Quick Solution #10

problem #58 (Chapter 9): $V_{cm}^2 = 2\,a\,l = 2(g \sin\theta)\, l/(1 + ½)$. Then $V_{cm} = 23$ m/s.

problem #74 (Chapter 9): (a) When the cylinder is in equilibrium $\Sigma\tau = 0$ (around CM) and $\Sigma F_x=0$ along the plane: $T = ½Mg \sin\theta$.
(b) $\Sigma\tau = I\,\alpha$ (around CM) and $\Sigma F_x=ma_x$ along the plane: $a_x = 2(2T - Mg \sin\theta) / 3M$.

problem #22 (Chapter 10): $\vec{\tau} = -(mgvt \cos\theta)\hat{k}$.

problem #32 (Chapter 10): Use energy conservation to find the speed of the point mass before it strikes the bar: From the conservation of angular momentum of the system of mass and bar about the pivot point *A* during the collision, we have $\omega = 9.4$ rad/s.

problem #50 (Chapter 10): First use the expression $v^2 = v_0^2 + 2ax$ to find the speed for the of the block after it travels a distance *d. Then use the expression* $\omega = v/r$ and $I = ½\,MR^2$. Applied the work-energy theorem to the system of cylinder and mass to relate the work done by friction to the potential and kinetic energy: $\mu = 0.38$.

problem #56 (Chapter 10): $\Sigma\tau = I\,\alpha$ and $\Sigma F_y=ma_y$. (a) $a_y=1.4$ m/s^2 (b) Solving $y=y_0 + v_{0y}\,t + ½a_y\,t^2$ gives t = 1.5 s.