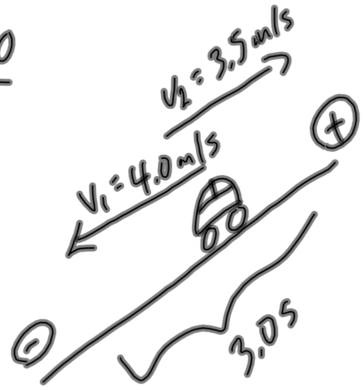
PP|80

2.




$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$

$\vec{a} = \frac{\vec{v}_2 - \vec{v}_1}{\Delta t}$

$a = \frac{3.5\text{m/s} - (-4.0\text{m/s})}{3.0\text{s}}$

$a = +\frac{7.5\text{m/s}}{3.0\text{s}}$

$a = +2.5\text{m/s}^2$

$\vec{a} = 2.5\text{m/s}^2$ [uphill]

3. $V_2 = 0$ m/s

$\Delta t = 3.0$ s

$a = -8.0\text{m/s}^2$

$V_1 = ??$

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

$a = \frac{V_2 - V_1}{\Delta t}$

$a\Delta t = V_2 - V_1$

$V_1 + a\Delta t = V_2$

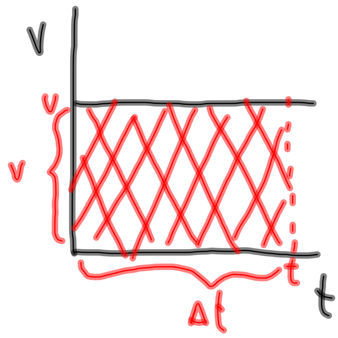
$V_1 = V_2 - a\Delta t$

$V_1 = 0 - (-8.0\text{m/s}^2)(3.0\text{s})$

$V_1 = 24\text{m/s}$

# Displacement & Acceleration

Consider an object travelling at a constant velocity:




Area of Rectangle = $l \times w$

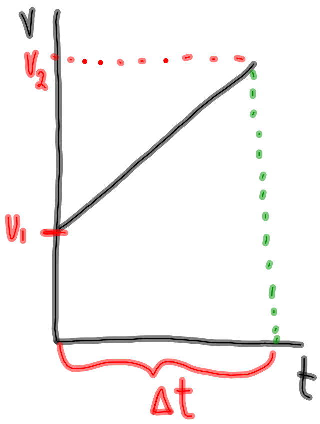
Area = $v \cdot \Delta t$

Recall: $v = \frac{\Delta d}{\Delta t}$

$\Delta d = v \Delta t$

Area under a v-t graph = $\Delta d$

Consider an object moving with constant acceleration




Area of a trapezoid = $\frac{1}{2} b(h_1 + h_2)$

area is Δd → $\Delta d = \frac{1}{2}(\Delta t)(v_1 + v_2)$

$\Delta d = \frac{1}{2}(v_1 + v_2)(\Delta t)$

$\Delta d = \left(\frac{v_1 + v_2}{2}\right)\Delta t$

$\Delta d = v_{ave} \Delta t$

Recall:

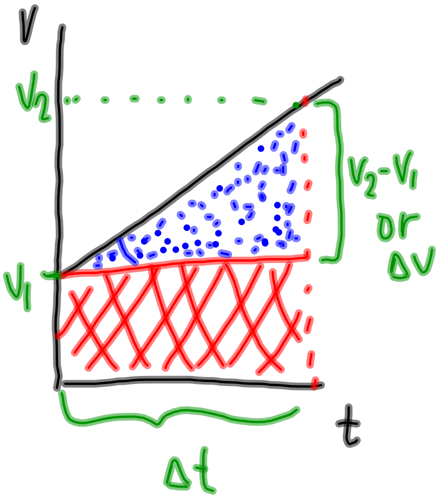
$v_{ave} = \frac{\Delta d}{\Delta t}$

$\Delta d = v_{ave} \Delta t$

same

where

$v_{ave} = \frac{v_1 + v_2}{2}$




Area = Area of □ + Area of Δ

Area = $v_1 \Delta t + \frac{1}{2}(\Delta v)(\Delta t)$

Area = $v_1 \Delta t + \frac{1}{2}(a \Delta t)(\Delta t)$

$a = \frac{\Delta v}{\Delta t}$

$\Delta v = a \Delta t$

Not a necessary equation, BUT convenient. ⟹ $\Delta d = v_1 \Delta t + \frac{1}{2} a (\Delta t)^2$

