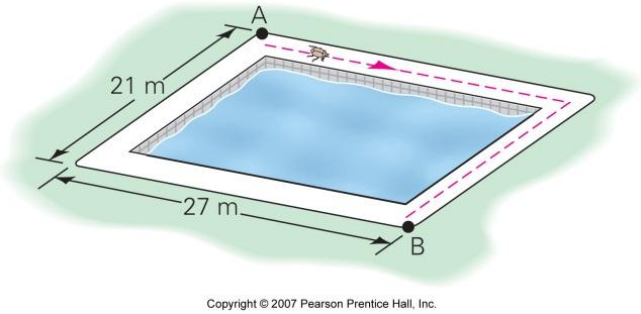
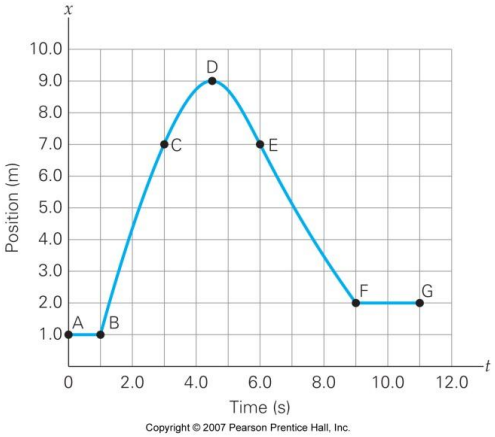
Name _____ Date _____ Period_____

Answer the following questions on a separate sheet of paper. Remember the steps in solving physics problems.

1. An insect crawls along the edge of a rectangular swimming pool of length 27 m and width 21 m (>Fig.). If it crawls from corner A to corner B in 30 min,
   a. what is its average speed,
   b. what is the magnitude of its average velocity?



2. The distance of one lap around an oval dirt bike track is 1,.50 km. If a rider going at a constant speed makes one lap in 1.10 minutes, what is the speed of the bike and rider in meters per second? Is the velocity of the bike constant? Explain!
3. Given that the speed of sound is 340. m/s and that the speed of light is 3.00 x 108 m/s (186,000 mi/s), how much time will elapse between a lightning flash and the resulting thunder if the lightning strikes 2.50 km away from the observer? Does your answer change if you assume light travels with an infinite speed (that is, the lightning flash is seen instantaneously)?
4. A plot of position versus time is shown in the figure to the right for an object in linear motion.
   a. What are the average velocities for the segments AB, BC, CD, DE, EF, FG, and BG?
   b. State whether the motion is uniform or nonuniform in each case.
   c. What is the instantaneous velocity at point D?



5. You can determine the speed of a car by measuring the time it takes to travel between the mile markers
   a. How many seconds should elapse between the mile markers if the car's average speed is 65.0 mi/hr?
   b. What is the average speed in miles per hour if it takes 65.0 seconds to travel between mile markers?

6. An earthquake releases two types of traveling seismic waves, called transverse and longitudinal waves. The average speeds of transverse and longitudinal waves in rock are 8.90 km/s and 5.10 km/s, respectively. A seismograph records the arrival of transverse waves 73.0 seconds before that of the longitudinal waves. Assuming the waves travel in a straight lines, how far away is the center of the earthquake?
7. The Indianapolis 500, a 500 mile auto race, was first run in 1911 in a time of 6 hours, 42 minutes and 8 seconds. In 2011, the race was won in a time of 2 hours, 56 minutes and 12 seconds.
   a. What were the average speeds for the Indy 500 for these years in miles per hour (to 0.1 mi/h)?
   b. What was the percentage change in the average speed from 1911 to 2011?
8. In demonstrating a dance step, a person moves in one dimension, as shown in the figure below. What are
   a. the average speed,
   b. the average velocity for each phase of the motion?
   c. What are the instantaneous velocities at $t = 1.0\,\text{s}$, 2.5 s, 4.5 s, and 6.0 s?
   d. What is the average velocity for the interval between $t = 4.5\,\text{s}$ and $t = 9.0\,\text{s}$?

   [*Hint*: Recall that the overall displacement is the displacement between the starting point and the ending point.]