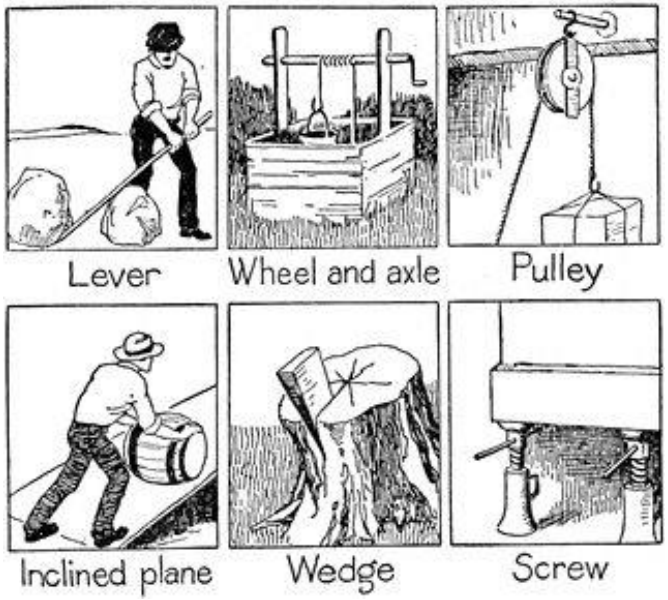
Simple Machines

(Making work easier…phew!)



Simple Machines Foldable

Cover Flap **SIMPLE MACHINES**	What are machines 3 ways to make work easier
Screw	Inside Flap Screw Definition Illustration/example (w/labels) How it makes work easier
Wheel and Axle	Inside Flap Wheel & Axle Definition Illustration/example (w/labels) How it makes work easier
Wedge	Inside Flap Wedge Definition Illustration/example (w/labels) How it makes work easier
Lever	Inside Flap Lever Definition Illustration/example (w/labels) – 3 types How it makes work easier
Inclined Plane	Inside Flap Inclined Plane Definition Illustration/example (w/labels) How it makes work easier
Pulley	Inside Flap Pulley Definition Illustration/example (w/labels) How it makes work easier

- Use the directions to complete your foldable.
- Then flip to the back to finish your notes.

What are MACHINES?

- Most people think of complex, technical, or electronic gadgets with motors…, but machines can be much SIMPLER.
- **A machine is any device that lets you do WORK in an *EASIER* or *BETTER* way.**

- Basically:
  Simple machines make work EASIER.

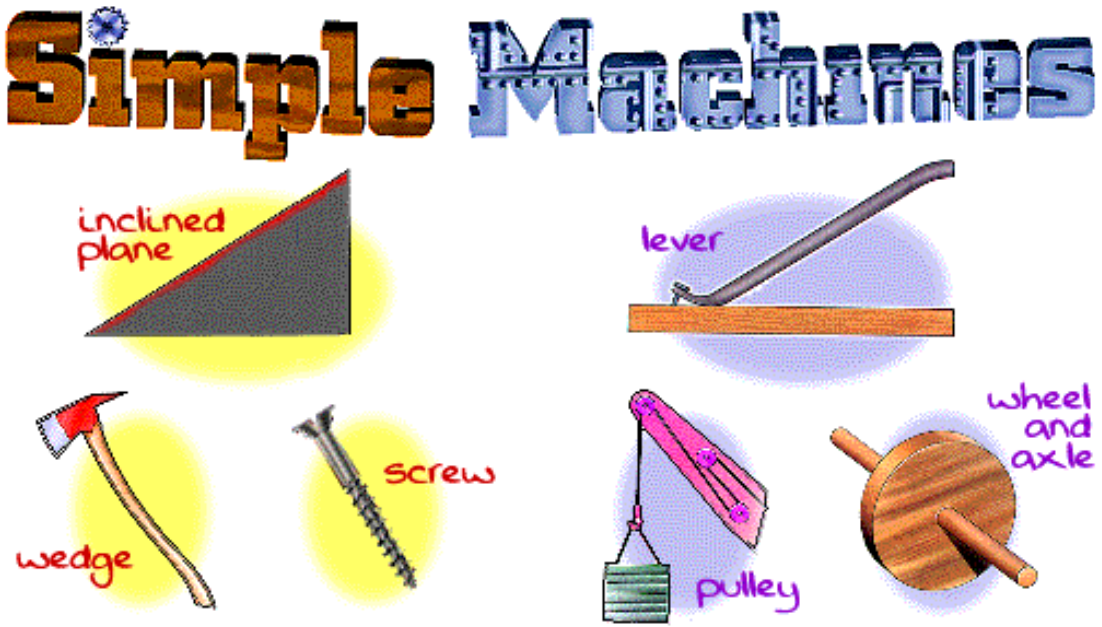
How do machines do work?

- Machines make work easier by changing 3 things about the FORCE you exert to do work:
  - **AMOUNT OF FORCE** you exert
  - **DISTANCE** over which you exert force
  - **DIRECTION** in which you exert force

What are SIMPLE MACHINES?

- There are only 6 basic simple machines that make work easier:

- **Inclined Plane**
- **Wedge**
- **Screw**
- **Lever**
- **Wheel & Axle**
- **Pulley**



WORK & SIMPLE MACHINES

- Simple machines DON'T change the amount of WORK done!

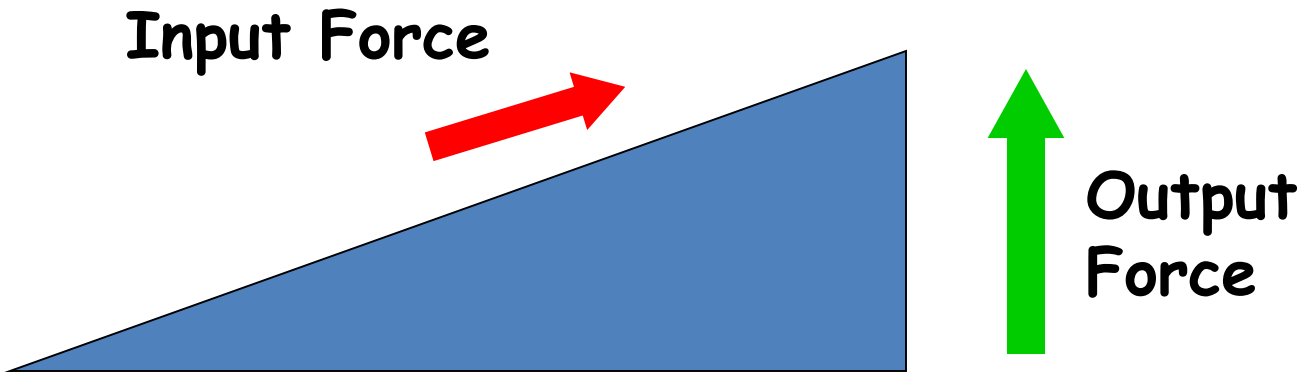
  (They change the size, distance or direction of your FORCE!)

