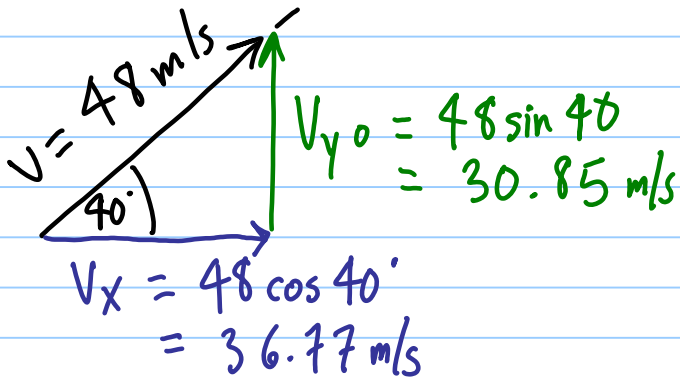


Worksheet #1.5

Note Title

21/09/2009

1)



$t = ?$
 $d_x = ?$

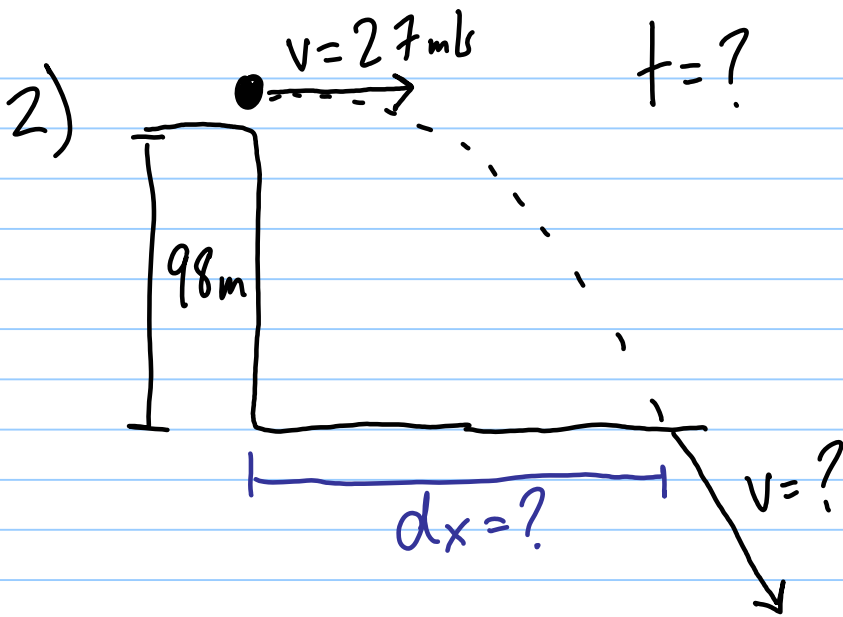


X	Y	
$V_x = 36.77 \text{ m/s}$ $d_x = ?$ $t = 38.56 \text{ s}$	$V_y = -30.85 \text{ m/s}$ ← for total flight $V = -V_0$ $V_{y0} = 30.85 \text{ m/s}$ $a_y = -1.6 \text{ m/s}^2$ $d_y =$ $t = ?$	$V = V_0 + at$ $t = \frac{V - V_0}{a}$ $= \frac{-30.85 - 30.85}{-1.6}$ $= 38.56 \text{ s}$ $= 38.6 \text{ s}$

