1. $v_i = 0$ m/s $v_f = 28$ m/s $\Delta t = 20$ s

a. $a = \frac{\Delta v}{\Delta t} = \frac{28 \text{ m/s}}{20 \text{ s}} = \boxed{1.4 \text{ m/s}^2}$

b. $x_f = \frac{1}{2} a \Delta t^2 + v_i \Delta t + x_i$ $x_f = \frac{1}{2}(1.4 \text{ m/s}^2)(20 \text{ s})^2 + 0(20 \text{ s}) + 0 \text{ m}$

$= \frac{1}{2}(1.4 \text{ m})(20)^2 = \boxed{280 \text{ m}}$

2. $t_i = 0$ s $v_i = 30$ m/s $t_f = 6$ s $v_f = 14$ m/s

$a = \frac{\Delta v}{\Delta t} = \frac{14 \text{ m/s} - 30 \text{ m/s}}{6 \text{ s} - 0 \text{ s}} = \frac{-16}{6} = \boxed{-2.67 \text{ m/s}^2}$

check Nik's answer

3. $v_i = 0$ m/s $a = 2$ m/s^2 $\Delta x = 16$ m

$v_f = ?$

~~$v_f = a \Delta t + v_i$~~ $v_f^2 = v_i^2 + 2a\Delta x$

~~$v_f = 2 \text{ m/s}^2 (\quad$~~ $v_f^2 = 0 \text{ m/s}^2 + 2(2 \text{ m/s}^2)(16 \text{ m})$

~~$\Delta x = \quad \Delta t$~~ $v_f^2 = 0 + 4 \text{ m/s}^2 (16 \text{ m})$

~~$\frac{16 \text{ m}}{2 \text{ m/s}^2} = \quad \text{s}^2 = \Delta t$~~ $v_f^2 = 64 \text{ m}^2/\text{s}^2$

$v_f = \sqrt{64 \text{ m}^2/\text{s}^2}$

$\boxed{v_f = 8 \text{ m/s}}$

Slowing

4. $t_i = 0$ $v_i = 20$ m/s $a = -4$ m/s^2 $\Delta t = ?$ $\Delta x = ?$

$v_f = 0$ m/s

$a = \frac{\Delta v}{\Delta t} = \frac{0 \text{ m/s} - 20 \text{ m/s}}{\Delta t} = -4 \text{ m/s}^2$

$\frac{-20 \text{ m/s}}{-4 \text{ m/s}^2} = \Delta t$

a. $\boxed{+5 \text{ s} = \Delta t}$

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

$x_f = \frac{1}{2}(-4 \text{ m/s}^2)(5 \text{ s})^2 + 20 \text{ m/s}(5 \text{ s}) + 0 \text{ m}$

~~$x_f = -50 \text{ m} + 100 \text{ m}$~~

$\boxed{x_f = 50 \text{ m}}$

b.

5. $v_i = 0$ m/s $a = 2$ m/s^2 $\Delta t = 15$ s

$\Delta x = ?$

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

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

$= \frac{1}{2}(2\ m/s^2)(15\ s)^2 + 0\ m/s(15\ s) + 0\ m$

$\boxed{x_f = 225\ m}$

6. $v_i = 5$ m/s $t_i = 8$ s Constant velocity

$v_e = 20$ m/s $t = 5$

a. $a = \frac{10\ m/s - 5\ m/s}{5\ s} = \frac{5\ m/s}{5\ s} = \boxed{1\ m/s^2}$ a.

b. Part 1 - CV

$\Delta x = v \Delta t$

$\Delta x = 5\ m/s(8\ s)$

$\Delta x = 40\ m$

Part 2 - acceleration

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

$\Delta x = \frac{1}{2}(1\ m/s^2)(5\ s)^2 + (5\ m/s)(5\ s) + 0$

$\Delta x = 12.5\ m + 25\ m$

$\Delta x = 37.5\ m$

total $\Delta x = 40\ m + 37.5\ m = \boxed{77.5\ m}$ b.

