Answer on Question #47018 – Physics – Mechanics | Kinematics | Dynamics

A bullet is fired on a horizontal from 1.50m. If it his a target 0.50m high that is a 100m away, how fast is the bullet traveling

Solution:
$h_1 = 1.5\text{m} -$ initial height;
$h_2 = 0.5\text{m} -$ final height;
$D = 100\text{m} -$ distance to the target;
$v -$ velocity of the bullet;
$t -$ time of travelling;
Equation of motion of the bullet along the X-axis:
$$D = vt$$
$$t = \frac{D}{v} \quad (1)$$
Equation of motion of the bullet along the Y-axis:

$$h_1 - h_2 = \frac{gt^2}{2} \quad (2)$$
$$(1)\text{in}(2):$$
$$h_1 - h_2 = \frac{g\left(\frac{D}{v}\right)^2}{2}$$
$$h_1 - h_2 = \frac{gD^2}{2v^2}$$
$$v^2 = \frac{gD^2}{2(h_1 - h_2)}$$
$$v = \sqrt{\frac{gD^2}{2(h_1 - h_2)}} = \sqrt{\frac{9.8\frac{\text{m}}{\text{s}^2} \cdot (100 \text{ m})^2}{2(1.5 \text{ m} - 0.5 \text{ m})}} = 221\frac{\text{m}}{\text{s}}$$

Answer: velocity of the bullet is equal to $221\frac{\text{m}}{\text{s}}$.