Answer on Question 58007, Physics, Mechanics, Relativity

Question:

A bullet is fired horizontally with an initial velocity of $900\ ms^{-1}$ at a target located $150\ ft$ from the rifle. How much time is required for the bullet to reach the target?

Solution:

In the condition of the question, the horizontal distance to the target x is given in feets. Let's first convert feets to meters:

$$x = (150\ ft) \cdot \left(\frac{12\ in}{1\ ft}\right) \cdot \left(\frac{2.54\ cm}{1\ in}\right) \cdot \left(\frac{1\ m}{100\ cm}\right) = 45.72\ m.$$

Then, we can write the equation of horizontal motion of the bullet:

$$x = v_0 t,$$

here x is the horizontal distance to the target, v_0 is the initial velocity of the bullet, t is the time of flight.

From this formula we can find how much time is required for the bullet to reach the target:

$$t = \frac{x}{v_0} = \frac{45.72\ m}{900\ ms^{-1}} = 0.05\ s.$$

Answer:

$t = 0.05\ s.$