Energy Storage and Transfer Model

- Properties:
  Mass, velocity, height, spring constant
- Representations:
  - Graphical → F v. Δx
  - Diagrammatic → LOL, FBD, Force
  - Mathematical

$$U_s = \frac{1}{2}k(\Delta x)^2 \qquad \Delta E = W = \int \vec{F} \cdot d\vec{r}$$

$$F = \frac{dU}{dx} \qquad K = \frac{1}{2}mv^2$$

$$P = \frac{dE}{dt} \qquad P = \vec{F} \cdot \vec{v}$$

$$\Delta U_g = m a_g \Delta h$$

- Rules of Behavior:
  - Energy is stored in something
    - Objects → deformation or motion
    - Fields
  - Energy changes happen through working, heating, and radiating.
  - Zero point for U_g is arbitrary; use good judgment when choosing.
  - Conservative forces allow energy to be conserved (in "physics world").
  - Non-conservative forces have energy lost to heating (and sounding).