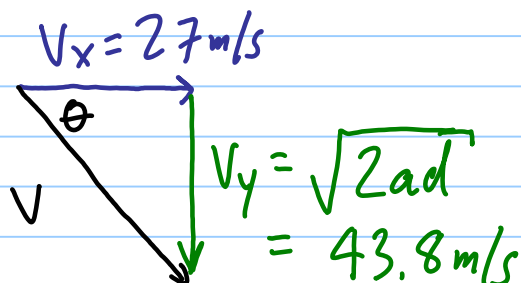
$$d_x = V_x \cdot t$$

$$= (36.77)(38.56)$$

$$= 1420 \text{ m}$$



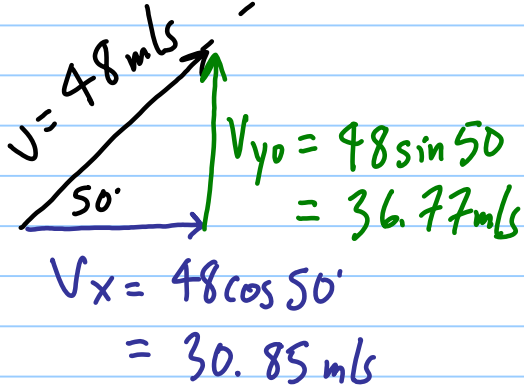
$V_x = 27 \text{ m/s}$ $d_x =$ $t = 4.472 \text{ s}$ $d_x = V_x \cdot t$ $= (27)(4.472)$ $= 121 \text{ m}$	$V_y =$ $V_{y0} = 0$ $a_y = -9.80 \text{ m/s}^2$ $d_y = -98 \text{ m}$ $t =$	$d = v_0 t + \frac{1}{2} a t^2$ $d = \frac{1}{2} a t^2$ $t = \sqrt{\frac{2d}{a}}$ $= \sqrt{\frac{2(-98)}{-9.80}}$ $= 4.472$ $= 4.47 \text{ s}$
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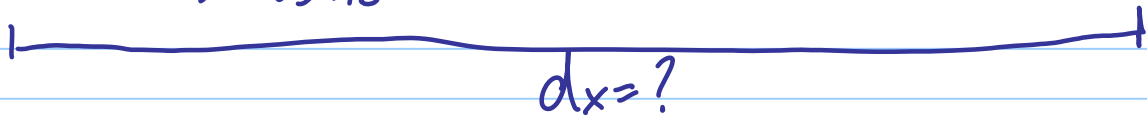
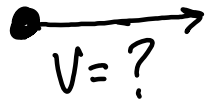
$$V = \sqrt{V_x^2 + V_y^2} = 51.5 \text{ m/s}$$

$$\theta = \tan^{-1}\left(\frac{43.8}{27}\right) = 58^\circ \text{ below horizontal}$$

3)



