

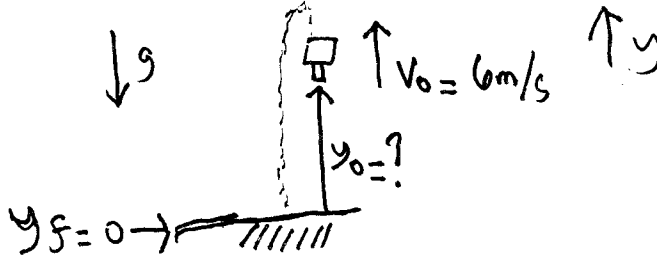
78. A bolt comes loose from underneath an elevator rising at 6m/s. The bolt reaches the bottom of the shaft 3s later. (A) How high was the elevator above the shaft's bottom at release? (B) What is the speed of the bolt at the shaft's bottom?

Given

Unknowns

$$V_0 = +6\text{m/s}, t = 3\text{s}, g = -9.81\text{m/s}^2, y_f = 0$$

$$y_0 = ? \text{ final speed} = ?$$



$$(A) y_f = y_0 + v_0 t - g/2t^2,$$

$$y_0 = -v_0 t + gt^2/2 = -6\text{m/s}(3\text{s}) + 9.81/2 \text{ m/s}^2 (9\text{s}^2) = 26.1\text{m}$$

$$(B) v = v_0 - gt = 6\text{m/s} - 9.81\text{m/s}^2(3\text{s}) = -23.4\text{m/s}; \text{ speed is } 23.4\text{m/s}$$

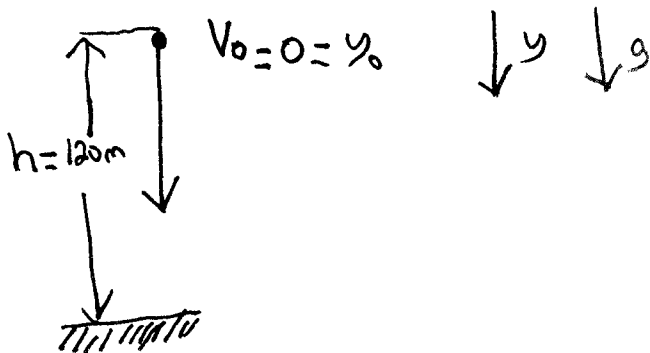
79. An object is dropped from rest a height of 120m. Find the distance traveled in its last second.

Given

Unknown,

$$V_0 = 0, h = 120\text{m}, g = 9.81\text{m/s}^2$$

$$d = ?$$



$$\text{Since } y_0 = v_0 = 0, h = y = 1/2gt^2, t = \sqrt{2h/g} = \sqrt{2(120\text{m})/9.81\text{m/s}^2} = 4.95\text{s}$$

$$y(t) = 1/2gt^2, d = y(4.95\text{s}) - y(3.95\text{s}) = 1/2(9.81\text{m/s}^2)[(4.95\text{s})^2 - (3.95\text{s})^2] = 43.6\text{m}$$