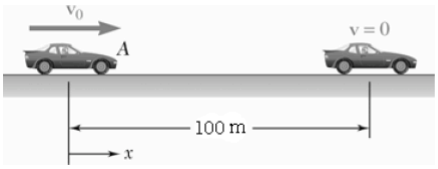
ES 208 Mechanics

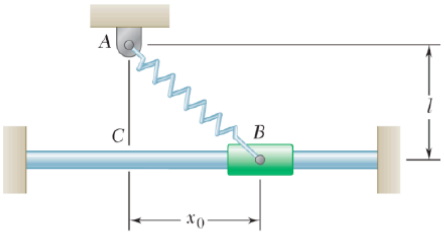
Tutorial 12

All problems are from Beer and Johnston's book



PROBLEM 11.9

The brakes of a car are applied, causing it to slow down at a rate of 3 m/s^2. Knowing that the car stops in 100 m, determine (*a*) how fast the car was traveling immediately before the brakes were applied, (*b*) the time required for the car to stop.

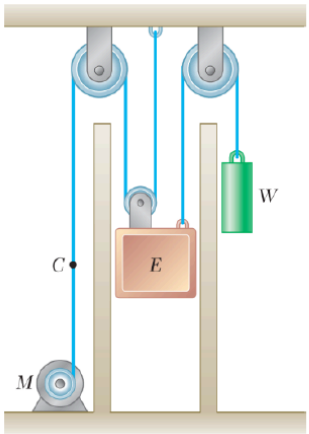


PROBLEM 11.20

A spring *AB* is attached to a support at *A* and to a collar. The unstretched length of the spring is *l*. Knowing that the collar is released from rest at $x = x_0$ and has an acceleration defined by the relation $a = -100(x - lx/\sqrt{l^2 + x^2})$, determine the velocity of the collar as it passes through Point *C*.

Problem 11.26

A human powered vehicle (HPV) team wants to model the acceleration during the 260 *m* sprint race (the first 60 *m* is called a flying start) using $a = A - Cv^2$, where *a* is acceleration in m/s^2 and *v* is the velocity in m/s. From wind tunnel testing, they found that C= 0.0012 m^{-1}. Knowing that the cyclist is going 100 km/h at the 260 meter mark, what is the value of *A*?



PROBLEM 11.47

The elevator shown in the figure moves downward with a constant velocity of 4 m/s. Determine (*a*) the velocity of the cable *C*, (*b*) the velocity of the counterweight *W*, (*c*) the relative velocity of the cable *C* with respect to the elevator, (*d*) the relative velocity of the counterweight *W* with respect to the elevator.