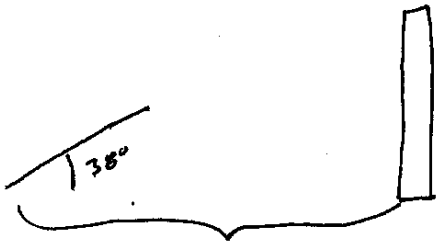
1.



x component

Traveled 15m in 1.30s

$\bar{V}_x = \frac{15m}{1.30s} = 11.54 m/s$

$V_{ox} = ?$ $a_x = 0$

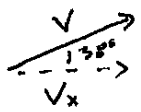
$\Delta x = 15m$ $t = 1.3s$

$x_f = x_0 + V_0 t + \frac{1}{2}at^2$

$x_f = V_0 t$

$V_{ox} = \frac{x_f}{t}$

V_x does not change



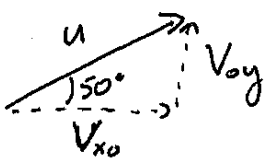
$\cos(38) = \frac{V_x}{V}$

$V = \frac{V_x}{\cos(38)}$

$= \frac{11.54}{\cos 38}$

$= 14.64 m/s$

2.



(a) $\cos 50 = \frac{V_{ox}}{u}$

$V_{ox} = u\cos(50)$

$\sin 50 = \frac{V_{oy}}{u}$

$V_{oy} = u\sin(50)$

(b)

X	Y
$a_x = 0$	$a_y = -9.8 m/s^2$
	$V_{proj_y} = 0$
	$\Delta Y_{max} = 8.0m$
	$V_{oy} = ?$

$V_{fy}^2 = V_{oy}^2 + 2a_y\Delta Y$

$0 = V_{oy} + 2a_y\Delta Y$

$V_{oy} = -2(-9.8 m/s^2)(8m)$

$V_{oy}^2 = 156.8 \rightarrow V_{oy} = 12.521$

$V_{oy} = u\sin(50)$

$u = \frac{V_{oy}}{\sin(50)}$ $\left(\frac{156.8}{\sin(50)}\right)$

$u = \frac{12.521}{\sin 50}$

$u = 16.346 m/s$

looking at the entire flight

2c $V_{oy} = 12.521 \text{ m/s}$

$Y_o = 0$

$Y_f = -2$

$a_y = -9.8 \text{ m/s}^2$

$V_{fy} = ?$

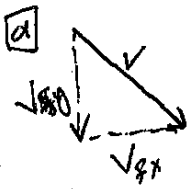
$V_{fy}^2 = V_{oy}^2 + 2a_y \Delta Y$

$V_{fy} = \sqrt{(12.521)^2 + 2(-9.8 \text{ m/s}^2)(-2)}$

$V_{fy} = 13.9991$

$\boxed{V_{fy} = -14.0 \text{ m/s}}$ must be negative

d



Angle has changed $\Rightarrow$ need V_{fx}

$V_{fx} = V_{ox}$ b/c $a_x = 0$

$V_{ox} = V \cos(50)$

$V_{ox} = 16.346 \cos(50)$

$\underline{V_{ox} = 8.575 \text{ m/s}}$

Pythagorean Theorem

$V^2 = V_{fy}^2 + V_{fx}^2$

$V = \sqrt{(14.007)^2 + (8.575)^2}$

$\boxed{V = 16.4 \text{ m/s}}$ $\boxed{17.51 \text{ m/s}}$

e $V_{oy} = 12.521 \text{ m/s}$

$V_{fy} = -14.0 \text{ m/s}$

$a_y = -9.8 \text{ m/s}^2$

$t = ?$

For whole flight, we know V_{oy} and V_{fy}. Use this!

$\rightarrow V_{fy} = V_{oy} + a_y t$

$V_{fy} = V_{oy} + a_y t$

$t = \dfrac{V_{fy} - V_{oy}}{a_y}$

$t = \dfrac{-4.0 \text{ m/s} + 12.521 \text{ m/s}}{-9.8 \text{ m/s}^2}$

$t = 0.1509 \text{ s}$

$t = ?$

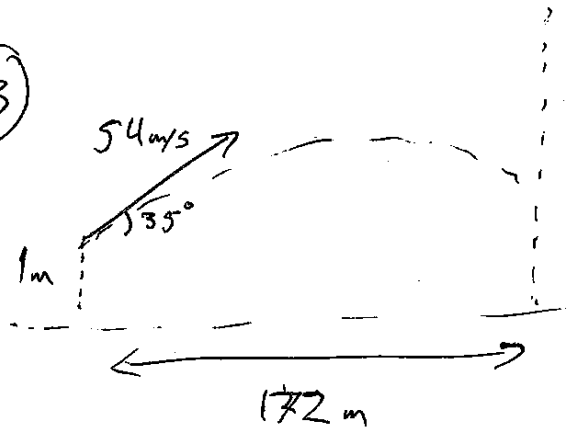
$-14 = 12.486 + (-9.8)t$ $V_{fy} = -14$

$V_{oy} = 12.486$

$\dfrac{-26.486}{-9.8} = \dfrac{-9.8t}{-9.8}$

$t = 2.7$

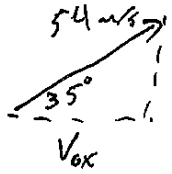
(3)



x	y
$x_0 = 0$	$y_0 = 1\text{ m}$
$x_f = 172\text{ m}$	$y_f = ?$
V_{ox}: can find	V_{oy}: can find
$a_x = 0$	$a_y = -10\text{ m/s}^2$

$t = ?$

(a) Need V_{ox} first



$\cos(35°) = \frac{V_{ox}}{54\text{ m/s}}$

$V_{ox} = 54 \cdot \cos 35°$

$V_{ox} = 44.23\text{ m/s}$

know everything but t for x-direction:

$x_f = x_0 + V_{ox}t + \frac{1}{2}a_x t^2$

$172\text{ m} = 0 + 44.23\text{ m/s} \cdot t + \frac{1}{2}(0)t^2$

$\frac{172\text{ m}}{44.2\text{ m/s}} = t$

$\boxed{t = 3.89\text{ s}}$

(b) Max height will be the height of the ball when $x = 172$ m. Know time to get to that pt. so can use y-equation.

$y_f = y_0 + V_{oy}t + \frac{1}{2}a_y t^2$

$y_f = 1\text{ m} + 30.97\text{ m/s} \cdot (3.89\text{ s}) + \frac{1}{2}(-10\text{ m/s}^2) \cdot (3.89\text{ s})^2$

$\sin(35°) = \frac{V_{oy}}{V_o}$

$V_{oy} = 54 \cdot \sin 35$

$V_{oy} = 30.97\text{ m/s}$

$\boxed{y_f = 45.81\text{ m}}$

Any higher and the ball won't make it over.

(c) Need to know sign of V_y when $t = 3.89$ s.

$V_y = V_{oy} + a_y t$

$V_y = 30.97\text{ m/s} + (-10\text{ m/s}^2) \cdot 3.89$

= a negative number.

I + is going $\boxed{\text{down}}$.