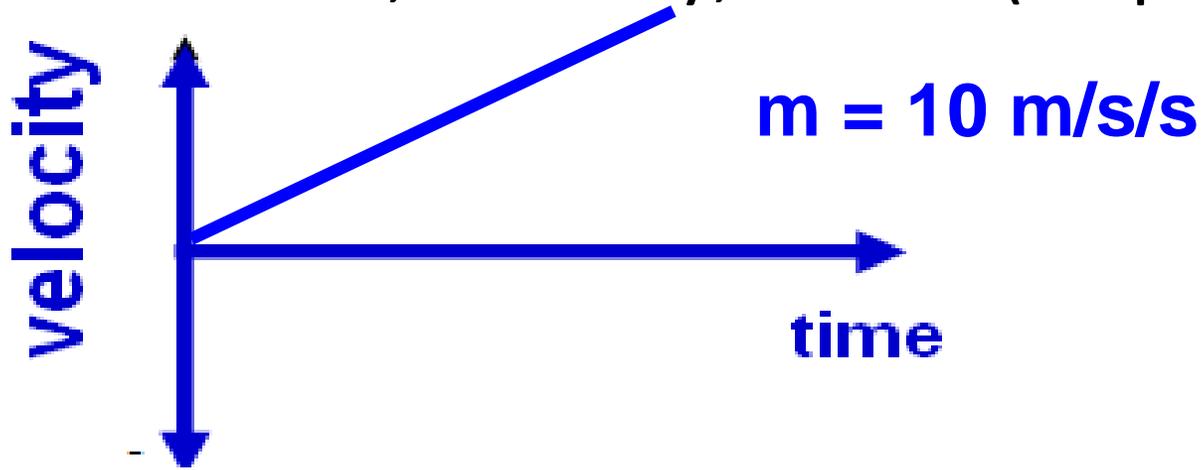


# Physics Bell Work, March 9 - 12, 2015

Physics: Instantaneous Velocity, Average Velocity, Constant Acceleration, Motion Maps of Uniform Acceleration, Displacement, Area Under a Velocity – Time Graph

# Physics Bell Work, Monday, Mar 9 (4 ques.)

Sketch the graphs.



1. What is the significance of the slope of this v-t graph?

Acceleration (how fast velocity is changing)

$$a = \frac{\Delta v}{\Delta t}$$

2. Write an equation for this v-t graph in the form of  $y = mx + b$

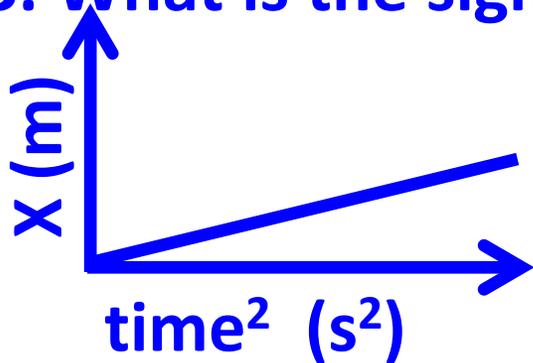
$$y = m \cdot x + b$$

$$v_f = (10 \text{ m/s}^2) \cdot \text{time} + 0$$

$$v_f = a \cdot t + v_0$$

3. What is the significance of the slope of the  $x-t^2$  graph?

$\frac{1}{2}$  the acceleration ( $m = 1/2a$ ).

