19. To view an interactive solution to a problem that is very similar to this one, go to Interactive Solution 7.19 (www.wiley.com/college/cutnell and select edition 6 student resources, Interactive Solutions). A fireworks rocket is moving at a speed of 45.0 m/s. The rocket suddenly breaks into two pieces of equal mass, which fly off with velocities $v_1$ and $v_2$, as shown in the drawing. What is the magnitude of (a) $v_1$ and (b) $v_2$?

42. Consider the two moving boxcars in Example 5. Determine the velocity of their center of mass (a) before and (b) after the collision. (c) Should your answer in part (b) be less than, greater than, or equal to the common velocity $v_f$ of the two coupled cars after the collision? Justify your answer.

Ch. 7

2. The drawing shows a boat being pulled by two locomotives through a canal of length 2.00 km. The tension in each cable is $5.00 \times 10^3$ N, and $\theta = 20.0^\circ$. What is the net work done on the boat by the two locomotives?

4. A 75.-kg man is riding an escalator in a shopping mall. The escalator moves the man at a constant velocity from ground level to the floor above, a vertical height of 4.60 m. What is the work done on the man by (a) the gravitational force and (b) the escalator?

14. Refer to Concept Simulation 6.1 at www.wiley.com/college/cutnell (select student companion site for the 6th Edition) for a review of the concepts with which this problem deals. A 0.075-kg arrow is fired horizontally. The bowstring exerts an average force of 65 N on the arrow over a distance of 0.90 m. With what speed does the arrow leave the bow?