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1 Range Equation

$$R = \frac{v_0^2 \sin(2\theta)}{g}$$

Only valid if $\Delta y = 0$

1.1 Lab Problem - 676

$$\begin{aligned} R &= \frac{v_0^2 \sin(2\theta)}{g} \\ v_0 &= \sqrt{\frac{Rg}{\sin(2\theta)}} \\ v_0 &= \sqrt{\frac{(192 \text{ ft})(-32.17 \text{ ft s}^{-2})}{\sin(2(37^\circ))}} \\ v_0 &= 79.18 \text{ ft s}^{-1} \end{aligned}$$

$$\begin{aligned} 0 &= 160 \text{ ft} + (-79.18 \text{ ft s}^{-1})(\cos(53^\circ))t + \frac{1}{2}(-32.17 \text{ ft s}^{-2})t^2 \\ t &= 2.003 \text{ s} \end{aligned}$$

$$\begin{aligned} x &= x_0 + v_{0x}t \\ x &= 0 + (79.18 \text{ ft s}^{-1})(\sin(53^\circ))(2.003 \text{ s}) \\ x &= 126.7 \text{ ft} \end{aligned}$$

$x = 126.7 \text{ ft}$