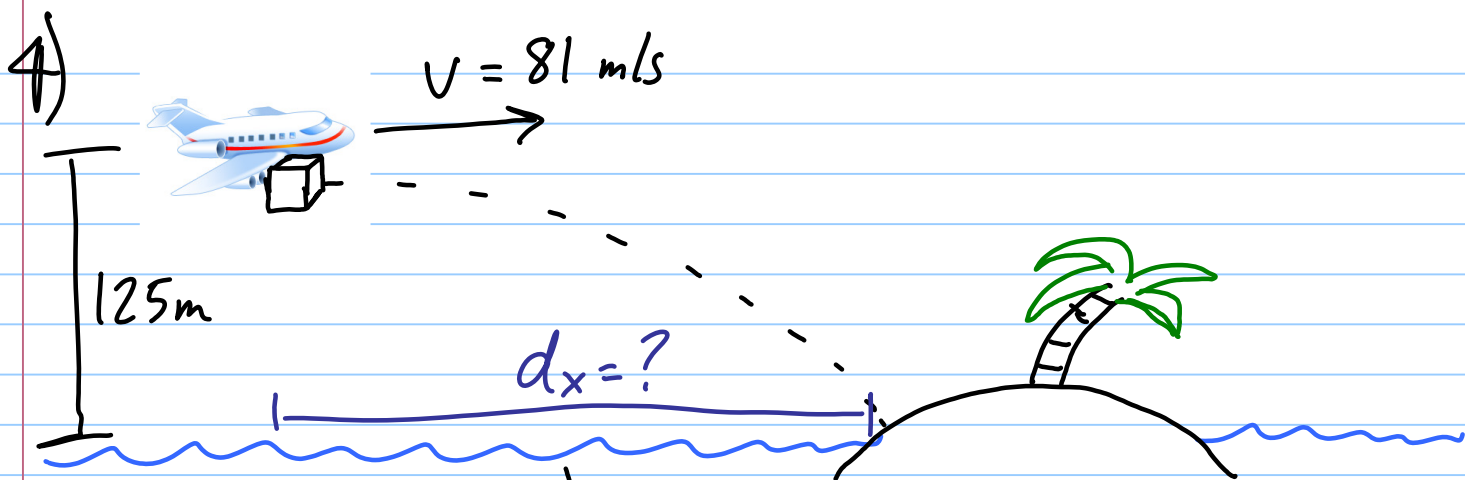
$t = ?$



X	y @ $t_{\frac{1}{2}}$
$V_x = 30.85 \text{ m/s}$ $d_x =$ $t = 2 \times t_{\frac{1}{2}}$ $= 7.504 \text{ s}$ $d_x = V_x \cdot t$ $= (30.85)(7.504)$ $= 232 \text{ m}$	$V_y = 0$ $V_{y0} = 36.77 \text{ m/s}$ $a_y = -9.80 \text{ m/s}^2$ $d_y =$ $t_{\frac{1}{2}} =$ $V = V_0 + at_{\frac{1}{2}}$ $t_{\frac{1}{2}} = \frac{-V_0}{a}$ $= \frac{-36.77}{-9.80}$ $= 3.752$ $= 3.75 \text{ s}$

