

You are aiming a rifle at a target 75 m away. The target is at the same height as the rifle, and the bullet will have a speed of 375 m/s. How far above the center of the target should the barrel of the rifle be aimed so that the bullet strikes the center?

$$\text{Range} = R = \frac{v^2 \sin(2\theta)}{g}$$

$$\sin(2\theta) = \frac{Rg}{v^2}$$

$$\theta = \frac{1}{2} \sin^{-1}\left(\frac{Rg}{v^2}\right) = 0.00261$$



$$\frac{h}{x} = \tan \theta = 0.00261$$

$$= 2.6 \text{ mm}$$