### Section 4.2

Uniform acceleration = constant over all time intervals
—Implies a constant slope on a velocity-time graph
—EX: Gravity has an acceleration of -9.81 m/s²

On a velocity-time graph (p72) with uniform acceleration:

\[ v_{\text{avg}} = \frac{1}{2}(v_f - v_i) \]  

(1)

So, in general, the distance depends on the initial and final speeds when there is uniform acceleration. For uniformly accelerating bodies, \( d = (v_{\text{avg}})(t) \), so

\[ d = \frac{1}{2}(v_f + v_i)t \]

(2)

Taking acceleration into consideration ( \( v_f = v_i + at \) ) (3) we find that the distance can be expressed as:

\[ d = v_i t + \frac{1}{2}a t^2 \]

(4)

So, the position-time graph for uniform acceleration, is a quadratic (parabola) relationship. \([y \text{ is distance, } x \text{ is time}]\)

Using (2) and (3), we can also find that:

\[ v_f^2 = v_i^2 + 2ad \]

(5)