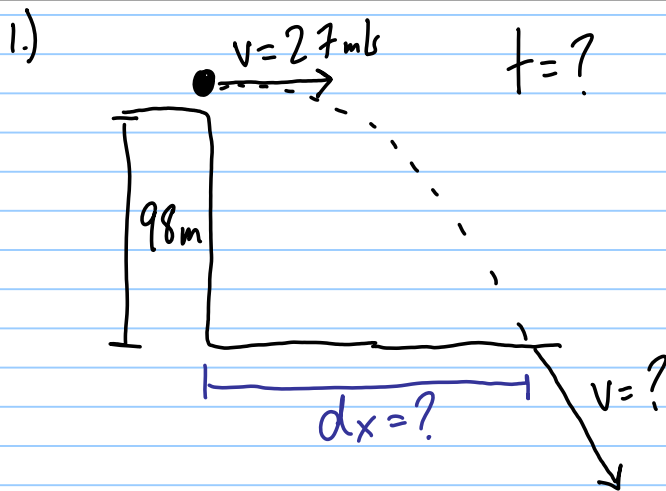


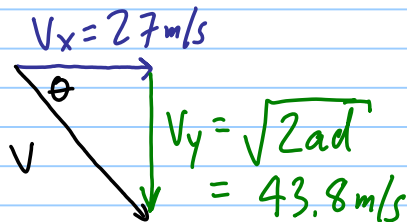
Worksheet 3.4

Note Title

12/11/2009



$v_x = 27 \text{ m/s}$ $dx =$ $t = 4.472 \text{ s}$ $dx = v_x \cdot t$ $= (27)(4.472)$ $= \boxed{121 \text{ m}}$	$v_y =$ $v_{y0} = 0$ $a_y = -9.80 \text{ m/s}^2$ $dy = -98 \text{ m}$ $t =$	$d = v_0 t + \frac{1}{2} a t^2$ $d = \frac{1}{2} a t^2$ $t = \sqrt{\frac{2d}{a}}$ $= \sqrt{\frac{2(-98)}{-9.80}}$ $= 4.472$ $= \boxed{4.47 \text{ s}}$
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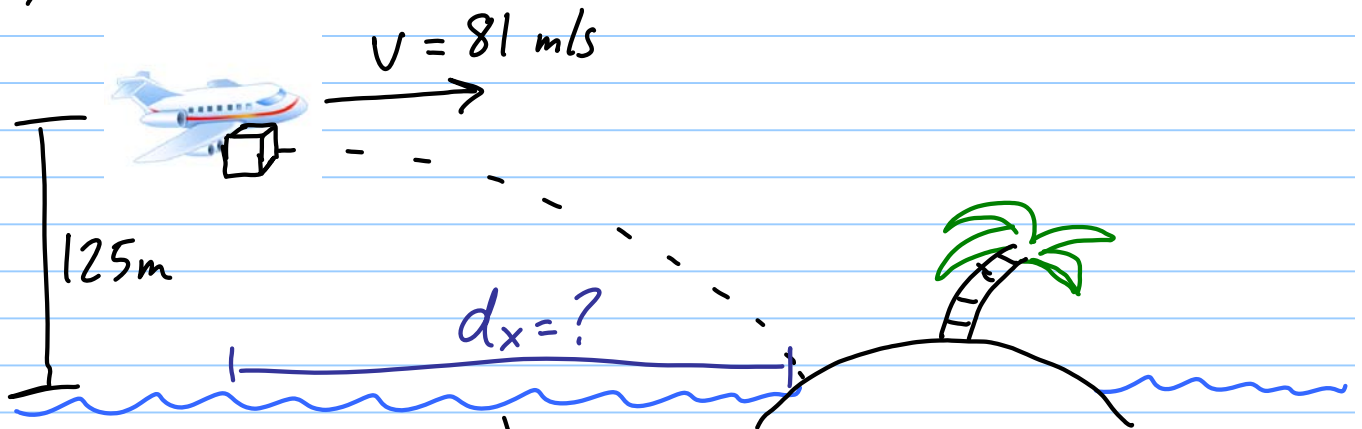


$$v = \sqrt{v_x^2 + v_y^2} = \boxed{51.5 \text{ m/s}}$$

$$\theta = \tan^{-1}\left(\frac{43.8}{27}\right)$$

$$= \boxed{58^\circ \text{ below horizontal}}$$

2.)



