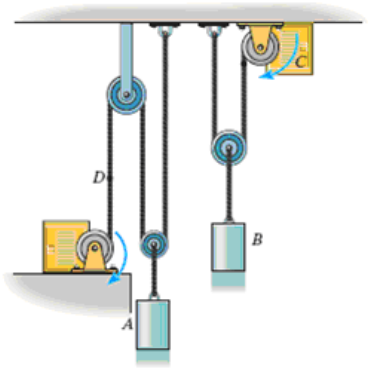
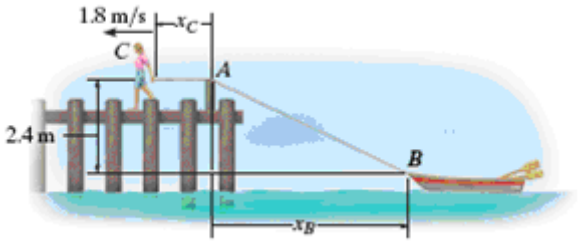
Exercise 2

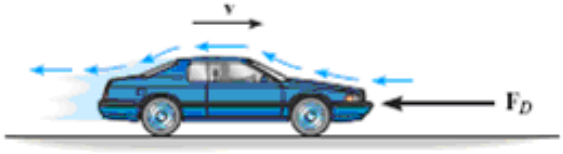
1. (Prob. 12-183) The motor draws in the cable at C with a constant velocity of $v_c=4m/s$. The motor draws in the cable at D with a constant acceleration of $a_D=8m/s^2$. If $v_D=0$ when $t=0$, determine
   a. The time needed for block A to rise 3m, and
   b. The relative velocity of block A with respect to block B when this occurs



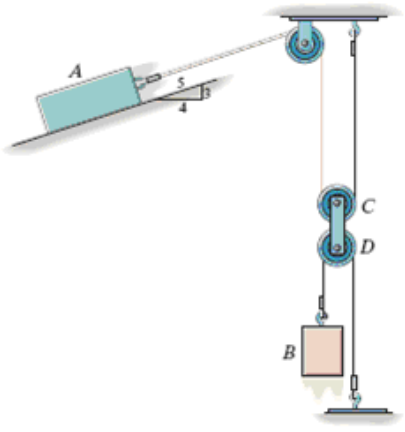
2. (Prob. 12/190) The girl at C stand near the edge of the pier and pulls in the rope horizontally at a constant speed of 1.8 m/s. Determine how fast the boat approaches the pier at the instant the rope length AB is 15 m.



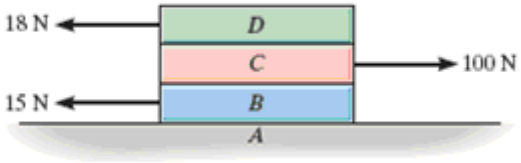
3. (Prob. 13/12) A car of mass m is traveling at a slow velocity v_0. If it is subjected to the drag resistance of the wind, which is proportional to its velocity, i.e., $F_D=kv$, determine the distance and the time the car will travel before its velocity becomes $0.5v_0$. Assume no other frictional forces act on the car.



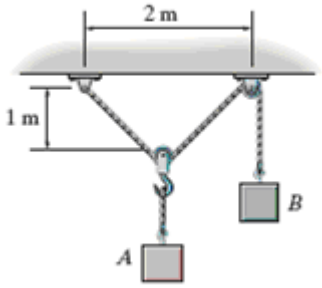
4. (Prob. 13/26) At the instant shown the 500-N (approx. 50 kg) block A is moving down the plane at 2m/s while being attached to the 250-N (approx. 25 kg) block B. If the coefficient of kinetic friction is $\mu_k = 0.2$, determine the acceleration of A and the distance A slides before it stops. Neglect the mass of the pulleys and cables.