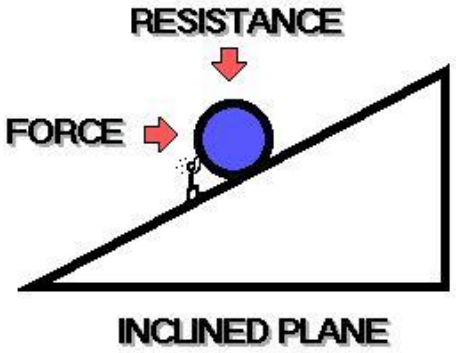
WORK IN = WORK OUT*

(*usually machines lose a bit of work due to FRICTION…)

INCLINED PLANE

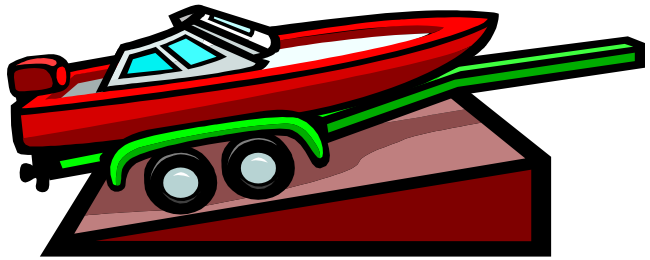
- An inclined plane is a flat, sloped surface. It connects a lower level to a higher level.
- You use less force over a longer distance to raise a load to a higher level.

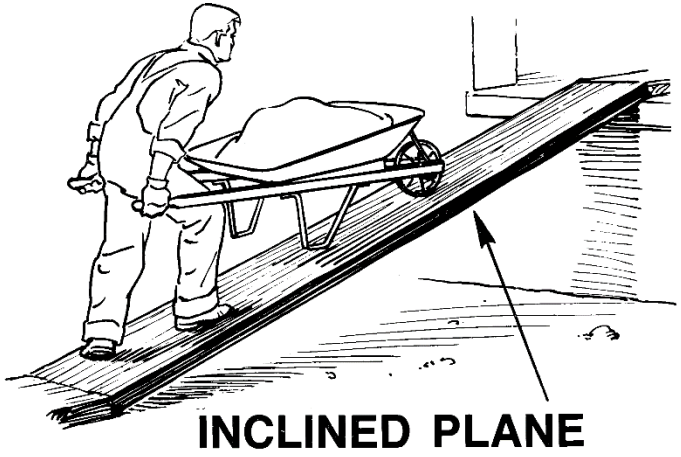


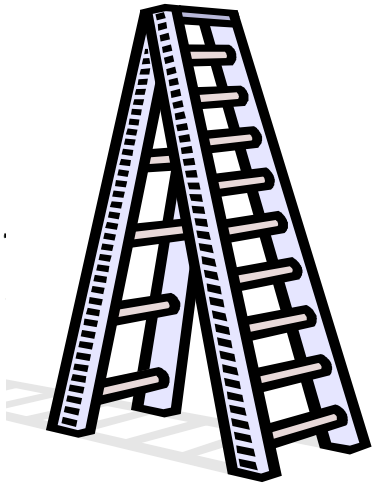


INCLINED PLANE: Examples

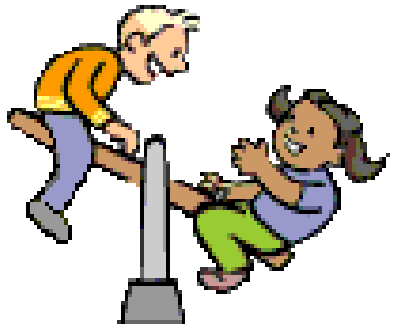
- Ramps (Boat ramps, wheelchair ramps)
- Ladders/Stairs