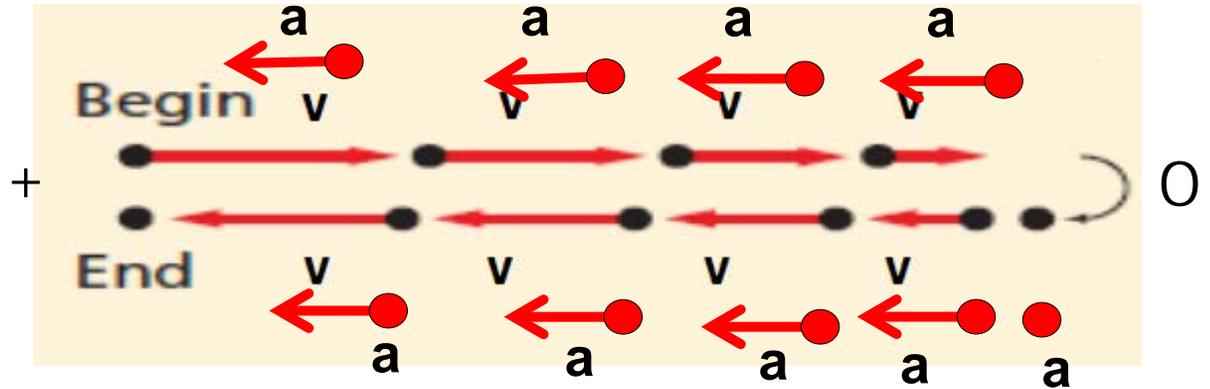
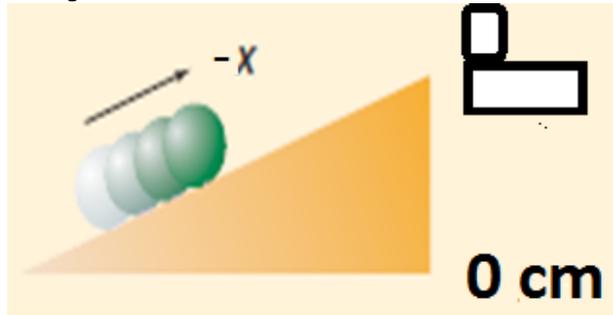


4. Write an equation for the  $x-t^2$  graph that relates,  $x$ ,  $a$ , &  $t$ .

$$y = m \cdot x + b$$

$$x_f = \frac{1}{2} a \cdot t^2 + x_0$$

# Physics Bell Work, Tuesday, Mar 10 (3 ques)



1. Copy the diagram and motion map. Describe the ball's motion. The ball slows down as it moves in the negative direction. The ball stops, reverses direction and speeds up in the positive direction.

