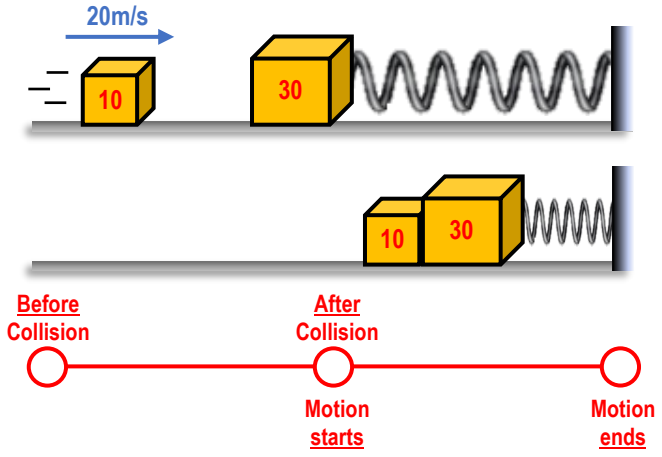
CONCEPT: COLLISIONS WITH SPRINGS

- In collision problems with springs, we use Cons. of Momentum for the collision, Cons. of Energy for the spring part.

EXAMPLE: A 10-kg crate moving with 20m/s to the right on a smooth surface collides and sticks to 30-kg crate initially at rest. After the collision, the crates move together and compress a spring with a spring constant of 500 N/m. Calculate the maximum compression distance of the spring.



CONSERVATION OF MOMENTUM WITH ENERGY

1) Draw Diagrams, label points of interest
(Points of Interest: Before/After Collision, end of motion)
2) Write Momentum & Energy Conservation EQs
3) Plug in values & solve

EQUATIONS

$$m_1 v_{1i} + m_2 v_{2i} = m_1 v_{1f} + m_2 v_{2f}$$

$$K_i + U_i + W_{NC} = K_f + U_f$$

$$U_{el} = \frac{1}{2} k x^2$$

PROBLEM: An 8g piece of sticky clay strikes and embeds itself in a 0.992kg block at rest on a frictionless, horizontal surface. The block is attached to a spring with a spring constant of 5N/m. The impact compresses the spring 75.0 cm. What was the initial speed of the clay?

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