

Casey Bantman

Show Work 1) Q9)

Step 1: Find E_i :

$$KE_i = 0$$

$$PE_i = mgh + \frac{1}{2}kx^2$$

Step 2: Find E_f :

$$KE_f = \frac{1}{2}mv_f^2$$

$$PE_f = 0$$

Phase 1) up to the edge

$$\Delta KE + \Delta U + \Delta E_{int} = 0$$

$$\frac{1}{2}mv_f^2 + \frac{1}{2}kx^2 = 0$$

$$v_f = \sqrt{\frac{-kx^2}{m}}$$

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Phase 2) after the ball passes the edge

$$\Delta KE + \Delta U + \Delta E_{int} = 0$$

$$\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2 + mgy = 0$$

$$\frac{1}{2}v_f^2 = -gy + \frac{1}{2}v_i^2$$

$$\frac{1}{2}v_f^2 = -gy + \frac{1}{2}\sqrt{\frac{kx^2}{m}}$$

$$v_f = \sqrt{-2gy - \frac{kx^2}{2m}}$$

Phase 1)

Phase 2) The ball after it passes the edge