Acceleration

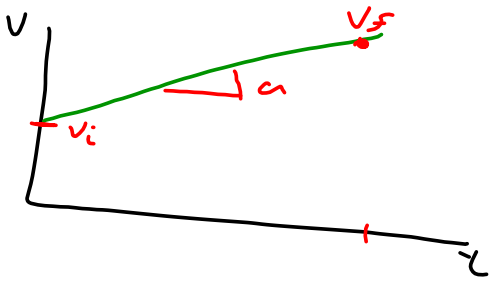
$$a = \frac{\Delta v}{\Delta t} = \frac{(v_f - v_i)}{\Delta t} \qquad (v_f - v_i) = a\Delta t$$

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

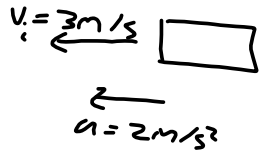
$$v_f = v_i + a\Delta t$$

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

$y \quad m \quad "x" \quad b$

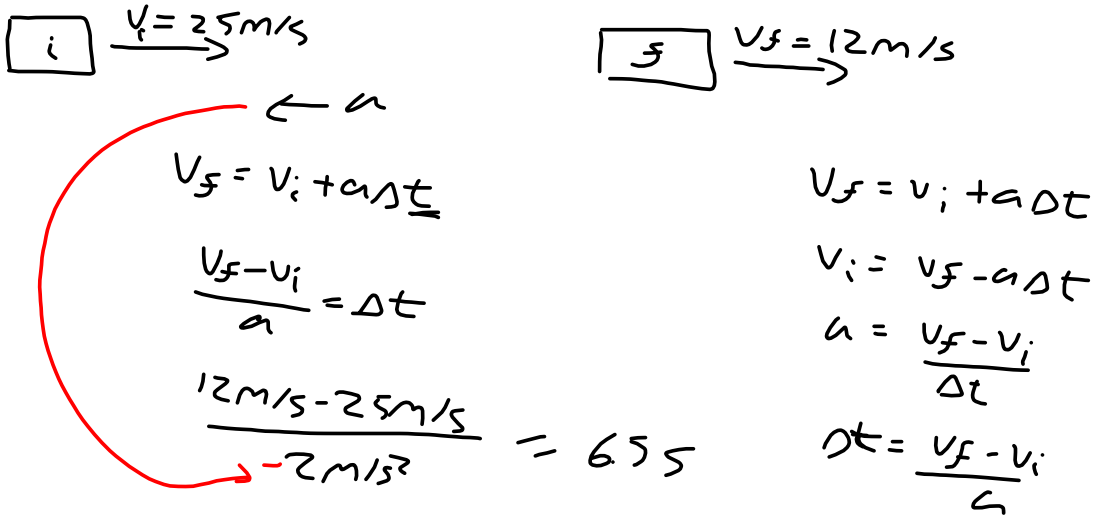


A car, travelling 3 m/s west, accelerates 2 m/s^2 west for 5 seconds. How fast is the car's final velocity?



$$v_f = v_i + a\Delta t$$
$$= 3\,m/s + (2\,m/s^2)(5\,s)$$
$$= 13\,m/s\ [W]$$

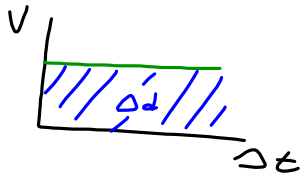
A car travelling 25 m/s east accelerates at 2 m/s^2 until the car is moving 12 m/s east. How long did the car accelerate for?

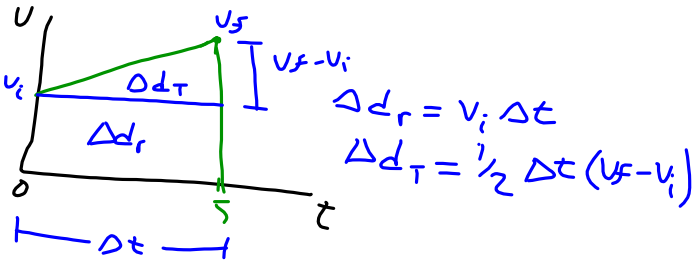


Finding Displacement

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

$\Delta d = V \Delta t$





$\Delta d_r = v_i \Delta t$

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

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

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

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

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

$\Delta d = V \Delta t$ (3)

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

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

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

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

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