# 302 problem set 1

4. A baseball player hits a triple and ends up on third base. A baseball "diamond" is a square, each side of length 27.4 m, with home plate and the three bases on the four corners. What is the magnitude of the player's displacement?

6. A mountain-climbing expedition establishes two intermediate camps, labeled A and B in the drawing, above the base camp. What is the magnitude Δr of the displacement between camp A and camp B?
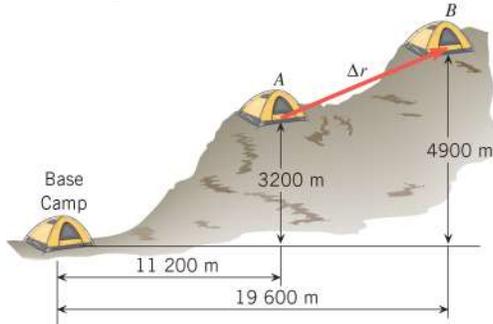
Section 3.2   Equations of Kinematics in Two Dimensions, Section 3.3   Projectile Motion

12. A spacecraft is traveling with a velocity of v_{0x} = 5480 m/s along the +x direction. Two engines are turned on for a time of 842 s. One engine gives the spacecraft an acceleration in the +x direction of a_x = 1.20 m/s^2, while the other gives it an acceleration in the +y direction of a_y = 8.40 m/s^2. At the end of the firing, find **(a)** v_x and **(b)** v_y.

13. ssm   A volleyball is spiked so that it has an initial velocity of 15 m/s directed downward at an angle of 55° below the horizontal. What is the horizontal component of the ball's velocity when the opposing player fields the ball?

14. ▶❚❚ As a tennis ball is struck, it departs from the racket horizontally with a speed of 28.0 m/s. The ball hits the court at a horizontal distance of 19.6 m from the racket. How far above the court is the tennis ball when it leaves the racket?

15. A skateboarder shoots off a ramp with a velocity of 6.6 m/s, directed at an angle of 58° above the horizontal. The end of the ramp is 1.2 m above the ground. Let the x axis be parallel to the ground, the +y direction be vertically upward, and take as the origin the point on the ground directly below the top of the ramp. **(a)** How high above the ground is the highest point that the skateboarder reaches? **(b)** When the skateboarder reaches the highest point, how far is this point horizontally from the end of the ramp?

16. GO A puck is moving on an air hockey table. Relative to an x, y coordinate system at time t = 0 s, the x components of the puck's initial velocity and acceleration are v_{0x} = +1.0 m/s and a_x = +2.0 m/s^2. The y components of the puck's initial velocity and acceleration are v_{0y} = +2.0 m/s and a_y = −2.0 m/s^2. Find the magnitude and direction of the puck's velocity at a time of t = 0.50 s. Specify the direction relative to the +x axis.