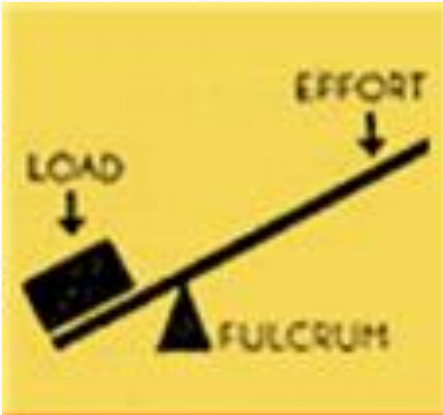


Simple Machines

Division 5

Definitions to know...

- **Work** – done when an applied force causes an object to move in the direction of the force
- **Energy** – ability to cause change; can change the speed, direction, shape, or temperature of an object
- **Load** – the weight being lifted by the simple machine
- **Effort** – effort is the force placed on the simple machine to move the load. Also called applied force or input force



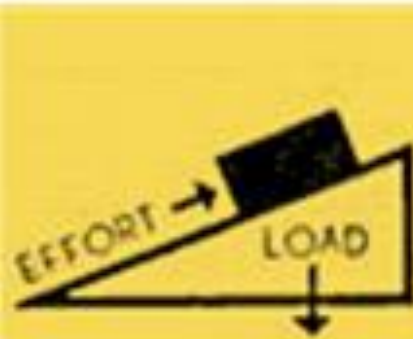
Lever



Wheel & Axel



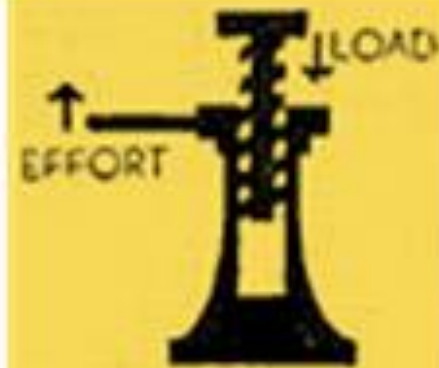
Pulley



Inclined Plane



Wedge



Screw

What is a Simple Machine?

- Simple Machines are tools that **make work easier** by pushing or pulling over increased distances
- In other words, simple machines allow us to do the **same work**, but with **less effort**
- They use **energy** to work; usually with one movement
- There are **6** types of simple machines

Simple Machines



Wedge



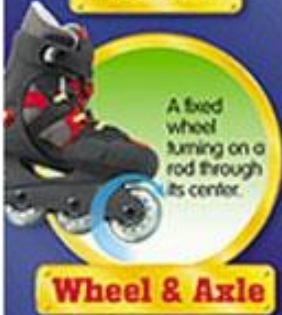
Pulley



Inclined Plane



Screw



Wheel & Axle

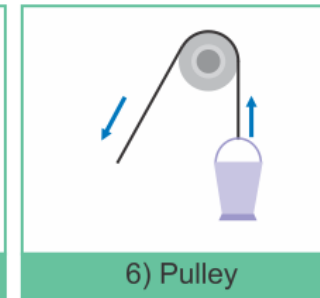
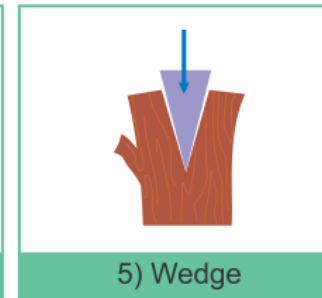
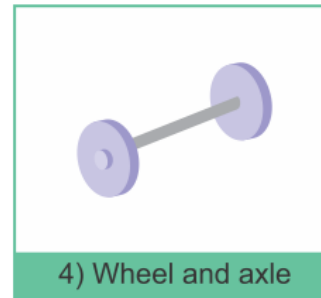
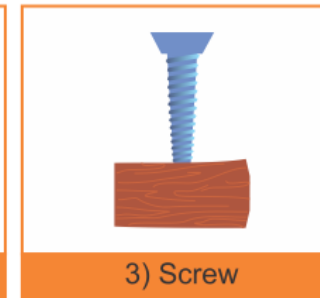
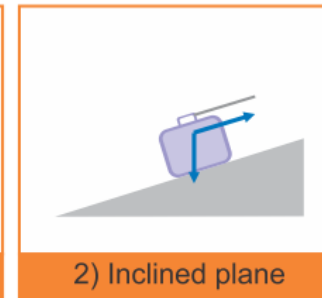
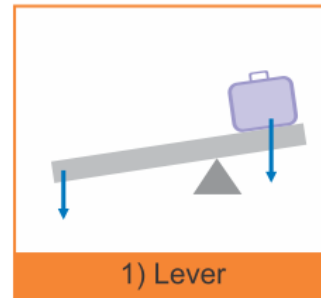