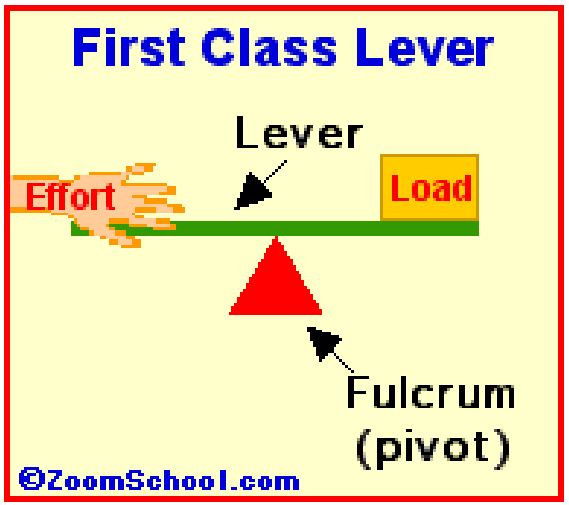


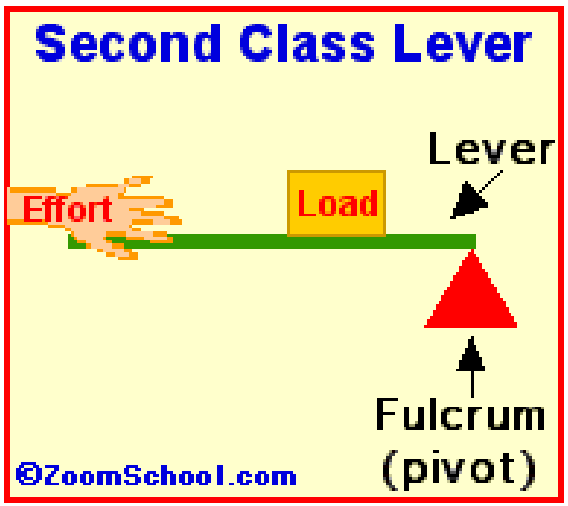


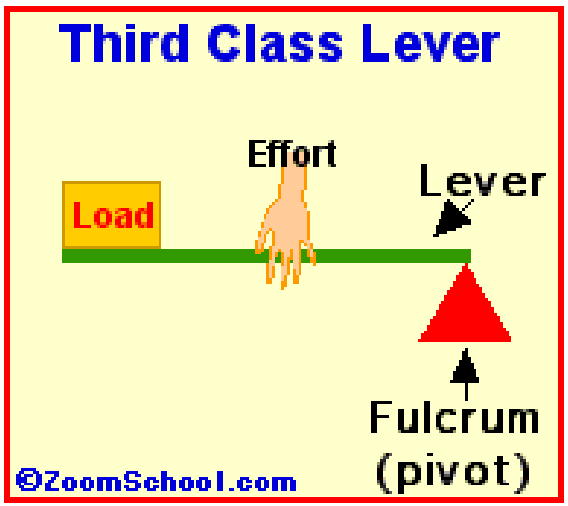
LEVER



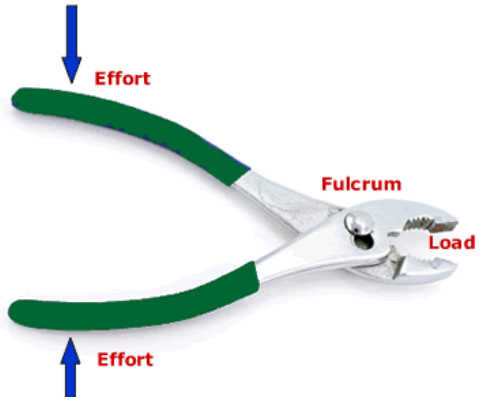
- A lever is a bar that pivots or rotates on a point (called a fulcrum).
- Levers may change the size, distance or direction of the force.



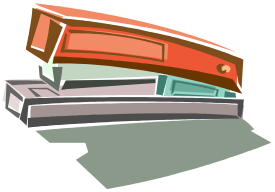


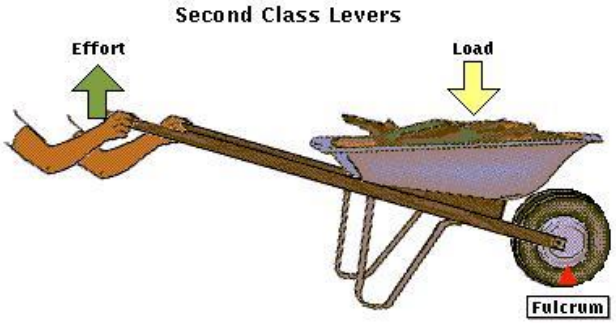


LEVERS: Examples & Uses

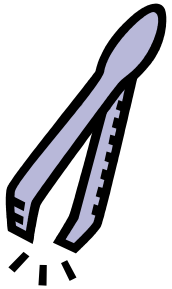


- First Class Levers:
  - Scissors, See-saws, Pliers





- Second Class Levers:
  - Staplers, Nutcrackers, Wheelbarrows

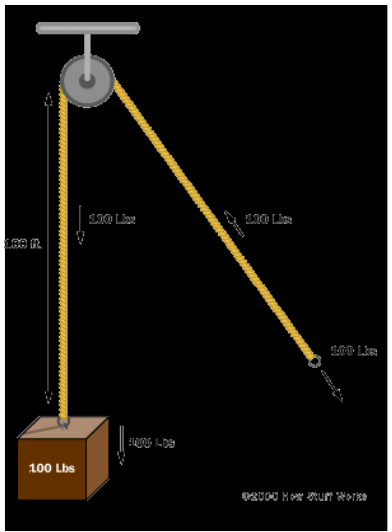


- Third Class Levers
  - Shovels, baseball bats, tweezers

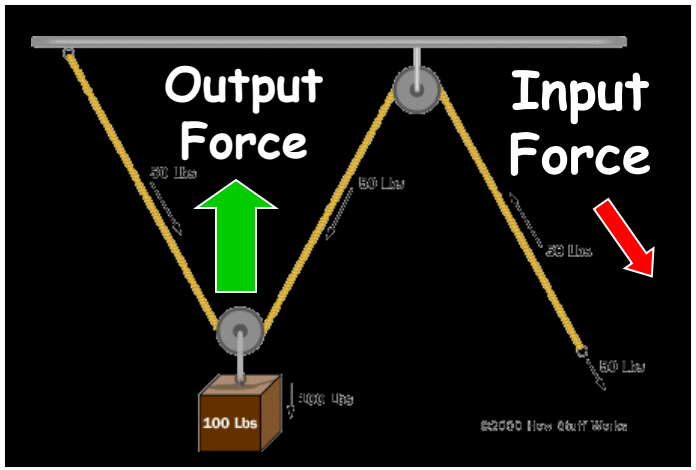
PULLEY

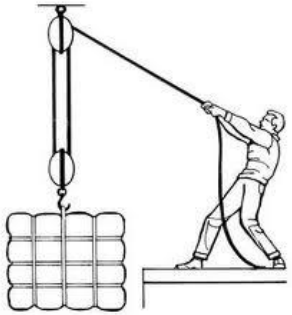
- A pulley is a grooved wheel with a rope, used to raise/lower/move a load.
- Pulley systems change the direction and/or decrease the input force so you can move heavier loads.

