Homework Questions

$V_f = V_i + a\Delta t$

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

$V_f^2 = V_i^2 + 2a\Delta d$

$\Delta d = v \Delta t$

6) $V_i = 0$, $a = ?$, $V_f \neq 0$, $\Delta t = 8s$, $\Delta d = 120m$

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

$120m = \frac{1}{2} a (8s)^2$

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

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

$\frac{2(120m)}{(8s)^2} = a$

9) $V_i = 0$, $\Delta t = ?$, $a = 5m/s^2$, $\Delta d = 90m$

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

$90m = \frac{1}{2}(5m/s^2)\Delta t^2$

$\frac{90m}{2.5m/s^2} = \frac{2.5m/s^2 \Delta t^2}{2.5m/s^2}$

$\Delta t^2 = 36s^2$

$\Delta t = 6s$

10) $V_i = 10m/s^2$, $a = 3m/s^2$, $V_f = ?$, $\Delta t = 5s$, $\Delta d = ?$

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

$\Delta d = 88m$

b) $V_f = V_i + a\Delta t$

11) $V_i = 25m/s$, $V_f = 0$, $\Delta t = 5s$, $a = ?$

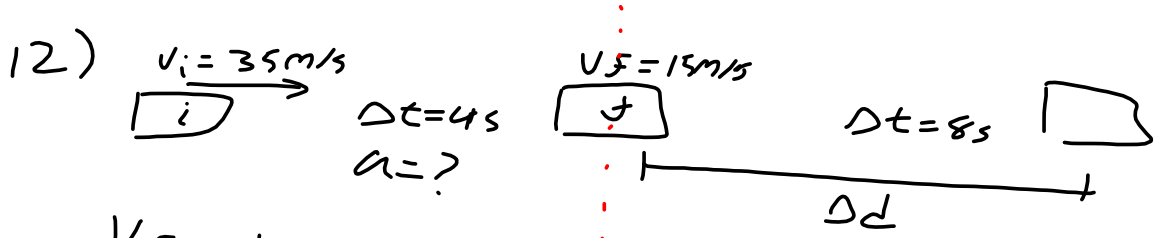
$V_f = V_i + a\Delta t$

$0 = 25\frac{m}{s} + a(5s)$

$\frac{-25m/s}{5s} = a = -5m/s^2$ (CW)

b) $\Delta d = V_i \Delta t + \frac{1}{2} a \Delta t^2$ $\quad V_f^2 = V_i^2 + 2a\Delta d$

12)



$v_f = v_i + a\Delta t$

$a = \frac{v_f - v_i}{\Delta t} = \frac{15 m/s - 35 m/s}{4s}$

$= -5 m/s^2$

$\Delta d = v\Delta t$

$= (15 m/s)(8s)$

$= 120 m$

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

$= (35 m/s)(4s) + \frac{1}{2}(-5 m/s^2)(4s)^2$

$= 100 m$

Unit conversion

km to m

$1000m = 1km$

$22.5\,km\left[\frac{1000m}{1km}\right]$

$= 22500m$

hr to min

$60min = 1h$

$35min\left(\frac{1h}{60min}\right) = 0.58h$

min to s

$60s = 1min$

$35min\left(\frac{60s}{1min}\right) = 2100s$

h -> s

$\left(\frac{60min}{1h}\right)\left(\frac{60s}{1min}\right) = \frac{3600s}{1h}$

km/h to m/s

$54\,km/h \downarrow m/s$

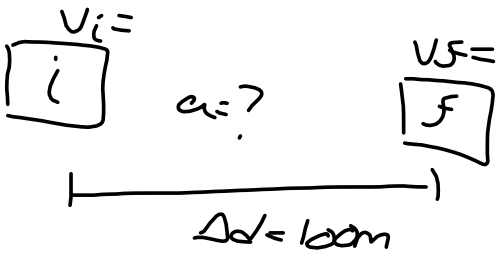
$54\,km/h\left(\frac{1000m}{1km}\right)\left(\frac{1h}{3600s}\right)$

$54\left(\frac{1m}{3.6s}\right) = 15m/s$

Our four Kinematics Equations

Using our new equation $V_f^2 = V_i^2 + 2a\Delta d$

A car is initially travelling 54 km/h and accelerates over a distance of 100 m to a final speed of 90 km/h. What is the car's acceleration?



54 km/h → 15 m/s

90 km/h $\left(\frac{1000m}{1km}\right)\left(\frac{1h}{3600s}\right)$

↓

25 m/s

$V_f^2 = V_i^2 + 2a\Delta d$

Questions:

Sheet questions 13-17