Mechanics Worksheet Section # 2-4 Problem # 14

1) Physics Representation
   a) Motion Diagram
   b) Force Identification
   c) Free-body Diagram

2) Pictorial Representation
   a) Sketch
   b) Coordinate system
   c) Symbols for knowns and unknowns

Known Information:

$a = 1.6\ m/s^2$

$V_0 = 60\ km/h = 22.22\ m/s$

$V_1 = 110\ km/h = 30.56\ m/s$

Desired Unknowns

$\Delta t = ?$

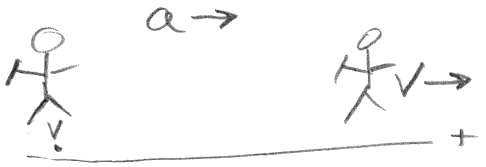
3) Mathematical Representation

$a = \frac{\Delta V}{\Delta t} \quad \Delta t = \frac{\Delta V}{a} = \frac{(30.56\ m/s - 22.22\ m/s)}{1.6\ m/s^2} = 5.21\ s$

Mechanics Worksheet Section # 2.4 Problem # 15

1) Physics Representation
   a) Motion Diagram
   b) Force Identification
   c) Free-body Diagram

2) Pictorial Representation
   a) Sketch
   b) Coordinate system
   c) Symbols for knowns and unknowns



Known Information:

$V_0 = 0\ m/s$

$V_1 = 10.0\ m/s =$

$\Delta t = 1.35 s$

Desired Unknowns

a m/s^2 & km/h^2

3) Mathematical Representation

$$a = \frac{\Delta V}{\Delta t} = \frac{10.0\ m/s - 0\ m/s}{1.35\ m/s^2} = 7.41\ m/s^2$$

$$V_1 = 10\ m/s \cdot \frac{3600\ s}{1\ h} \cdot \frac{1\ km}{1000\ m} = 36\ km/h$$

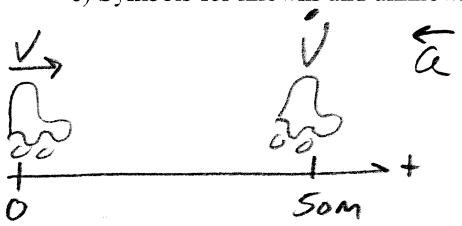
$$\Delta t = 1.35\ s \cdot \frac{1\ h}{3600\ s} = 3.75 \times 10^{-4}\ h$$

$$a = \frac{\Delta V}{\Delta t} = \frac{36.0\ km/h}{3.75 \times 10^{-4}\ h} = 96000\ km/h^2 = 9.60 \times 10^4\ km/h^2$$

Mechanics Worksheet Section # 2.4 Problem # 16

1) Physics Representation
   a) Motion Diagram
   b) Force Identification
   c) Free-body Diagram

2) Pictorial Representation
   a) Sketch
   b) Coordinate system
   c) Symbols for knowns and unknowns



Known Information:

$\Delta x = 50.0\,m$

$V_0 = 90.0\ km/h = 25.0\ m/s$

Desired Unknowns

$a = ?$ $g's = ?$

3) Mathematical Representation

$V^2 = V_0^2 + 2a(x_2 - x_1)$ $a = \frac{V^2 - V_0^2}{2(x_2 - x_1)} = \frac{(0^2_{m/s} - 25.0\,m/s^2)}{2(50.0m - 0m)} = -6.25\,m/s^2$

$g's = \frac{-6.25\,m/s^2}{9.80\,m/s^2} = .638\,g's$

$\bar{V} = \frac{25\,m/s - 0\,m/s}{2} = 12.5\,m/s$ $\bar{V} = \frac{d}{t}$ $\Delta t = \frac{d}{V} = \frac{50.0m}{12.5\,m/s} = 4.00s$

$a = \frac{\Delta V}{\Delta t} = \frac{0\,m/s - 25\,m/s}{4.00s} = -6.25\,m/s^2$

$g's = \frac{-6.25\,m/s^2}{9.80\,m/s^2} = -.638\,g's$

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$\bar{V}_{,125} = \frac{X - X_0}{t - t_0} =$

$\bar{a}_{,25} = \frac{\Delta V}{\Delta t} = \frac{V - V_0}{t - t_0}$

t (s)	x (m)		t (s)	v (m/s)		t (s)	a (m/s^2)
0.00	0.00		0.00	0.00			
0.25	0.11		0.13	0.44		0.25	3.84
0.50	0.46		0.38	1.40		0.50	4.00
0.75	1.06		0.63	2.40		0.75	4.48
1.00	1.94		0.88	3.52		1.00	4.91
1.50	4.62		1.25	5.36		1.50	5.00
2.00	8.55		1.75	7.86		2.00	5.24
2.50	13.79		2.25	10.48		2.50	5.32
3.00	20.36		2.75	13.14		3.00	5.52
3.50	28.31		3.25	15.90		3.50	5.56
4.00	37.65		3.75	18.68		4.00	5.52
4.50	48.37		4.25	21.44		4.50	4.84
5.00	60.30		4.75	23.86		5.00	4.12
5.50	73.26		5.25	25.92		5.50	3.76
6.00	87.16		5.75	27.80		6.00