ME 104: Homework 2

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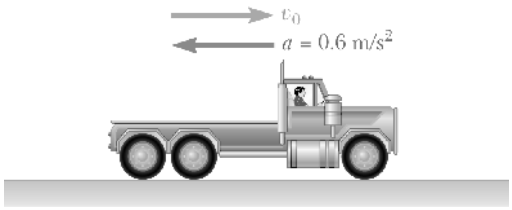
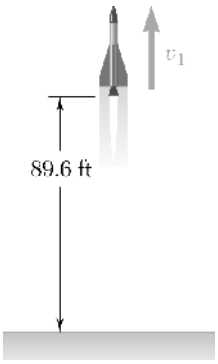
Due: Monday September, 14th

Chapter 11, Problem 34



A truck travels 220 m in 10 s while being decelerated at a constant rate of 0.6 m/s^2. Determine (*a*) its initial velocity, (*b*) its final velocity, (*c*) the distance traveled during the first 1.5 s.

Chapter 11, Problem 36

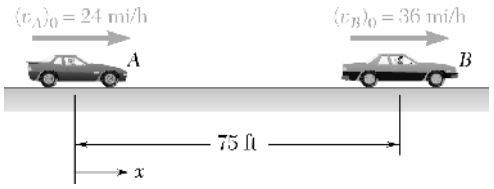


A group of students launches a model rocket in the vertical direction. Based on tracking data, they determine that the altitude of the rocket was 89.6 ft at the end of the powered portion of the flight and that the rocket landed 16 s later. Knowing that the descent parachute failed to deploy so that the rocket fell freely to the ground after reaching its maximum altitude and assuming that $g = 32.2$ ft/s^2, determine (*a*) the speed v_1 of the rocket at the end of powered flight, (*b*) the maximum altitude reached by the rocket.

Chapter 11, Problem 39

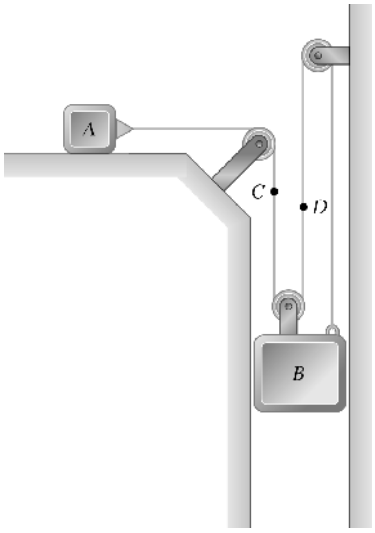
A police officer in a patrol car parked in a 70 km/h speed zone observes a passing automobile traveling at a slow, constant speed. Believing that the driver of the automobile might be intoxicated, the officer starts his car, accelerates uniformly to 90 km/h in 8 s, and, maintaining a constant velocity of 90 km/h, overtakes the motorist 42 s after the automobile passed him. Knowing that 18 s elapsed before the officer began pursuing the motorist, determine (*a*) the distance the officer traveled before overtaking the motorist, (*b*) the motorist's speed.

Chapter 11, Problem 41



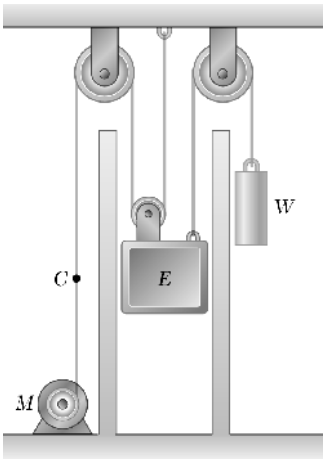
Automobiles *A* and *B* are traveling in adjacent highway lanes and at $t = 0$ have the positions and speeds shown. Knowing that automobile *A* has a constant acceleration of 1.8 ft/s^2 and that *B* has a constant deceleration of 1.2 ft/s^2, determine (*a*) when and where *A* will overtake *B*, (*b*) the speed of each automobile at that time.