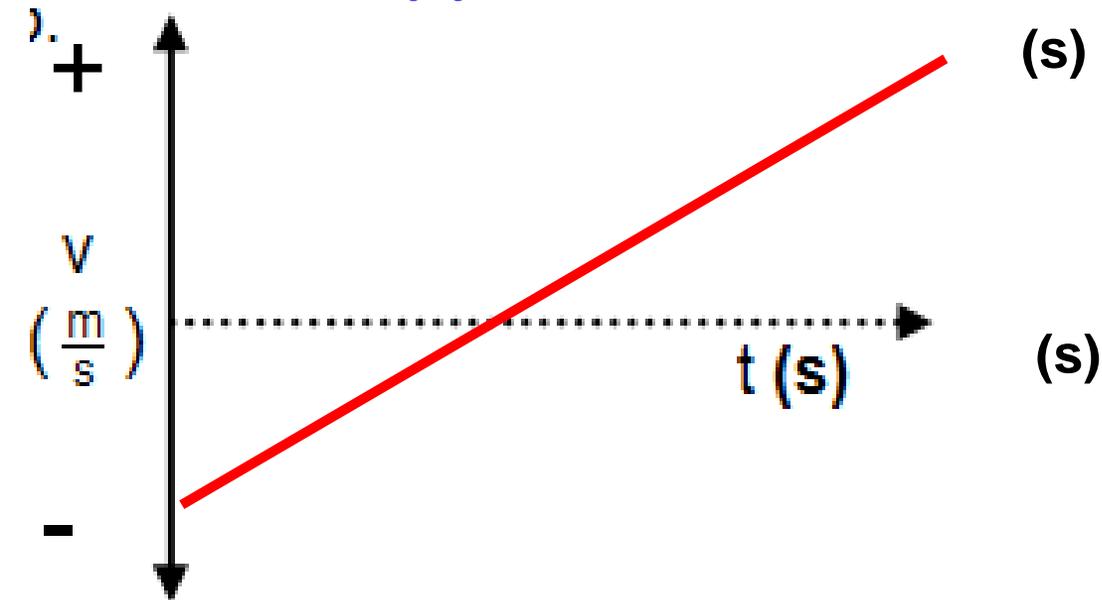
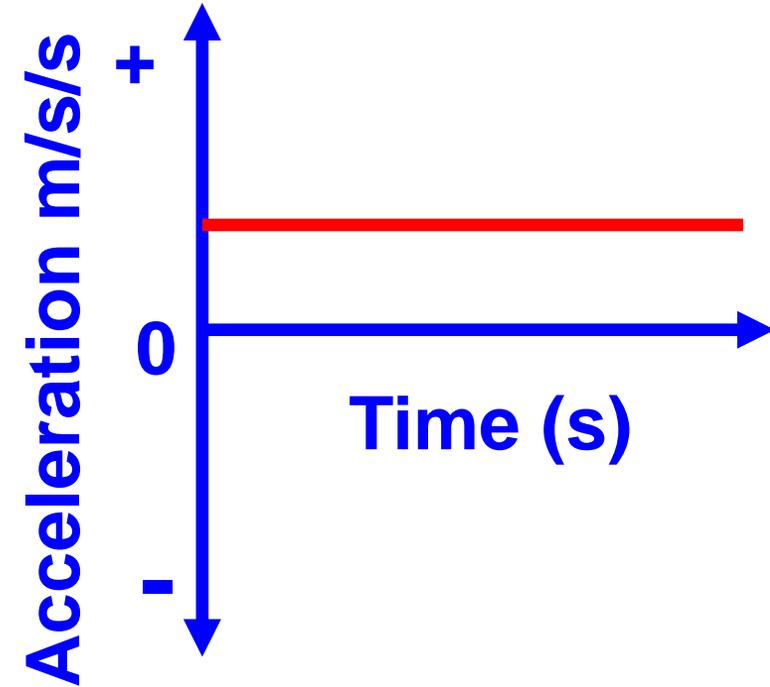
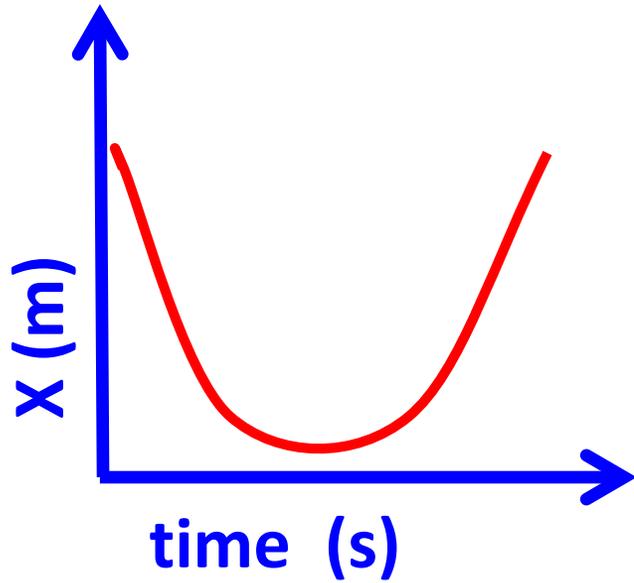
2. For #1, is the acceleration always negative or always positive, or changing?

It is always positive acceleration. Positive and negative acceleration have nothing to do with speeding up or slowing down. It has to do with the slope of velocity.

