LAST TELPAS ESSAY

- Full Name
- February 29, 2016
- “Write an essay telling a new student how to make a really good grade in your science class.”
- Keep it 3-4 paragraphs, so we can move on to Universal Gravitation.
- **YOUR APQT IS THIS THURSDAY!!!!!**

Sample Questions

Universal Gravitation

Law of Universal Gravitation

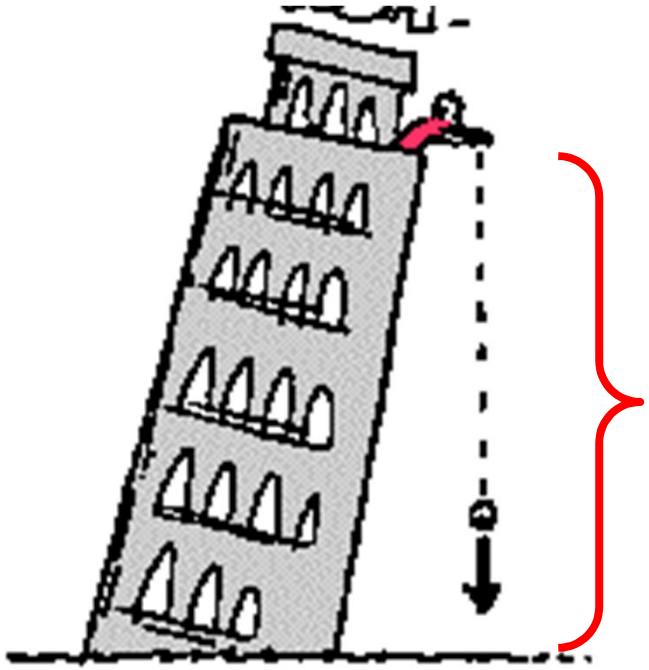
Every body in the universe attracts every other body with a mutual force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers.

$$\vec{F}_{gravity} = \frac{GM_1M_2}{R^2}$$

Where: $G = 6.67 \times 10^{-11}\ N\ m^2/kg^2$

The Universal Gravitation Constant

Example: A body in free fall falls 4.9m in the first second of fall.



16 ft.

1 sec

$$d = v_o t + \frac{1}{2} a t^2$$

$$d = 0 + \frac{1}{2}(9.8)(1^2)$$

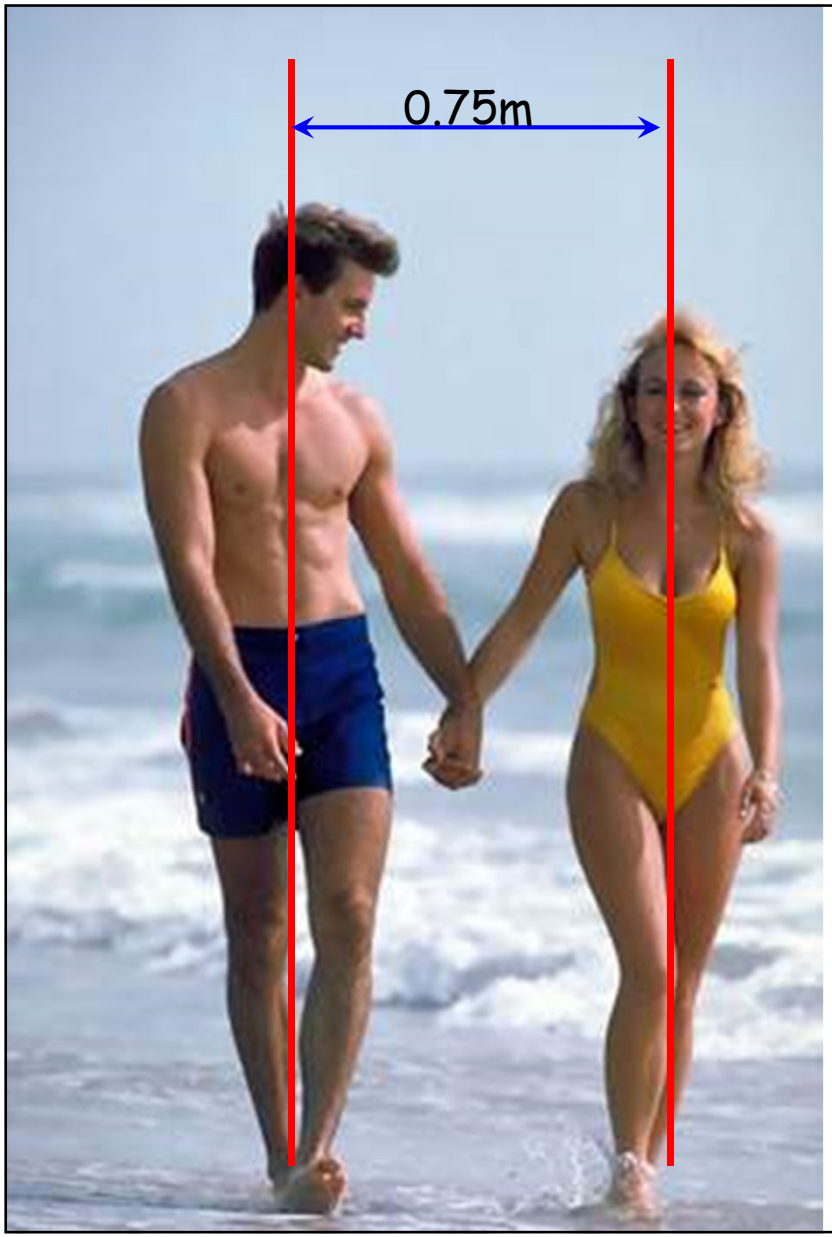
Example:

