Velocity, Acceleration, Net Change

1. A particle moves along a line so that its velocity at time t is $v(t) = t^2 - t - 6 \ m/s$.
   (a) Find the displacement of the particle during the time period [1, 4];
   (b) Find the distance traveled during this time period.

2. The acceleration function (in m /s^2) and the initial velocity are given for a particle moving along a line. Find
   (a) the velocity at time t and
   (b) the distance traveled during the given time interval.
   $a(t) = t + 6 \ m/s^2, \ v(0) = 5, \ 0 \le t \le 10$

3. The velocity function (in meters per second) is given for a particle moving along a line. Find the distance traveled by the particle during the given time interval:
   $v(t) = 4t - 3, \ 0 \le t \le 6$

4. Evaluate the integral.

$$\int_{-2}^{5} \left| 4x - x^2 \right| dx$$

5. Alabama Instruments Company has set up a production line to manufacture a new calculator. The rate of production of these calculators after t weeks is
   $\dfrac{dx}{dt} = 4{,}500 \left(1 - \dfrac{130}{(t+9)^2} \right)$ calculators per week. Production approaches 4,500 per week as time goes on, but the initial production is lower because of the workers' unfamiliarity with the new techniques. Find the number of calculators produced from the beginning of the third week to the end of the fourth week. Round the answer to the nearest integer.

6. The acceleration function (in m / s ^{2}) and the initial velocity are given for a particle moving along a line. Find the velocity at time t and the distance traveled during the given time interval.

$$a(t) = t + 4, \ v(0) = 3, \ 0 \le t \le 10$$

7. An animal population is increasing at a rate of $13 + 51t$ per year (where t is measured in years). By how much does the animal population increase between the fourth and tenth years?

8. If h' is a child's rate of growth in pounds per year, determine the expression that represent the increase in the child's weight (in pounds) between the years 2 and 5?