3. Sketch a position vs. time ( $x-t$ ), velocity vs. time ( $v-t$ ), and acceleration vs. time ( $a-t$ ) graphs.

# Physics Bell Work, Tuesday, Mar 10, 2015

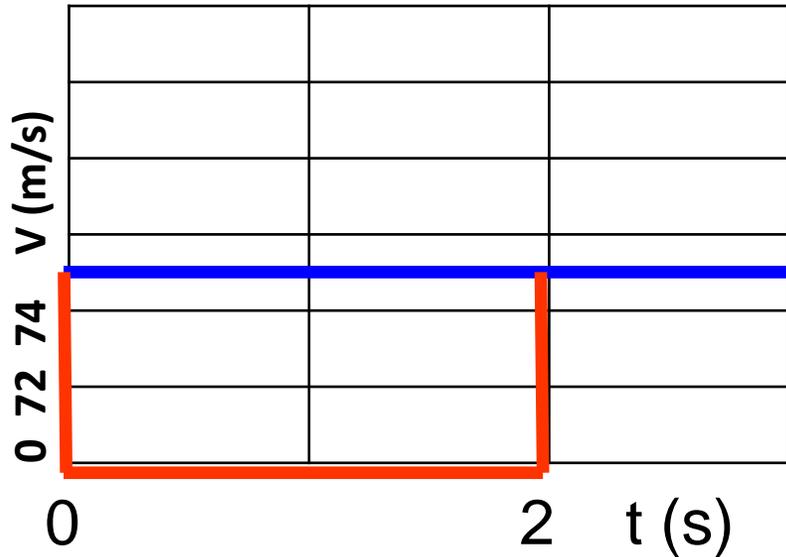
## 3. Draw the graphs



# Physics Bell Work, Wednesday, Mar 11, 2015

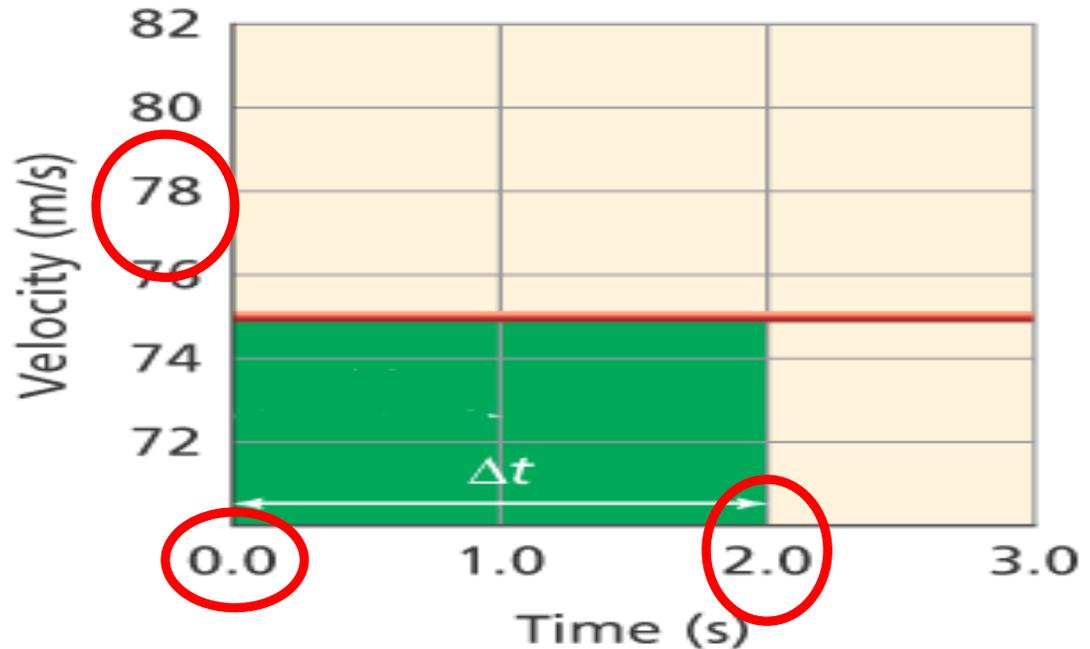
**Objective:** The area under the  $v$ - $t$  graph is equal to the object's change in position. Change in position is displacement.

