

Falling ball

a)

$$\frac{1}{2}mv^2 = mgh \quad \Rightarrow \quad \frac{1}{2}v^2 = gh \quad v = \sqrt{2gh}$$

$$e = - \frac{v_{fp} - v_{fb}}{v_{ip} - v_{ib}} \quad \begin{array}{l} v_{ip} = 0 \\ v_{fp} = 0 \end{array}$$

$$e = \frac{v_{fb}}{v_{ib}} = \frac{\sqrt{2gh_1}}{\sqrt{2gh_0}} = \sqrt{\frac{2gh_1}{2gh_0}} = \sqrt{\frac{h_1}{h_0}}$$