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

$d_x = ?$

$t = 5.051 \text{ s}$

$$d_x = v_x \cdot t$$
$$= (81)(5.051)$$
$$= \boxed{409 \text{ m}}$$

$v_y =$

$v_{y0} = 0$

$a_y = -9.80$

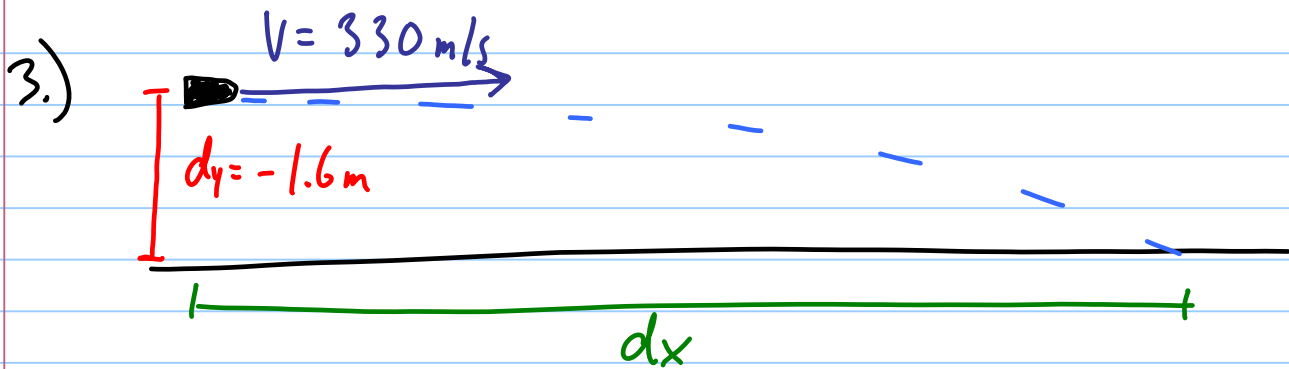
$d_y = -125$

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
$v_x = 330\text{ m/s}$	$v_y =$
$dx =$	$v_{y0} = 0$
$t = 0.5714\text{ s}$	$a_y = -9.80\text{ m/s}^2$
	$dy = -1.6\text{ m}$
	$t =$

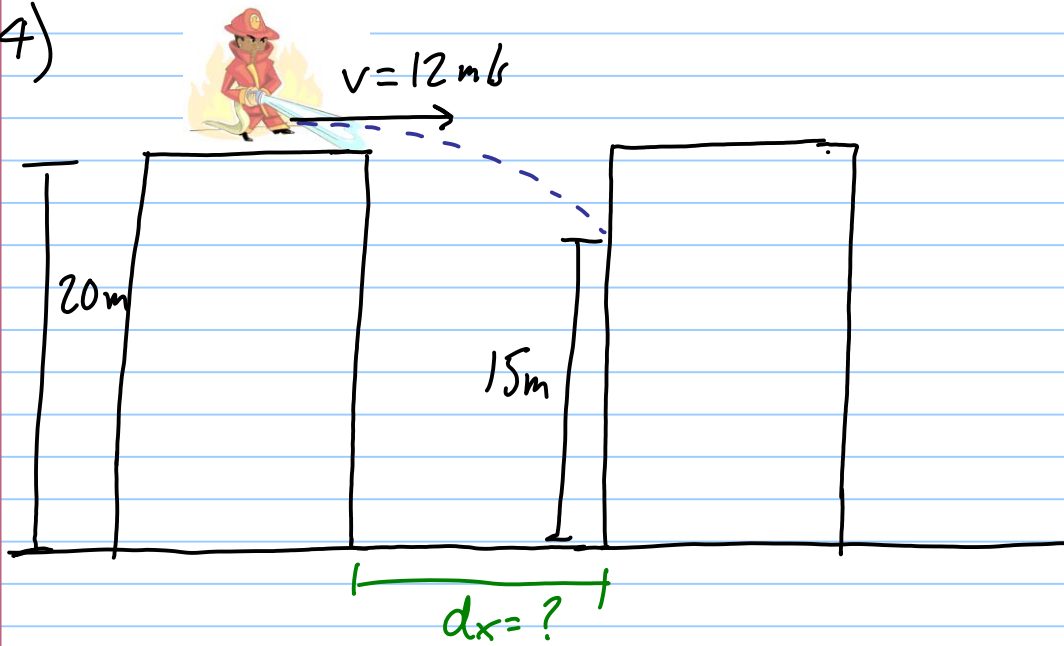
$d = v_0 t + \frac{1}{2} a t^2$
 $d = \frac{1}{2} a t^2$
 $t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(-1.6)}{-9.80}}$
 $= 0.5714\text{ s}$

