Answer on Question #46718, Physics, Other

A ball leaves a kicker's foot with a velocity of 23.0 m/s and at an angle of 40 degrees up from the ground, how far did the ball travel before being caught by another player?

Without drag the ball will move with acceleration along vertical axis and uniformly along horizontal axis.

OX: $S_x = v_{0x}t$

OY: $v_{0y} = gt_{0.5} \rightarrow t = 2t_{0.5} = \frac{2v_{0y}}{g}$

$$S_x = \frac{2v_{0y}v_{0x}}{g} = \frac{2v_0^2\sin(\alpha)\cos(\alpha)}{g} = \frac{v_0^2\sin(2\alpha)}{g}$$

So, the ball will travel distance:

$$S_x = \frac{\left(23.0\frac{m}{s}\right)^2 \cdot \sin(2 \cdot 40°)}{9.81\frac{m}{s^2}} \approx 53.1m$$

Answer: ball will travel $S_x \approx 53.1m$