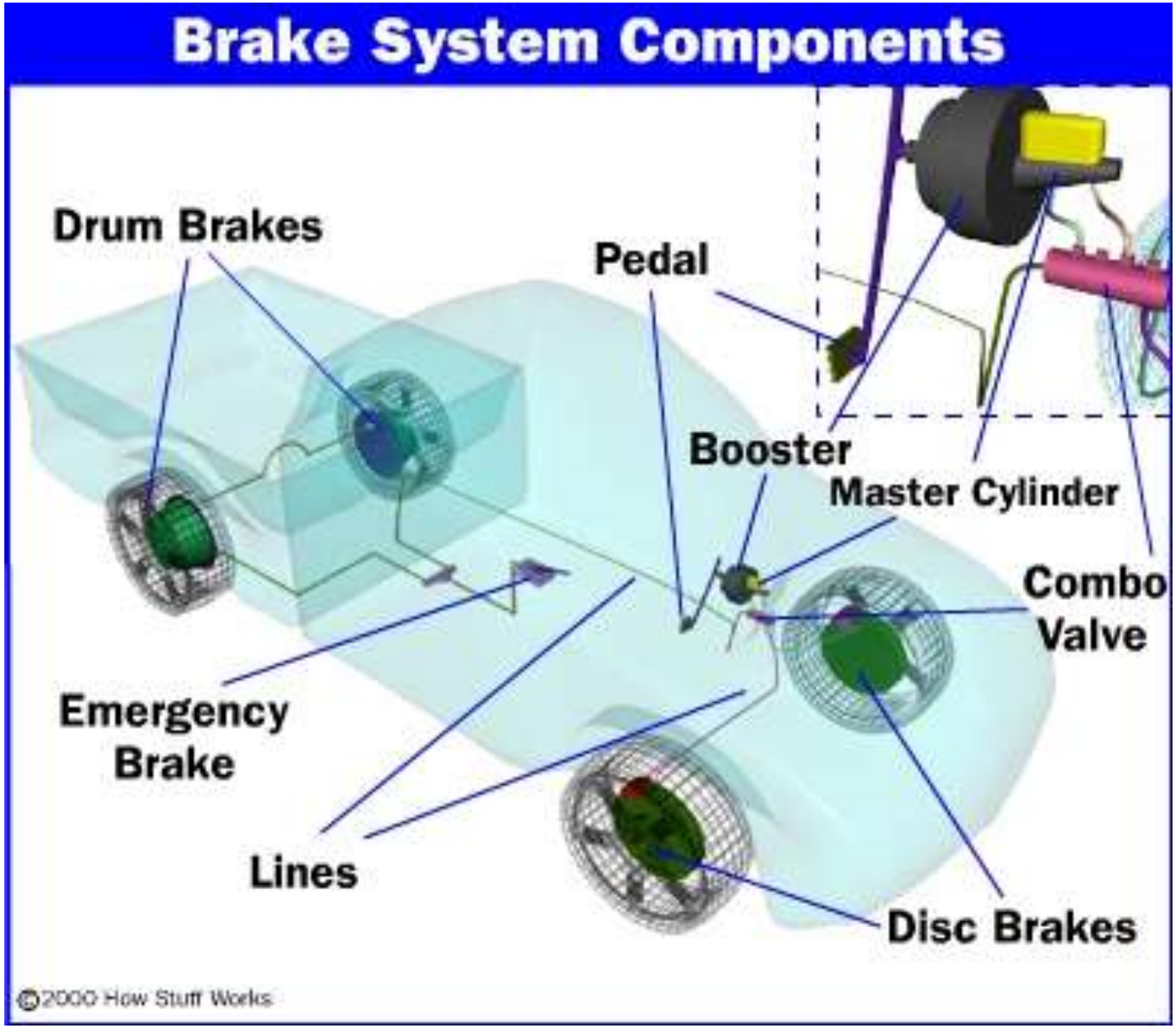
When you depress your brake pedal, your car transmits the force from your foot to its brakes through a fluid. Since the actual brakes require a much greater force than you could apply with your leg, your car must also multiply the force of your foot. It does this in two ways:

Mechanical advantage (leverage)