Three Classes of Levers

A rigid bar that rotates on a pivot called a fulcrum.

LC4580

Types of Simple Machines



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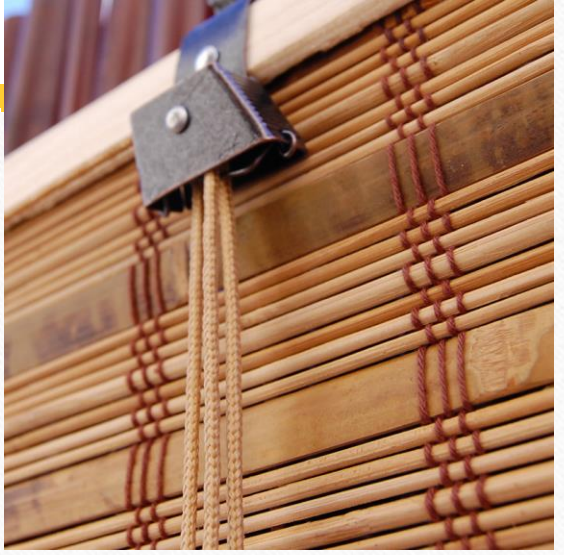
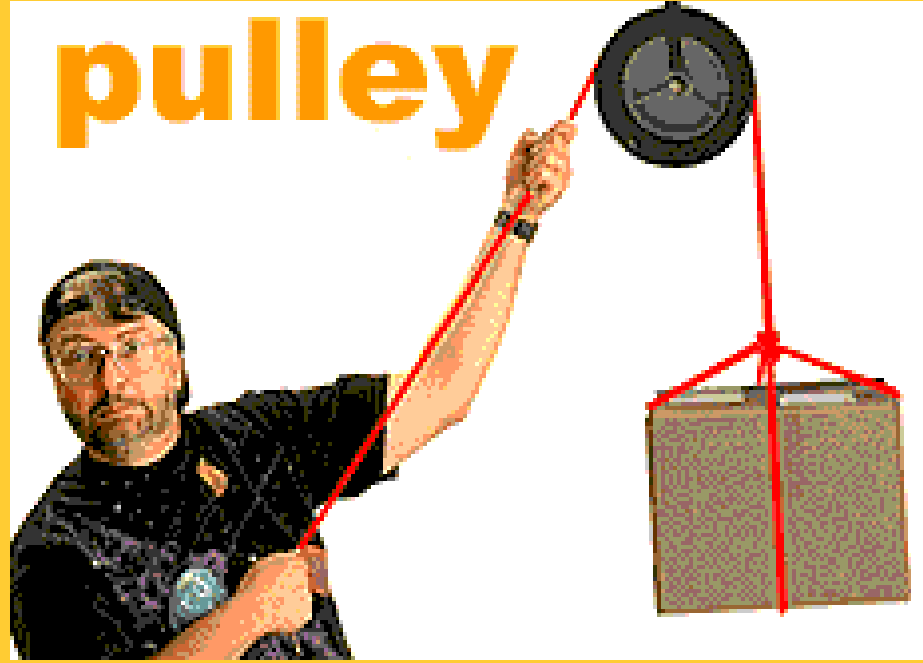
C5-34/50