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

$$dx = v_x t$$

$$= (330)(0.5714) = \boxed{190\text{ m}}$$

4)



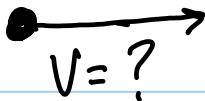
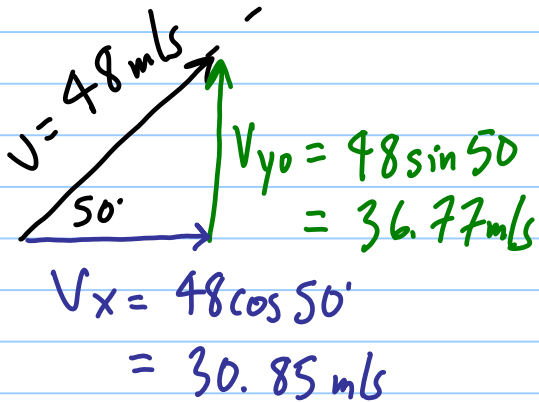
$$\begin{aligned}
 v_x &= 12 \text{ m/s} \\
 dx &= \\
 t &= 1.01 \text{ s}
 \end{aligned}$$

$$\begin{aligned}
 dx &= v_x t \\
 &= \boxed{12.1 \text{ m}}
 \end{aligned}$$

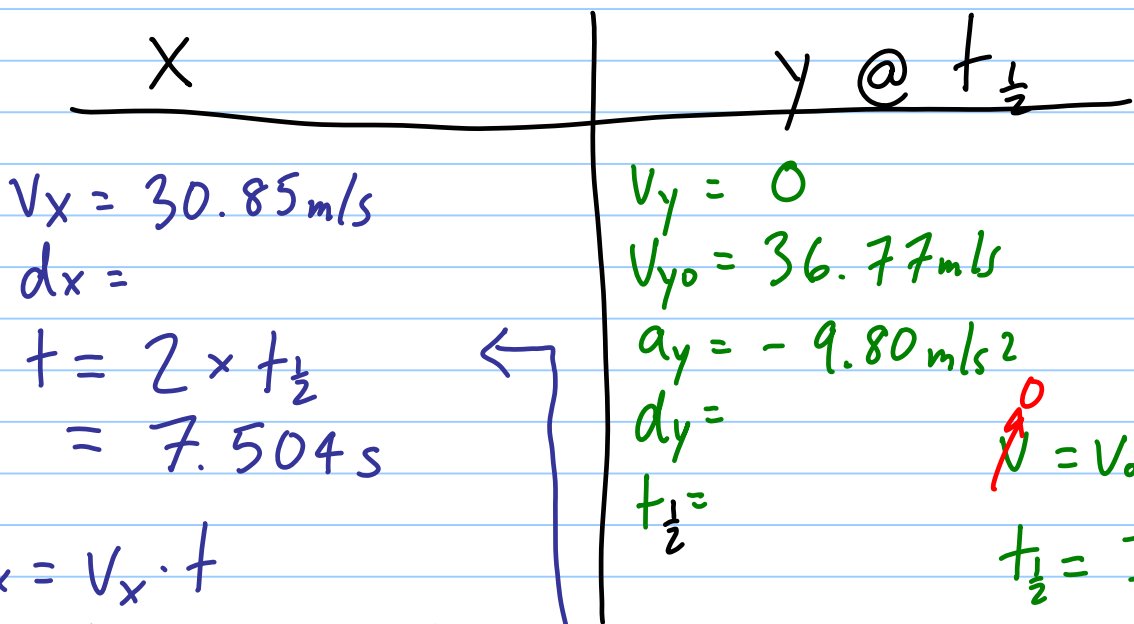
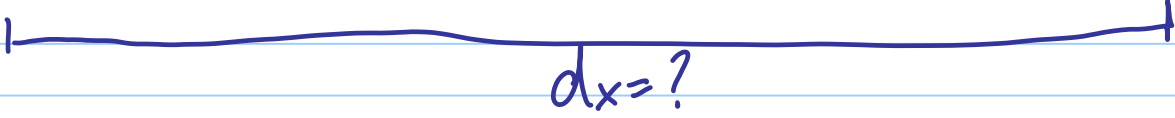
X	Y
$v_y =$	
$v_{y0} = 0$	
$a_y = -9.80 \text{ m/s}^2$	
$dy = -5.0 \text{ m}$	
$t =$	

$$\begin{aligned}
 t &= \sqrt{\frac{2d}{a}} \\
 &= 1.01 \text{ s}
 \end{aligned}$$

