Due Wed., Oct 31

2012 PreAP Forces 7

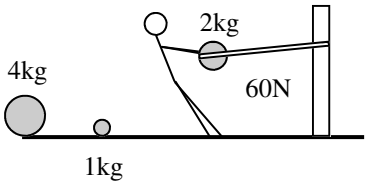
1. * A 1200 kg object is 1400 meters from a 300,000 kg object. Calculate the force of gravity between them. (*Use the "EE" key for ×10. Example, in your calculator G should look like: 6.673E−11*).

2. A 25 kg object is on the surface of the earth. The m_{earth} = 5.97×10^{24} kg and $r_{earth} = 6.378\times10^{6}$ m. Use the equation for gravitational force to calculate the force of gravity on the object.

3. Let's learn how mass and distance affect the gravitational force. In the following table calculate the gravitational force for each of the situations. Leave "G" in your answer. This is only for comparison, the actual answer is irrelevant.

Situation	m_1 =	m_2 =	r =	F_g = (keep G in the equation)
A. control (what you compare your answers to)	1	1	1	$F_g = G\frac{m_1 m_2}{r^2} = G\frac{1(1)}{1^2} = G\frac{1}{1} = 1G$
B. * double the mass	2	1	1	
C. half the mass	1	0.5	1	
D. double the distance	1	1	2	
E. * half the distance	1	1	.5	

4. Use the information you just collected to answer the following.
   A. If the distance between two masses doubles, by how much does the force change?
   B. If the mass doubles, by how much does the force change?
   C. If the distance between two masses is halved, by how much does the force change?
   Now, continue the logic:
   D. If one of the masses is tripled, by how much does the force change?
   E. If the distance is tripled, by how much does the force change?
   F. If the distance is 1/3 the original, by how much does the force change?



5. Slim Jim makes a giant slingshot that can provide 60N of force. He launches three objects with the following masses: 1 kg; 2 kg; 4 kg.
   A. Which mass has the greatest acceleration when launched?
   B. Why?
   C. * In the F = ma equation, solve for a.
   D. So the acceleration is proportional to the _____ and inversely proportional to the _____.
   E. So, if you triple the mass the acceleration would:
   F. If you triple the force the acceleration would:

6. A 6 kg object is moved by a 150 N net force, which is vertically upward. Calculate the acceleration of the object.

1) 1.23×10^{-8} N
3B) 2G 3E) 4G (mult by recipr)
5C) a = F/m