Hydraulic force multiplication

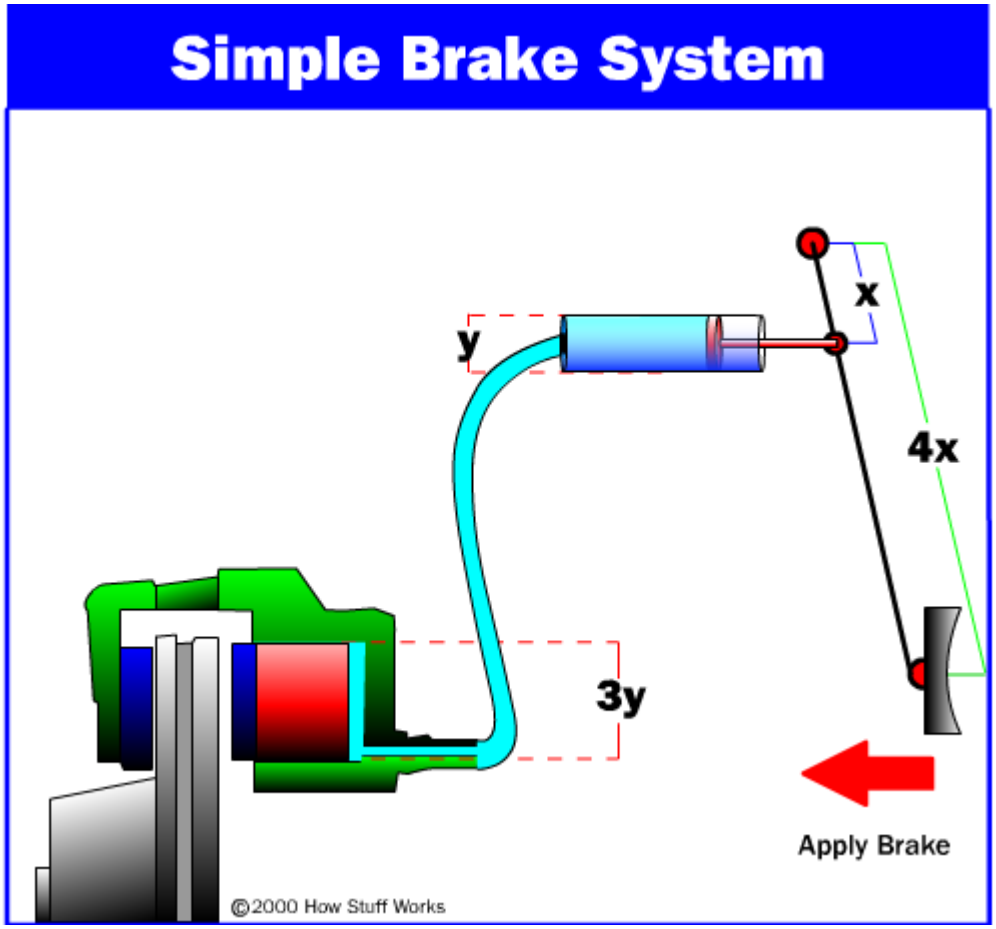
The brakes transmit the force to the tires using **friction**, and the tires transmit that force to the road using friction also. Before we begin our discussion on the components of the brake system, let's cover these three principles:

Leverage
Hydraulics
Friction

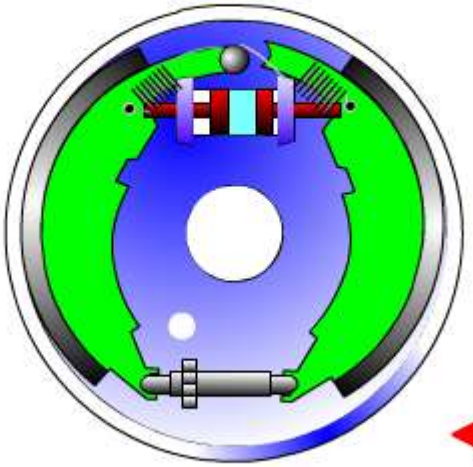

Brake System Components
Drum Brakes
Pedal
Booster
Master Cylinder
Combo Valve
Emergency Brake
Lines
Disc Brakes
©2000 How Stuff Works