Output Force



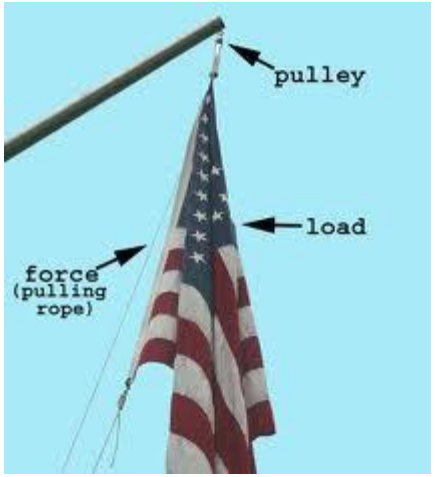
Input Force

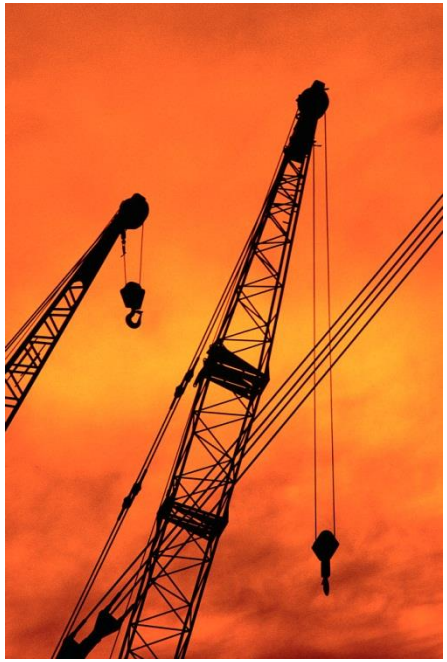




PULLEY: Examples & Uses

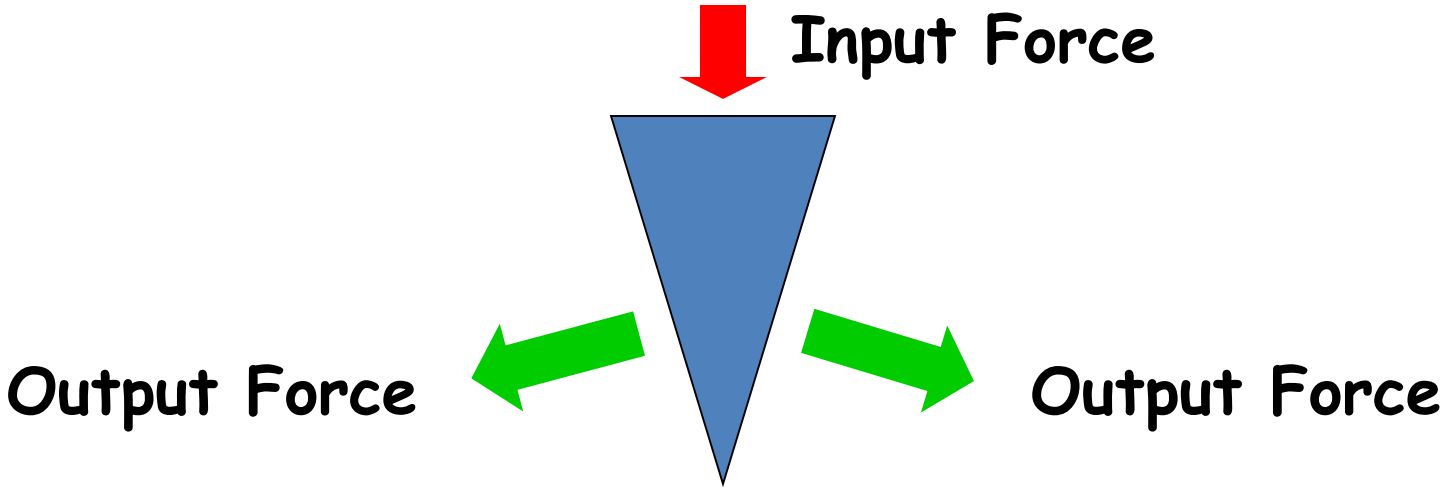
- Cranes
- Raising a flag on a pole
- Window Blinds
- Raising a sail on a boat
- Clothesline





WEDGE

- A wedge has slanting slides that meet at an edge – it splits material apart.
- It changes force in one direction into a splitting force that acts at right angles to the blade.



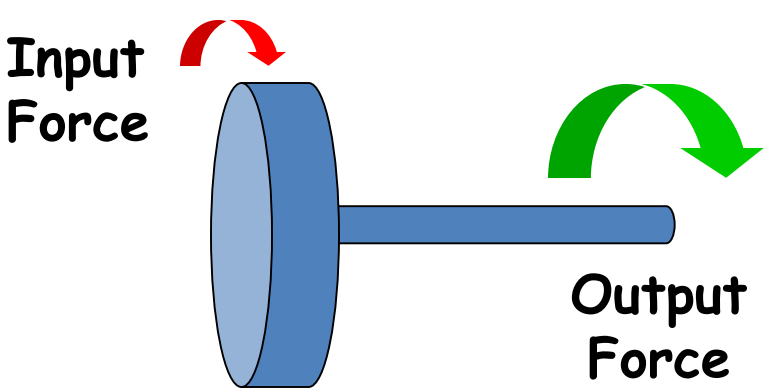
WEDGE: Examples & Use

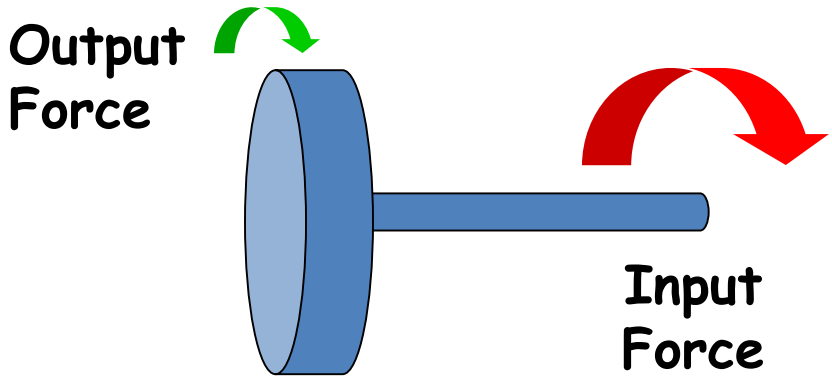
- Ax, Knife, etc.
- Zippers

- Used in all cutting machines (to split materials apart)

