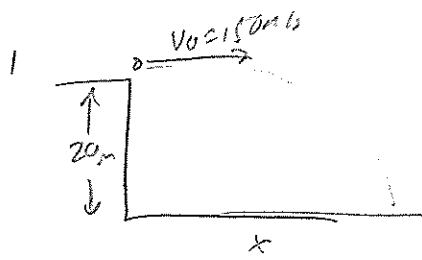


KEY



x	y
$\Delta x =$	$\Delta y = 20 \text{ m}$
$a = 0$	$a = -10 \text{ m/s}^2$
$v_0 = 150 \text{ m/s}$	$v_0 = 0$

$$\Delta y = v_0 t + \frac{1}{2} a t^2$$

$$-20 = 0 t + \frac{1}{2} (-10) t^2$$

$$-20 = -5 t^2$$

$$4 = t^2$$

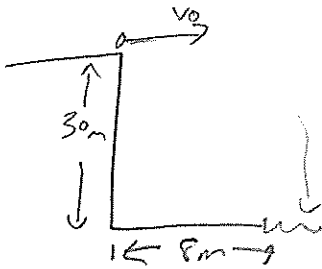
$$\boxed{2 = t}$$

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

$$\Delta x = 150(2) + 0$$

$$\boxed{\Delta x = 300 \text{ m}}$$

2



x	y
$\Delta x = 8$	$\Delta y = -30$
$a = 0$	$v_0 = 0$
	$a = -10$

$$\Delta y = v_0 t + \frac{1}{2} a t^2$$

$$-30 = 0 t + \frac{1}{2} (-10) t^2$$

$$-30 = -5 t^2$$

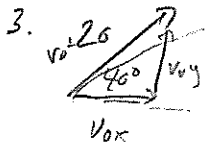
$$6 = t^2$$

$$\boxed{2.45 \text{ s} = t}$$

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

$$8 = v_0 (2.45)$$

$$\boxed{3.27 \text{ m/s} = v_0}$$



a)

$$v_{0x} = 20 \cos 40 = 15.32$$

$$v_{0y} = 20 \sin 40 = 12.86$$

b)

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

$$\Delta x = 15.32(1) + 0$$

$$\Delta x = 15.32 \text{ m}$$

x	y
$v_0 = 15.32$	$v_0 = 12.86$
$a = 0$	$a = -9.8$
$t = 1$	$t = 1$

c)

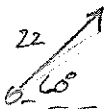
$$\Delta x = v_0 t + \frac{1}{2} a t^2$$

$$\Delta x = 12.86(1) + \frac{1}{2}(-9.8)(1)^2$$

$$= 12.86 + (-4.9)$$

$$\Delta x = 7.96 \text{ m}$$

4.



a)

$$v_{0x} = 22 \cos 60 = 11$$

$$v_{0y} = 22 \sin 60 = 19.1$$

b)

x	y
$\Delta x = 40$	$\Delta x = ?$
$a = 0$	$a = -10$
$v_0 = 11$	$v_0 = 19.1$

b)

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

$$40 = 11t + \frac{1}{2}(-10)t^2$$

$$t = 3.64 \text{ s}$$

c)

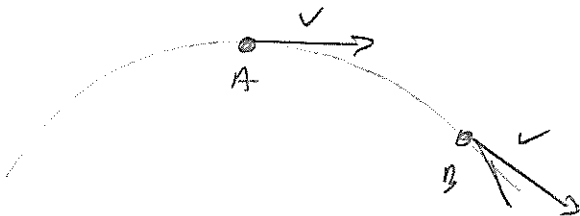
$$\Delta x = v_0 t + \frac{1}{2} a t^2$$

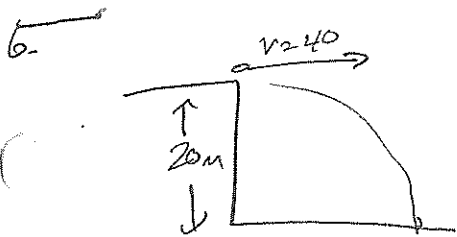
$$= (19.1)(3.64) + \frac{1}{2}(-10)(3.64)^2$$

$$= 69.5 + (-66.3)$$

$$\Delta x = 3.25 \text{ m}$$

5.





x	y
$v_0 = 40$	$v_0 = 0$
$a = 0$	$a = -10$
	$\Delta x = 20$

a) y

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

$$-20 = 0 + \frac{1}{2} (-10) t^2$$

$$-20 = -5 t^2$$

$$\boxed{2s = t}$$

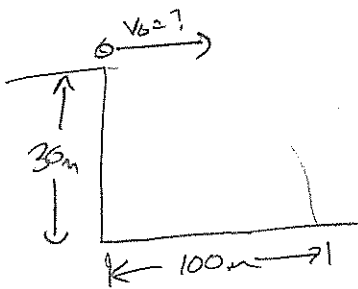
b) x

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

$$\Delta x = 40(2) + 0$$

$$\boxed{\Delta x = 80m}$$

7.



