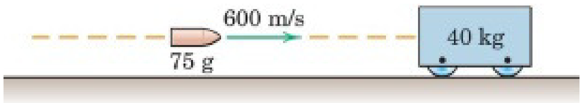
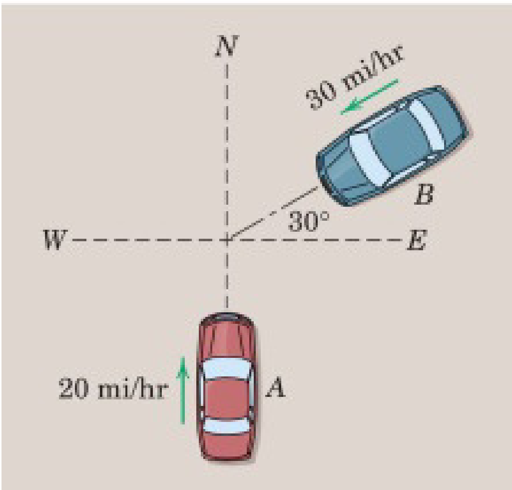
3/177 Ans: $|\Delta E| = 13.470$ J; $n = 99.8\%$

A 75-g projectile traveling at 600 m/s strikes and becomes embedded in the 40-kg block, which is initialy stationary. Compute the energy lost during the impact. Express your answer as an absolute value $|\Delta E|$ and as a percentage n of the orginal system energy E.



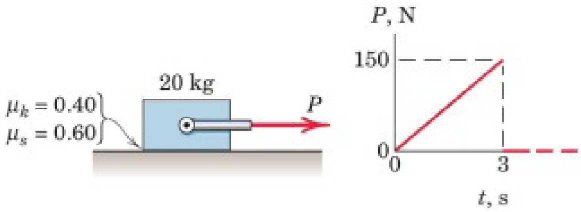
3/188 *Ans*: $v = 13.83$ mi/hr, $\theta = 83.9°$ west of north

Car A weighing 3200 lb and traveling north at 20 mi/hr with car B weighing 3600 lb and traveling at 30 mi/hr as shown. If the two cars bcecom entangled and move together as a unit after the crash, compute the magnitude v of their common velocity immediately after the impact and the angle θ made by the velocity vector with the north direction.



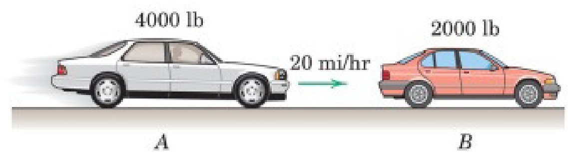
3/194 *Ans*: $t_s = 3.46$ s

The initially stationary 20-kg block is subjected to the time-varying horizontal force whose magnitude P is shown in the plot. Note that the force is zero for all times gerater than 3 s. Determine the time t_s at which the block comes to rest.



3/201 *Ans*: (*a*) 19.56 ft/sec = 13.33 mi/hr; (*b*) a_A = 97.8 ft/sec^2 left, a_B = 195.6 ft/sec^2 right; (*c*) 12,150 lb

Car *B* is intitially stationary and is struck by car *A* mvong with initial speed v_1 = 20 mi/hr. The cars become entangled and move togetehr with speed v' after the collisions. If the time duraiton of the collison is 0.1 sec, determine (*a*) the common final speed v'; (*b*) the average acceleration of each car during the collision, and (*c*) the maganitude *R* of the average force exerted by each car on the other car during the collision.



