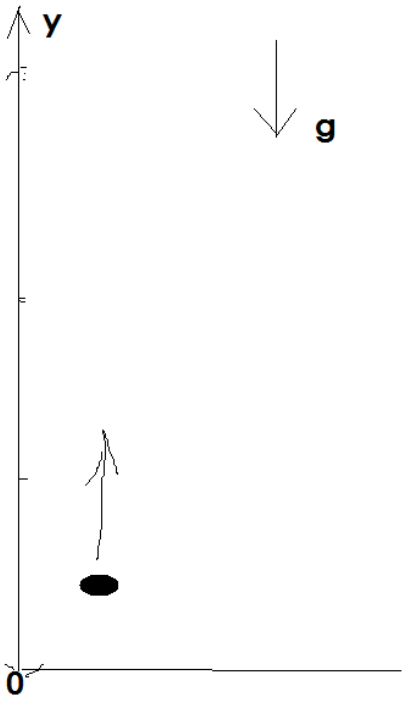
A body is thrown vertically upward such that it crosses the same height after 2 seconds and after 8 seconds. What is the value of the mentioned height?



The general equation is

$$y(t) = v_0 t - \frac{gt^2}{2}$$

$$t_1 = 2\ s; t_2 = 2\ s$$

$$y(t_1) = v_0 t_1 - \frac{g{t_1}^2}{2}$$

$$y(t_2) = v_0 t_2 - \frac{g{t_2}^2}{2}$$

We express the initial velocity from the two equations

$$y(t_1) = v_0 t_1 - \frac{g{t_1}^2}{2} \text{ -> } v_0 = \frac{y(t_1)+\frac{g{t_1}^2}{2}}{t_1}$$

$$y(t_2) = v_0 t_2 - \frac{g{t_2}^2}{2} \text{ -> } v_0 = \frac{y(t_2)+\frac{g{t_2}^2}{2}}{t_2}$$

$$\text{-> } \frac{y(t_1)+\frac{g{t_1}^2}{2}}{t_1} = \frac{y(t_2)+\frac{g{t_2}^2}{2}}{t_2}$$

Considering

$$y(t_1) = y(t_2) = h$$

We have $h = \frac{g({t_2}^2 t_1 - {t_1}^2 t_2)}{2(t_2 - t_1)} = \frac{9.81(64*2-8*4)}{2(8-2)}$=78.48 m