WHEEL & AXLE

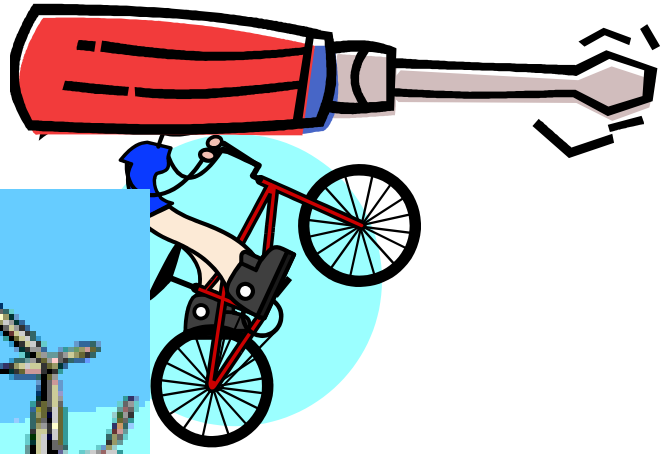
- The wheel is locked to the central axle – when one turns, so does the other one.
- A short powerful force at the axle, will move the wheel's edge a long distance.
- A long motion at edge of wheel, moves the axle with great force.

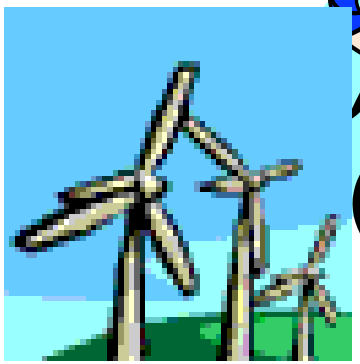


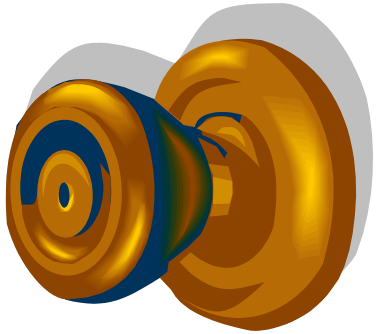


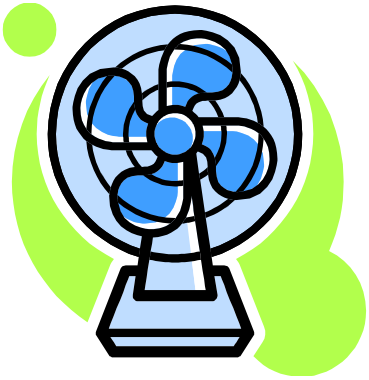
WHEEL & AXLE: Examples & Uses

- Screwdriver
- Windmill
- Cars/Bicycles
- Rolling Pin
- Door Knob
- Fan



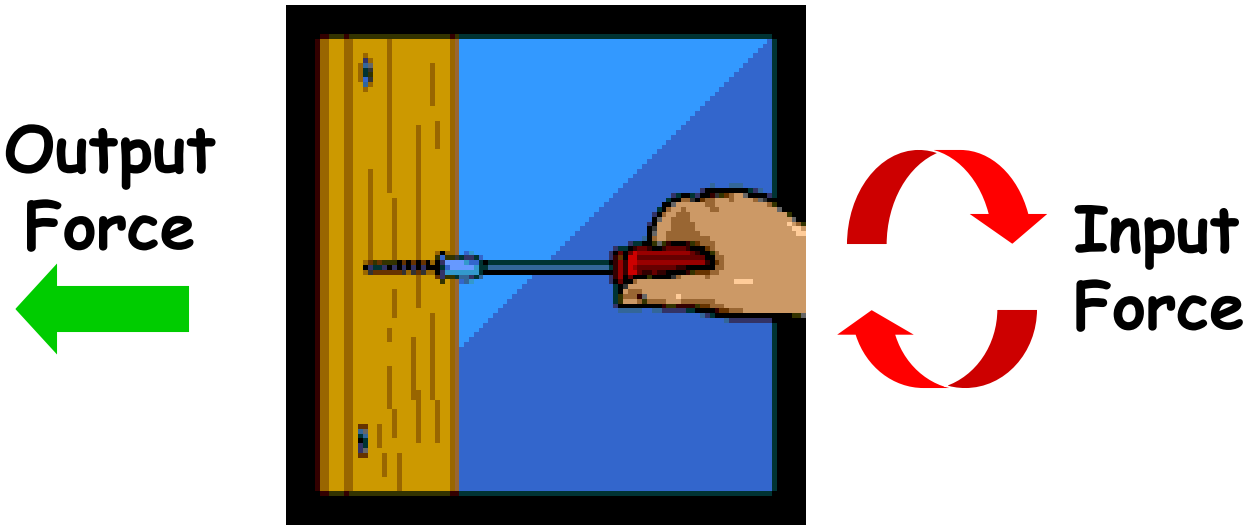






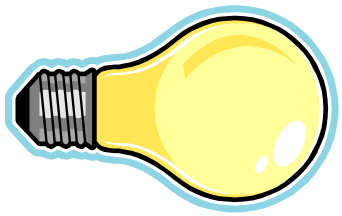
SCREW

- A screw has a "thread" or "groove" wrapped around a central cylinder.
- While turning, it converts a twisting force into a forward or backward force.