7. $v_i = 30$ m/s $v_f = 10$ m/s $\Delta t = 5$ s

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

$a = \frac{10 - 30}{5}$

$a = \frac{-20}{5}$

a. $\boxed{a = -4\ m/s^2}$

$t = 2$ s to $t = 3$ s

v @ 2s $a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i} = \frac{v_f - 30\ m/s}{2\ s - 0\ s}$

$-4\ m/s^2 = \frac{v_f - 30\ m/s}{2\ s}$

$-4\ m/s^2(2\ s) = v_f - 30\ m/s$

$v_f = 22\ m/s$ at 2s

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

$x_f = \frac{1}{2}(-4\ m/s^2)(1\ s)^2 + 22\ m/s(1\ s) + 0$

$= -2\ m + 22\ m$

b. $\boxed{x_f = 20\ m}$

Physics Solutions Worksheet 3

1) $v_i = 0 m/s$ $\quad v_f = 28 m/s$ $\quad \Delta t = 20 s$

a) $\Delta v = a \Delta t$

$28 - 0 = a(20)$

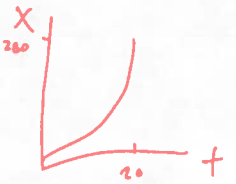
$a = \frac{28 m/s}{20 s}$

$a = 1.4 \frac{m/s}{s}$

b) $\Delta x = \frac{1}{2} a \Delta t^2 + v_i \Delta t$

$\Delta x = \frac{1}{2}(1.4)(20)^2 + 0(20)$

$[\Delta x = 280 m]$



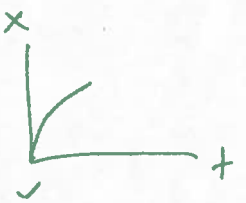
2) $v_i = 30 m/s$ $\quad v_f = 14 m/s$

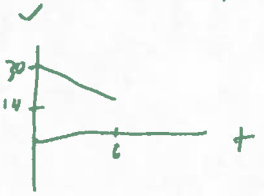
$t_i = 0 s$ $\quad t_f = 6 s$

$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i} = \frac{14 - 30}{6 - 0}$

$a = \frac{-16 m/s}{6 s}$

$[a = 2.\bar{6} \frac{m/s}{s}]$





3) $v_i = 0 m/s$ $\quad a = 2 m/s^2$ $\quad \Delta x = 16 m$

$v_f = ?$

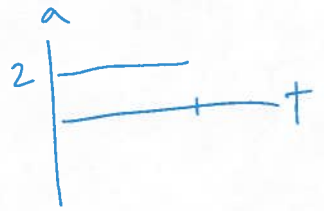
$v_f^2 = v_i^2 + 2a\Delta x$

$v_f^2 = 0^2 + 2(2 m/s^2)(16 m)$

$v_f^2 = (64 m^2/s^2)$

$v_f = +/- 8 m/s$

$[v_f = +8 m/s]$



4) $v_i = 20\ m/s$ $\quad v_f = 0\ m/s$

$t_i = 0\ s$ $\quad a = -4\ m/s^2$

a) $\Delta v = a\Delta t$

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

$\frac{0-20}{-4} = \Delta t$

$[\Delta t = 5\ s]$

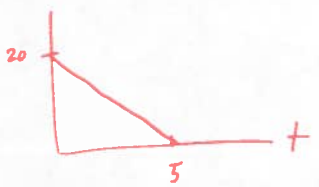
b) $\Delta x = \frac{1}{2}a\Delta t^2 + v_i \Delta t$

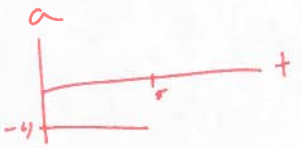
$\Delta x = \frac{1}{2}(-4\ m/s^2)(5\ s)^2 + (20\ m/s)(5\ s)$

$\Delta x = -50\ m + 100\ m$

$[\Delta x = 50\ m]$

✓





5) 

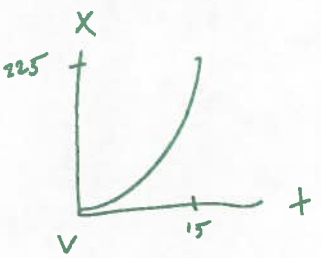
$a = 2\ m/s^2$ $\quad v_i = 0\ m/s$

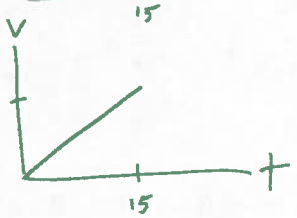
$\Delta t = 15\ s$

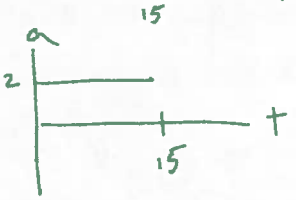
$\Delta x = \frac{1}{2}a\Delta t^2 + v_i \Delta t$