**1. Find the displacement of object 1 at  $\Delta t = 2.0$**



**1. Area under the  $v$ - $t$  graph is the area of the rectangle**

$$2s * 75 \frac{m}{s} = 150 m$$



# IB Physics Bell Work, Wednesday, Mar 10, 2015

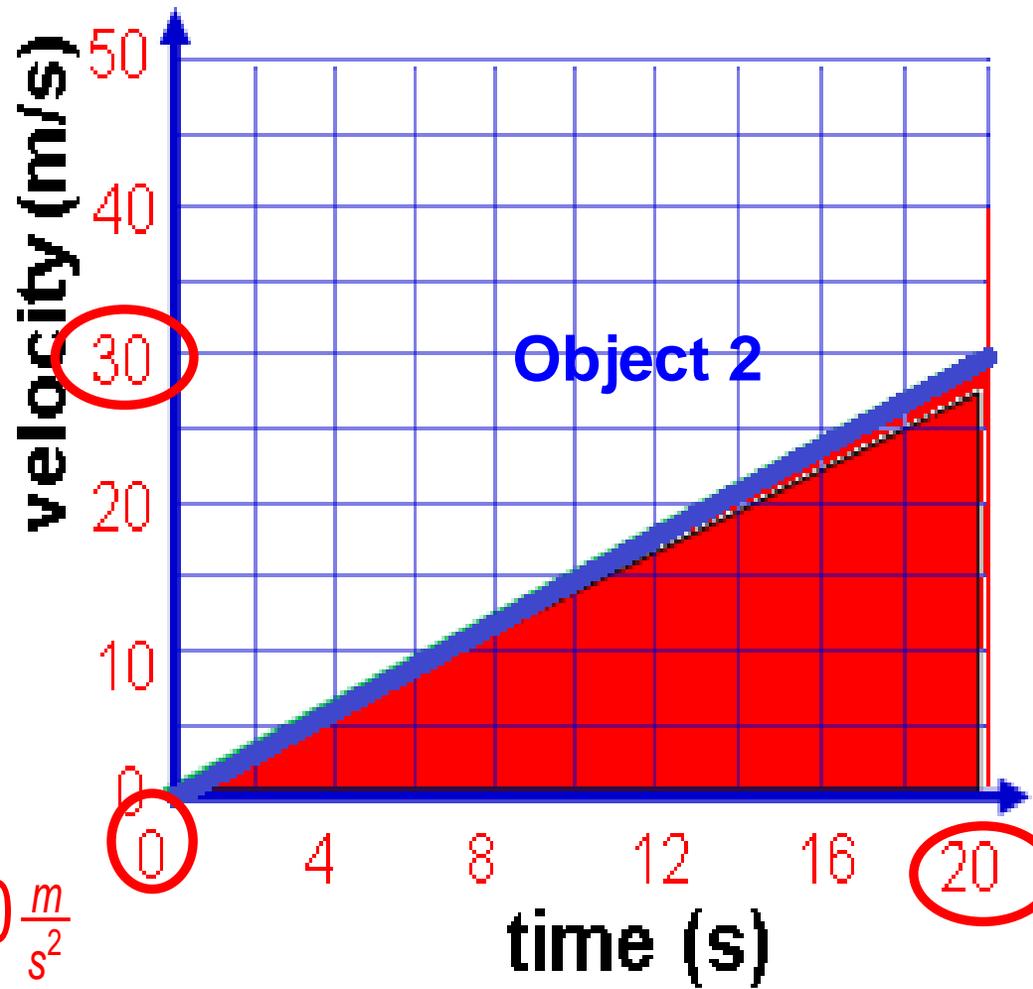
2. Find the displacement of object 2 at  $\Delta t = 20.0s$

The area under the v-t graph is the area of the triangle  $a = \frac{1}{2}bh$

$$a = \frac{b \cdot h}{2} = \frac{20s \cdot 30 \text{ m/s}}{2} = 300 \text{ m}$$

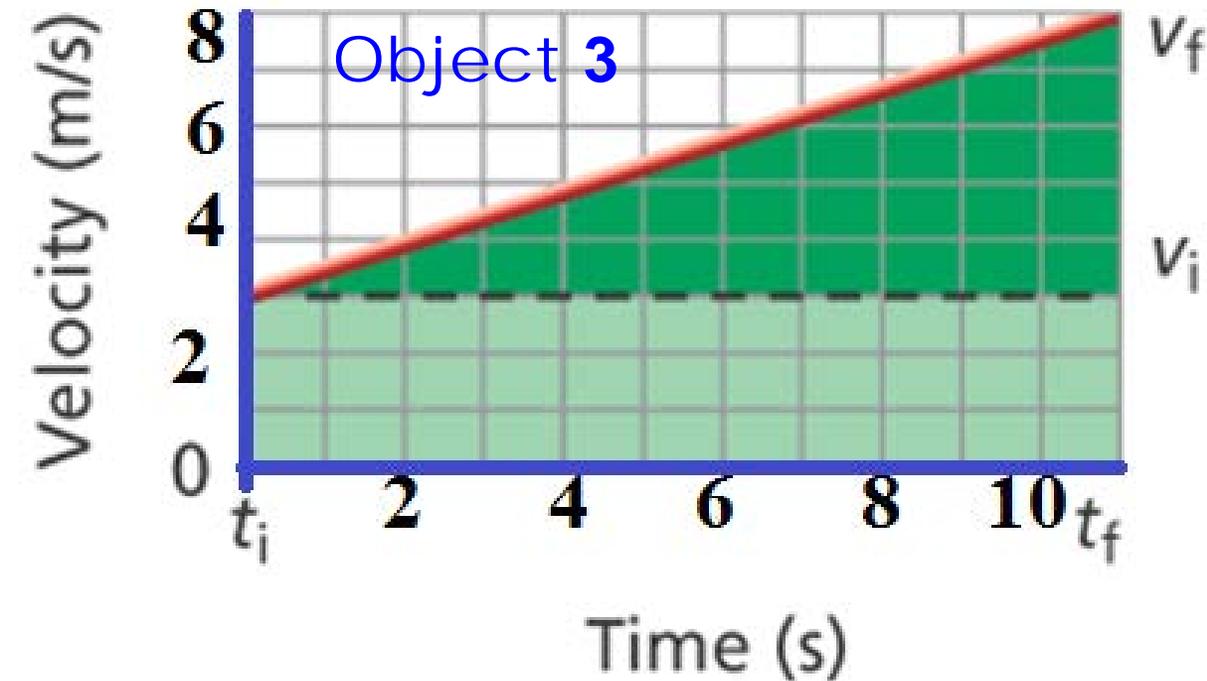
3. A poorly tuned car accelerates from rest to a speed of 28 m/s in 20 s. What is the objects average acceleration?