5)



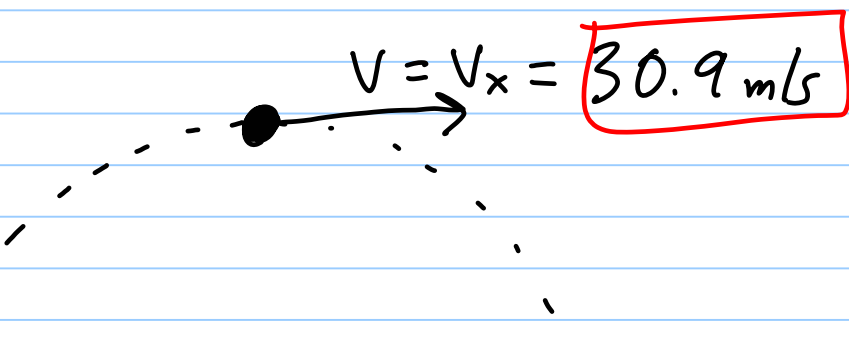
$t = ?$



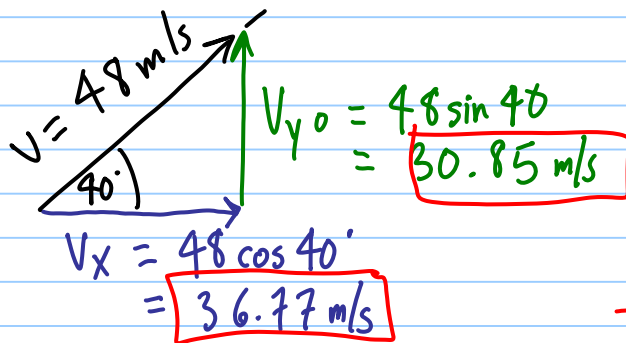
$0 = V_0 + a t_{\frac{1}{2}}$

$t_{\frac{1}{2}} = \frac{-V_0}{a}$
 $= \frac{-36.77}{-9.80}$

$= 3.752$
 $= 3.75 \text{ s}$



6.)



$t = ?$
 $d_x = ?$

X	Y
$V_x = 36.77 \text{ m/s}$ $d_x = ?$ $t = 38.56 \text{ s}$	$V_y = -30.85 \text{ m/s}$ $V_{y0} = 30.85 \text{ m/s}$ $a_y = -1.6 \text{ m/s}^2$ $d_y = ?$ $t = ?$

