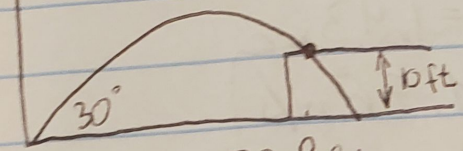
205.4 ft

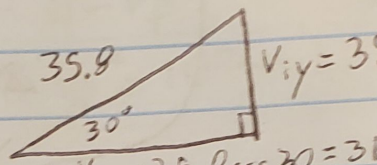
13 car lengths

9

1. $V_i = 80 \text{ mph} = 35.8 \text{ m/s}$



$10_m = 32.8 \text{ ft}$



$$X_f = \frac{1}{2} a_x t^2 + V_{ix} t + X_i$$

$$Y_f = \frac{1}{2} a_y t^2 + V_{iy} t + Y_i$$

$$10 = \frac{1}{2}(-9.8)t^2 + 17.9t + 0$$

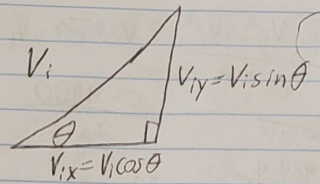
$$-4.9t^2 + 17.9t - 10 \qquad t = 2.965 \text{ seconds}$$

$$X_f = \frac{1}{2}(0)(2.965) + 31(2.965) + 0 = 91_m = 298.6 \text{ ft}$$

Prof. uses the wrong root of $-16t^2 + 98t - 10$ to calculate the displacement

2. Prof. found V_{ix} with $V_i \sin 30$ instead of $V_i \cos 30$

PHYS 407



$$y_f = \tfrac{1}{2} a_y t^2 + V_{iy} t + y_i$$

$$x_f = \tfrac{1}{2} a_x t^2 + V_{ix} t + x_i$$

$\hookrightarrow V_{ix} t$

$x_f = 21.1\text{m}$

$$V_{ix} = \frac{x_f - x_i - \frac{1}{2} a_x t^2}{t}$$

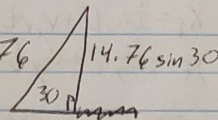
$$\frac{21.1\text{m} - 0 - 0}{t} = \frac{V_{ix}}{} = 21.1/t$$

$\theta = 0° \rightarrow V_i = V_{ix}$

$-4.9t^2 + 0 + 10$

$t = 1.43\text{sec}$

$21.1/1.43 = 14.76\text{ m/s}$



$14.76 \sin 30 = 7.38 = V_{iy}$

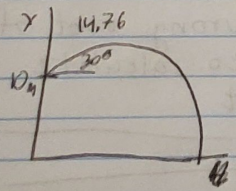
$14.76 \cos 30 = 12.78 = V_{ix}$

$-4.9t^2 + 7.38t + 10$

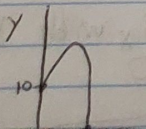
roots: $\pm 2.16\text{sec}$, 2.368sec

2.368

$X_f = 12.78(1.88) = 24.03\text{ m}$



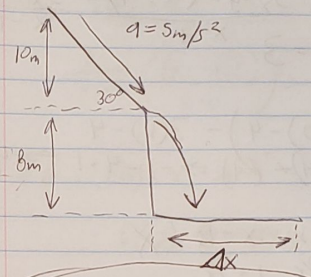
21.1m
10m
30°
$\rightarrow V = 14.76\text{m/s}$



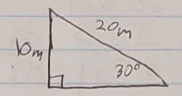
$\Delta y = -4.9t^2 + 7.38t + 10$

$\Delta x = 12.78(2.368) = 30.3\text{m}$

PHYS 407



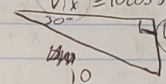
$V_f^2 - V_i^2 = a\,\Delta x$



~~$V_f = V_i + a\,\Delta t$~~

~~$0 + 5(4) = 20\text{m/s}$~~

$y_f = -4.9t^2 + (-5)t + 8$

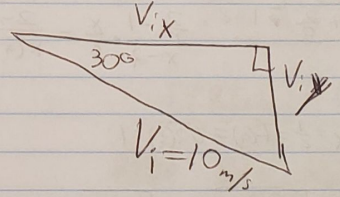


$20(5) = 0 - V_f^2 \quad -100 = -V_f^2$

$V_f^2 - 0 = 20(5) \rightarrow V_f^2 = 100 \rightarrow V_f = \sqrt{100} = 10\text{ m/s}$

$t = 0.866$

$x_f = \frac{1}{2} a_x t^2 + V_{ix} t + x_i$



$0 + V_{ix} t + 0 \rightarrow 8.67(0.866) = 7.5\text{m}$

$\Delta y = y_f - y_i$

$y = 8$

$\Delta y \rightarrow y_f = \frac{1}{2} a t^2 + V_i t + y_i$

used the wrong equation