A Simple Brake System

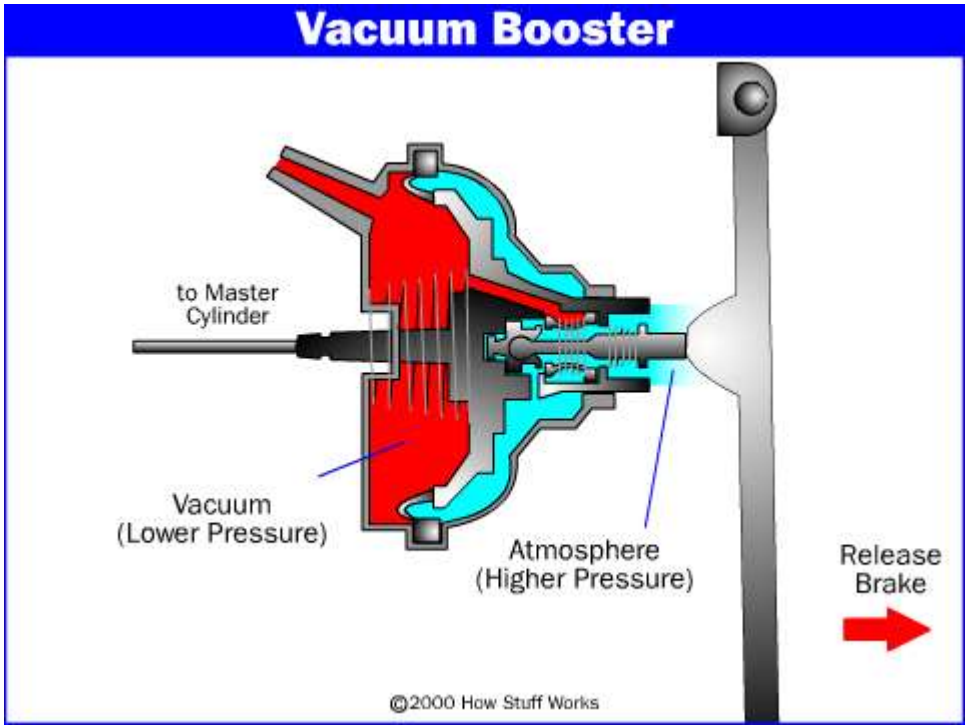
Before we get into all the parts of an actual car brake system, let's look at a simplified system:



How Drum Brakes Work



Reset


Vacuum Booster
to Master Cylinder
Vacuum (Lower Pressure)
Atmosphere (Higher Pressure)
Release Brake
©2000 How Stuff Works

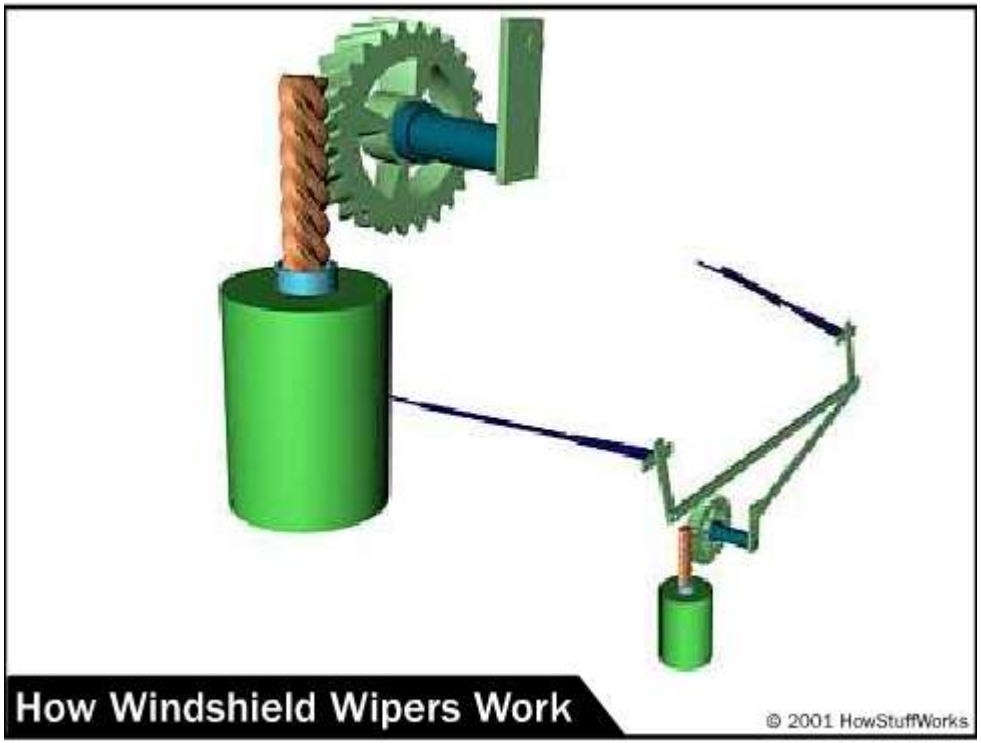
Introduction/Motivation

Machines are used to convert energy into different forms and transmit energy. Machines are composed different types of mechanisms. A mechanism is a device that converts input motion and force into a desired out motion and force. Linkages, cams, gears, and pulleys are examples of mechanisms.

Mechanical Advantage

Recall that mechanical advantage is an important design relation:

$$MA = \frac{\text{Load}}{\text{Effort}} = \frac{L}{E}$$



Worm Gears

If you want to create a high gear ratio, nothing beats the **worm gear**. In a worm gear, a threaded shaft engages the teeth on a gear. Each time the shaft spins one revolution, the gear moves one tooth forward. If the gear has 40 teeth, you have a 40:1 gear ratio