SM3

Pulley

- ***Basic definition:*** it is a type of wheel and axle combined with a rope, chain, or other cord to move something up and down or side to side.
- ***More information:*** it can be combined with other pulleys to reduce the amount of work needed to lift or to lower down heavy objects
 - It is also easier to move something up from the ground.
 - You need to pull down to move something up.

pulley



Lever

- ***Basic definition:*** a pole or bar that rests on a support called a *fulcrum*, which lifts or moves loads
- ***More information:*** fulcrum gives lever something to push down against; the closer the fulcrum is to the object being lifted, the easier the person can lift the object
 - The longer the lever, the higher the object can be lifted



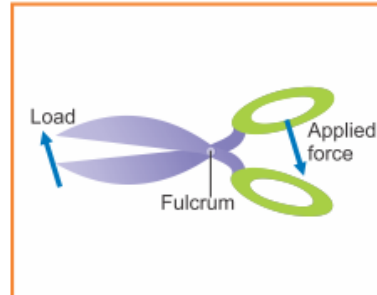
lever

Seesaw

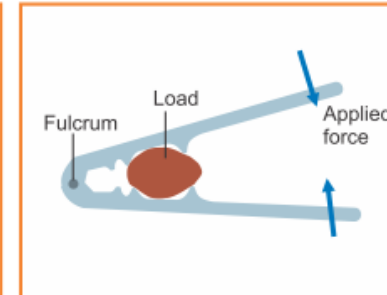


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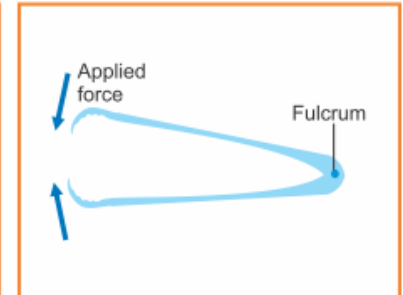
Examples of Lever in Daily Life



