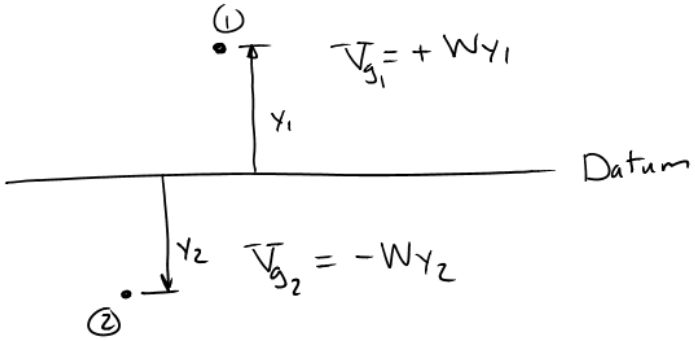
Conservative Force
- Independent of path
- Weights and springs

Nonconservative Force
- Friction and applied forces

Potential Energy
- Gravitational Potential Energy

$V_g = Wy$ — Potential Energy

Distance above or below an arbitrary fixed point (Datum)
=> Above the Datum => Positive
=> Below the Datum => Negative



- Elastic Potential Energy

$V_e = \frac{1}{2} k s^2$ — distance the spring is compressed or stretched

Elastic Potential Energy

- The total potential energy is the sum of the gravitational and elastic potential energies

$V = V_g + V_e$

- Conservation of Energy

$$T_1 + \sum U_{1-2} = T_2 \quad \text{(Principle of Work and Energy)}$$

$$T_1 + \underbrace{\sum U_{1-2}}_{V_1 - V_2}{}_{\text{conservative}} + \sum U_{1-2}{}_{\text{nonconversative}} = T_2$$

$$T_1 + V_1 + \sum U_{1-2}{}_{\substack{\text{nonconservative} \\ \text{Forces}}} = T_2 + V_2$$

Conservation of Energy

If there are no nonconservative forces present

$$T_1 + V_1 = T_2 + V_2$$