Problem Set #5 Graph Reading, Kinematics, and Piecewise Functions
Due Thursday Oct. 3 (A/B)/Friday Oct. 4 (C/D)

Name:_____

I worked with:

Equations:

Position (constant velocity)	$s(t) = s_0 + v_0t$
Position:	$s(t) = s_0 + v_0t + \frac{1}{2} at^2$
Velocity:	$v(t) = v_0 + at$
Final Velocity (time):	$v_f = v_0 + at_f$
Final Velocity (position):	$v_f^2 = v_0^2 + 2as_f$
Force:	$F = ma$
Acceleration due to gravity:	$9.8\ m/s^2$
Universal Gravitation:	$F = \frac{GMm}{r^2}$
Gravitational Constant:	$G = 6.67 \times 10^{-11}$
Avogadro's Number:	6.022×10^{23}

1. This weekend my family and I went out on a hike, we started by walking north 5.0 km at 6.0 km/h and then west 12 km at 5.0 km/hr. For my journey, determine…
    a. The total distance of the entire trip
    b. The total displacement of the entire trip
    c. The average speed of the entire trip
    d. The average velocity of the entire trip
    e. The average acceleration of the entire trip

2. A soccer ball is kicked horizontally off the roof of HTHNC at a height of 20 meters by a student trying to kick the ball onto a spot on the ground located 25 meters from the base of the building. Ignore the effects of air resistance.
    a. How long will it take for the ball to reach the ground?
    b. At what velocity must the ball be kicked so that it lands inside of the circle?
    c. Assuming that the ball accelerates from zero m/s over 0.1 s what acceleration did the student give the ball?
    d. Write the piecewise function that describes the motion of the ball

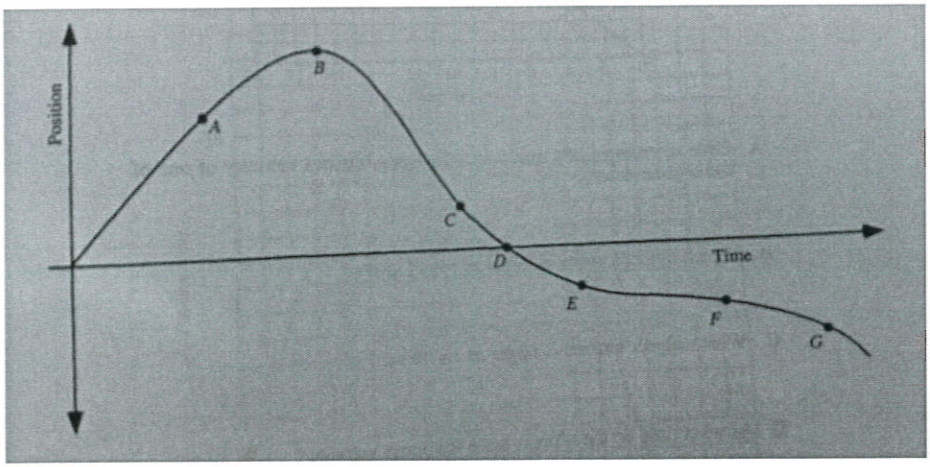
3. The following piecewise function describe the position of an object in motion.

a. Draw the graph that corresponds with this motion
b. What is the object's final position?
c. Determine the object's position at t = 6

$$s(t)\begin{cases} 5 & 0 \le t \le 4 \\ 5 + \frac{5}{16}(t-4)^2 & 4 \le t \le 8 \\ 10 + \frac{3}{4}(t-8) & 8 \le t \le 12 \end{cases}$$

4. At which of the lettered points on the graph below:
   a. Is the motion the slowest
   b. Is the object speeding up?
   c. Is the object slowing down
   d. Is the object turning around

Explain your reasoning in each case



5. (Honors) Using full sentences describe the motion shown by the position versus time graph below. Then sketch the velocity versus time graph that corresponds to

the x versus t graph below. Sketch means draw the general shape of the graph without computing actual values.