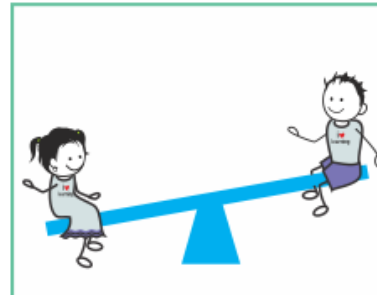
Scissor



Nut cracker



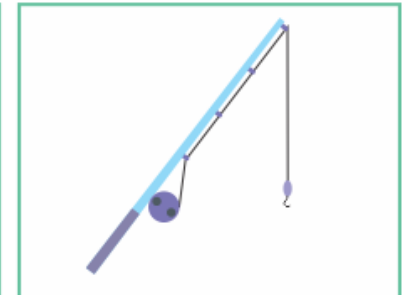
Pair of tongs



Seesaw



Wheel barrow

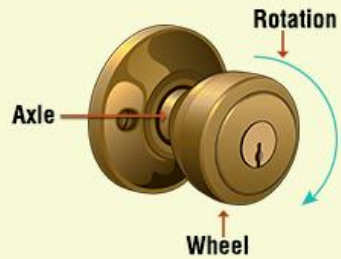
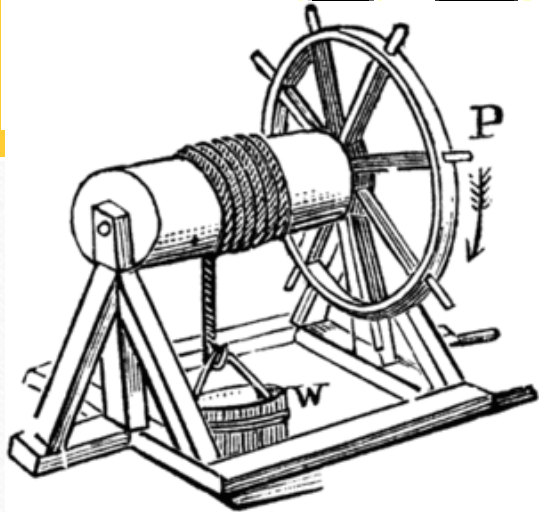
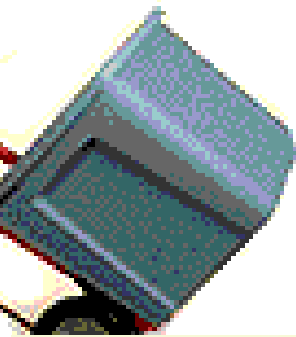


Fishing rod

Wheel & Axle

- ***Basic definition:*** a wheel with a rod, called an axle, through its center lifts or moves loads by spinning in a balanced circle
- ***More information:*** wheels are found where things turn in a circle

wheel & axle



In case of doorknobs, the applied force increases, making it possible to open the door easily.

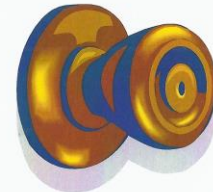
Wheel and Axle



Bike Chain



Gears



Doorknob



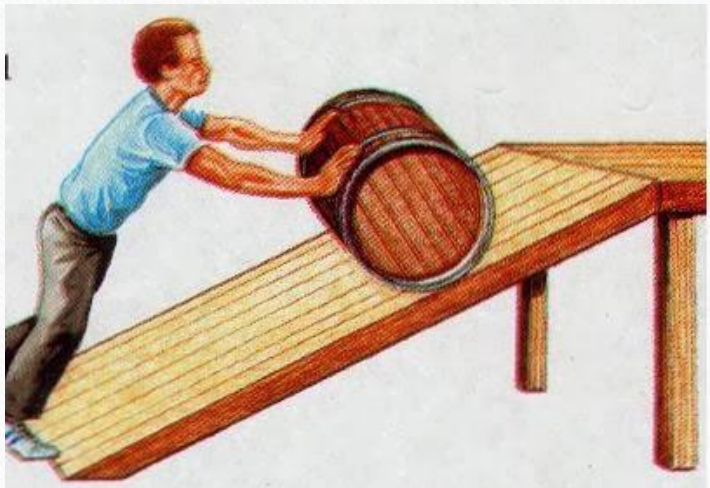
Crank Wheel



Ferris Wheel

Inclined Plane

- ***Basic definition:*** a slanting surface connecting a lower level to a higher level; simply a ramp
- ***More information:*** it takes the same amount of work, but less force, to move it vertically
 - Gravity makes it easier to move an object down a ramp than up