Chapter 11, Problem 47



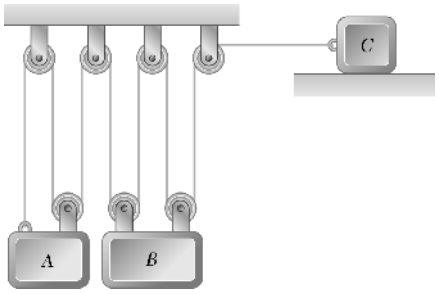
Slider block *A* moves to the left with a constant velocity of 6 m/s. Determine (*a*) the velocity of block *B*, (*b*) the velocity of portion *D* of the cable, (*c*) the relative velocity of portion *C* of the cable with respect to portion *D*.

Chapter 11, Problem 49



The elevator shown in the figure moves downward with a constant velocity of 15 ft/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.

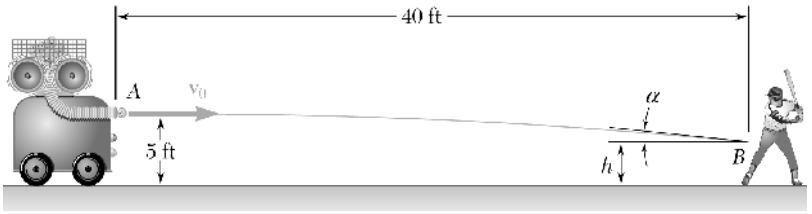
Chapter 11, Problem 55



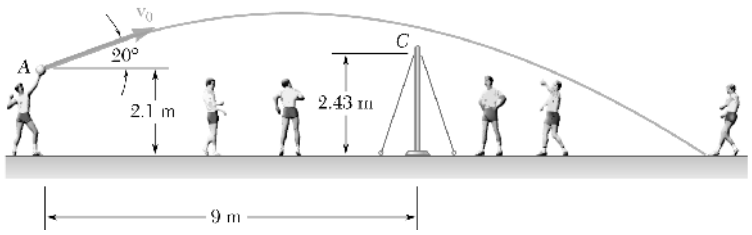
Block B moves downward with a constant velocity of 20 mm/s. At $t = 0$, block A is moving upward with a constant acceleration, and its velocity is 30 mm/s. Knowing that at $t = 3$ s slider block C has moved 57 mm to the right, determine (*a*) the velocity of slider block C at $t = 0$, (*b*) the accelerations of A and C, (*c*) the change in position of block A after 5 s.

Chapter 11, Problem 100

A baseball pitching machine "throws" baseballs with a horizontal velocity $\mathbf{v}_0$. Knowing that height h varies between 31 in. and 42 in., determine (*a*) the range of values of v_0, (*b*) the values of α corresponding to $h = 31$ in. and $h = 42$ in.

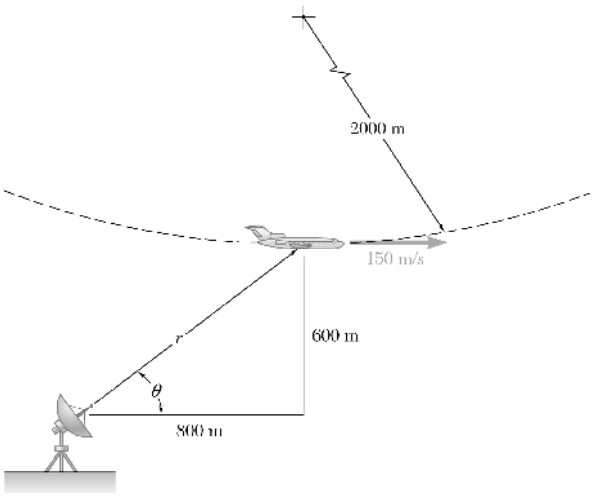


Chapter 11, Problem 101



A volleyball player serves the ball with an initial velocity $\mathbf{v}_0$ of magnitude 13.40 m/s at an angle of 20° with the horizontal. Determine (*a*) if the ball will clear the top of the net, (*b*) how far from the net the ball will land.

Chapter 11, Problem 193



At the bottom of a loop in the vertical plane, an airplane has a horizontal velocity of 150 m/s and is speeding up at a rate of 25 m/s^2. The radius of curvature of the loop is 2000 m. The plane is being tracked by radar at *O*. What are the recorded values of $\dot{r}$, $\ddot{r}$, $\dot{\theta}$ and $\ddot{\theta}$ for this instant?