$V = V_x = 30.9 \text{ m/s}$





$$v_x = 81 \text{ m/s}$$

$$d_x = ?$$

$$t = 5.051 \text{ s}$$

$$d_x = v_x \cdot t$$

$$= (81)(5.051)$$

$$= 409 \text{ m}$$

$$v_y =$$

$$v_{y0} = 0$$

$$a_y = -9.80$$

$$d_y = -125$$

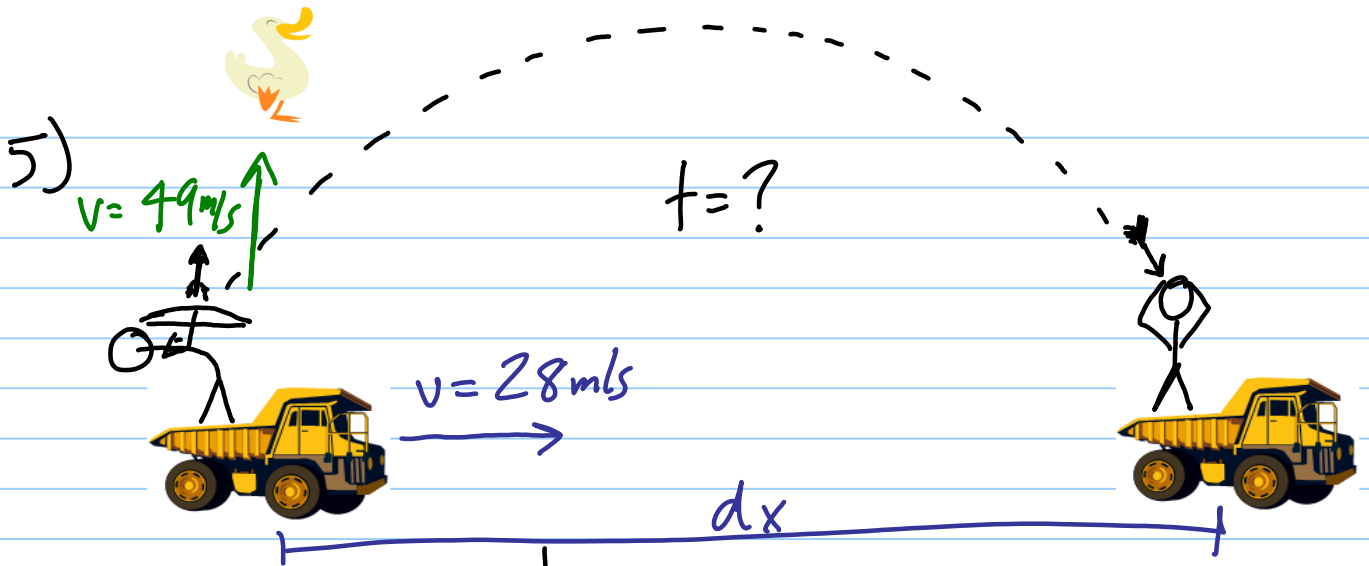
$$t$$

$$d = v_y t + \frac{1}{2} a t^2$$

$$t = \sqrt{\frac{2d}{a}}$$

$$= \sqrt{\frac{2(-125)}{-9.80}}$$

$$= 5.051 \text{ s}$$



X	Y
$v_x = 28 \text{ m/s}$	$v_y = -49 \text{ m/s}$
$d_x =$	$v_{y0} = 49 \text{ m/s}$
$t = 10.0 \text{ s}$	$a_y = -9.80 \text{ m/s}^2$
	$d_y =$
	$t =$

$$t = \frac{v - v_0}{a}$$

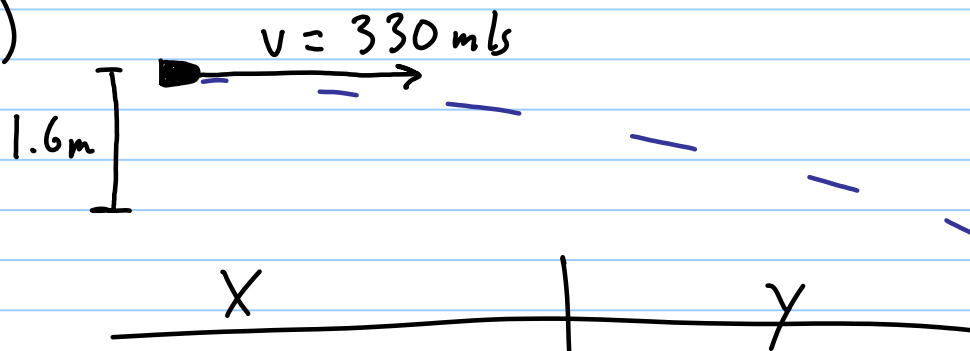
$$= \frac{-49 - 49}{-9.80}$$

$$= 10.0 \text{ s}$$

$$d_x = (28)(10.0)$$

$$= 280 \text{ m}$$

6)