for total flight
 $V = -V_0$

$V = V_0 + at$

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

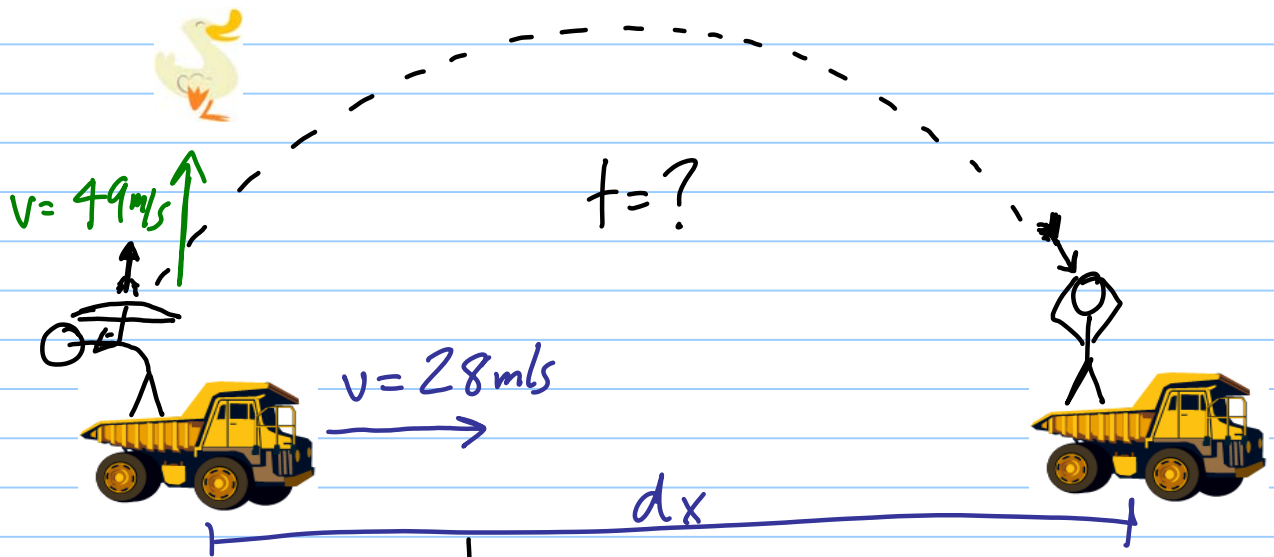
$= \frac{-30.85 - 30.85}{-1.6}$

$= 38.56 \text{ s}$

$= 38.6 \text{ s}$

$d_x = V_x \cdot t$
 $= (36.77)(38.56)$
 $= 1420 \text{ m}$

7.)



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

$$d_x =$$

$$t = 10.0 \text{ s}$$

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

$$= \boxed{280 \text{ m}}$$

$$v_y = -49 \text{ m/s}$$

$$v_{y0} = 49 \text{ m/s}$$

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

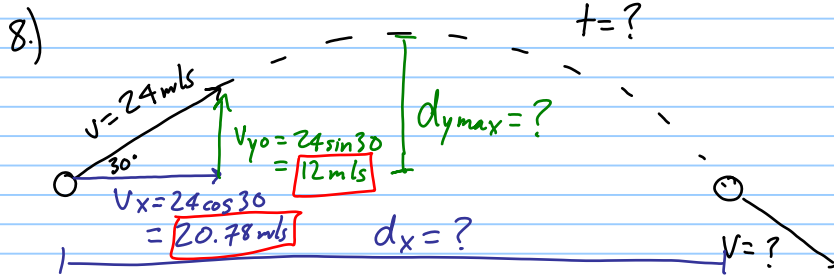
$$d_y =$$

$$t =$$

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

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

$$= \boxed{10.0 \text{ s}}$$



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

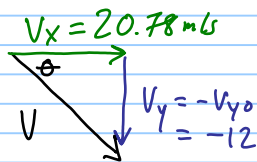
$$t_{\frac{1}{2}} = \frac{v - v_0}{a} = \frac{0 - 12}{-9.80} = 1.224$$

$$t_{\text{total}} = 2 \times t_{\frac{1}{2}} = 2.448$$

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

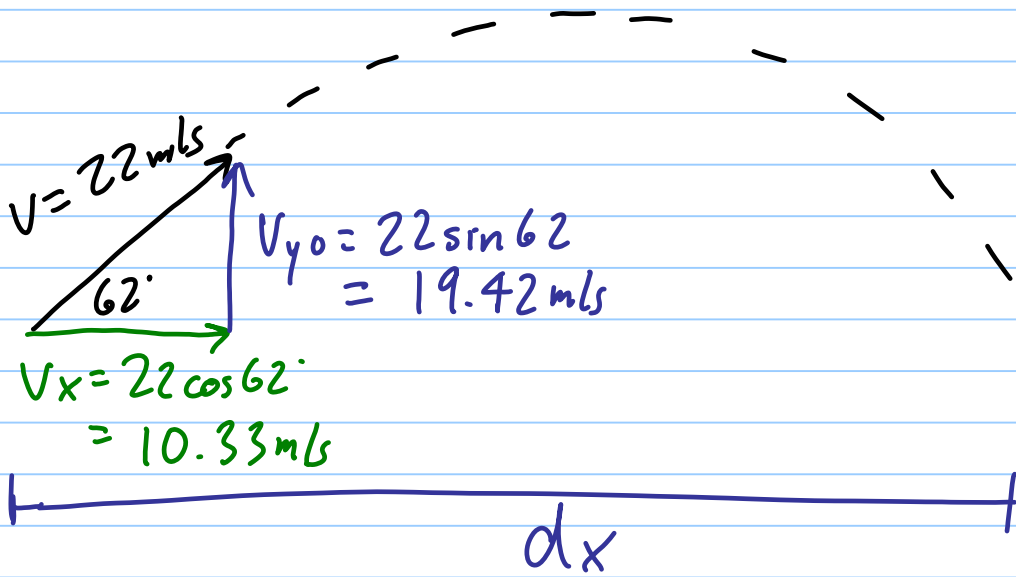
$$d_{y\max} = \frac{-v_0^2}{2a} = \frac{-(12)^2}{2(-9.80)}$$

$$= 7.35 \text{ m}$$



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

9.)

