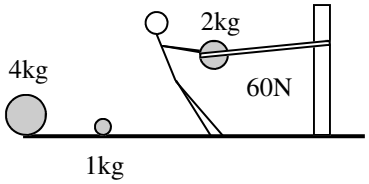
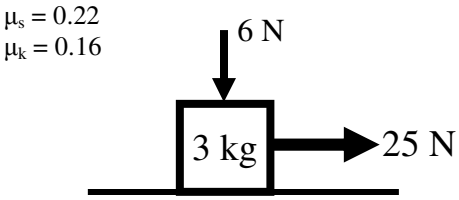
A-Day: Due Wed., 10/29
B-Day: Due Thurs., 10/30

2009 PreAP Forces 7

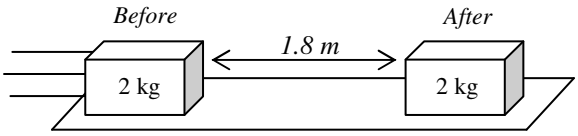


1. Slim Jim makes a giant slingshot that can provide 60N of force. He launches three objects: 1 kg; 2 kg; 4 kg. Which mass has the greatest acceleration? Why?



2. A. What is the normal force pushing up on the mass?
   C. Calculate the forces of static and kinetic friction acting on the mass.

   D. If the object starts at rest, is the 25N force enough to start it moving?
   E. If it is moving, calculate the acceleration of the object.



3. A 2 kg box slides to a stop in 0.65 seconds.
   A. Use a kinematic equation to calculate the acceleration of the object.

   B. Calculate the force of friction that stopped the object.

   C. Calculate the coefficient of friction of the surface.

4. 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 for comparison, so you don't need to fully calculate your answer.

Situation	m_1 =	m_2 =	r =	F_g = (keep G in the equation)
1. control	1	1	1	$F_g = G\frac{m_1 m_2}{r^2} = G\frac{1(1)}{1^2} = G\frac{1}{1} = 1G$
2. double the mass	2	1	1	
3. half the mass	1	0.5	1	
4. double the distance	1	1	2	
5. half the distance	1	1	.5	

A. When the distance between the two masses doubled, by how much did the force change?
B. When the mass doubled, by how much did the force change?
C. If the distance between two masses as halved, by how much did the force change?
Now, continue the logic:
D. If one of the masses is tripled, by how much would the gravitational 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. In the gravity equation, what does "r" stand for, exactly?

6. A 14 kg object is moved from the Earth to Mars.
   A. What is its weight on the Earth?
   B. What is the mass of the object on Mars?
   C. If the mass of Mars is 6.4×10^{23} kg and the radius of Mars is 3.39×10^{6} m calculate the force of gravity of the 14 kg object on Mars.

   D. If the object's mass were doubled, how would the force of gravity change?
   E. If the distance to the center of Mars was doubled, how would Fg change?

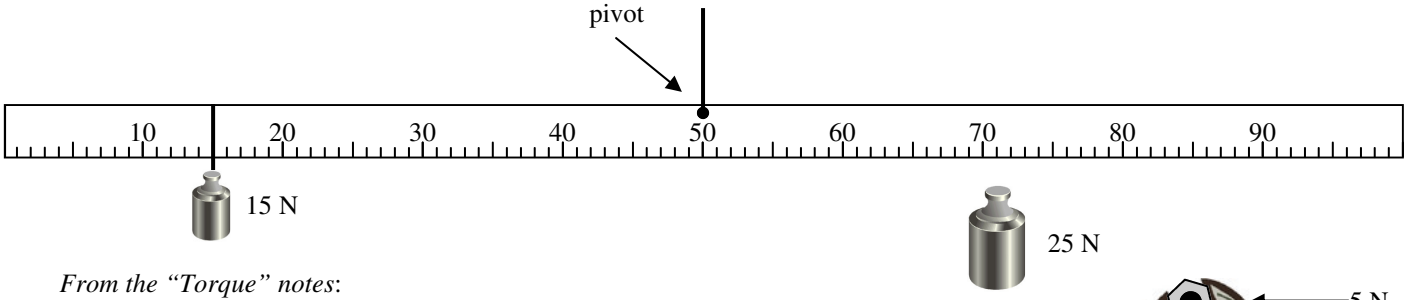
From the "Centripetal Force" notes.

7. Which direction does the centripetal acceleration always point?

8. What provides the centripetal acceleration for the following situations?
   A. A car turning a corner.
   B. The earth moving around the sun.
   C. A ball being spun around on a string.
   D. A roller coaster at the bottom of the track.

9. A 280kg go-cart is moving 12 m/s as it moves around a circular track that has a radius of 35m.
   A. Which way does the centripetal acceleration point?
   B. What force provides the centripetal force that keeps the cart moving in the circle?
   C. Calculate the centripetal acceleration of the cart.

   D. Calculate the force keeping the cart in the circle.



From the "Torque" notes:

10. A 15 N force is hanging at 15 cm on a meter stick.
    A. How far is the mass from the pivot point (in meters)?
    B. Calculate the torque caused by the 15N force.

    C. Where would you need to put a 25N force to make the meter stick balanced?

11. Which way is positive: clockwise or counterclockwise?

12. Calculate the net torque of the forces shown acting on the wrench.