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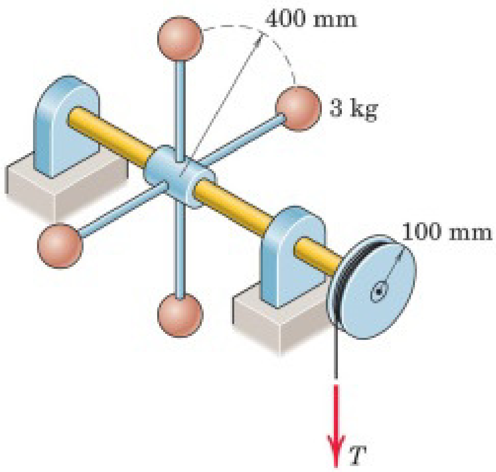
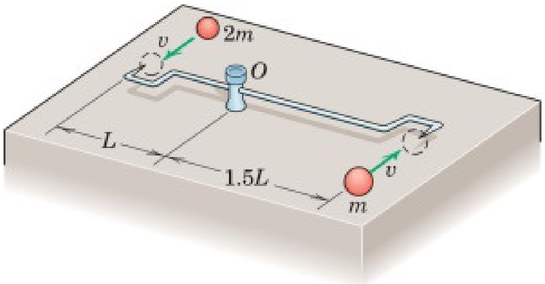
Ans: $t = 15.08$ s

The assembly starts from rest and reaches an angular speed of 150 rev/min under the action of a 20-N force T applied to the string for t seconds. Determine t. Negelct friction and all masses except those of the four 3-kg spheres, which may be treated as particles.



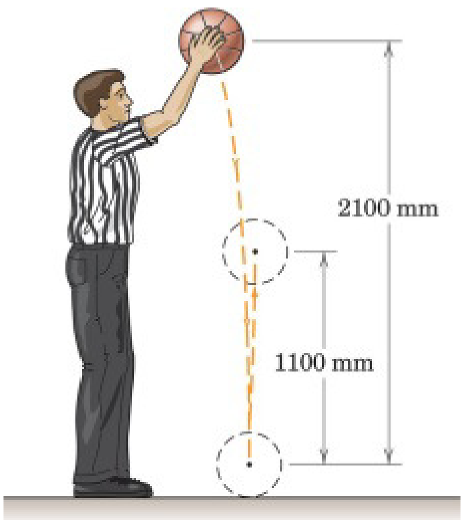
3/229 *Ans*: $\omega = 0.824(v/L)$

The small spheres, which have the masses and initial velocities shown in the figure, strike and become attached to the spiked ends of the rod, which is freely pivoted at O and is initially at rest. Determine the angular velocity ω of the assembly after impact. Neglect the mass of the rod.



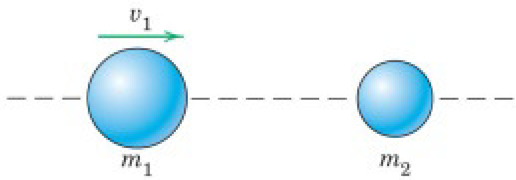
3/241 $Ans\text{: } e = 0.724;\ n = 47.6\%$

As a check of the basketball before the start of a game, the referee releases the ball from the overhead position, shown, and the ball rebounds to about waist level. Determine the coefficient of constitution e and percentage n of the original energy lost during the impact.



3/244 *Ans*: $\frac{m_1}{m_2} > \frac{1}{e}$

The sphere of mass m_1 travels with an initial velocity v_1 directed as shown and strikes the stationary sphere of mass m_2. For a given coefficient of restitution e, what condition on the mass ratio m_1/m_2 ensures that the final velocity of m_2 is greater than v_1?



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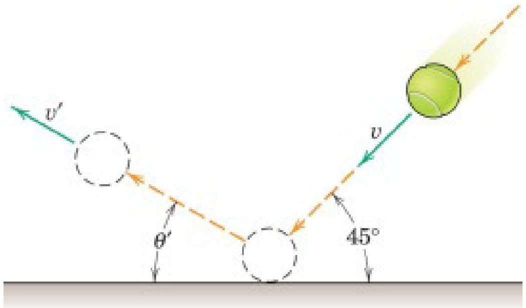
Ans: $h = g/\omega^2; T = mL\omega^2$

A tennis ball is projected toward a smooth surface with speed v as shown. Determine the rebound angle θ_1 and the final speed v'. the coefficient of resistution is 0.6.



3/250 *Ans*: (*a*) h = 10.94 in., (*b*) h_2 = 7.43 in.

If the center of the ping-pong ball is to clear the net as shown, what height h should the ball be horizontally served? Also determine h_2. The coefficient of restitution for the impacts between ball and table is e = 0.9, and the raius of the ball is r = 0.75 in.