A-Day: Due Thurs., Nov 17 (Assigned: 11/13)
B-Day: Due Fri., Nov 18 (Assigned: 11/14)

2008 Momentum 2

1) What kind of collision: elastic, inelastic, perfectly inelastic?
   A) ____The two objects stick together.
   B) ____The two objects don't stick together.
   C) ____Kinetic energy is conserved.
   D) ____The experiment cars with the Velcro sides towards each other.
   E)_____The experiment cars with the magnets towards each other.
   F) ____Some Ek is lost.

2) Yes, No, or Maybe? (And give reasons why.)
   A) ____In a noisy collision Ek is conserved.
   B) ____A small force can produce the same change of momentum as a large force.
   C) ____If an object is thrown by a person momentum is conserved.
   D) ____Two moving objects have a net momentum of zero.

3) Book Ch6: #8, 9, 20,

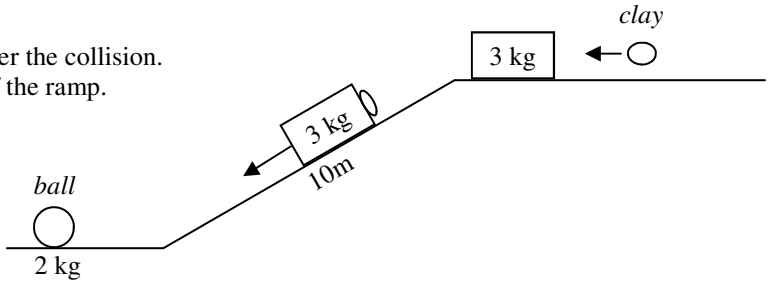
4) Give an example of momentum NOT being conserved.

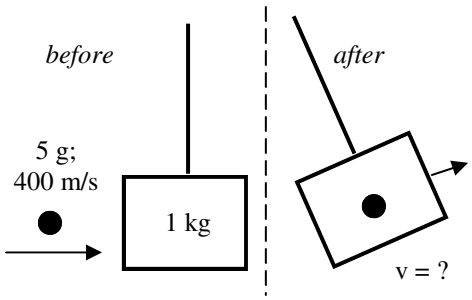
5) Give an example of there being MORE kinetic energy after a collision than before.

6) A 12 kg object going 4 m/s strikes a wall and bounces back going 3 m/s. If the wall exerts a 120 N force,
   A) How long was the object in contact with the wall?
   B) How much kinetic energy was lost?
   C) Where did this lost energy go?
   D) What kind of collision was it?

7) An 85 kg person fires a 5 g bullet from a gun. The bullet is shot with an initial velocity of 425 m/s.
   A) If the person is standing on roller blades, how fast does the person move backwards?
   B) If the bullet hits an 85 kg stuntman (also on roller blades [wearing a bullet proof, Kevlar vest, of course]), how fast does the 85 kg stuntman move backwards?
   C) In movies people are shot with bullets and fly backwards from the bullet striking them. How does this happen?

8) A 3 kg block of wood is at rest at the top of a frictionless, 10 m long ramp inclined at 30°.
   The block is struck by a 1 kg piece of clay going 5 m/s. The clay sticks to the block.
   The block slides down the ramp.
   A) What kind of collision is this?
   B) Find the velocity of the block and clay combination after the collision.
   C) Find the velocity of the block and clay at the bottom of the ramp.
   D) At the bottom of the ramp the block hits a 2 kg ball.
   After striking the ball the block is still going 0.5 m/s.
   How fast is the ball going?

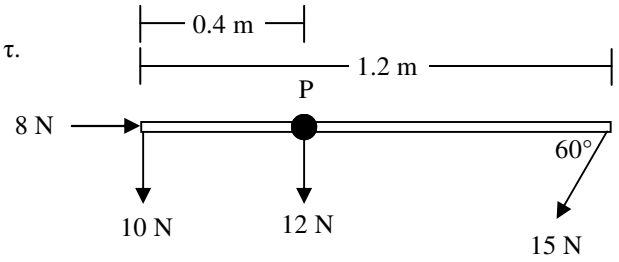




9) A 5 g bullet is moving 400 m/s (smokin!). It strikes a stationary 1 kg metal ballistic pendulum and is ricochets backwards going 80 m/s.
   A) How fast is the pendulum moving after the collision?
   B) How fast is the pendulum moving when it has raised up 8 cm?
   C) Is the collision elastic, inelastic, or perfectly inelastic (give proof).

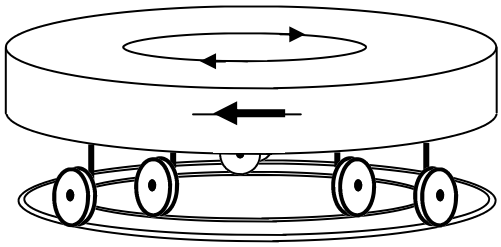
10) For the ballistic pendulum problem above, how does the total momentum before compare with the total momentum afterwards?

11) From the diagram at the right, the pivot point is at letter "P".
   A. Which forces give no τ?
   B. 100% of this force gives τ.
   C. Which force gives positive τ?
   D. Which give negative τ?
   E. Find the net τ.



12) Given: ω; v_t; α; s; θ; a_t.
   A. Which ones are radius dependent?
   B. Which ones are radius independent?
   C. Has units of m/s.
   D. Has units of radians.
   E. Has units of rad/sec^2
   F. Has units of m
   G. Has units of rad/sec
   H. Has units of m/s^2

13) Use the graphic of the rotating platform at the right to answer the following .
Answer: I (Inside wheels); O (outside wheels); N (neither or both).
   A) __ Which has the greatest radius?
   B) __ Which have the fastest tangential speed?
   C) __ If it comes to rest, which have the fastest angular acceleration?
   D) __ Which travels the least arc length?
   E) __ Which has the smallest radius?
   F) __ Which have the fastest angular speed?
   G) __ As it starts rotating, which has the slowest tangential acceleration?
   H) __ Which have the slowest tangential speed?
   I) __ Which travel the greatest angular displacement?
   J) __ Which have the slowest angular velocity?
   K) __ When it slows, which have the greatest tangential acceleration?
   L) __ Which travel the largest arc length?



A platform turning clockwise, when viewed from above.

14) A) Convert 3 revolutions to radians. B) Convert 20 rpm (rev per min) to rad/sec.

The following two columns are designed to help you see the correlations between linear and rotational quantities and equations. Remember that ***all angles in the equations must be in radians!*** *Calculate out all numbers (don't leave as fractions).*

15) A car travels 240 meters in 12 seconds. Find the velocity of the car.

16) A car going 300 m/s slows to 100 m/s in 10 seconds. Find the acceleration of the car.

17) A car going 20 m/s stops in 80 meters. How long did it take to stop?

18) A box sliding down a hill going 3 m/s accelerates at 2 m/s^2. How fast is going after 4 seconds?

19) A wheel rotates 2 revolutions in 3 seconds. Find the angular velocity of the wheel.

20) A wheel spinning 8 rad/sec slows to 2 rad/sec in 3 seconds. Find the angular acceleration of the wheel.

21) A wheel turning 3 rev per second stops in 6 revolutions. How long did it take to stop?

22) A wheel turning 2 rad/sec accelerates at 3 rad/sec^2. How fast is it spinning after 5 seconds?