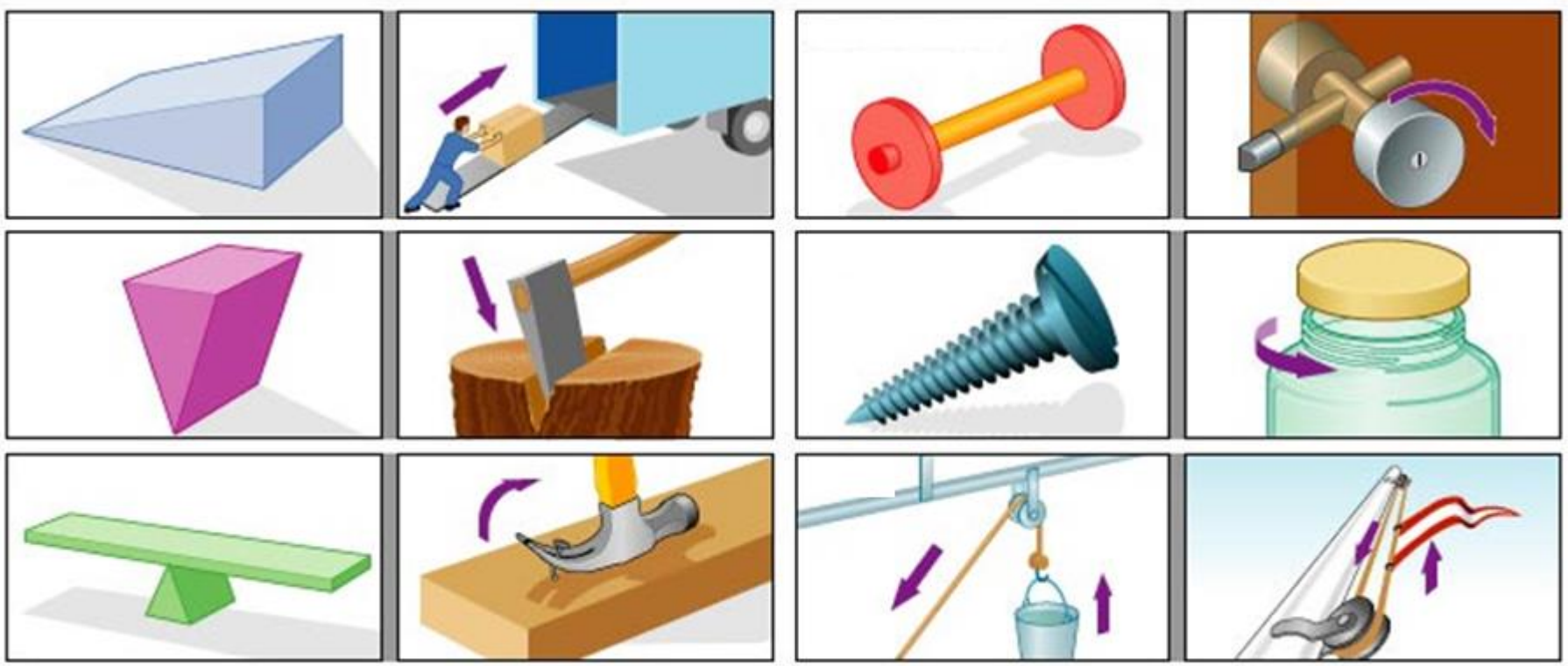
SCREW:
Examples & Uses

- Screws can holds things together or lift materials.
- Screws
- Screw top lids for jars/bottles
- Light bulb
- Swivel stools/chairs



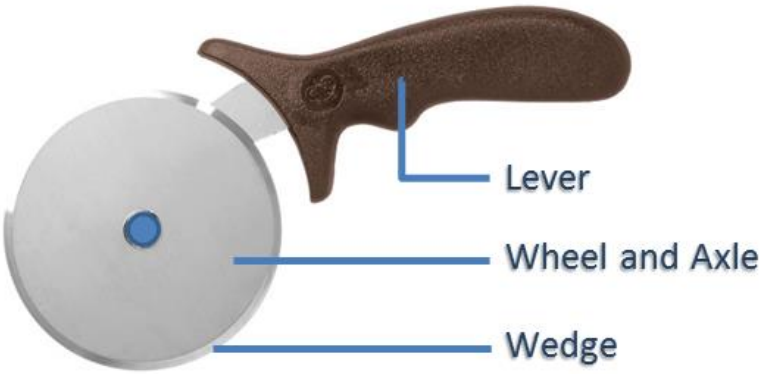
Simple Machine Review!

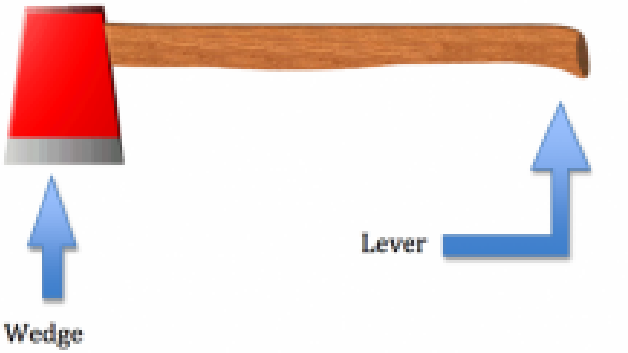
Write the name of the type of simple machine next to the picture on the back of your foldable.

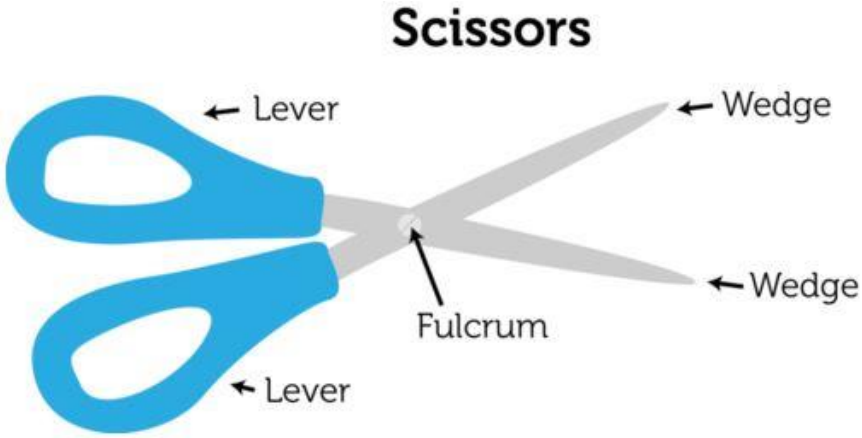


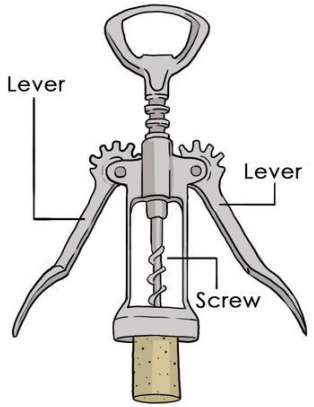
COMPOUND MACHINES

- Compound Machines – are made of **combinations** of two or more simple machines.

