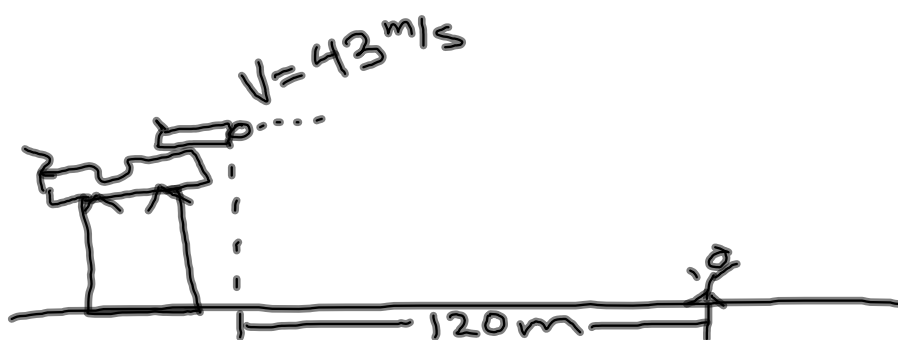


- 1) horizontal initial velocity
from a height
- 2) angled velocity from ground
- 3) angled velocity from/to
height.



$$\begin{aligned} \underline{x} \\ v_i &= 43 \text{ m/s} \\ \Delta x &= 120 \text{ m} \\ a &= 0 \end{aligned}$$

$$\begin{aligned} \Delta x &= v_0 t + \frac{1}{2} a t^2 \\ 120 &= 43 \cdot t \\ t &= 2.79 \text{ s} \end{aligned}$$

$$\begin{aligned} \underline{y} \\ v_i &= 0 \\ \Delta y &= \\ a &= -9.8 \text{ m/s}^2 \end{aligned}$$

$$\begin{aligned} t &= 2.79 \text{ s} \\ \Delta y &= 0 \cdot 2.79 + \frac{1}{2} (-9.8) (2.79)^2 \\ \Delta y &= -4.9 \cdot 7.78 \\ \Delta y &= -38.16 \text{ m} \end{aligned}$$

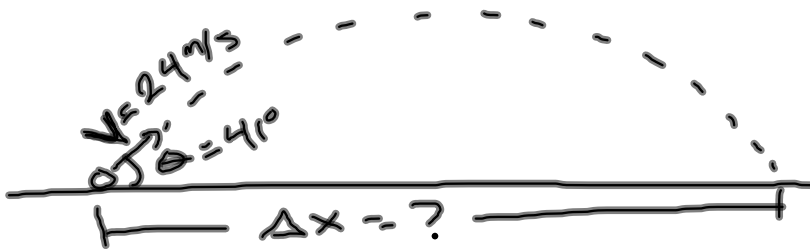
Angled Velocities



$$\begin{aligned} \frac{x}{a} &= 0 \\ V_x &= V \cos \theta \\ V_x &= 24 \cdot \cos 41 = 18.11 \text{ m/s} \end{aligned}$$

max height = ?

$$\begin{aligned} \frac{y}{a} &= -9.8 \text{ m/s} \\ V_y &= V \sin \theta \\ V_f &= 0 \text{ m/s} \\ V_y &= 24 \sin(41) \\ V_y &= 15.75 \text{ m/s} \\ V_f^2 &= V_0^2 + 2a\Delta y \\ 0 &= 15.75^2 + 2(-9.8)\Delta y \\ 0 &= 248.06 - 19.6\Delta y \\ 19.6\Delta y &= 248.06 \\ \Delta y &= 12.65 \text{ m} \end{aligned}$$



$$\begin{array}{l} \underline{X} \\ v_x = v \cos \theta = 18.11 \text{ m/s} \\ a = 0 \end{array}$$

$$\begin{aligned} \Delta x &= v_0 t + \frac{1}{2} a t^2 \\ \Delta x &= 18.11(3.21) \\ \Delta x &= 58.21 \text{ m} \end{aligned}$$

$$\begin{array}{l} \underline{Y} \\ v_y = 15.75 \text{ m/s} \\ a = -9.8 \text{ m/s}^2 \\ \Delta y = 0 \text{ m} \end{array}$$

$$\begin{aligned} \Delta y &= v_0 t + \frac{1}{2} a t^2 \\ 0 &= 15.75 t - 4.9 t^2 \\ 0 &= t (15.75 - 4.9 t) \\ t = 0 & \quad 0 = 15.75 - 4.9 t \\ & \quad \underline{4.9 t = 15.75} \\ & \quad \quad \underline{4.9} \\ & \quad \quad t = 3.21 \text{ s} \end{aligned}$$



$$\begin{aligned} &\underline{x} \\ v_x &= 48 \cos 20 \\ v_x &= 45.10 \text{ m/s} \\ a &= 0 \end{aligned}$$

$$\begin{aligned} &\underline{y} \\ v_y &= 48 \sin 20 \\ v_y &= 16.4 \text{ m/s} \\ a &= -9.8 \text{ m/s} \\ \Delta y &= -120 \text{ m} \end{aligned}$$

