

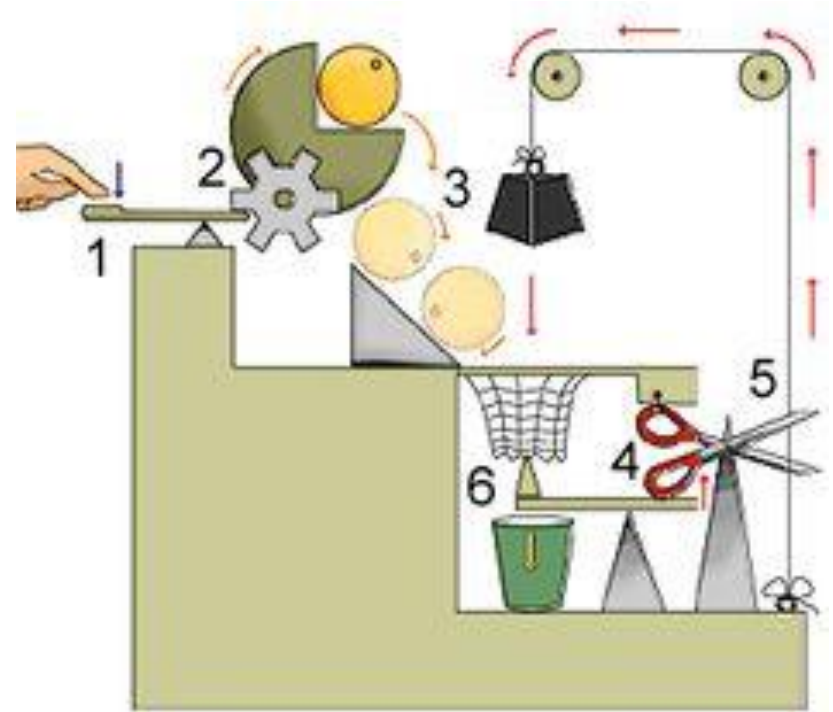
# Simple Machines



Micron Foundation  
K-12 Program

# What Will We Discover?

- ▶ What a simple machine is
- ▶ How we use simple machines in our daily lives
- ▶ The different types of simple machines
- ▶ What is the definition of work
- ▶ The importance of simple machines



# What is a Machine?

## What the dictionary says:

### Machine:

A system or device which uses energy to perform a task.

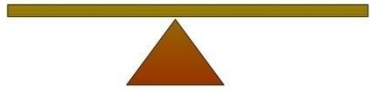
A system that helps you do work.

### Simple Machine:

A machine with few or no moving parts.

A non-powered device that either multiplies or changes the direction of a force.

