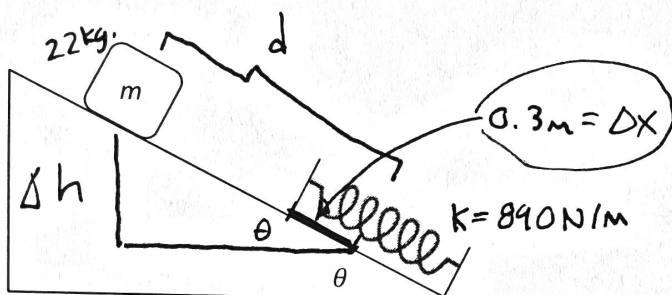


Spring Energy Problem

Name: _____ Date: _____

A 22 kg crate slides from rest down a ramp inclined at 29° to the horizontal onto a spring of force constant 890 N/m. The spring is compressed a distance of 0.30 m before the crate stops. Determine the total distance the crate slides along the ramp. Friction is negligible.

$$v = \emptyset$$



$$E_{ki} + mgh_i + E_{si} = E_{kf} + Mgh_f + E_{sf} \quad \leftarrow \text{energy equation}$$

$$mg\Delta h = \frac{k\Delta x^2}{2}$$

$$mg(d\sin\theta) = \frac{k\Delta x^2}{2}$$

$$\left\{ \begin{array}{l} \frac{\Delta h}{d} = \sin\theta \\ \Delta h = d\sin\theta \end{array} \right.$$

$$d = \frac{k\Delta x^2}{2mg\sin\theta}$$

$$= \frac{(890)(0.3)^2}{2(22)(9.8)\sin 29^\circ}$$

$$d = 0.38 \text{ m} \quad \text{or } 38 \text{ cm. } \checkmark$$