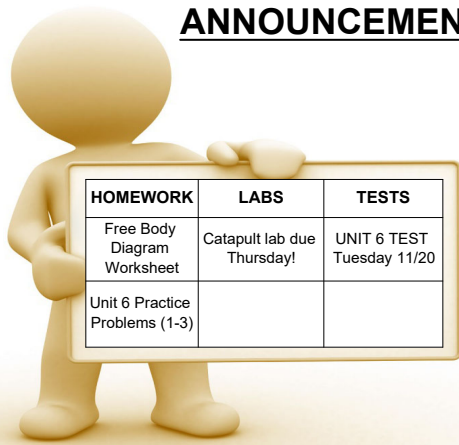
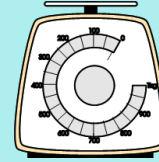


ANNOUNCEMENTS**6.3****Newton's 2nd Law****LEARNING TARGETS**

6.2 I can define, interpret, and analyze the difference between mass and weight.

**Newton's Laws of Motion****1. Newton's First Law of Motion**

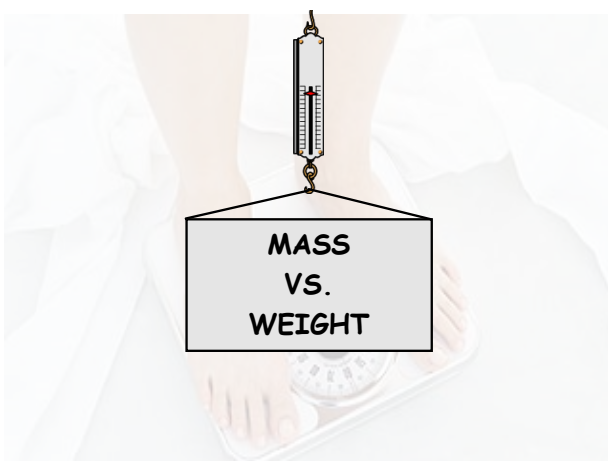
- Every object will continue in a **state of rest** or **with constant speed in a straight line** unless acted upon by an external force.

2. Newton's Second Law of Motion

- When a net force act on an object, the **object accelerates** in the direction of the net force. The acceleration is directly proportional to the net force and inversely proportional to the mass. Thus, $a \propto F/m$ or, $a \propto F/m$

**SOLVING FORCE PROBLEMS**

- Draw free-body diagram
- Find F_{net}
 - « Add all the vectors
 - « Use Newton's 2nd ($F_{net}=ma$)
- Solve

**Weight**

The **weight**, \vec{F}_g , of an object on the Earth's surface is the gravitational force exerted on it by the Earth.

$$\vec{F}_g = m\vec{g}$$

Weight

Your mass is 75.0-kg, and you are standing stationary on a scale. What would the scale read, in Newtons?

$$F_{net} = F_s - F_g$$


$$ma = F_s - mg$$

$$0 = F_s - mg$$

$$mg = F_s$$

$$(75.0 \text{ kg})(9.8 \text{ m/s}^2) = F_s$$

735 N = F_s



Apparent Weight

This is what your weight appears to be when in an accelerated reference frame.



Apparent Weight

Now you are standing on the scale in an elevator. What would the scale read if the elevator was moving upwards at a constant 2.0 m/s?



$$a = 0 \quad F_{net} = ma$$


735 N

Apparent Weight

What would the scale read if the elevator was accelerating upwards at 2.0 m/s²?



- 1) moving up & speeding up
- 2) moving down & slowing down



$$F_{net} = F_s - F_g$$

$$ma = F_s - mg$$

$$m(a + g) = F_s$$

$$(75 \text{ kg})(2 \text{ m/s}^2 + 9.8 \text{ m/s}^2)$$


885 N

Apparent Weight

What would the scale read if the elevator was accelerating downwards at 2.0 m/s²?



- 1) moving down & speeding up
- 2) moving up & slowing down



$$F_{net} = F_g - F_s$$

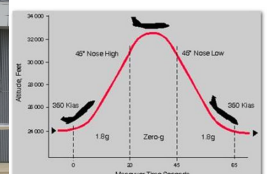
$$ma = mg - F_s$$

$$F_s = mg - ma$$

$$F_s = m(g - a)$$

585 N

ZERO -G



HOMework

Practice Problems

(4-7)