

- 26.** In the Daytona 500 auto race, a Ford Thunderbird and a Mercedes Benz are moving side by side down a straight-away at 71.5 m/s. The driver of the Thunderbird realizes he must make a pit stop, and he smoothly slows to a stop over a distance of 250 m. He spends 5.00 s in the pit and then accelerates out, reaching his previous speed of 71.5 m/s after a distance of 350 m. At this point, how far has the Thunderbird fallen behind the Mercedes Benz, which has continued at a constant speed?
- 27.** A jet plane lands with a speed of 100 m/s and can accelerate at a maximum rate of  $-5.00 \text{ m/s}^2$  as it comes to rest.  
(a) From the instant the plane touches the runway, what is the minimum time interval needed before it can come to rest?  
(b) Can this plane land on a small tropical island airport where the runway is 0.800 km long?
- 28.** A car is approaching a hill at 30.0 m/s when its engine suddenly fails just at the bottom of the hill. The car moves with a constant acceleration of  $-2.00 \text{ m/s}^2$  while coasting up the hill.  
(a) Write equations for the position along the slope and for the velocity as functions of time, taking  $x = 0$  at the bottom of the hill, where  $v_i = 30.0 \text{ m/s}$ .  
(b) Determine the maximum distance the car rolls up the hill.
- 45.** In Mostar, Bosnia, the ultimate test of a young man's courage once was to jump off a 400-year-old bridge (now destroyed) into the River Neretva, 23.0 m below the bridge.  
(a) How long did the jump last?  
(b) How fast was the diver traveling upon impact with the water?  
(c) If the speed of sound in air is 340 m/s, how long after the diver took off did a spectator on the bridge hear the splash?
- 46.** A ball is dropped from rest from a height  $h$  above the ground. Another ball is thrown vertically upwards from the ground at the instant the first ball is released. Determine the speed of the second ball if the two balls are to meet at a height  $h/2$  above the ground.
- 47.** A baseball is hit so that it travels straight upward after being struck by the bat. A fan observes that it takes 3.00 s for the ball to reach its maximum height. Find (a) its initial velocity and (b) the height it reaches.

- 13.** One strategy in a snowball fight is to throw a snowball at a high angle over level ground. While your opponent is watching the first one, a second snowball is thrown at a low angle timed to arrive before or at the same time as the first one. Assume both snowballs are thrown with a speed of 25.0 m/s. The first one is thrown at an angle of  $70.0^\circ$  with respect to the horizontal. (a) At what angle should the second snowball be thrown to arrive at the same point as the first? (b) How many seconds later should the second snowball be thrown after the first to arrive at the same time?
- 14.** An astronaut on a strange planet finds that she can jump a maximum horizontal distance of 15.0 m if her initial speed is 3.00 m/s. What is the free-fall acceleration on the planet?
- 19.**  A place-kicker must kick a football from a point 36.0 m (about 40 yards) from the goal, and half the crowd hopes the ball will clear the crossbar, which is 3.05 m high. When kicked, the ball leaves the ground with a speed of 20.0 m/s at an angle of  $53.0^\circ$  to the horizontal. (a) By how much does the ball clear or fall short of clearing the crossbar? (b) Does the ball approach the crossbar while still rising or while falling?