Constant Velocity Model

Key ideas:

By the end of this unit, you should be able to do the following:

1. You should be able to determine the average velocity of an object in two ways:
    determining the slope of an x vs. t graph.
    using the equation

2. You should be able to determine the displacement of an object in two ways:
    finding the area under a v vs. t graph.
    using the equation

3. Given an x vs. t graph,
    describe the motion of the object (starting position, direction of motion, velocity)
    draw the corresponding v vs. t graph
    determine the average velocity of the object (slope).
    write the mathematical model which describes the motion.

4. Given a v vs. t graph,
    draw the corresponding x vs. t graph
    determine the displacement of the object (area between the line and the x-axis).

5. Solve complex problems with the constant velocity model (solve for unknown positions, times, and velocities)

Terms and Definitions:

Average Velocity = Slope of x-t graph = $\dfrac{\text{Change in Position}}{\text{Change in Time}} = \dfrac{x_f - x_i}{t_f - t_i} = \dfrac{\Delta x}{\Delta t}$

Δx = **change in position** = x_f - x_i = **displacement** = area under v-t graph. Displacement is the straight-line distance between the starting point and the ending point. Displacement also reports the direction of motion.

Distance = total distance traveled along a path to get from the starting position to the ending position.

Average Speed = Distance / Change in Time

Scalar = A Quantity that tells "how much" only; i.e. speed

Vector = A quantity that tells *how much* and *which direction;* i.e. velocity

Qualitative = Conceptually correct, but not numerically precise

Quantitative = Numerically Accurate