He is obviously attracted to her. But, how much force of attraction is there?

$$\vec{F}_{gravity} = \frac{GM_1 M_2}{R^2}$$

Assume: His mass = 80. kg

Her mass = 52 kg



He is obviously attracted to her. But, how much force of attraction is there?

$$\vec{F}_{gravity} = \frac{GM_1M_2}{R^2}$$

Assume: His mass = 80 kg

Her mass = 52 kg.

$$= \frac{(6.67\times10^{-11})(80kg)(52kg)}{(0.75m)^2}$$

=

Example: A satellite orbits around the Earth, making one complete revolution every 3 days. At what altitude is the orbit? (Mass of Earth = 6.0 x10^{24} kg, Radius of Earth = 6.4 x10^{6} m)

$$T = 3days \times \frac{24hr}{1day} \times \frac{60\,\text{min}}{1hr} \times \frac{60\,\text{sec}}{1\,\text{min}} = 2.59 \times 10^{5}\ \text{sec}$$

$$F_c = F_g$$

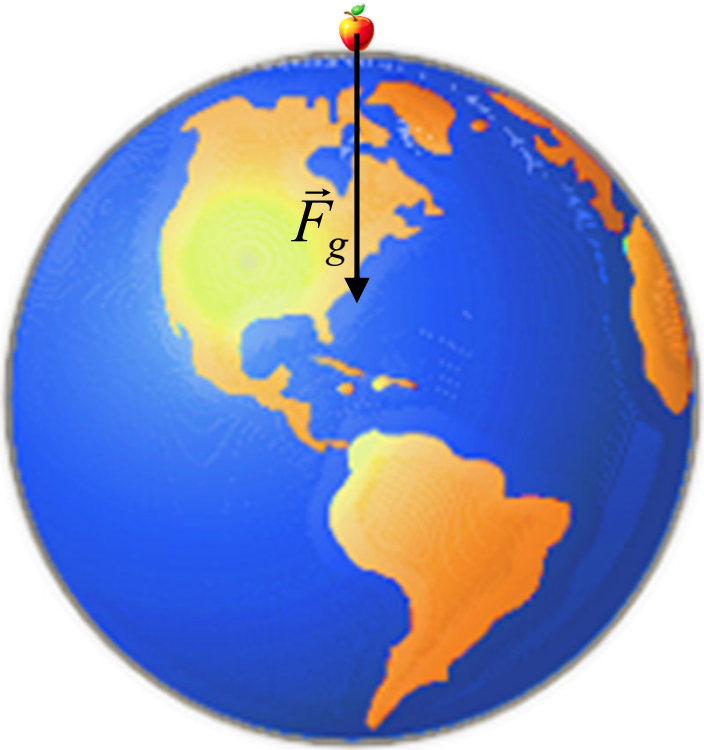
$$\frac{m_s 4\pi^2 d}{T^2} = \frac{GM_s M_E}{d^2}$$

$$R^3 = \frac{GM_E T^2}{4\pi^2}$$

1.) A $50.\ kg$ student is $1.0\ m$ away from a $75\ kg$ student. Calculate the force of gravitational attraction between them.

$$F_g = G\frac{m_1 m_2}{r^2}$$

2.) Consider an apple at a distance r_E from the center of the Earth. First we'll solve for the Mass of Earth



