

# Forces

“Push,” “Pull,” or “Lift up”

# Sir Isaac Newton

- 1643 – 1727
- Calculus, Laws of Motion, Optics
- Cambridge University
- Principia (1687)
- Alchemy (mercury poisoning)
- Questioned the Trinity
- Never Married.....few friends.....loner

# Newton's First Law

- Every body continues in its state of rest or of uniform speed in a straight line unless acted upon by a non net force.
- The tendency of a body to maintain its state of rest or of uniform motion in a straight line is called inertia.
- Mass is a measure of the inertia of a body.  
Mass is a measure of the body itself.

# Weight

- The force of gravity on an object,  $F_g$ , whose magnitude is usually called its weight, is written as  $F_g = mg$  (Newtons, down toward the center of the earth).
- Example: my mass is 81 kg  
$$F_g = (81)(9.8) = 794 \text{ Newtons}$$

# Newton's Second Law

- The acceleration of an object is directly proportional to the net force acting on it and is inversely proportional to its mass. The direction of the acceleration is in the direction of the net force acting on the object.
- $a = F/m$
- $F = ma$
- Newton =  $\text{kg m/s}^2$

# Newton's Third Law of Motion

- Whenever one object exerts a force on a second object, the second object exerts an equal and opposite force on the first.
- To every action there is an equal and opposite reaction.