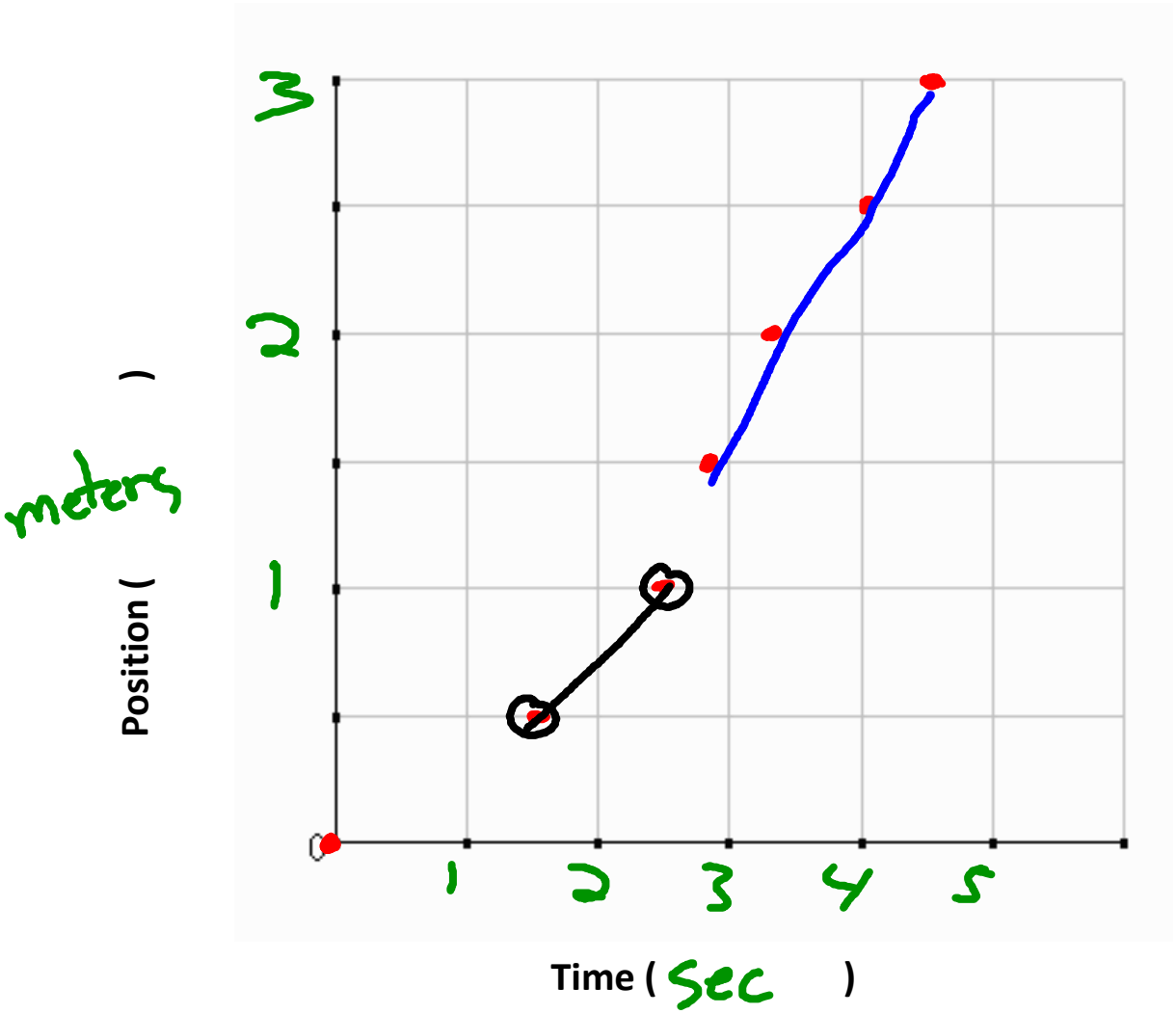
Graphing, Slope, & Instantaneous Velocity

Data Table						
Position (m)	.5	1	1.5	2	2.5	3
Time (s)	1.66	2.51	2.88	3.34	4.08	4.54

Position vs. Time Graph



Slope

Formula

Δ = change in

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_f - y_i}{x_f - x_i}$$

What does the slope of a position vs. time graph tell us?

$$\frac{\text{distance}}{\text{time}} = \text{velocity}$$

Average Velocity

Formula

$$v_{avg} = \frac{\text{total dist}}{\text{total time}}$$

What is the average velocity for our graph?

$$v_{avg} = \frac{3.0\,m}{4.54\,s} = 0.66\,m/s$$

Instantaneous Velocity

The exact velocity at any specific time.

Can be calculated using the slope of a position-time graph.

Formula

x = position

$$v_{inst} = \frac{\Delta x}{\Delta t} = \frac{x_f - x_i}{t_f - t_i}$$

What was the instantaneous velocity at time 2 s *?*

$$v_{inst} = \frac{(1m - 0.5m)}{(2.51s - 1.66s)} = 0.59 m/s$$