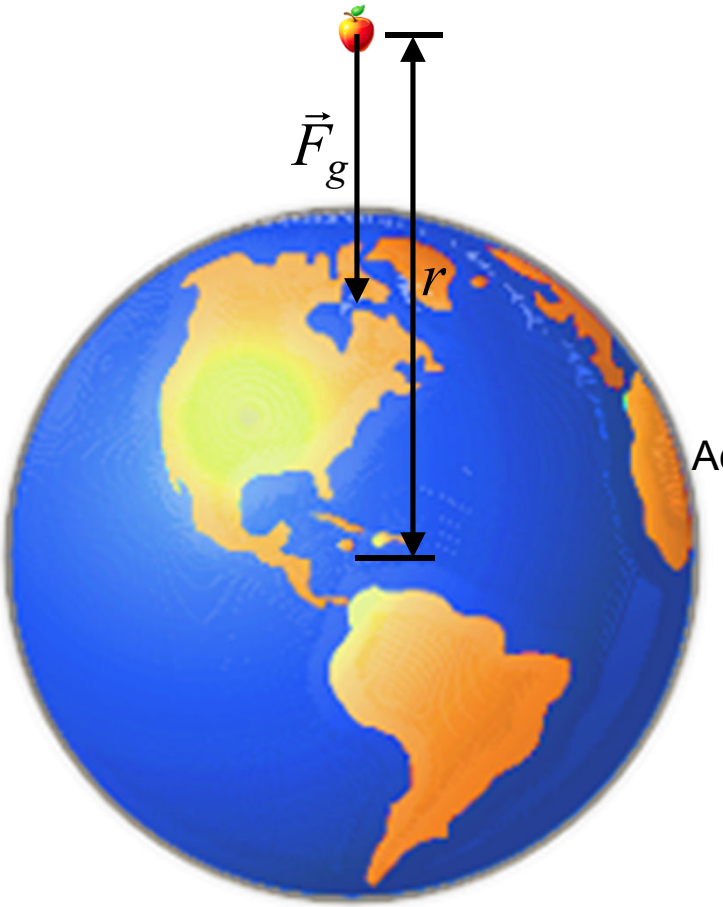
$$\sum \vec{F}_y = m\vec{a}_y$$

$$-F_g = -m_a g$$

$$G\frac{m_E \cancel{m_a}}{r_E^2} = \cancel{m_a} g$$

$$m_E = \frac{g r_E^2}{G}$$

3.) Consider an apple at a distance r from the center of the Earth.



$$\sum \vec{F}_y = m\vec{a}_y$$

$$-F_g = -m_a a_g$$

$$G\frac{\cancel{m_a}M}{r^2} = \cancel{m_a}a_g$$

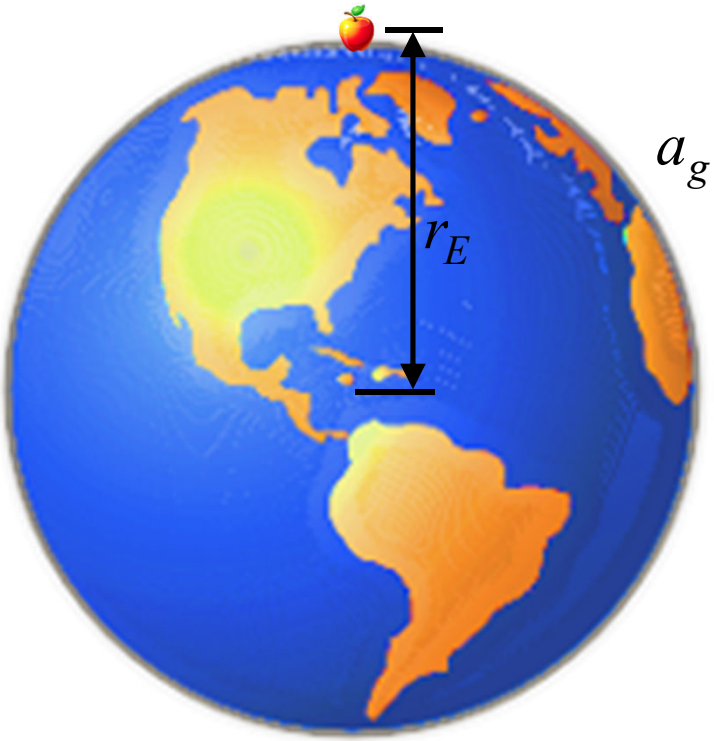
Acceleration due to gravity at a distance r from the center of a planet

$$\boxed{a_g = G\frac{M}{r^2}}$$

Where M = mass of the planet

3.) Consider an apple at a distance r_E from the center of the Earth. (Continued)

$$a_g = G\frac{M_E}{r_E^2}$$



$a_g =$

On Your Own #1

- Two spheres of mass 35kg are 60m apart.

A) What force does one exert on the other?

B) If the mass of on is tripled and the radius is quadrupled how does the force change?

On Your Own #2

- Two spheres of equal mass have a force of gravity of $7x10^{-9}$ exerted on each other. If the distance between them is 7m, find the mass.

On Your Own #3

- Find the value of the gravitational acceleration **g**. The mass of the earth is 6.0×10^{24}kg.