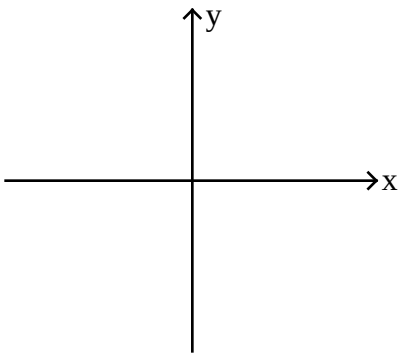
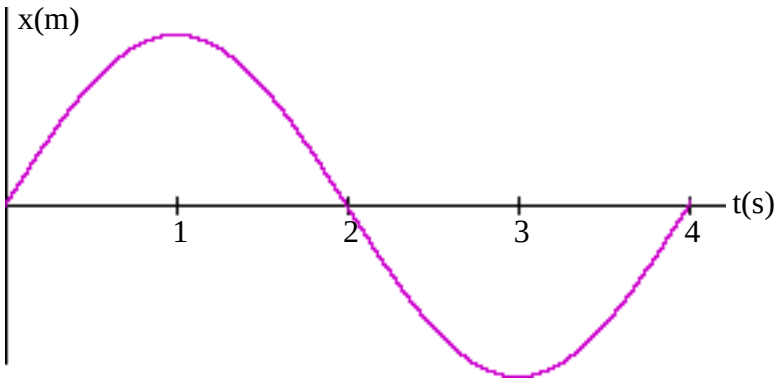
Name:_____

Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles which are on the last page. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

1. The vector $\vec{a} = 4.00\hat{i} - 3.00\hat{j}$ and the vector $\vec{b} = -2.00\hat{i} + 4.00\hat{j}$. (a)Sketch the vectors $\vec{a}$ and $\vec{b}$. (b)Find the x and y components of $\vec{r} = \vec{a} + \vec{b}$. (c)Sketch $\vec{r}$. (d)Find the magnitude and direction of $\vec{r}$.



2. Using the graph of position versus time for an object shown at the right, estimate the time or times when the object



(a)is to the right of the origin,

(b)is to the left of the origin,

(c)is at the origin,

(d)has a positive velocity,

(e)has a negative velocity,

(f)has a velocity of zero,

(g)has a positive acceleration,

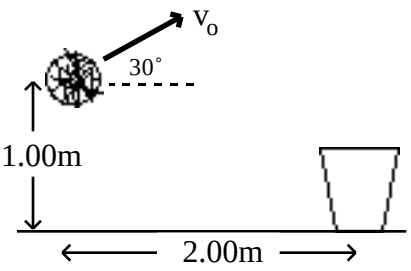
(h)has a negative acceleration,

(i)has a acceleration of zero.

(j)Find the total displacement of the object.

3. A baseball is thrown at 40.0m/s. Mark McGwire hits it back in the opposite direction at a speed of 65.0m/s. The ball is in contact with the bat for 1.20ms. Find (a)the acceleration of the ball assuming it is constant and (b)the distance the ball travels while it is in contact with the bat.

4. A wad of paper is tossed into a wastebasket 2.00m away. It is released from a height of 1.00m at an angle of 30.0˚. Find the initial speed required for it to land in the center of the bottom assuming that air resistance is negligible.



5. A television satellite must appear stationary in the sky so that the satellite dish doesn't have to move as it orbits. This means that the satellite completes precisely one orbit each day. The radius of the satellites orbit is 4.22×10^4km. Find the acceleration due to gravity felt by this satellite. Is your answer consistent with the Rule of Falling Bodies? Explain.