
because acceleration is constant

$$v = v_0 + at$$

$$x = x_0 + v_0 t + \tfrac{1}{2} a t^2$$

How long to go from rest to 80 km/h?

What is $t$ when $v = 80\ km/h$?

$$v_0 = 0$$

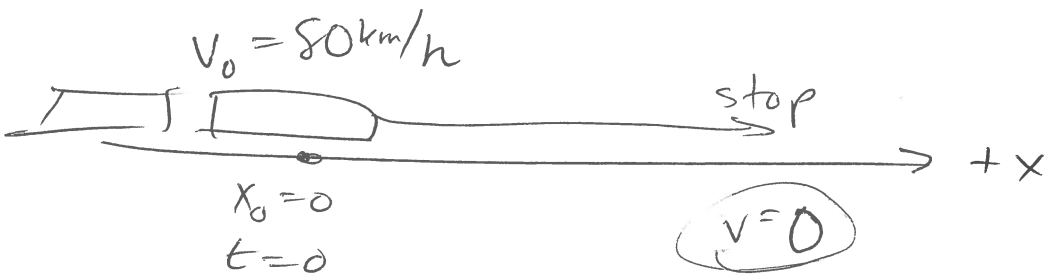
$$a = 1.35\ m/s^2$$

$$v = v_0 + at$$

$$t = v/a$$

$$v = 80\ \frac{km}{h} \cdot \frac{1000\ m}{1\ km} \cdot \frac{1\ h}{3600\ s} = \frac{800}{36}\ m/s$$

$$t = \left(\frac{800}{36}\ m/s\right)\left(\frac{1\ s^2}{1.35\ m}\right) = 16.5\ s$$




constant acceleration

$v = v_0 + at$

$x = x_0 + v_0 t + \frac{1}{2} a t^2$

what is x when $t = 8.3 s$?

intermediate: what is a?

$\cancel{v}^{0} = v_0 + at$

$0 = v_0 + at$

$-v_0 = at$

$a = -v_0/t$

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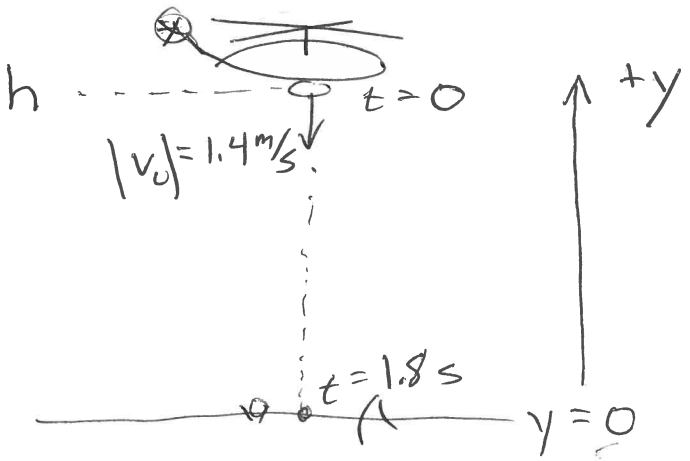
$x = \cancel{x_0}^{0} + v_0 t + \frac{1}{2} a t^2$

$= v_0 t + \frac{1}{2}(-v_0/\cancel{t})\cancel{t}$

$= v_0 t - \frac{1}{2} v_0 t = \frac{1}{2} v_0 t$

$= \frac{1}{2}\left(\frac{800 m/\cancel{s}}{36}\right)(8.3\cancel{s}) = 92 m$




constant acceleration, so:

$$v = v_0 + at$$

$$y = y_0 + v_0 t + \tfrac{1}{2} a t^2$$

what is $h = y_0$?

$y = 0 \quad t = 1.8\ s \quad a = -g \quad v_0 = -1.4\ m/s$

$$0 = h + v_0 t - \tfrac{1}{2} g t^2$$

$$h = \tfrac{1}{2} g t^2 - v_0 t$$

$$= \tfrac{1}{2}(9.8\ m/s^2)(1.8\ s)^2 + (1.4\ m/s)(1.8\ s)$$

or

$$-(-1.4\ m/s)(1.8\ s)$$

$$= 18.4\ m$$