The block shown is launched down the incline with a speed of 5.25 m/s. Its mass is 0.850 kg. It travels 1.50 m and strikes a spring that is at its equilibrium length. The spring constant is \( k = 420 \text{ N/m} \).

(a) Find the maximum compression of the spring (in cm).

(b) If the spring is compressed 20.0 cm with the block in contact and then released, calculate how far up the incline the block will go. Measure from point A, the equilibrium position of the end of the spring.

\[ m = 0.850 \text{ kg} \]
\[ v_0 = 5.25 \text{ m/s} \]
\[ \mu_s = 0.70 \]
\[ \mu_k = 0.55 \]

At equilibrium:
\[ P_E = 0 \]

\[ -k = (1.5 + x) \sin 25^\circ \]

MANY PEOPLE LOST MUCH CREDIT BECAUSE THEY DID NOT CAREFULLY DEFINE VARIABLES.

Cons. 1. Eqn.
\[ \frac{1}{2} m v_0^2 + 0 = -mg(\cos \theta) + \frac{1}{2} k x^2 + \mu_k mg \cos \theta \cdot x \]

\[ x = \frac{v_0}{\frac{1}{2} \cdot 4.20} \text{ [m]} \]

\[ 11.71 = -3.02x - 5.28 + \frac{1}{2}(420)x^2 + 6.28 + 4.152x \]

\[ 210x^2 + 0.632x + (-10.76) = 0 \]

\[ x = \frac{-0.632 \pm \sqrt{0.395 + 4(210)(10.76)}}{4.20} \]

\[ x = 0.227 \text{ m} \]
SHOW ALL WORK!!!!!
REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!
Use the conversion constants and data given on the front page.

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Measure from point A, the equilibrium position of the end of the spring.

$m = 0.850$
$\mu_k = 0.70$
$\mu_k = 0.55$

Choose $PE = 0$ at point A,

$\frac{1}{2} kx^2 + m g (-x) \sin 25^\circ = m g D \sin 25^\circ + \mu_k m g \cos 25^\circ$

Wrong people got this wrong

$\frac{1}{2} (420) (0.20)^2 - 1.70y = 3.52D + 4.15L + 4.15D$

$8.40 - 1.70y = 3.52D + 0.83 + 4.15D$

$7.67D = 6.86$

$D = \boxed{0.89 \text{ m}}$

Common Errors:
- $W_{friction} = \text{Friction Force} \ (\text{no distance})$
- Spring force taken as constant
- Sloppiness with $PE = 0$
- Signs messed up. [By people who did $\Delta U + \Delta KE$]
- Arithmetic errors