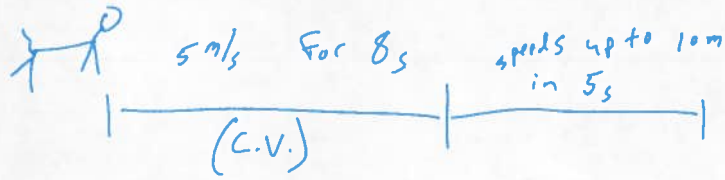
$\Delta x = \frac{1}{2}(2\ m/s^2)(15)^2 + 0(15)$

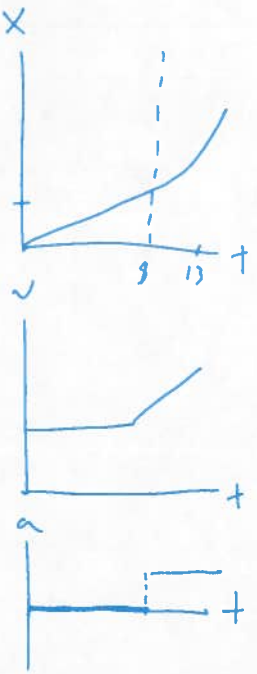
$[\Delta x = 225\ m]$







6) 



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

$a = \frac{10 m/s - 5 m/s}{5 s}$

$\left[a = 1 \frac{m/s}{s} \right]$

b) math way:

CV part

$\Delta x = v \Delta t$

$\Delta x = 5 m/s \cdot 8 s$

$\Delta x = 40 m$

accelerating part

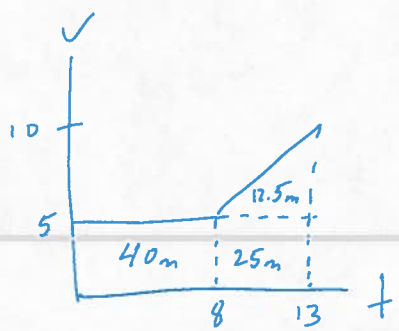
$\Delta x = \frac{1}{2} a \Delta t^2 + v_i \Delta t$

$\Delta x = \frac{1}{2}(1)(5)^2 + 5(5)$

$\Delta x = 37.5 m$

$\left[\text{total } \Delta x = 77.5 m \right]$

graphical way:



area under v-t is equal to Δx

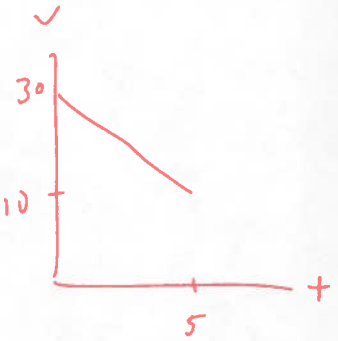
$\Delta x = 40 + 25 + 12.5$

$\left[\Delta x = 77.5 m \right]$

7) $v_i = 30\,m/s$, $v_f = 10\,m/s$, $\Delta t = 5\,s$

a) $a = \frac{\Delta v}{\Delta t} = \frac{10-30}{5}$

$\left[a = -4\,\frac{m/s}{s}\right]$



b) Δx For $t = 2s$ - $t = 3s$

math way:

v @ 2s

$a = \frac{v_f - v_i}{\Delta t}$

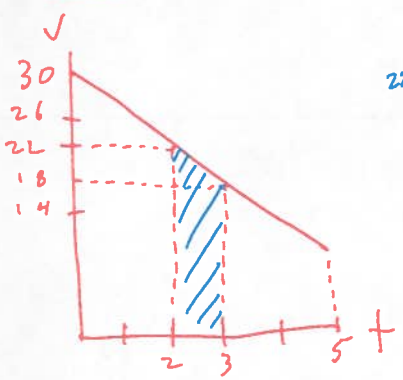
$-4\,m/s^2 = \frac{v_f - 30\,m/s}{2s}$ $\left[v_f = 22\,m/s\right]$

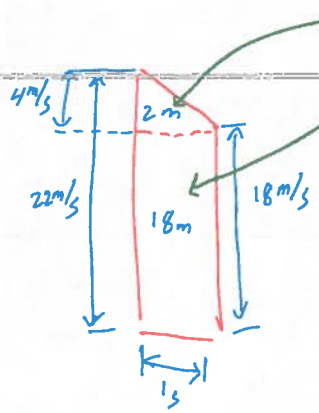
$\Delta x = \frac{1}{2} a \Delta t^2 + v_i \Delta t$

$\Delta x = \frac{1}{2}(-4\,m/s^2)(1s)^2 + (22\,m/s)(1s)$

$\left[\Delta x = 20\,m\right]$

graph way:





$\Delta x = 18m + 2m$

$\left[\Delta x = 20m\right]$