Graphing Motion

Plotting Position (m) versus Time (s) and Obtaining Velocity (D/T) as Slope

Establish a Frame of Reference for Position

- 1.   Establish positive direction
- 2.   Establish negative direction
- 3.   Set the origin position = 0 m

Graphing Position (m) versus Time (s)

- Time (s) is the independent variable and goes along the x-axis (horizontal). Please note that initial time is usually t = 0 s.

- Position (m) is the dependent variable and goes along the y-axis (vertical).

- Label each axis appropriately with title and proper units.

Connect the points

- Dot to dot
- (In general, do NOT go past the first real point and do NOT go past the last real point)

Slope of Position versus Time is Velocity

Slope= Rise/Run

=(change in vertical)/(change in horizontal)

=(change in dependent variable)/(change

in independent variable)

For Position versus Time

Slope = (final position – initial position)/time

Meaning of Slope

- Positive Slope = line goes up and to the right
  - Means motion in the positive direction
  - Steeper line means faster in the positive direction
- Negative Slope = line goes up and to the left
  - Means motion in the negative direction
  - Steeper line means faster in the negative direction
- Slope = Zero = FLAT line = horizontal line
  - Means No Motion. Object stopped.

Equation of a line

- Position versus Time graph is a line or can be approximated using a line.

- General Formula: y = mx + b

- Position (m) = ((slope) x Time(s)) + Y-intercept
  - Y-intercept is the position at time = zero seconds.

Examples from Kinematics

Position = ((-7) x time) + 640

Slope is -7 m/s (up and to the left)

Y-intercept is 640 m at time = 0 s

Position = ((0.475) x time) + 0.01

Slope is +0.475 m/s (up and to the righjt)

Y-intercept is 0.01 m at time = 0

Example

- I drive from home to SFP on the LIE at 40 mph.

- At time = 0 my position is 0 m.

- Write the equation for Position versus time.

- Position = ((40 mph) x time) + 0 meters.