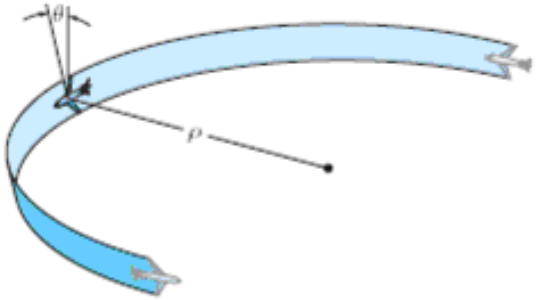
5. (Prob. 13/44) Each of the three plates has a mass of 10 kg. If the coefficients of static and kinetic friction at each surface of contact are $\mu_s = 0.3$ and $\mu_k = 0.2$, respectively, determine the acceleration of each plate when the three horizontal forces are applied.



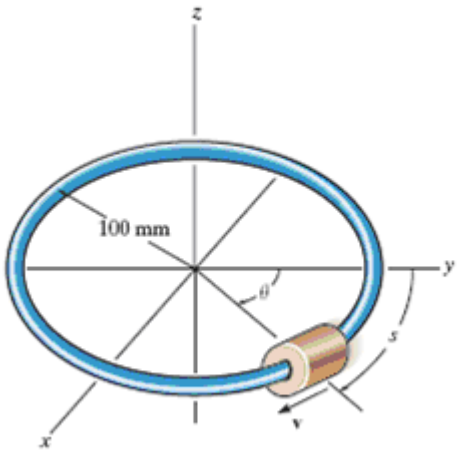
6. (Prob. 13/48) Block *B* has a mass *m* and is hoisted using the cord and pulley system shown. Determine the magnitude of force **F** as a function of the block's vertical position *y* so that when **F** is applied the block rises with a constant acceleration $\mathbf{a}_B$. Neglect the mass of the cord and pulleys.



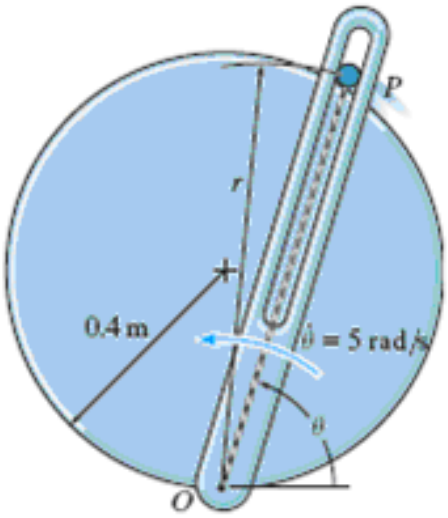
7. (Prob. 13/64) The airplane, traveling at a constant speed of *50m/s*, is executing a horizontal turn. If the plane is banked at $\theta = 15^\circ$, when the pilot experiences only a normal force on the seat of the plane, determine the radius of curvature ρ of the turn. Also, what is the normal force of the seat on the pilot if he has a mass of 70 kg.



8. (Prob. 13/70) A collar having a mass of 0.75 kg and negligible size slides over the surface of a horizontal circular rod for which the coefficient of kinetic friction is $\mu_k = 0.3$. If the collar is given a speed of 4m/s and the released at $\theta = 0^\circ$, determine how far, *s*, it slides on the rod before coming to rest.



9. (Prob. 13/97) The smooth particle has a mass of 80g. It is attached to and elastic cord extending from O to P and due to the slotted arm guide moves along the horizontal circular path $r = (0.8\sin\theta)$ m. If the cord has a stiffness k=30N/m and an unstretched length of 0.25m, determine the force of the guide on the particle when $\theta = 60^\circ$. The guide has a constant angular velocity $\dot{\theta} = 5$ rad/s.



10. (Prob. 13/103) The collar has a mass of 2kg and travels along the smooth horizontal rod defined by the equiangular spiral $r = (e^{\theta})$ m, where θ is in radians. Determine the tangential force F and the normal force N acting on the collar when $\theta = 90^\circ$, if the force F maintains a constant angular motion $\dot{\theta} = 2$ rad/s.