Maybe Useful Equations:

① $\Delta d = v_1 \Delta t + \frac{1}{2} a (\Delta t)^2$

② $\Delta d = v_2 \Delta t - \frac{1}{2} a (\Delta t)^2$

③ $v_2^2 = v_1^2 + 2 a \Delta d$

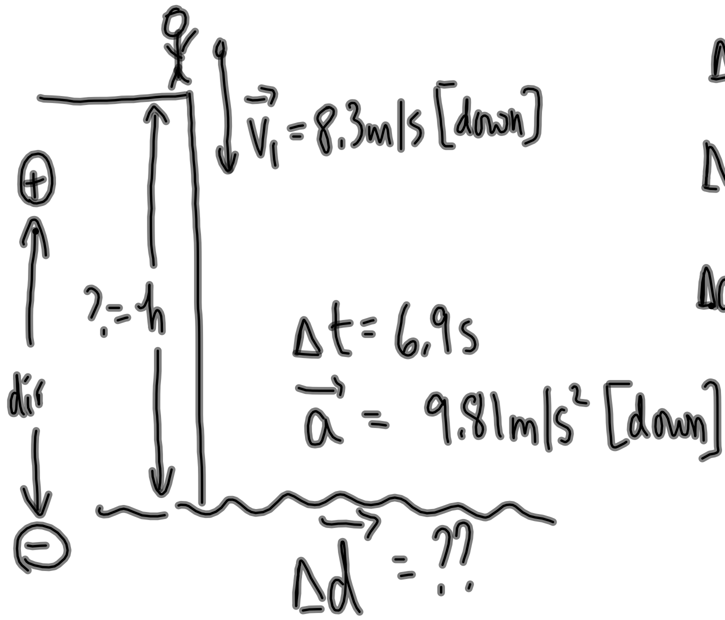
Will Always be given

You need to know: $v_{ave} = \frac{\Delta d}{\Delta t}$ where $v_{ave} = \frac{v_1 + v_2}{2}$

$a = \frac{\Delta v}{\Delta t}$

(this is all you really need!)

## MP|84




$$\Delta d = v_1 \Delta t + \frac{1}{2} a (\Delta t)^2$$

$$\Delta d = (-8.3\,m/s)(6.9\,s) + \frac{1}{2}(-9.81\,m/s^2)(6.9\,s)^2$$

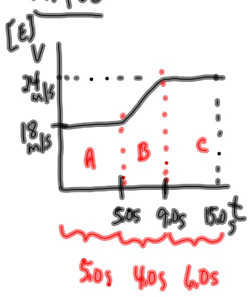
$$\Delta d = -57.27\,m - 233.53\,m$$

$$\Delta d \doteq -290.80\,m$$

$$\vec{\Delta d} \doteq -2.9 \times 10^2\,m \text{ [down]}$$

$$\therefore h = 2.9 \times 10^2\,m$$

MP|85




$\vec{\Delta d} = ?$

Section A: (constant velocity)

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

$\Delta d = v\Delta t$

$\Delta d = (18\,m/s)(5.0\,s)$

$\Delta d = 90\,m$

$\vec{\Delta d} = 90\,m\,[E]$

Section B: (constant acceleration)

$V_{ave} = \frac{\Delta d}{\Delta t}$

$\frac{V_1 + V_2}{2} = \frac{\Delta d}{\Delta t}$

$\Delta d = \left(\frac{V_1 + V_2}{2}\right)\Delta t$

$\Delta d = \left(\frac{18\,m/s + 24\,m/s}{2}\right)(4.0\,s)$

$\Delta d = (21\,m/s)(4.0\,s)$

$\Delta d = 84\,m$

$\vec{\Delta d} = 84\,m\,[E]$

Section C: (constant velocity)

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

$\Delta d = v\Delta t$

$\Delta d = (24\,m/s)(6.0\,s)$

$\Delta d = 144\,m$

$\vec{\Delta d} = 144\,m\,[E]$

TOTAL: $\vec{\Delta d} = 90\,m\,[E] + 84\,m\,[E] + 144\,m\,[E]$

$\vec{\Delta d} = 318\,m\,[E]$

$\vec{\Delta d} \doteq 3.2 \times 10^2\,m\,[E]$

320 m
is it 2 or 3 sd?

PP|89| not 5