$$V_x = 330 \text{ m/s}$$

$$d_x =$$

$$t = 0.5714 \text{ s}$$

$$d_x = V_x \cdot t$$

$$= (330)(0.5714)$$

$$= 189 \text{ m}$$

$$V_y =$$

$$V_{y0} = 0$$

$$a_y = -9.80 \text{ m/s}^2$$

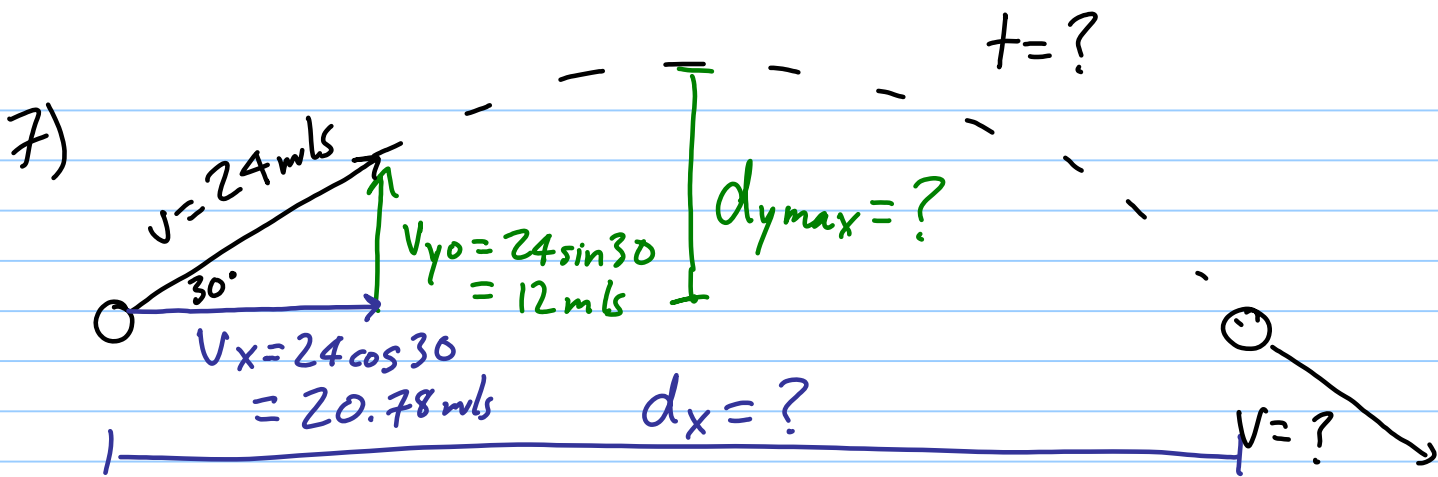
$$d_y = -1.6 \text{ m}$$

$$t$$

$$t = \sqrt{\frac{2d}{a}}$$

$$= \sqrt{\frac{2(-1.6)}{-9.80}}$$

$$= 0.5714 \text{ s}$$



X	Y @ $t_{\frac{1}{2}}$
$v_x = 20.78 \text{ m/s}$	$v_y = 0$
$dx =$	$v_{y0} = 12 \text{ m/s}$
$t = 2.448 \text{ s}$	$a_y = -9.80$
$dx = v_x \cdot t$	$d_{y \max} =$
$= (20.78)(2.448)$	$t_{\frac{1}{2}} =$
$= 50.9 \text{ m}$	

$$t_{\frac{1}{2}} = \frac{v - v_0}{a}$$

$$= \frac{0 - 12}{-9.80}$$

$$= 1.224$$

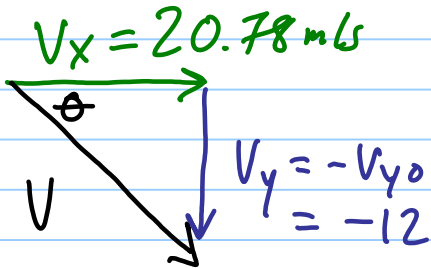
$$t_{\text{total}} = 2 \times t_{\frac{1}{2}}$$

$$= 2.448$$

$$v^2 = v_0^2 + 2ad$$

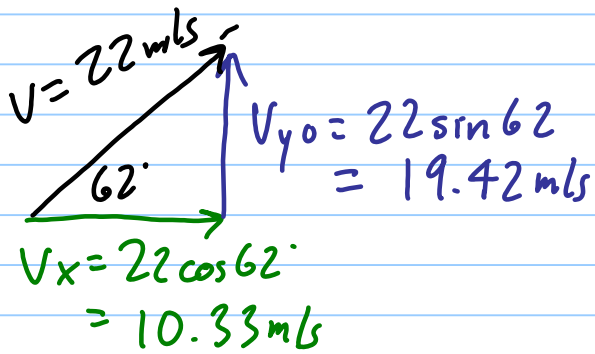
$$d_{y \max} = \frac{-v_0^2}{2a} = \frac{-(12)^2}{2(-9.80)}$$

$$= 7.35 \text{ m}$$



$\therefore V = 24 \text{ m/s } 30^\circ \text{ below horiz}$

8)



