Answer on question #64394, Physics / Mechanics | Relativity

Question   A rifle is fired up at an angle of 5.5 degrees above horizontal. If the inital velocity of the bullet is 570 m/s, what will be it's velocity 2.5s after firing?

Solution   The horizontal initial velocity is

$$v_h = v \cdot \cos \alpha = 570 \cdot \cos 5.5° \approx 567.4 \, m/s$$

The vertical initial velocity is

$$v_v = v \cdot \sin \alpha = 570 \cdot \sin 5.5° \approx 54.6 \, m/s$$

The horizontal velocity will not change. The verical on will change in the following way due to gravity:

$$v_{2v} = v_v - gt^2/2 = 54.6 - 9.8 \cdot 2.5^2/2 \approx 24 \, m/s$$

So, final velocity after 2.5 seconds will be

$$v_f = \sqrt{v_h^2 + v_{2v}^2} = \sqrt{567.4^2 + 24^2} \approx 567.9 \, m/s$$