1D Kinematic Homework #1

1. In the qualifying round of the 50-yd freestyle in the sectional swimming championship, Dugan got an early lead by finishing the first 25.00 yd in 10.01 seconds. Dugan finished the return leg (25.00 yd distance) in 10.22 seconds.

**a.** Determine Dugan's average speed for the entire race.  
**b.** Determine Dugan's average speed for the first 25.00 yd leg of the race.  
**c.** Determine Dugan's average velocity for the entire race.

**2.2.** In last week's Homecoming victory, Al Konfurance, the star halfback of South's football team, broke a tackle at the line of scrimmage and darted upfield untouched. He averaged 9.8 m/s for an 80-yard (73 m) score. Determine the time for Al to run from the line of scrimmage to the end zone.

3. During the annual shuffleboard competition, Renee gives her puck an initial speed of 9.32 m/s. Once leaving her stick, the puck slows down at a rate of -4.06 m/s/s.

**a.** Determine the time it takes the puck to slow to a stop.  
**b.** Use your initial speed and the calculated time to determine the average speed and the distance which the puck travels before stopping.

4. Ken Runfast is the star of the cross-country team. During a recent morning run, Ken averaged a speed of 5.8 m/s for 12.9 minutes. Ken then averaged a speed of 6.10 m/s for 7.1 minutes. Determine the total distance which Ken ran during his 20 minute jog.

5. The Lamborghini Murcielago can accelerate from 0 to 27.8 m/s (100 km/hr or 62.2 mi/hr) in a time of 3.40 seconds. Determine the acceleration of this car in both m/s/s and mi/hr/s.

6. Homer Agin leads the Varsity team in home runs. In a recent game, Homer hit a 96 mi/hr sinking curve ball head on, sending it off his bat in the exact opposite direction at 56 mi/hr. The actually contact between ball and bat lasted for 0.75 milliseconds. Determine the magnitude of the average acceleration of the ball during the contact with the bat. Express your answer in both mi/hr/s and in m/s/s. (Given: 1.00 m/s = 2.24 mi/hr)

7. A Formula One car is a single-seat racing car with an open cockpit and substantial wings located in the front and rear. At high speeds, the aerodynamics of the car help to create a strong downward force which allows the car to brake from 27.8 m/s (100 km/hr or 62.2 mi/hr) to 0 in as small of a distance as 17 meters. Determine the deceleration rate (i.e., acceleration) achieved by such a car.