x	y
$v_0 = ?$	$v_0 = 0$
$\Delta x = 100$	$\Delta x = -35$
$a = 0$	$a = -10$

y

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

$$-35 = 0 t + \frac{1}{2} (-10) t^2$$

$$-35 = -5 t^2$$

$$6 = t^2$$

$$\boxed{2.45s = t}$$

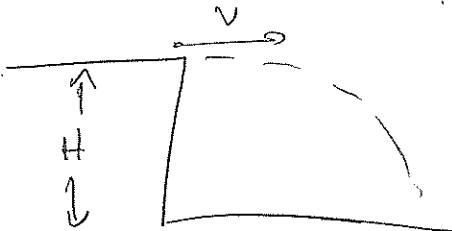
x

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

$$100 = v_0 (2.45)$$

$$\boxed{v_0 = 40.8 m/s}$$

8.



x	y
$a = 0$	$a = -g$
$v_0 = v$	$\Delta x = -H$
	$v_0 = 0$

b) x

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

$$\Delta x = v \sqrt{\frac{2H}{g}} + 0$$

$$\boxed{\Delta x = v \sqrt{\frac{2H}{g}}}$$

a) y

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

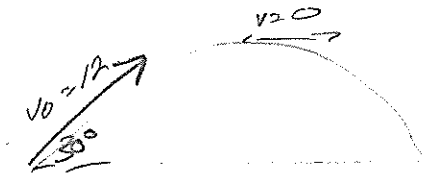
$$-H = 0 t + \frac{1}{2} (-g) t^2$$

$$-H = -\frac{1}{2} g t^2$$

$$2H = g t^2$$

$$\boxed{\sqrt{\frac{2H}{g}} = t}$$

9.



$$v_{0x} = 12 \cos 30 = 10.4 \text{ m/s}$$

$$v_{0y} = 12 \sin 30 = 6 \text{ m/s}$$

x	y
$v_0 = 10.4$	$v_0 = 6$
$a = 0$	$a = -10$
	$v = 0$ (at top)

$$v = v_0 + at$$

$$0 = 6 + (-10)t$$

$$t = 0.6 \text{ s (to top)}$$

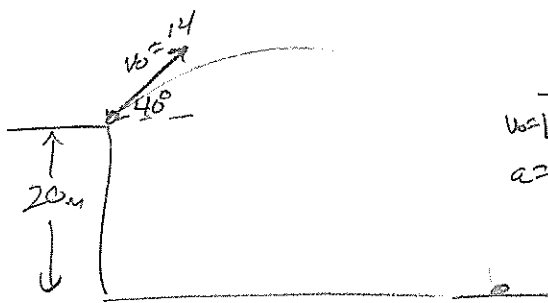
$$t = 1.2 \text{ s}$$

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

$$\Delta x = (10.4)(1.2) + 0$$

$$\Delta x = 12.5 \text{ m}$$

10.



$$v_{0x} = 14 \cos 45 = 10.72$$

$$v_{0y} = 14 \sin 45 = 9.0$$

x	y
$v_0 = 10.72$	$v_0 = 9.0$
$a = 0$	$a = -10$
	$\Delta x = -20$

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

$$-20 = 9t + \frac{1}{2}(-10)t^2$$

$$-20 = 9t - 5t^2$$

$$5t^2 - 9t - 20 = 0$$

$$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$t = \frac{9 \pm \sqrt{81 - 4(5)(-20)}}{2(5)}$$

$$t = \frac{9 \pm \sqrt{481}}{10}$$

$$= \frac{9 \pm 21.9}{10}$$

$$t = 3.09 \text{ s OR } -1.29 \text{ s}$$

$$t = 3.09 \text{ s}$$

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

$$\Delta x = 10.72(3.09) + 0$$

$$\Delta x = 33.1 \text{ m}$$

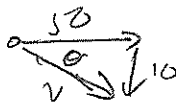
11.

x	y
$\Delta x = 500$	$\Delta x = -600$
$t = 10$	$t = 10$
$a = 0$	$a = -10$
$v_0 = ?$	$v_0 = ?$

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

$$500 = v_0 (10)$$

$$\boxed{50 \text{ m/s} = v_0}$$



$$v_0^2 = 50^2 + 10^2$$

$$\boxed{v_0 = 51 \text{ m/s}}$$

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

$$-600 = v_0 (10) + \frac{1}{2} (-10) (10)^2$$

$$-600 = 10v_0 - 500$$

$$-100 = 10v_0$$

$$\boxed{-10 \text{ m/s} = v_0}$$

$$\tan \theta = \frac{10}{50}$$

$$\boxed{\theta = 11.3^\circ}$$

12.



x	y
$v_0 = v \cos \theta$	$v_0 = v \sin \theta$
$a = 0$	$a = -g$
	$v \geq 0$ (at top)

$$v = v_0 + at$$

$$0 = v \sin \theta + (-g)t$$

$$-v \sin \theta = -gt$$

$$\boxed{\frac{v \sin \theta}{g} = t}$$

to top!

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

$$\Delta x = v \cos \theta \left(\frac{2v \sin \theta}{g} \right)$$

$$\Delta x = \frac{v^2 (2 \sin \theta \cos \theta)}{g}$$

$$\boxed{t = \frac{2v \sin \theta}{g}}$$

$$\boxed{\Delta x = \frac{v^2 \sin 2\theta}{g}}$$

- Max Δx at 45°

1

2

3

4