Inclined Planes



Wheelchair Ramp



Exit Ramp



Slanted Roof



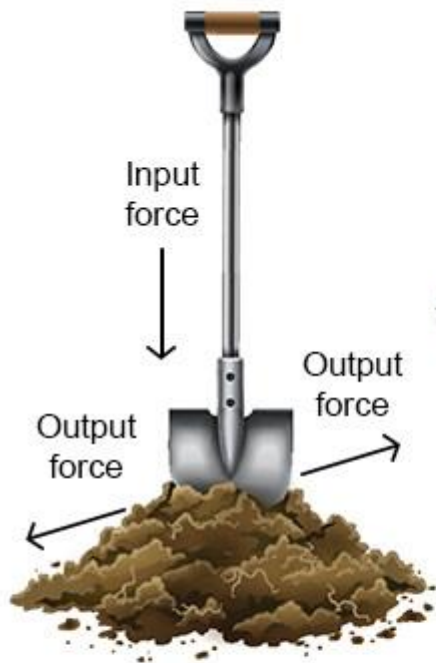
Skateboard Ramp



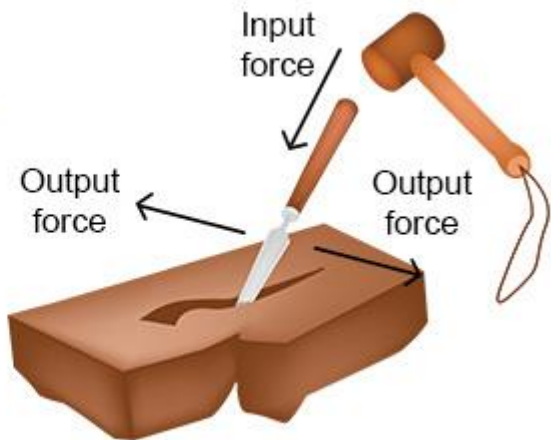
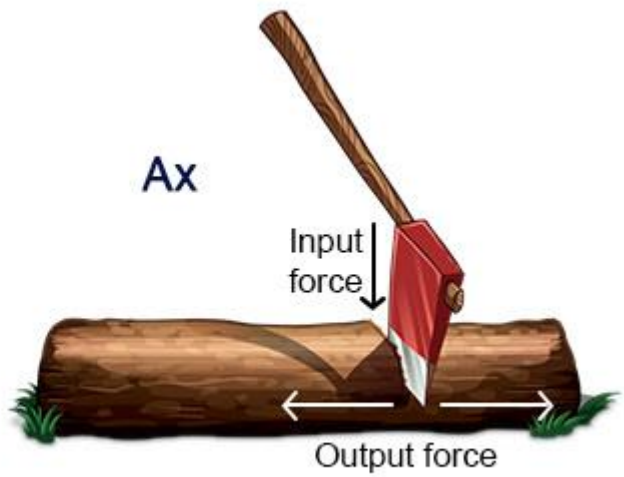
Board

Wedge

- ***Basic definition:*** an object with at least one slanting side ending in a sharp edge, which cuts material apart
- ***More information:*** it can also be used to keep things together or secure things from being moved



Shovel



Chisel & Hammer

Screw

- ***Basic definition:*** a twisted inclined plane wrapped around a pole that holds things together or lifts materials
- ***More information:*** it allows movement from a lower position to a higher position, but at the same time it moves it in a circle
 - ***Screw pump:*** a huge screw shape is lowered into the water and by turning the screw, the water is moved up the twisted shaft and lifted to where it is needed



Examples of Screws



Screw Examples

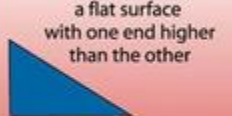

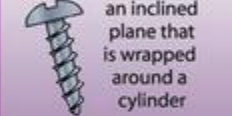

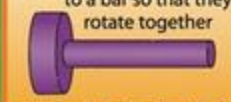



What are Compound Machines?

- Compound machines have two or more simple machines working together to make work easier







Simple Machines

a basic tool that is used to do work

inclined plane a flat surface with one end higher than the other  ramp dump truck slide	wedge an object that is thick at one edge, tapered to a thin edge at the other  axe knife nail fork	screw an inclined plane that is wrapped around a cylinder  drill jar lid spiral staircase
lever a straight bar that pivots on or around a fulcrum  F=fulcrum E=effort L=load first class second class third class seesaw crowbar bat	wheel & axle a wheel attached to a bar so that they rotate together  doorknob roller skates toy car	pulley a chain, belt, or rope wrapped around a wheel  mini blinds flagpole drapes

Compound Machines

two or more simple machines working together

wheelbarrow  levers wheel & axle levers	pencil sharpener  levers wedges (inside) wheel & axle (inside)	crane  pulley lever wheel & axle
bulldozer  wedge lever wheel & axle	clippers  wedges levers	escalator  pulleys (inside) inclined plane