**3/177** *Ans*: $\left|∆E\right|=13.470 J; n=99.8\%$

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 |*E*| and as a percentage *n* of the orginal system energy *E*.

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

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 ** made by the velocity vector with the north direction.

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**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 *ts* at which the block comes to rest.

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**3/201** *Ans*: (*a*) 19.56 ft/sec = 13.33 mi/hr;  (*b*) *a*A = 97.8 ft/sec2 left, *a*B = 195.6 ft/sec2 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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**3/219** *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.

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**3/229** *Ans*: **= 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 ** of the assembly after impact. Neglect the mass of the rod.

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**3/241** *Ans*: **$e=0.724; n=47.6\%$

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.

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**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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**3/245** *Ans*: **$h=g/ω^{2};T=mLω^{2}$

A tennis ball is projected toward a smooth surface with speed *v* as shown. Determine the rebound angle **1 and the final speed *v′*. the coefficient of resistution is 0.6.

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**3/250** *Ans*: **$\left(a\right)$*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.

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