X | y @ t_{total}

$$V_x = 10.33 \text{ m/s}$$

$$d_x =$$

$$t = 3.963 \text{ s}$$

$$d_x = V_x \cdot t$$

$$= (10.33)(3.963)$$

$$= 40.9 \text{ m}$$

$$V_y = -19.42$$

$$V_{y0} = 19.42 \text{ m/s}$$

$$a_y = -9.80 \text{ m/s}^2$$

$$d_y =$$

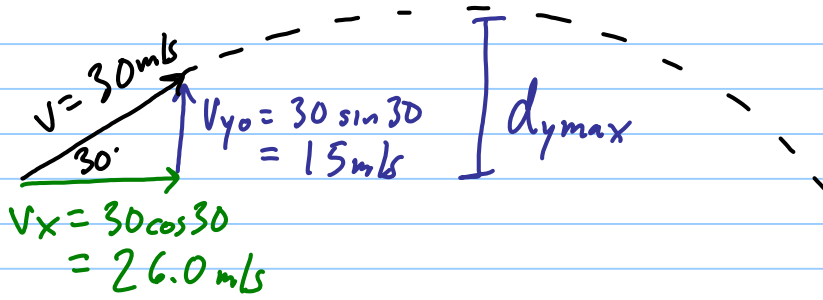
$$t =$$

$$t = \frac{V - V_0}{a}$$

$$= \frac{-19.42 - 19.42}{-9.80}$$

$$= 3.963 \text{ s}$$

9)



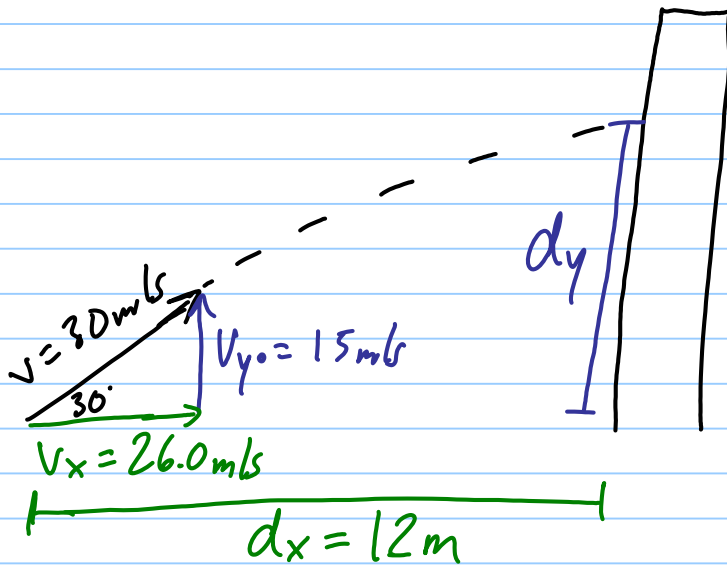
X	Y @ $t_{\frac{1}{2}}$
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$$\begin{aligned}
 v_y &= 0 \\
 v_{y0} &= 15 \text{ m/s} \\
 a_y &= -9.80 \text{ m/s}^2 \\
 d_{y \max} &= \\
 t_{\frac{1}{2}} &=
 \end{aligned}$$

$$v^2 = v_0^2 + 2ad$$

$$d = \frac{-v_0^2}{2a} = \frac{-(15)^2}{2(-9.80)}$$

$$= 11.5 \text{ m}$$



X	Y
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$$v_x = 26.0 \text{ m/s}$$

