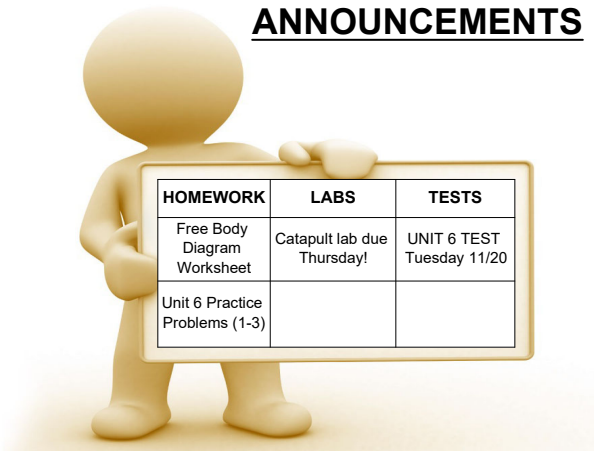
ANNOUNCEMENTS

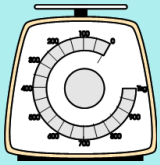


HOMEWORK	LABS	TESTS
Free Body Diagram Worksheet	Catapult lab due Thursday!	UNIT 6 TEST Tuesday 11/20
Unit 6 Practice Problems (1-3)		

6.3 Newton's 2nd Law

LEARNING TARGETS

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

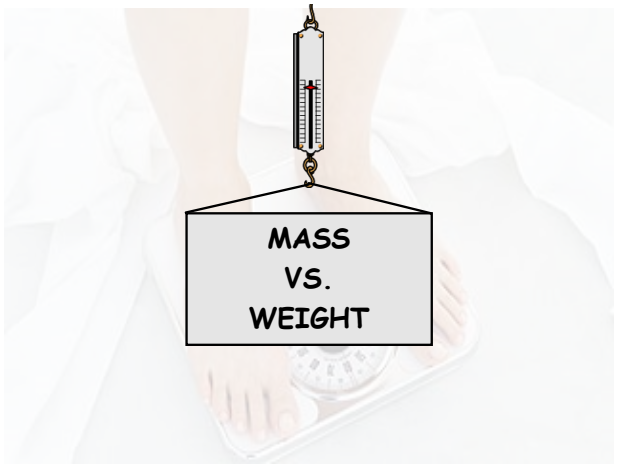


Newton's Laws of Motion

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, $a \sim F/m$ or, $a \propto F/m$

SOLVING FORCE PROBLEMS

1. Draw free-body diagram
2. Find $\mathbf{F}_{net}$
   - « Add all the vectors
   - « Use Newton's 2nd ($\mathbf{F}_{net}$=ma)
3. 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?

$a = 0$

$F_{net} = ma = 0$

$F_{net} = F_s - F_g$

$0 = F_s - mg$

$mg = F_s$

$(75\,kg)(9.8\,m/s^2) = F_s$

$F_s = 735\,N$

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?

$a = 0$

$F_{net} = ma = 0$

Apparent Weight

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

1) moves up & speeds up
2) moving down & slowing down

$F_{net} = F_s - F_g$

$ma = F_s - mg$

$ma + mg = F_s$

$m(a+g) = F_s$

$(75\,kg)(2\,m/s^2 + 9.8\,m/s^2) = F_s$

$F_s = 885\,N$

Apparent Weight

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

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

$F_{net} = F_g - F_s$

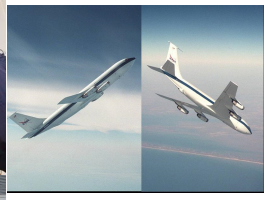
$ma = mg - F_s$

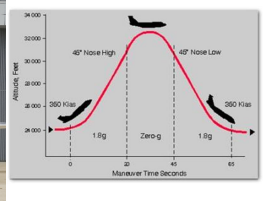
$F_s = mg - ma$

$F_s = m(g-a)$

$585\,N$

ZERO -G





HOMEWORK

Practice Problems

(4-6)