

Ex. A juggler throws a ball from the left hand to the right hand at 2.0 m/s at  $60^\circ$  above the horizontal.

- Find the time the ball is in the air.
- How far apart should the juggler hold his hands?
- What is the maximum height of the ball?

a)

$$\begin{aligned} V_0 &= 2.0 \text{ m/s} \\ V_{0x} &= 2.0 \text{ m/s} \cos 60^\circ \\ &= 1.0 \text{ m/s} \\ t &=? \end{aligned}$$

$$\begin{aligned} V_{0y} &= 2.0 \text{ m/s} \sin 60^\circ \\ &= 1.7 \text{ m/s} \\ a &= -9.8 \text{ m/s}^2 \\ t &=? \\ V_{2y} &= 1.7 \text{ m/s} \end{aligned}$$

$$t = \frac{V_{2y} - V_{0y}}{a}$$

$$= \frac{-1.7 \text{ m/s} - 1.7 \text{ m/s}}{-9.8 \text{ m/s}^2}$$

$$t = 0.35 \text{ s}$$

b)  $\Delta x = ?$

$$\begin{aligned} \Delta x &= V_{0x} t \\ &= (1.0 \text{ m/s})(0.35 \text{ s}) \\ &\approx 0.35 \text{ m} \end{aligned}$$

c)  $V_{2y} = 0$

$$\begin{aligned} V_{0y} &= 1.7 \text{ m/s} \\ a &= -9.8 \text{ m/s}^2 \\ \Delta y &=? \end{aligned}$$

$$\begin{aligned} \Delta y &= \frac{V_{2y}^2 - V_{0y}^2}{2a} \\ &= \frac{0 - (1.7 \text{ m/s})^2}{2(-9.8 \text{ m/s}^2)} \\ &= 0.15 \text{ m} \end{aligned}$$