Answer on Question #71139, Physics / Mechanics

Question What is the vertical velocity of a cannon ball launched at ground level after it has achieved a height of 1.3 meters off the ground? (exit velocity of the cannon ball is 200 meters per second at an angle of 45 degrees)

Solution The initial vertical velocity:

$$v_{iv} = v_i \sin 45^\circ = 200 \cdot \sqrt{2}/2 \approx 141.42\, m/s$$

The change of velocity can be found from energy conservation:

$$mv^/2 = mgh$$

$$\Delta v = \sqrt{2g\Delta h} = \sqrt{2 \cdot 9.8 \cdot 1.3} \approx 5.05\, m/s$$

Hence, vertical velocity will be

$$v_v = v_{iv} - \Delta v = 141.42 - 5.05 = 136.37\, m/s$$