$$d_x = 12 \text{ m}$$

$$t =$$

$$t = \frac{d_x}{v_x} = \frac{12 \text{ m}}{26.0 \text{ m/s}}$$

$$= 0.4615 \text{ s}$$

$$v_y =$$

$$v_{y0} = 15 \text{ m/s}$$

$$a_y = -9.80 \text{ m/s}^2$$

$$d_y = ?$$

$$t = 0.4615 \text{ s}$$

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

$$= (15)(0.4615)$$

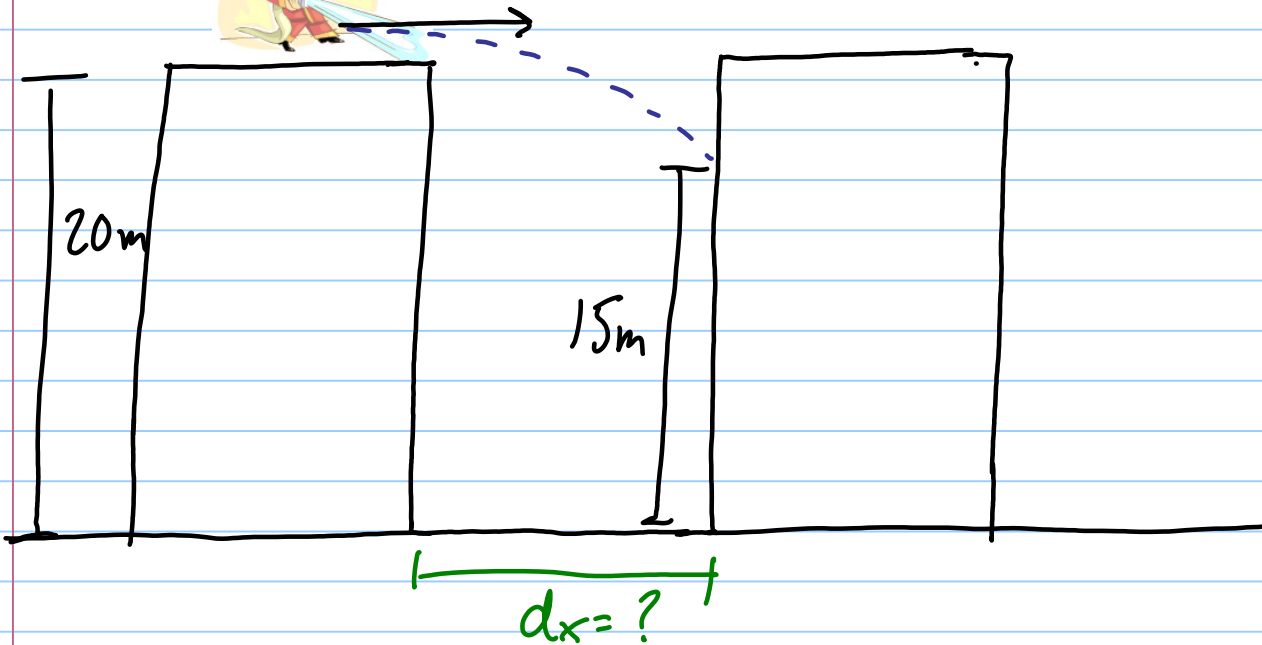
$$+ \frac{1}{2}(-9.80)(0.4615)^2$$

$$= 5.88 \text{ m}$$

10)



$v = 12 \text{ m/s}$



X	Y
$v_x = 12 \text{ m/s}$	$v_y =$
$dx =$	$v_{y0} = 0$
$t = 1.01 \text{ s}$	$a_y = -9.80 \text{ m/s}^2$
	$dy = -5.0 \text{ m}$
	$t =$

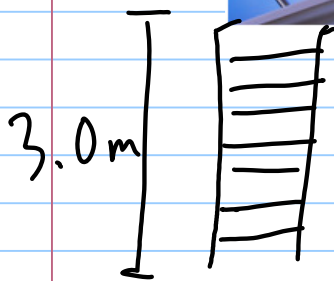
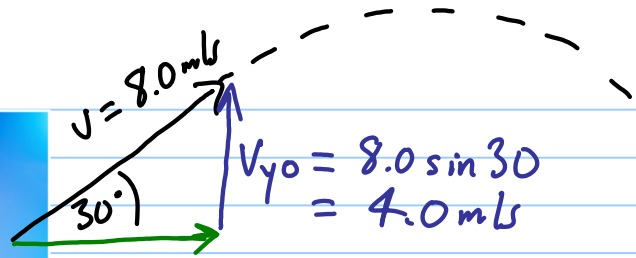
$$dx = v_x t$$

$$= 12.1 \text{ m}$$

$$t = \sqrt{\frac{2d}{a}}$$

$$= 1.01 \text{ s}$$

11)



y

$$\begin{aligned}v_y &= \\v_{y0} &= 4.0 \text{ m/s} \\a_y &= -9.80 \text{ m/s}^2 \\d_y &= -3.0 \text{ m} \\t &= ?\end{aligned}$$

