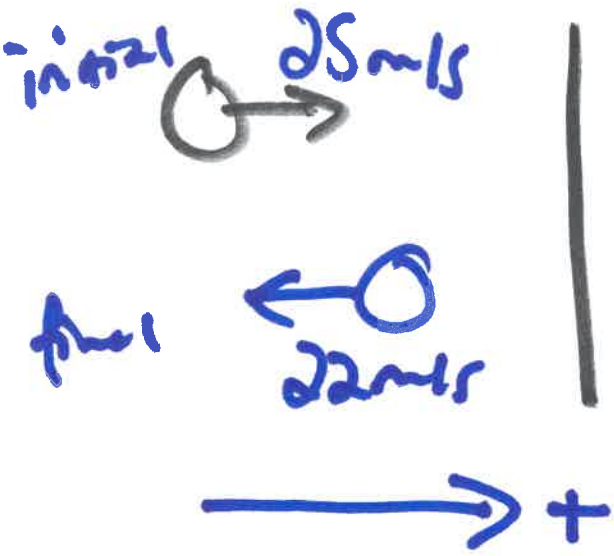

$m = 50\,g$

$v_0 = +25\ m/s$

$v_f = -22\ m/s$

$t = 3.5\,ms \left(\frac{1\,s}{1000\,ms}\right)$

$0.0035\ s$

$a = ?$

$v = v_0 + at$

$-v_0$

$v_f - v_0 = at$

$a = \frac{v_f - v_0}{t}$

$a = \frac{v_f - v_0}{t} = \frac{-22\ m/s - 25\ m/s}{0.0035\ s}$

$= |-13{,}400\ m/s^2|$

If asked for magnitude, take | absolute value |

Cheetah

$v_0 = 0$

$\Delta x = 45\ m$

$v_f = 72\ km/hr$

$a = ?$

$$v_f^2 = v_0^2 + 2a\Delta x$$

$$\frac{v_f^2 - v_0^2 = 2a\Delta x}{2\Delta x}$$

$$a = \frac{v_f^2 - v_0^2}{2\Delta x}$$

$$v_f = 72\frac{km}{hr}\left(\frac{1000\ m}{1\ km}\right)\left(\frac{1\ hr}{3600\ s}\right) = 20\ m/s$$

$$a = \frac{(20\ \frac{m}{s})^2 - 0^2}{2(45m)} = 4.4\ m/s^2$$

Part b

$v_0 = 0$

$t = 3.5\ s$

$\Delta x = ?$

$a = 4.4\ m/s^2$

$$\Delta x = v_0 t + \frac{1}{2}at^2$$

$$= (0)(3.5\ s) + \frac{1}{2}(4.4\ m/s^2)(3.5\ s)^2 = 27\ m$$