Answer on Question #75006, Physics Mechanics Relativity

A 0.45-kg eraser slides off of your stack of books 1.75m above the ground. Like a good physicist, you note that the eraser bounces back up to a height of 1.52m. How much energy is lost during the bounce (in J)? Having lost this energy, how fast does the eraser leave the ground after the bounce?

Solution.

Energy is lost during the bounce

$$\Delta W = W_{before\ bounce} - W_{after\ bounce} = m \cdot g \cdot h_1 - m \cdot g \cdot h_2 =$$
$$= 0.45\ kg \cdot 9.81 \frac{m}{s^2} \cdot 1.75m - 0.45\ kg \cdot 9.81 \frac{m}{s^2} \cdot 1.52m = 1.015\ J\ (\frac{kg \cdot m^2}{s^2})$$

Fast the eraser leave the ground after the bounce is

$$v = \sqrt{2 \cdot g \cdot h_2} = \sqrt{2 \cdot 9.81\ \frac{m}{s^2} \cdot 1.52\ m} = 5.46 \frac{m}{s}$$

Answer: $\Delta W = 1.015\ J\ (\frac{kg \cdot m^2}{s^2}),\ v = 5.46 \frac{m}{s}$