$$\text{slope} = a = \frac{\Delta v}{\Delta t} = \frac{28.0 \frac{m}{s} - 0.0 \frac{m}{s}}{20.0s - 0s} = 1.40 \frac{m}{s^2}$$



# Physics Bell Work, Thursday, Mar 12, 2015

1. Find the displacement of object 3 at  $\Delta t = 11 \text{ s}$



The area under the v-t graph can be found by dividing it into a triangle and a rectangle and adding the areas together.

$$\text{Area of rectangle} = 11 \text{ s} * 3 \frac{\text{m}}{\text{s}} = 33 \text{ m}$$

$$\text{Area of triangle} = \frac{11 \text{ s} \cdot 5 \text{ m/s}}{2} = 27.5 \text{ m}$$

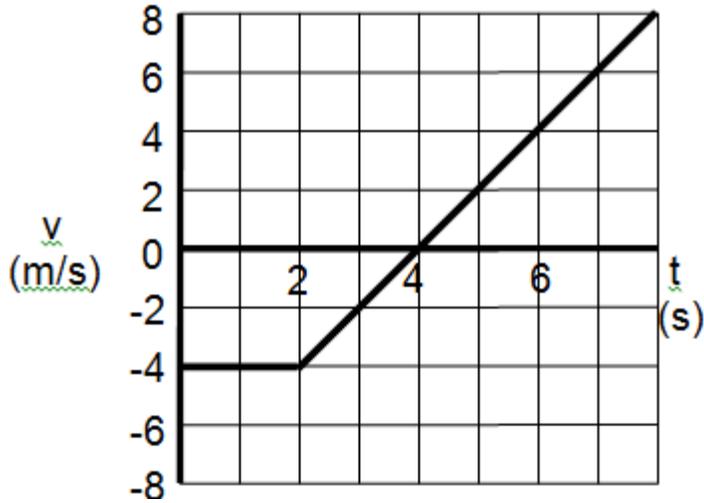
$$\begin{aligned} \text{Displacement} &= \\ 33 \text{ m} + 27.5 \text{ m} &= \\ 60.5 \text{ m} & \end{aligned}$$

# Physics Bell Work, Thursday, Mar 11, 2015

**The next two Bell Works, # 2 & # 3, are to be copied on to Worksheet 4. All you need to write on your Bell Work sheet is “See W/S 4.”**

