HW3-2 Soln)

Put the origin at the launch point and make upward be positive.

$y_i = 0$

$y_f = H \leftarrow$

$v_{yi} = v_o \sin\theta_o$

$v_{yf} = 0$

$a_y = a_g$

t = ?

(4)

$$v_f^2 = v_i^2 + 2a(y - y_i)$$

$$y = \frac{v_f^2 - v_i^2}{2a} + y_i$$

$$H = \frac{0 - (v_o \sin\theta_o)^2}{2a_g} + 0$$

$$H = \frac{v_o^2 \sin^2\theta_o}{2|a_g|}$$

Then, for the example given:

$$H_{20} = \frac{50^2 \sin^2 20^o}{2(10)} = 14.6 \text{ m}$$

$$H_{70} = \frac{50^2 \sin^2 70^o}{2(10)} = 110.4 \text{ m} \quad .$$

Each of these agree with the graph in the notes.