

Acceleration

$$a = \frac{\Delta v}{\Delta t} = \frac{(v_f - v_i)}{\Delta t}$$

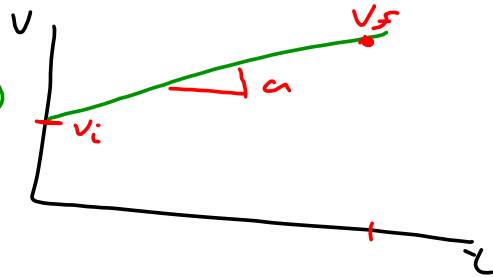
$$(v_f - v_i) = a \Delta t$$

$$a \Delta t = v_f - v_i$$

$$v_f = v_i + a \Delta t$$

$$v_f = a \Delta t + v_i$$

(The equation above is circled in green. Below it, four blue arrows point down to the terms: Δt , m , "x", and b . Red brackets are under v_f and v_i .)



A car, travelling 3 m/s west, accelerates 2 m/s² west for 5 seconds.
How fast is the car's final velocity?

$$v_i = 3 \text{ m/s} \leftarrow \boxed{}$$

$$\leftarrow a = 2 \text{ m/s}^2$$

$$v_f = v_i + a \Delta t$$

$$= 3 \text{ m/s} + (2 \text{ m/s}^2)(5 \text{ s})$$

$$= 13 \text{ m/s } \{w\}$$

A car travelling 25 m/s east accelerates at 2 m/s² until the car is moving 12 m/s east. How long did the car accelerate for?

$$\boxed{i} \xrightarrow{v_i = 25 \text{ m/s}}$$

$$\leftarrow a$$

$$\boxed{f} \xrightarrow{v_f = 12 \text{ m/s}}$$

$$v_f = v_i + a \Delta t$$

$$\frac{v_f - v_i}{a} = \Delta t$$

$$\frac{12 \text{ m/s} - 25 \text{ m/s}}{-2 \text{ m/s}^2} = 6.5 \text{ s}$$

$$v_f = v_i + a \Delta t$$

$$v_i = v_f - a \Delta t$$

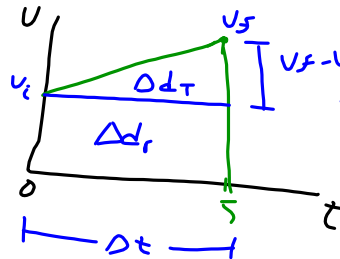
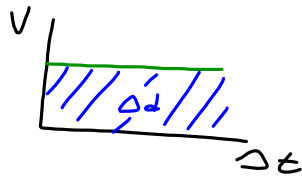
$$a = \frac{v_f - v_i}{\Delta t}$$

$$\Delta t = \frac{v_f - v_i}{a}$$

Finding Displacement

$$V = \frac{\Delta d}{\Delta t}$$

$$\Delta d = V \Delta t$$



$$\Delta d_r = v_i \Delta t$$

$$\Delta d_T = \frac{1}{2} \Delta t (v_f - v_i)$$

$$\Delta d = \Delta d_r + \Delta d_T$$

$$= v_i \Delta t + \frac{1}{2} \Delta t (v_f - v_i)$$

$$= v_i \Delta t + \frac{1}{2} \Delta t (a \Delta t)$$

$$\Delta d = v_i \Delta t + \frac{1}{2} a \Delta t^2$$

2

$$\Delta d = V \Delta t$$

3

$$\Delta d = v_i \Delta t + \frac{1}{2} \Delta t (v_f - v_i)$$

$$a = \frac{v_f - v_i}{\Delta t}$$

$$\Delta t = \frac{v_f - v_i}{a}$$

$$\Delta d = v_i \left(\frac{v_f - v_i}{a} \right) + \frac{1}{2} \left(\frac{v_f - v_i}{a} \right) (v_f - v_i)$$

$$= \frac{v_f v_i - v_i^2}{a} + \frac{(v_f^2 - v_f v_i - v_i v_f + v_i^2)}{2a}$$