

Diagram of an inclined plane with a block of mass \$m\$ and spring constant \$k\$. The spring is stretched by distance \$x\$.

Part a)

$$U_{spring} = \frac{1}{2} k x^2 = 0.5 \cdot 100 \cdot (0.1)^2 = 0.5 \cdot 100 \cdot 0.01 = 0.5 \cdot 1 = 0.5 \text{ J}$$

$$U_{gravity} = m g h = m g x \sin \theta = 2 \cdot 9.8 \cdot 0.1 \cdot \frac{1}{2} = 9.8 \cdot 0.1 = 0.98 \text{ J}$$

$$U_{total} = U_{spring} + U_{gravity} = 0.5 + 0.98 = 1.48 \text{ J}$$

Part b)

$$U_{total} = E_p + E_k$$

$$1.48 = \frac{1}{2} m v^2 + m g x \sin \theta$$

$$1.48 = \frac{1}{2} \cdot 2 \cdot v^2 + 9.8 \cdot 0.1 \cdot \frac{1}{2}$$

$$1.48 = v^2 + 0.49$$

$$v^2 = 1.48 - 0.49 = 0.99$$

$$v = \sqrt{0.99} \approx 0.995 \text{ m/s}$$

Part c)

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1) notazione: \$A, B, C, D\$
 - calc: \$cp, 0.08, 0.07, r\$

Diagram showing a vertical spring and a horizontal spring.

$$U_{vertical} = \frac{1}{2} k x^2 = 0.5 \cdot 100 \cdot (0.1)^2 = 0.5 \cdot 100 \cdot 0.01 = 0.5 \text{ J}$$

$$U_{horizontal} = \frac{1}{2} k x^2 = 0.5 \cdot 100 \cdot (0.1)^2 = 0.5 \cdot 100 \cdot 0.01 = 0.5 \text{ J}$$

$$U_{total} = 0.5 + 0.5 = 1 \text{ J}$$

$$E_k = \frac{1}{2} m v^2 = 0.5 \cdot 2 \cdot v^2 = v^2$$

$$1 = v^2$$

$$v = 1 \text{ m/s}$$

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