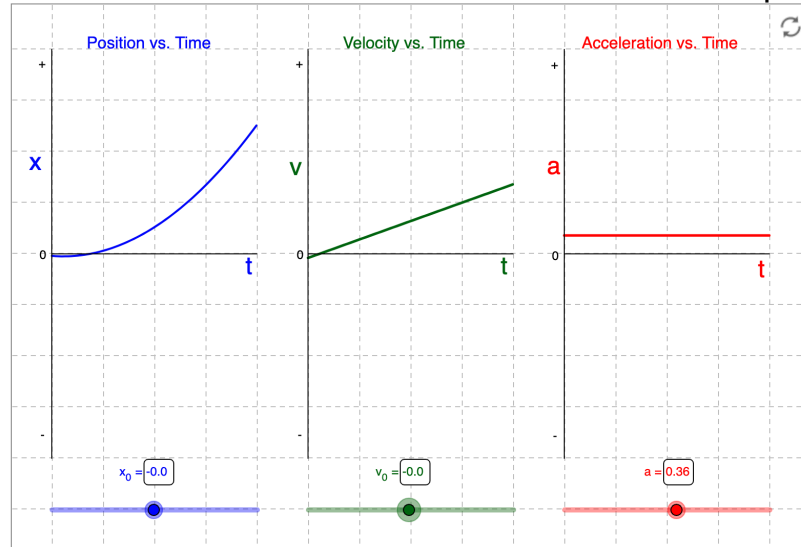


## *oPhysics: Uniform Acceleration in One Dimension*

### Uniform Acceleration in One Dimension: Motion Graphs



### Zero Velocity Graph

Set the acceleration to  $a = 0 \text{ ms}^{-2}$

Set the velocity slider to  $v_0 = 0.0 \text{ ms}^{-1}$

Move the  $x_0$  slider between  $-4 \text{ m}$  and  $+4 \text{ m}$ .

1. Describe the effect on the position time graph as you move the  $x_0$  slider.
2. Using the general equation  $y=mx+b$ , identify the term that is associated with the variable  $x_0$  in the equation ( $y$ ,  $m$ ,  $x$ , or  $b$ )
3. Describe why the position slider is designated with the subscript  $x_0$ .

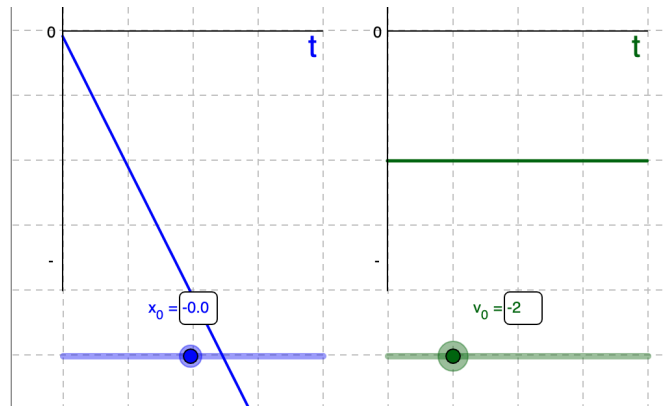
# Constant Velocity Graph

Set the acceleration to  $a = 0 \text{ ms}^{-2}$

Set the position to  $x_0 = 0 \text{ m}$

Move the velocity slider (green) from  $-4 \text{ ms}^{-1}$  to  $+4 \text{ ms}^{-1}$

1. Qualitatively describe the impact of changing the velocity on the **position**-time graph.
2. In the image below, determine the quantitative relationship between the velocity-time graph and position-time graph.



3. On the **position**-time graph, using the general equation  $y=mx+b$ , identify the term that is associated with the variable  $v_0$  in the equation ( $y$ ,  $m$ ,  $x$ , or  $b$ )
4. Describe why the velocity slider is designated with the subscript  $v_0$ .
5. With the  $v_0$  slider set to  $+1 \text{ ms}^{-1}$ , move the **position** slider from  $-4 \text{ m}$  to  $+4 \text{ m}$ , from a mathematical perspective, what effect does this have on the position-time graph?
6. Complete the following: The value of  $v_0$  determines the \_\_\_\_\_ of the \_\_\_\_\_ - time graph.

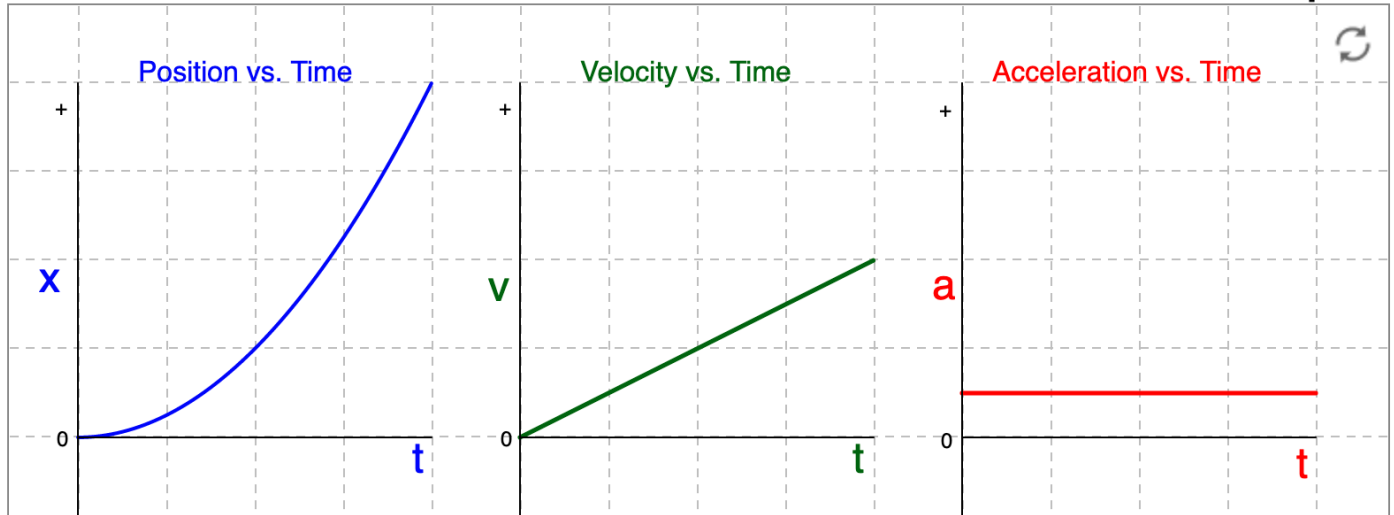
# Constant Acceleration Graph

Set the velocity to  $v_0 = 0 \text{ ms}^{-1}$

Set the position to  $x_0 = 0 \text{ m}$

Move the acceleration slider (red) from  $-4 \text{ ms}^{-2}$  to  $+4 \text{ ms}^{-2}$

In the image below, the  $a = +0.5 \text{ ms}^{-2}$ ,  $v_0 = 0 \text{ ms}^{-1}$ , and  $x_0 = 0 \text{ m}$ .



1. Describe the mathematical relationship of each of the graphs.
2. Based on your experimentation with the acceleration slider, outline the relationship between the value of the acceleration graph and the shape of the velocity-time graph.
3. In the simulation the position and velocity sliders are represented by  $x_0$  and  $v_0$  respectively. Explain why the acceleration slider is not designated with  $a_0$ .