# Types of Simple Machines



▶ **Lever**

▶ **Inclined plane**



▶ **Pulley**

▶ **Screw**

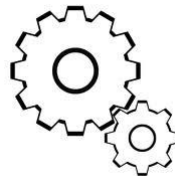


▶ **Wheel and Axle**

▶ **Wedge**



▶ **Gears**

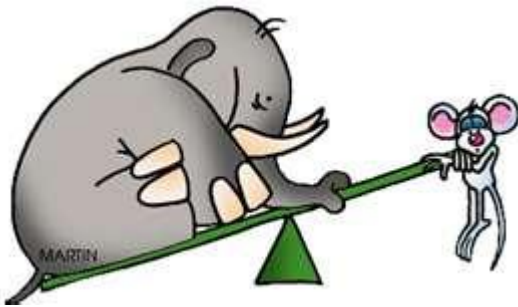


# What Simple Machines do you see?

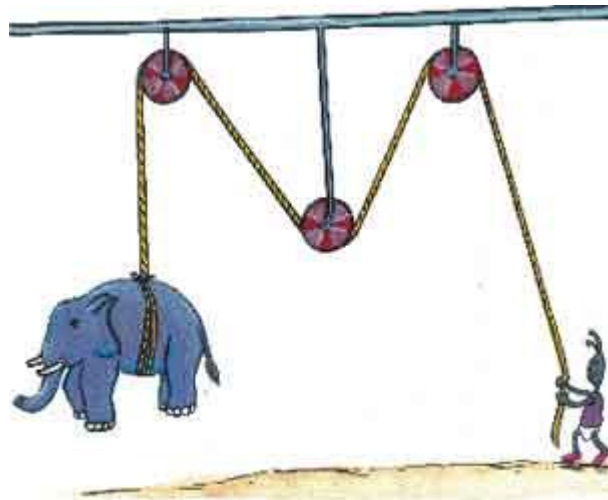


# Today's Focus

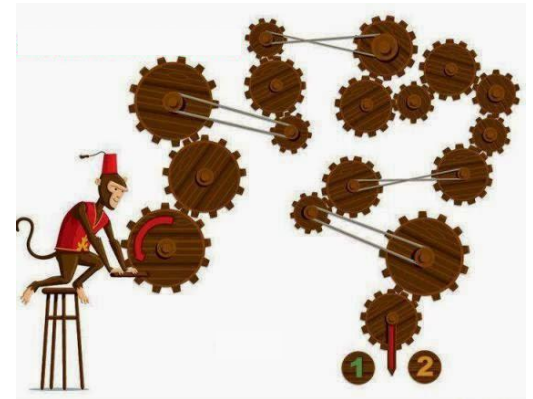
## Lever



## Pulley

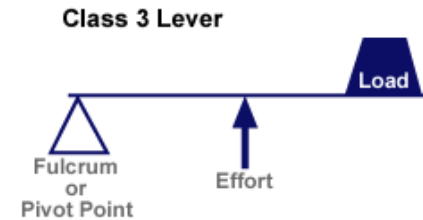
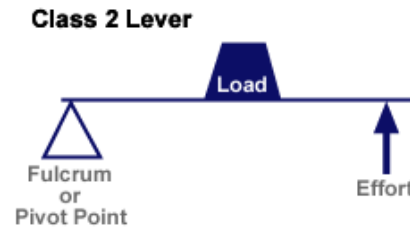
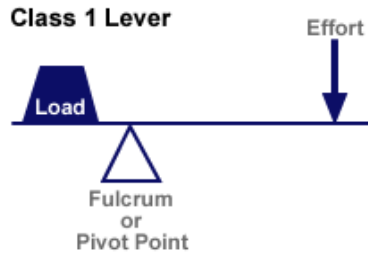


## Gears + Wheel & Axle



# Levers

- ▶ A lever is a simple machine used to lift, cut, or open objects.
- ▶ Parts of a lever:
  - Straight rod or arm that pivots on a point called a fulcrum, a load and an effort (or force)
- ▶ Three types of levers:



# Examples of Levers

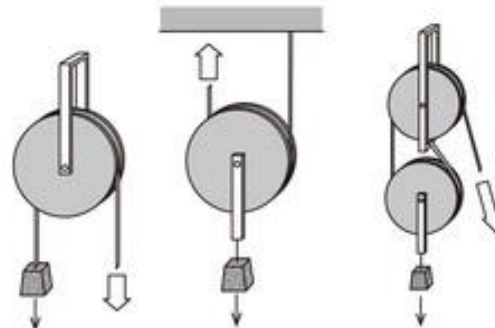
- ▶ Door on hinges
- ▶ Seesaw
- ▶ Hammer
- ▶ Bottle opener
- ▶ Fork
- ▶ Nutcracker
- ▶ Shovel
- ▶ Crowbar
- ▶ Fishing rod
- ▶ Wheelbarrow
- ▶ Wrench
- ▶ Stapler
- ▶ Scissors



# Pulleys

- ▶ A pulley can change the direction or size of the effort force, making it easier to lift objects to a higher place.
- ▶ A pulley is made up of a grooved wheel that turns around an axle with a rope passing through it.
- ▶ Three types of pulleys:

- Fixed
- Moveable
- Combined



# Examples of Pulleys

- ▶ Flag pole
- ▶ Mini-blinds
- ▶ Elevator
- ▶ Winch
- ▶ Wishing well
- ▶ Crane
- ▶ Window washing platform
- ▶ Ski lift
- ▶ Rigging on a sailboat
- ▶ The swing at the Discovery Center

# Wheel and Axle

- ▶ The wheel and axle consists of a large wheel rigidly secured to a smaller wheel or shaft, called an axle
- ▶ A force applied to the wheel is multiplied when it is transferred to the axle, which travels a shorter distance than the wheel.
- ▶ The wheel and axle can be thought of as a type of lever that rotates around a center fulcrum.



# Examples of Wheel and Axle

- ▶ Pencil sharpener
- ▶ Rolling pin
- ▶ Windmill
- ▶ Roller blades
- ▶ Dishwasher rack rollers
- ▶ Ferris Wheel
- ▶ Bike wheels
- ▶ Furniture casters
- ▶ Fan
- ▶ Door knob
- ▶ Skate board

# Gears

- ▶ Gears are used to slow things down or speed things up, which also changes the force required.
- ▶ Gears are used to change direction.
- ▶ Gear description:
  - Toothed or pegged wheels that fit together to change direction or transmit motion and force



# Examples of Gears

- ▶ Clock
- ▶ Automobile
- ▶ Drill
- ▶ Hand-mixer
- ▶ Bicycle gears
- ▶ Guitar tuning pegs



# Machines help us to do Work.

## What is Work?

In Science, Work is the amount of energy necessary to move an object.

It is defined as a Force Applied Through a Distance

$$W_{\text{ork}} = F_{\text{orce}} \times D_{\text{istance}}$$

(times)

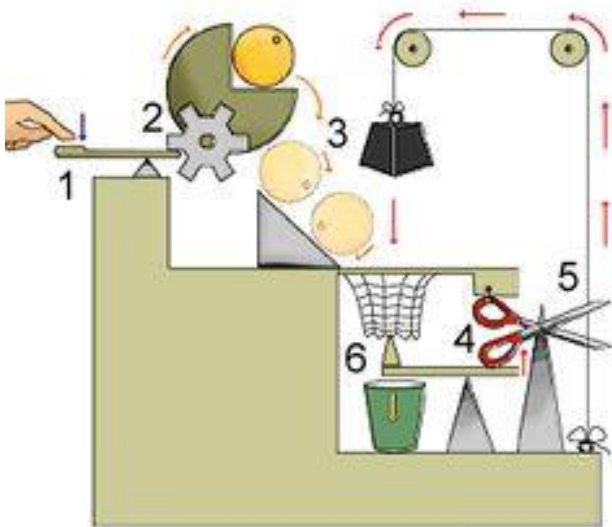
**Force = exertion of physical power**



# Activity Stations and Safety

## ▶ Stations

- Lever
- Pulley
- Gears / Wheel and axle



## ▶ Safety

- Follow instructions
- Keep hands to your sides
- Wait your turn
- Only do actions as instructed
- Have FUN!