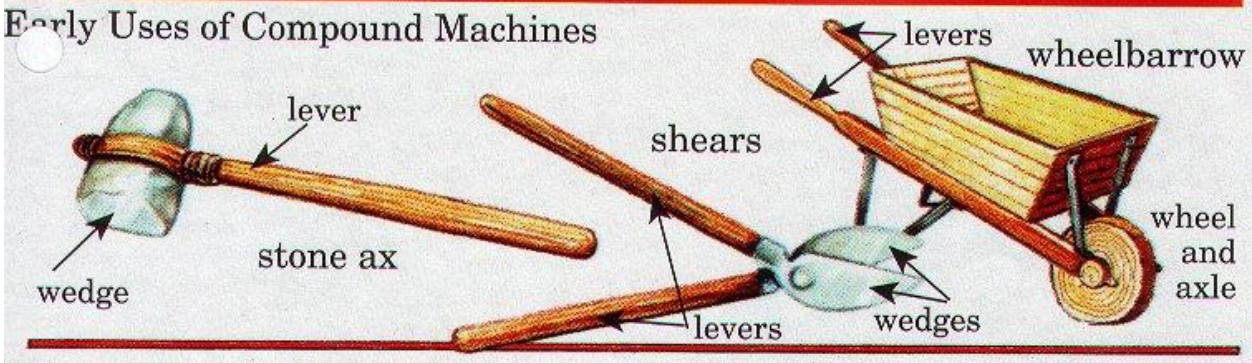


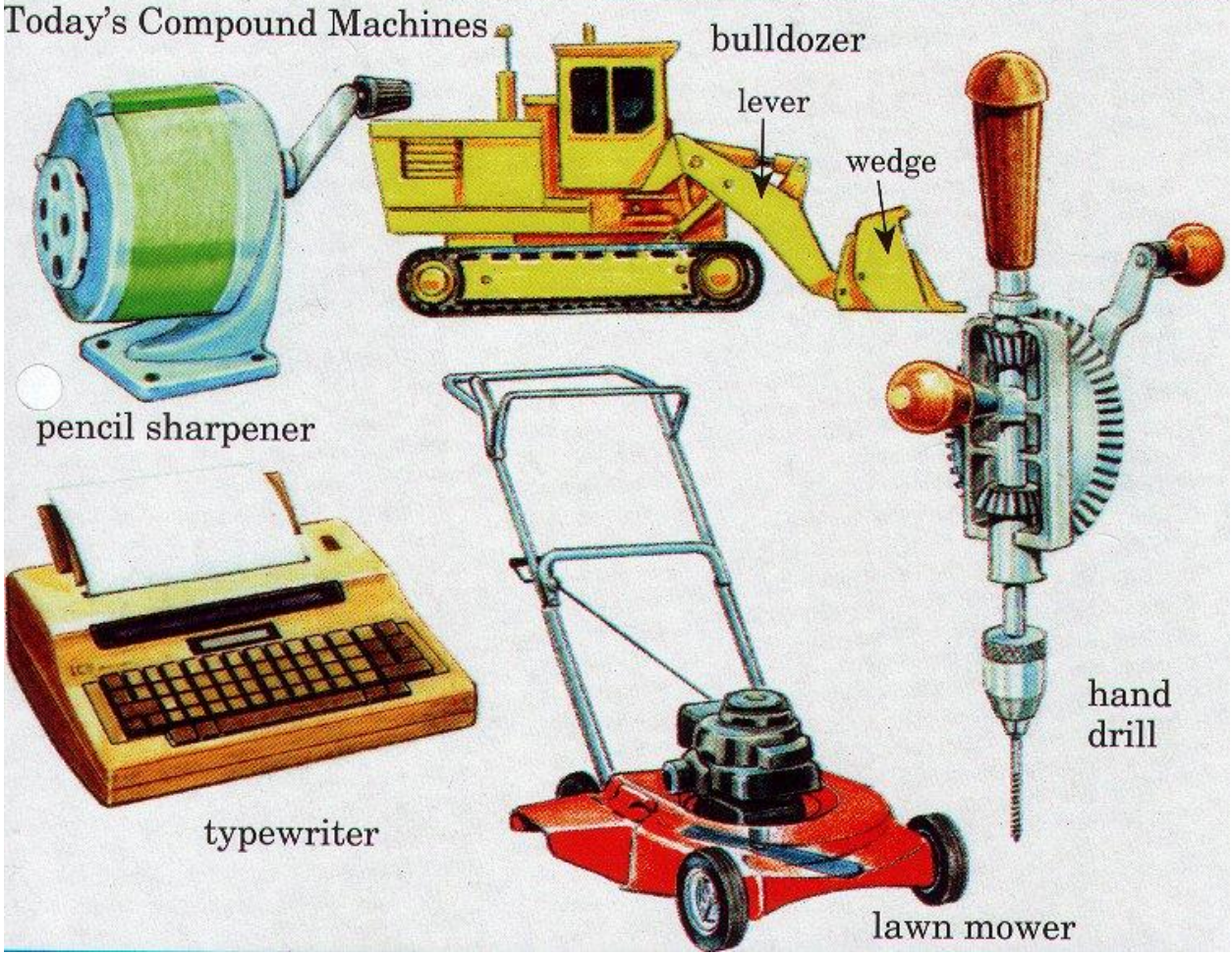






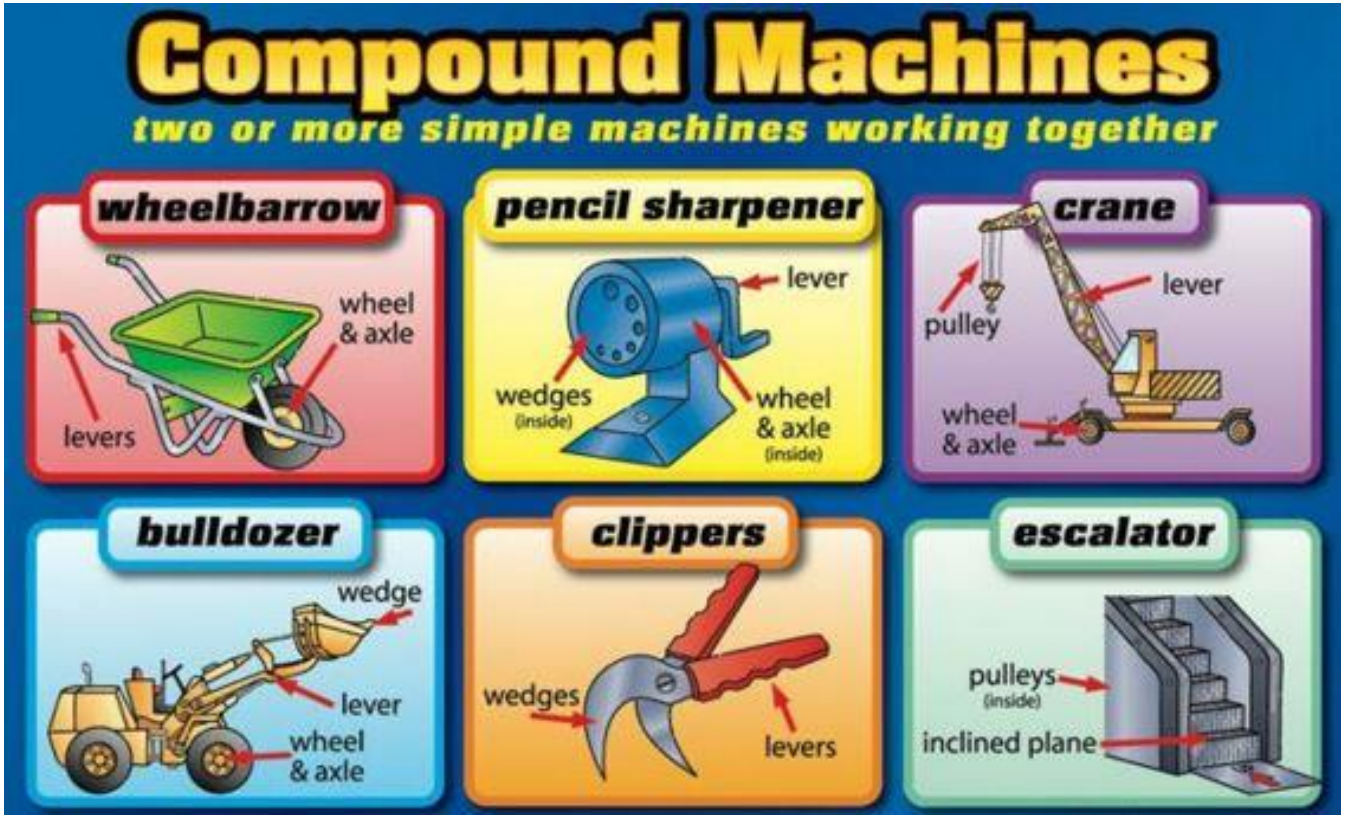
Compound Machines





Compound Machines

two or more simple machines working together

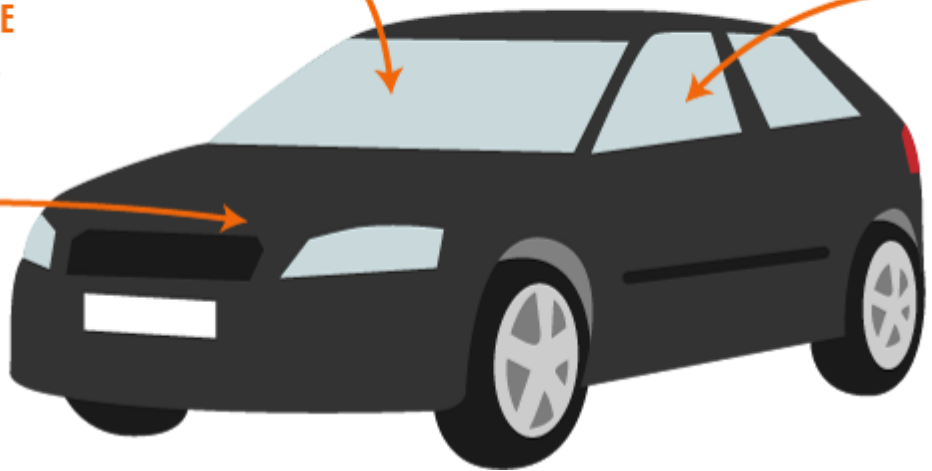


INCLINED PLANE
Pedal

LEVER
Gearshift

WEDGE
Brakes

SCREW
Found in body & engine



PULLEY
Seatbelt

WHEEL AND AXLE
Car wheels and axles

Machines make work easier by changing 3 things about the FORCE:

- The amount of force
- The distance of the force
- The direction of the force

Machines make work easier by changing 3 things about the FORCE:

