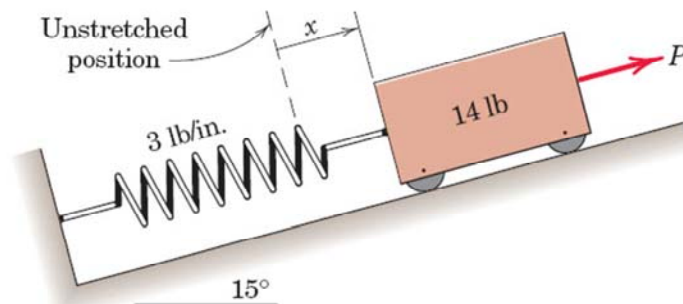


Work and Kinetic Energy: Exercise 1



Under the action of **force P** , the cart moves from initial **position $x_1 = -6$ in** to the final **position $x_2 = 3$ in**.

Determine the **work** done on the cart by (a) the **spring** and (b) the **weight**.

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$$\begin{aligned} \text{(a) } U_{1-2} &= \frac{1}{2} k (x_1^2 - x_2^2) \\ &= \frac{1}{2} (3)(12) \left[\left(\frac{6}{12}\right)^2 - \left(\frac{3}{12}\right)^2 \right] = \underline{3.38 \text{ ft-lb}} \\ \text{(b) } U_{1-2} &= -mgh = -14 \left(\frac{9}{12}\right) \sin 15^\circ \\ &= \underline{-2.72 \text{ ft-lb}} \end{aligned}$$