Hw Assignment # 5.

Chapter 11

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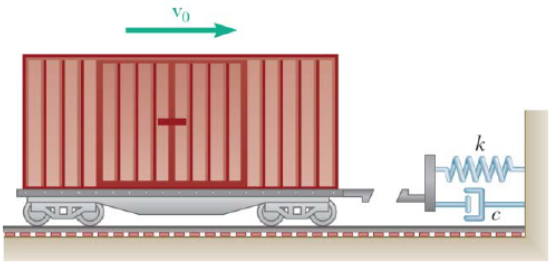
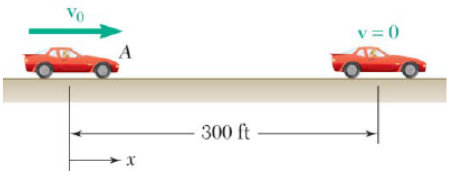


PROBLEM 11.4

A loaded railroad car is rolling at a constant velocity when it couples with a spring and dashpot bumper system. After the coupling, the motion of the car is defined by the relation $x = 60e^{-4.8t}\sin 16t$ where x and t are expressed in mm and seconds, respectively. Determine the position, the velocity and the acceleration of the railroad car when (a) $t = 0$, (b) $t = 0.3$ s.

PROBLEM 11.6

The motion of a particle is defined by the relation $x = t^3 - 9t^2 + 24t - 8$, where x and t are expressed in inches and seconds, respectively. Determine (a) when the velocity is zero, (b) the position and the total distance traveled when the acceleration is zero.

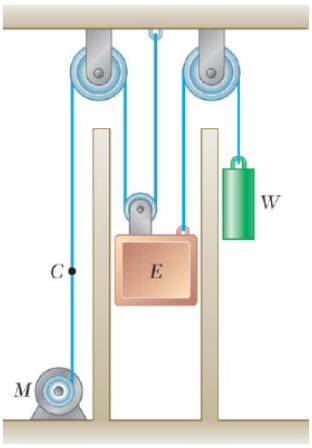


PROBLEM 11.9

The brakes of a car are applied, causing it to slow down at a rate of 10 ft/s^2. Knowing that the car stops in 100 ft, determine (a) how fast the car was traveling immediately before the brakes were applied, (b) the time required for the car to stop.

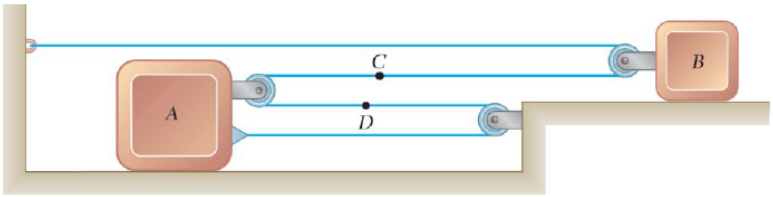
PROBLEM 11.28

Based on observations, the speed of a jogger can be approximated by the relation $v = 7.5(1 - 0.04x)^{0.3}$, where v and x are expressed in mi/h and miles, respectively. Knowing that $x = 0$ at $t = 0$, determine (a) the distance the jogger has run when $t = 1$ h, (b) the jogger's acceleration in ft/s^2 at $t = 0$, (c) the time required for the jogger to run 6 mi.



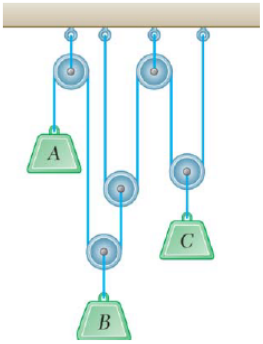
PROBLEM 11.48

The elevator shown starts from rest and moves upward with a constant acceleration. If the counterweight W moves through 30 ft in 5 s, determine (a) the acceleration of the elevator and the cable C, (b) the velocity of the elevator after 5 s.



PROBLEM 11.51

Slider block B moves to the right with a constant velocity of 300 mm/s. Determine (a) the velocity of slider block A, (b) the velocity of portion C of the cable, (c) the velocity of portion D of the cable, (d) the relative velocity of portion C of the cable with respect to slider block A.

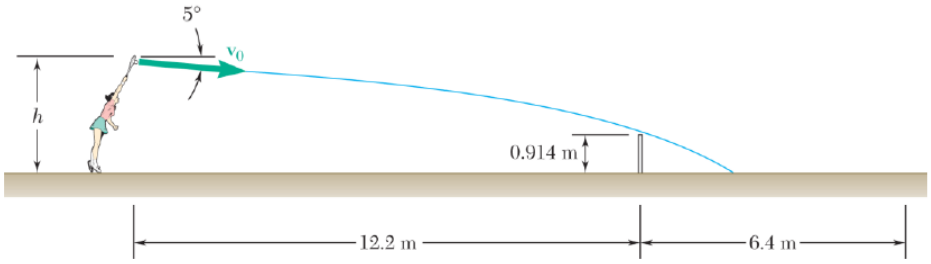


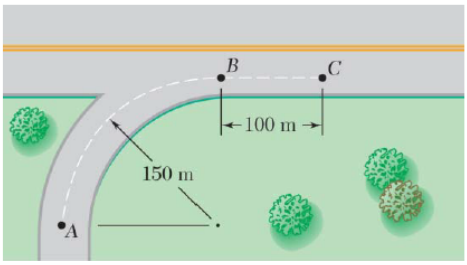
PROBLEM 11.56

Block A starts from rest at $t = 0$ and moves downward with a constant acceleration of 6 in./s^2. Knowing that block B moves up with a constant velocity of 3 in./s, determine (a) the time when the velocity of block C is zero, (b) the corresponding position of block C.

PROBLEM 11.108

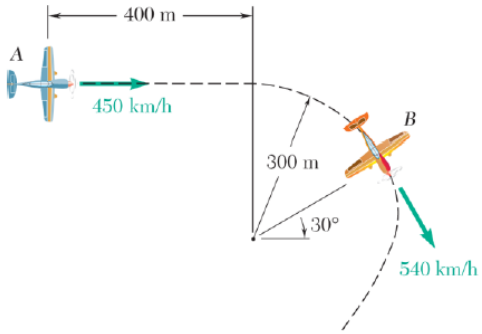
A tennis player serves the ball at a height $h = 2.5$ m with an initial velocity of $\mathbf{v}_0$ at an angle of 5° with the horizontal. Determine the range for which of v_0 for which the ball will land in the service area which extends to 6.4 m beyond the net.





PROBLEM 11.140

A motorist starts from rest at Point A on a circular entrance ramp when $t = 0$, increases the speed of her automobile at a constant rate and enters the highway at Point B. Knowing that her speed continues to increase at the same rate until it reaches 100 km/h at Point C, determine (a) the speed at Point B, (b) the magnitude of the total acceleration when $t = 20$ s.



PROBLEM 11.142

At a given instant in an airplane race, airplane A is flying horizontally in a straight line, and its speed is being increased at the rate of 8 m/s^2. Airplane B is flying at the same altitude as airplane A and, as it rounds a pylon, is following a circular path of 300-m radius. Knowing that at the given instant the speed of B is being decreased at the rate of 3 m/s^2, determine, for the positions shown, (a) the velocity of B relative to A, (b) the acceleration of B relative to A.