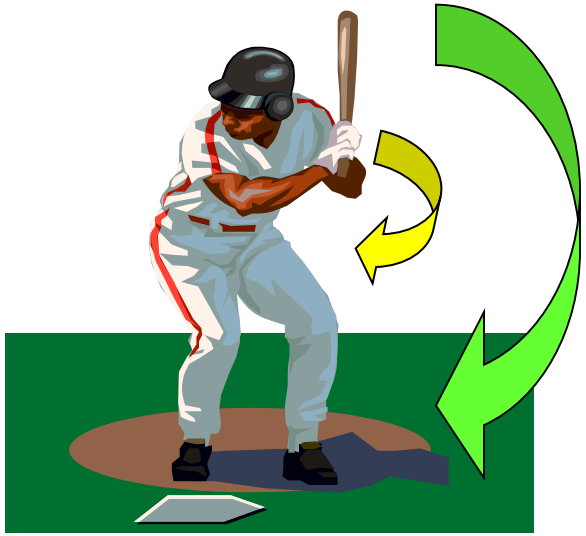
- The <u>amount</u> of force

  (eg. A ramp lets you lift a heavy object with <u>LESS force</u>)

Machines make work easier by changing 3 things about the FORCE:

- The <u>distance</u> of the force

  (eg. A baseball bat lets you move your arms a short distance, but move the end of the bat a large distance).



Machines make work easier by changing 3 things about the FORCE:

- The <u>direction</u> of the force

  (eg. The pulley on a set of window blinds lets you move the blinds UP with a DOWNWARD pull.