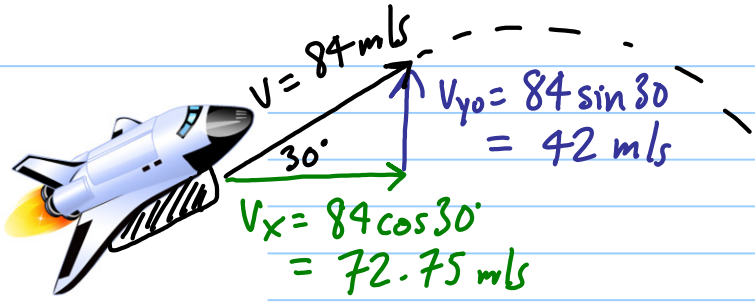
$$v_y^2 = v_{y0}^2 + 2ad$$

$$\begin{aligned}v_y &= \pm \sqrt{v_{y0}^2 + 2ad} \\&= \pm \sqrt{(4.0)^2 + 2(-9.80)(-3.0)} \\&= \pm 8.65 \text{ m/s} \\&= -8.65 \text{ m/s}\end{aligned}$$

$$v = v_0 + at$$

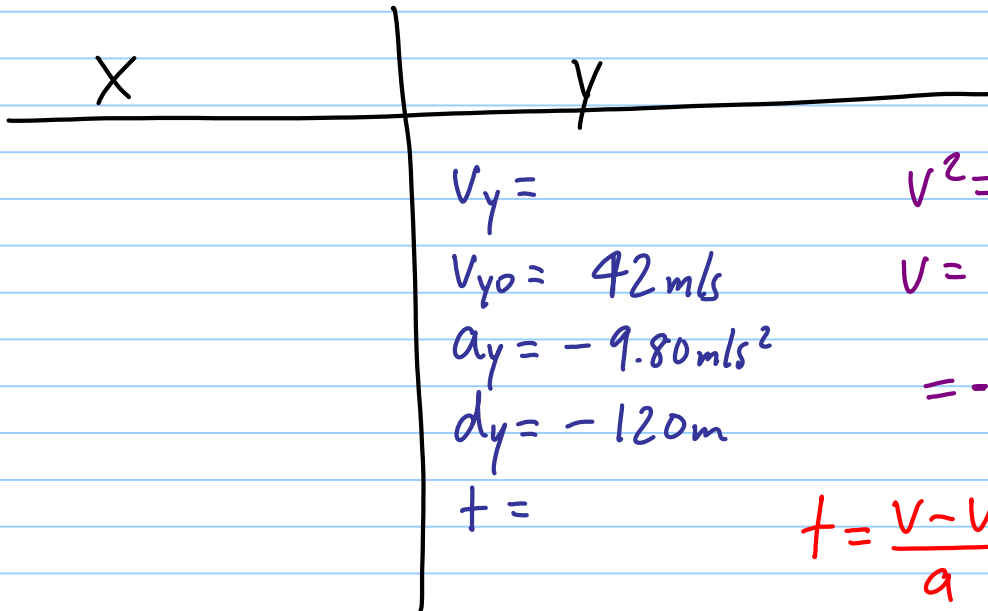
$$\begin{aligned}t &= \frac{v - v_0}{a} \\&= \frac{-8.65 - 4.0}{-9.80} \\&= 1.29 \text{ s}\end{aligned}$$

12)



120m

t = ?



$$v_y =$$

$$v_{y0} = 42 \text{ m/s}$$

$$a_y = -9.80 \text{ m/s}^2$$

$$dy = -120 \text{ m}$$

$$t =$$

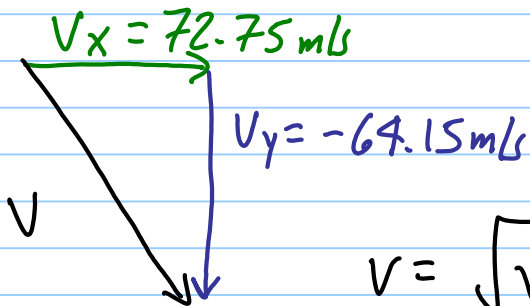
$$v^2 = v_0^2 + 2ad$$

$$v = \pm \sqrt{v_0^2 + 2ad}$$

$$= -64.15$$

$$t = \frac{v - v_0}{a}$$

$$= 10.8 \text{ s}$$



$$v = \sqrt{v_x^2 + v_y^2}$$

$$= 97.7 \text{ m/s}$$