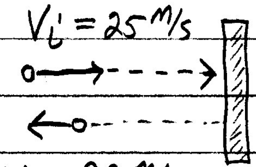
P2.1)

a) $V_{x\,avg} = \dfrac{x_f - x_i}{t_f - t_i} = \dfrac{2.3\,m - 0\,m}{1\,s} = 2.3\ m/s$

b) $V_{x\,avg} = \dfrac{x_f - x_i}{t_f - t_i} = \dfrac{57.5\,m - 9.2\,m}{5\,s - 2\,s} = 16.1\ m/s$

c) $V_{x\,avg} = \dfrac{x_f - x_i}{t_f - t_i} = \dfrac{57.5\,m - 0\,m}{5\,s - 0\,s} = 11.5\ m/s$

P2.10) $V_i = 25\ m/s$



acceleration occurs over $3.5 \times 10^{-3}\ s$

$V_f = 22\ m/s$

$\longrightarrow x$

$$\vec{a}_x = \frac{\Delta V_x}{\Delta t} = \frac{V_f - V_i}{\Delta t} = \frac{-22\,m/s - 25\,m/s}{3.5 \times 10^{-3}\,s}$$

$$a_x = 1.34 \times 10^{4}\ m/s^2$$

P2.13)

$$x(t) = 2.00 + 3.00t - 1.00t^2$$

$$x(3s) = 2.00 + 3.00(3.00s) - 1.00(3.00s)^2 = 2.00\ m$$

$$V = \frac{dx}{dt} = \frac{d}{dt}(2.00 + 3.00t - 1.00t^2)$$

$$V = 3.00 - 2.00t$$

$$V(3s) = 3.00 - 2.00(3s) = -3\ m/s$$

$$a = \frac{dV}{dt} = \frac{d}{dt}(3.00 - 2.00t)$$

$$a = -2.00\ m/s^2$$

If you do not know calculus, we could calculate
$\Delta x = x(3s + \Delta t) - x(3s)$, for example $\Delta t = .1$
$x(3.1s) = 2.00 + 3.00(3.1s) - 1.00(3.1s)^2 = 1.69\ m$

$$V = \frac{\Delta x}{\Delta t} = \frac{1.69m - 2.00m}{.1s} = -3.1\ m/s$$

P2.15)

a) $a_{x,avg} = \frac{v_f - v_i}{t_f - t_i} = \frac{8\ m/s - 0\ m/s}{6s - 0s} = 1.33\ m/s^2$

b) $t = 3s$ slope positive and steepest

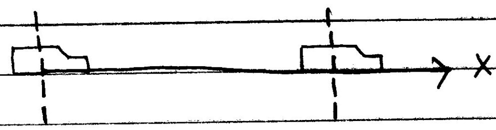
c) $a_{x,avg} = \frac{v_f - v_i}{t_f - t_i} = \frac{6\ m/s - 2\ m/s}{4s - 2s} = 2\ m/s^2$

c) $a = 0$, when slope is zero at 6 seconds. slope is also zero at $t > 11s$

d) $a_{x,avg} = \frac{v_f - v_i}{t_f - t_i} = \frac{5\ m/s - 8\ m/s}{9s - 7s} = -1.5\ m/s^2$

negative slope is a maximum at 8s

P2.17) $a_x = ?$



$x_i = 0$

$v_{xi} = ?$

$x_f = 40\,m$

$v_{xf} = 2.8\,m/s$

$t = 8.50\,s$

To find v_i, we will need an equation w/out a_x.

$$x_f = x_i + \frac{1}{2}(v_{xi} + v_{xf})t$$

$$v_{xi} = \frac{2(x_f - x_i)}{t} - v_{xf}$$

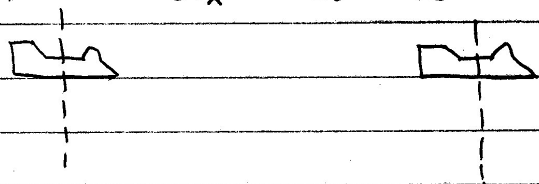
$$v_{xi} = \frac{2(40m - 0m)}{8.5s} - 2.8\,m/s$$

$$v_{xi} = 6.6\,m/s$$

$$a_x = \frac{v_{xf} - v_{xi}}{t} = \frac{2.8\frac{m}{s} - 6.6\frac{m}{s}}{8.50\,s} = -.45\frac{m}{s^2}$$

P2.21)

$a_x = -5.00\ m/s^2$



$x_i = 0$

$v_{xi} = 100\ m/s$

$x_f = ?$

$v_{xf} = 0\ m/s$

$t = ?$

Use first equation $v_{xf} = v_{xi} + a_x t$

$$t = \frac{v_{xf} - v_{xi}}{a_x} = \frac{0\ m/s - 100\ m/s}{-5.00\ m/s^2} = 20\ s$$

How far will it travel in this time?

$$x_f = x_i + v_{xi}\, t + \frac{1}{2} a_x t^2$$

$$x_f = 100\ m/s\,(20\ s) + \frac{1}{2}(-5\ m/s^2)(20\ s)^2$$

$$x_f = 2000\ m/s - 1000\ m/s = 1000\ m/s$$