

7.	\vec{v}_0	\vec{v}	\vec{a}	\vec{d}	t
	?	0	-9.81 m/s^2	25.0 m	1.08 s

NOTE: Time to reach $v = 0$ will be

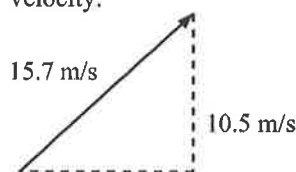
$$2.15 \text{ s} \times 0.5 = 1.08 \text{ s}$$

$$\vec{d} = \frac{\vec{v} - \vec{v}_0}{t}$$

$$-9.81 \text{ m/s}^2 = \frac{0 - \vec{v}_0}{1.08 \text{ s}}$$

$$\vec{v}_0 = 10.6 \text{ m/s up}$$

NOTE: This is the vertical component of the velocity.



$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{10.5 \text{ m/s}}{15.7 \text{ m/s}}$$

$$\theta = 42.2^\circ$$

8. Find the vertical and horizontal components of this velocity.

$$\vec{v}_y = v \cos \theta = (30.0 \text{ m/s})(\cos 35.0^\circ) = 24.6 \text{ m/s}$$

$$\vec{v}_x = v \sin \theta = (30.0 \text{ m/s})(\sin 35.0^\circ) = 17.2 \text{ m/s}$$

$\vec{v}_{y(i)}$	$\vec{v}_{y(t)}$	\vec{a}	d	t
24.6 m/s	-24.6 m/s	-9.81 m/s^2	×	?

$$\vec{a} = \frac{\vec{v}_{y(t)} - \vec{v}_{y(i)}}{t}$$

$$-9.81 \text{ m/s}^2 = \frac{-24.6 \text{ m/s} - 24.6 \text{ m/s}}{t}$$

$$t = 5.02 \text{ s}$$

Horizontal speed

$$v_x = \frac{d}{t}$$

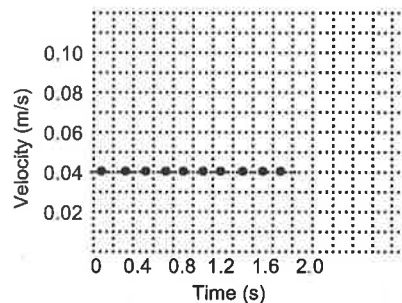
Range

$$d = v_x t = (17.2 \text{ m/s})(5.02 \text{ s}) = 86.3 \text{ m}$$

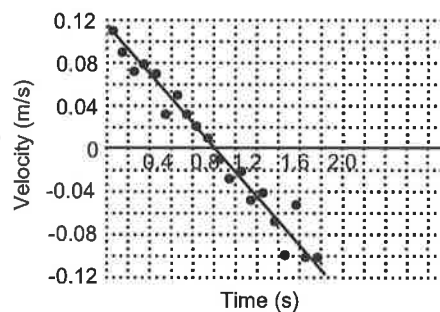
9. a)

time (s)	displacement from $t = 0$ ($\times 10^{-2}$ m)		displacement during time interval ($\times 10^{-2}$ m)		average velocity during time interval ($\times 10^{-1}$ m/s)	
	horiz.	vert.	horiz.	vert.	horiz.	vert.
0	0	0				
0.10	0.4	1.1	0.4	1.1	0.4	1.1
0.20	0.8	2.0	0.4	0.9	0.4	0.9
0.30	1.2	2.7	0.4	0.7	0.4	0.7
0.40	1.6	3.5	0.4	0.8	0.4	0.8
0.50	2.0	4.2	0.4	0.7	0.4	0.7
0.60	2.4	4.5	0.4	0.3	0.4	0.3
0.70	2.8	5.0	0.4	0.5	0.4	0.5
0.80	3.2	5.3	0.4	0.3	0.4	0.3
0.90	3.6	5.5	0.4	0.2	0.4	0.2
1.00	4.0	5.6	0.4	0.1	0.4	0.1
1.10	4.4	5.5	0.4	0.1	0.4	0.1
1.20	4.8	5.2	0.4	0.3	0.4	0.3
1.30	5.2	5.0	0.4	0.2	0.4	0.2
1.40	5.6	4.5	0.4	0.5	0.4	0.5
1.50	6.0	4.1	0.4	0.4	0.4	0.4
1.60	6.4	3.4	0.4	0.7	0.4	0.7
1.70	6.8	2.5	0.4	0.9	0.4	0.9
1.80	7.2	2.0	0.4	0.5	0.4	0.5
1.90	7.6	1.1	0.4	1.0	0.4	1.0
2.00	8.0	0	0.4	1.0	0.4	1.0

- b)



- c)



- d) acceleration = slope of velocity-time graph

i) acceleration = 0

ii) slope = $\frac{\text{rise}}{\text{run}} = \frac{(-0.10 - 0.10) \text{ m/s}}{(0.15 - 0.05) \text{ s}} = 2.0 \text{ m/s}^2$

Acceleration = 2.0 m/s^2 downward