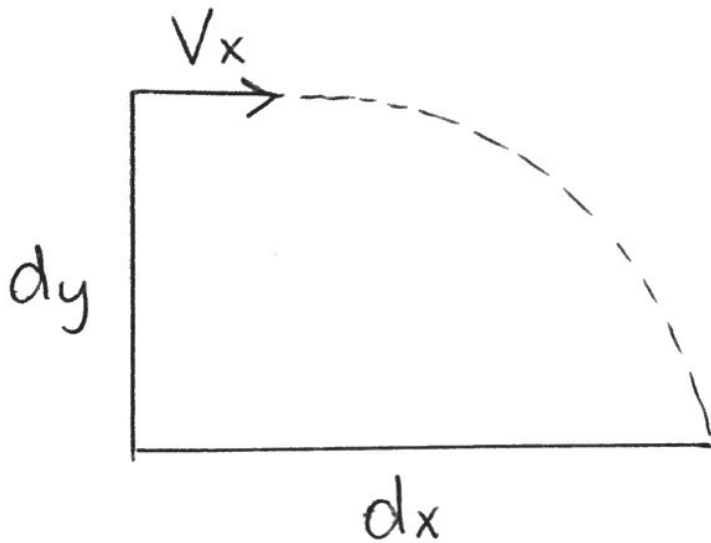


Horizontal Launch



$$\frac{x}{dx = V_x t}$$

$$\frac{y}{dy = \frac{1}{2}gt^2}$$
$$V_{fy} = V_{iy} + gt$$

Example:

We are standing on top of a cliff, 1000 m tall. We shoot a cannon out horizontally at 30 m/s. How far from the cliff does the cannon land?

Givens

$$\frac{x}{V_x = 30 \text{ m/s}}$$
$$dx = ?$$

$$\frac{y}{dy = 1000 \text{ m}}$$
$$g = -9.8 \text{ m/s}^2$$
$$V_{iy} = 0 \text{ m/s}$$
$$t = ?$$

Step 1: Find time using

$$dy = \frac{1}{2}gt^2$$
$$-1000 \text{ m} = \frac{1}{2}(-9.8 \text{ m/s}^2)t^2$$
$$\frac{-1000 \text{ m}}{-4.9} = \frac{-4.9 t^2}{-4.9}$$

$$204 = t^2$$

$$\boxed{14.3 \text{ s} = t}$$

Step 2: Find dx using

$$dx = V_x t$$

$$dx = (30 \text{ m/s})(14.3 \text{ s})$$

$$\boxed{429 \text{ m}}$$