

if the time of flight of a bullet over a horizontal range R is T, then the angle of projection with horizontal is?

Horizontal range equals:

$$R = v \cos \alpha T$$

α – angle of projection with horizontal.

And time of flight of a bullet equals:

$$2v \sin \alpha = gT$$

From the first equation we get:

$$v \cos \alpha = \frac{R}{T}$$

From the second:

$$v \sin \alpha = \frac{gT}{2}$$

Therefore, divide (2)/(1):

$$\tan \alpha = \frac{gT^2}{2R}$$

Or:

$$\alpha = \text{Arctan} \left(\frac{gT^2}{2R} \right)$$

Answer: $\alpha = \text{Arctan} \left(\frac{gT^2}{2R} \right)$