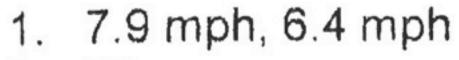
Practice Problems

- 1. A runner jogs 7 miles north in 55 minutes and then sprints 2 miles west in 13 minutes. Find the runner's average speed and the magnitude of the runner's average velocity. Express both answers in miles per hour.
- 2. An object with an initial velocity of 5 m/s has a constant acceleration of 2 m/s². When its speed is 15 m/s, how far has it traveled?
- 3. A particle starting from a position x_0 and with a velocity v_0 is subjected to a constant acceleration of 3 m/s^2 . At t = 4 s, it is at x = 100 m; at t = 6 s, it has a velocity of 15 m/s. Find its position at t = 6 s.
- 4. A car accelerates from rest for 20 s until it reaches 40 m/s. The speed is then held constant for 20 s, after which there is an acceleration of -4 m/s² until the car stops.
 - a. Graph the car's acceleration vs. time.
 - b. Graph the car's velocity vs. time.
 - c. Graph the car's position vs. time. Label the maximum value reached on the y-axis.
 - d. What is the average speed of the car?
- 5. Two trains face each other on adjacent tracks. They are initially at rest 40 m apart. The train on the left accelerates rightward at 1.4 m/s². The train on the right accelerates leftward at 2.2 m/s². How far does the train on the left travel before the two trains pass?
- 6. A speeder passes a stationary police officer going at a constant speed of 34 m/s. The officer begins pursuit after 4 seconds and accelerates at a constant rate until he pulls up alongside the speeder. If the police officer travels 646 m from his starting position, at what rate did he accelerate?
- 7. The position of a particle is given by $x(t) = 4t^3 48t$, where x is in meters and t is in seconds.
 - a. What is the average velocity of the object from t = 0 s to t = 4 s?
 - b. What is the velocity at t = 4 s?
 - c. What is the acceleration at t = 4 s?
 - d. Where is the object located when it stops for the first time?
- 8. The acceleration of an object is given by a(t) = 5t. At t = 0, the object has a velocity of 18 m/s and is located 14 m from the origin. What is the object's position at t = 3 s?



- 2. 50 m
- 3. 124 m
- 4. See graphs, 28 m/s
- 5. 15.6 m
- 6. 5.7 m/s²
- 7. 16 m/s, 144 m/s, 96 m/s², -64 m
- 8. 90.5 m

