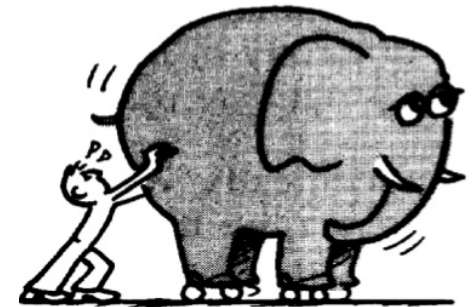# Newton's Second Law

- Newton's 2nd Law states: acceleration of an object increases w/ increased force and decreases w/ increased mass.
  - Object will accelerate in the direction of the force.
  - Force can change an object's direction w/o changing an object's speed
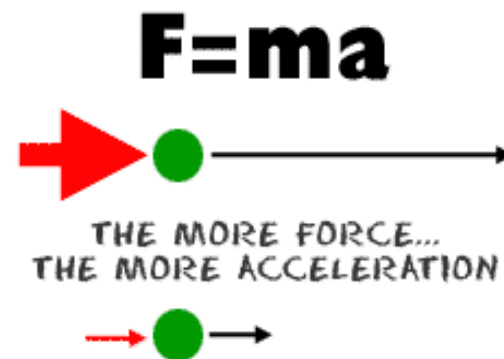   - Ex. soccer player dribbling a soccer ball

Newton's
Second Law
of Motion

Newton's Second Law

The unbalanced force acting on an object equals the object's mass times its acceleration.

Force is measured in Newtons (N)

$$1 \text{ N} = 1\text{kg} \times 1 \text{ m/s}^2$$

F=ma

THE MORE FORCE...
THE MORE ACCELERATION

1. What is the net force necessary for a 1.6×10^3 kg automobile to accelerate forward at 2.0 m/s^2?

2. A baseball accelerates downward at 9.8 m/s^2. If the gravitational force is the only force acting on the baseball and is 1.4 N, what is the baseball's mass?

3. A sailboat and its crew have a combined mass of 655 kg. Ignoring frictional forces, if the sailboat experiences a net force of 895 N pushing it forward, what is the sailboat's acceleration?

Second Law Problems

How much force is needed to accelerate a 100 kg object at 6 m/s^2?

What is the acceleration of an object that has a mass of 5 kg when a 10 N force is applied?

What is the mass of an abject that is accelerating at 10 m/s^2 when a 6 N force is applied?

Centripetal Force

- Any force that keeps an object moving in a circle = centripetal force

- Force points toward center of circle

  - Ex. ball on string whirling in circle

  - If let go of string, ball goes off in direction it was going before string lost