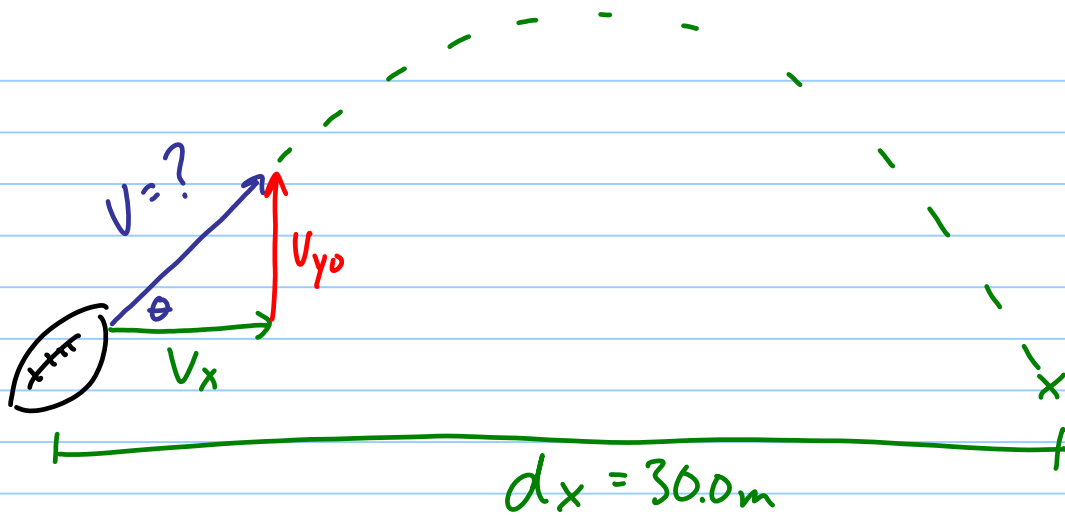


X	y @ t_{total}
$V_x = 10.33 \text{ m/s}$	$V_y = -19.42$
$d_x =$	$V_{y0} = 19.42 \text{ m/s}$
$t = 3.963 \text{ s}$	$a_y = -9.80 \text{ m/s}^2$
	$d_y =$
	$t =$

$d_x = V_x \cdot t$
 $= (10.33)(3.963)$
 $= \boxed{40.9 \text{ m}}$

$t = \frac{V - V_0}{a}$
 $= \frac{-19.42 - 19.42}{-9.80}$
 $= 3.963 \text{ s}$

10.)



x	y @ $t_{\frac{1}{2}}$
$V_x =$	$V_y = 0\text{ m/s}$
$d_x = 30.0\text{m}$	$V_{yo} =$
$t = 2.0\text{ s}$	$a_y = -9.80$
	$d_y =$
	$t = 2.0\text{ s}$

$V = V_0 + at$
 $V_0 = -at$
 $= -(-9.80)(2.0)$
 $= 19.6\text{ m/s}$

$V_x = \frac{d_x}{t} = \frac{30.0\text{m}}{2.0\text{s}} = 15\text{ m/s}$

A velocity vector triangle diagram. The horizontal base is a green vector labeled $V_x = 15\text{ m/s}$. The vertical height is a red vector labeled $V_{yo} = 19.6\text{ m/s}$. The hypotenuse is a blue vector labeled $V=?$ at an angle θ to the horizontal.

$V^2 = V_x^2 + V_{yo}^2$
 $V = \sqrt{V_x^2 + V_{yo}^2}$
 $= \sqrt{(15)^2 + (19.6)^2}$
 $= 25\text{ m/s}$

$\tan\theta = \frac{19.6}{15}$
 $\theta = \tan^{-1}\left(\frac{19.6}{15}\right)$
 $= 53^\circ \text{ above the horizontal}$