# Physics Bell Work, Thur, Mar 12, 2015

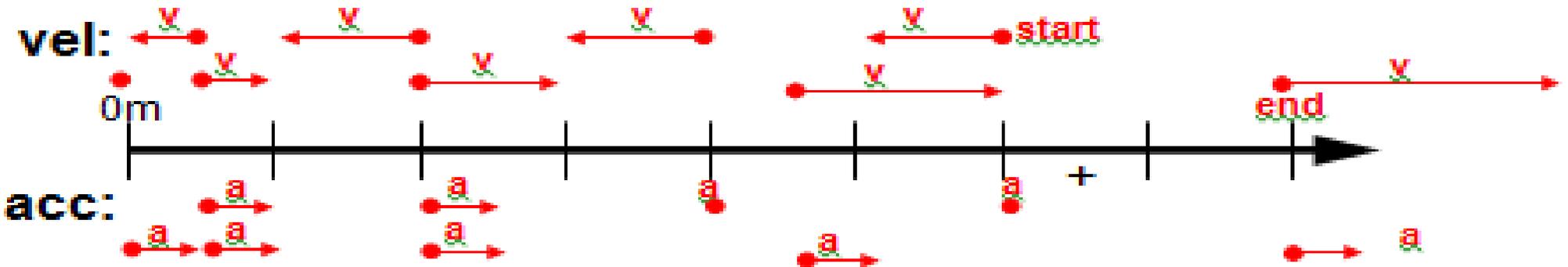
## 2. Unit 3, Worksheet 4, Page 4, Object D: a, b, g



a. Give a written description of the motion.

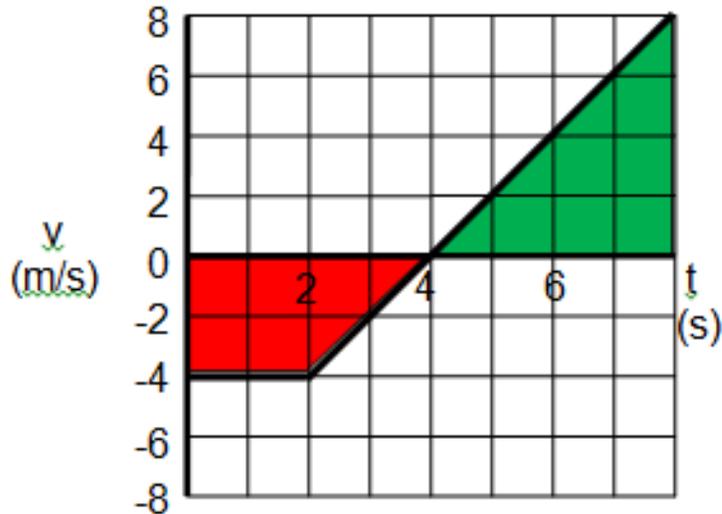
Object D is traveling in the negative direction at 4 m/s. At time  $t = 2$ s it begins to slow down and instantaneously stops 2s later. It then speeds up in the positive direction for 6s.

b. Sketch a motion map. Be sure to include both velocity and acceleration vectors.



# Physics Bell Work, Thur, Mar 12, 2015

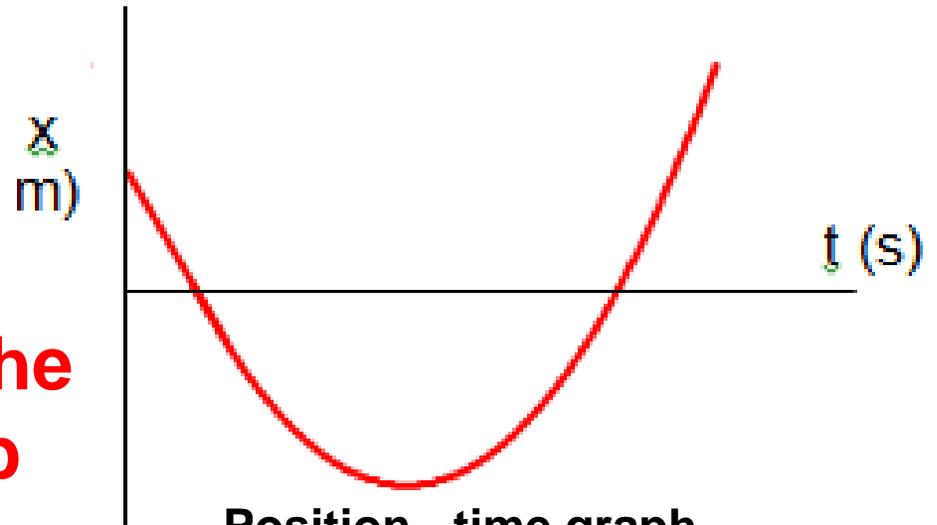
## 3. Unit 3. Worksheet 4. Page 4, Object D: a, b, g



velocity - time graph

We have no idea where the initial position for the trip is.

g. Sketch a possible x-t graph for the motion of the object. Explain why your graph is only one of many possible graphs.



Motion map for object D:

