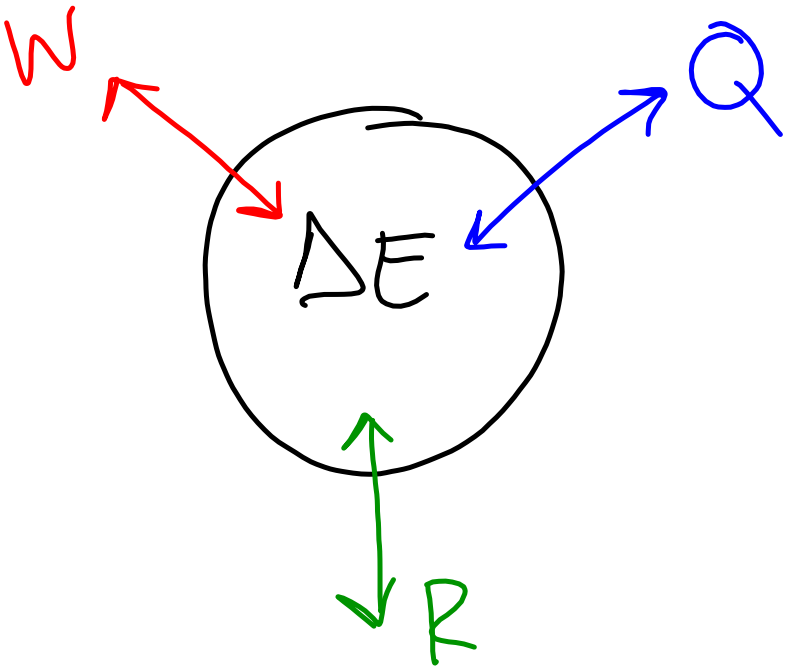
- Ch. 6 in Matter and Interactions
- Equations
  - $U_s = \frac{1}{2}kx^2$
  - $K = \frac{1}{2}mv^2$
  - $U_g = Mg\Delta h$

- Chacterizing Energy
  - Energy is stored in something
  - Stored in an object → movement or deformable object
  - Store in fields

- "Kinds"
  - Kinetic
  - Spring
  - Gravitational potential
  - Thermal → objects have internal motion and structure (E_{th})

- 1st Law of Thermodynamics

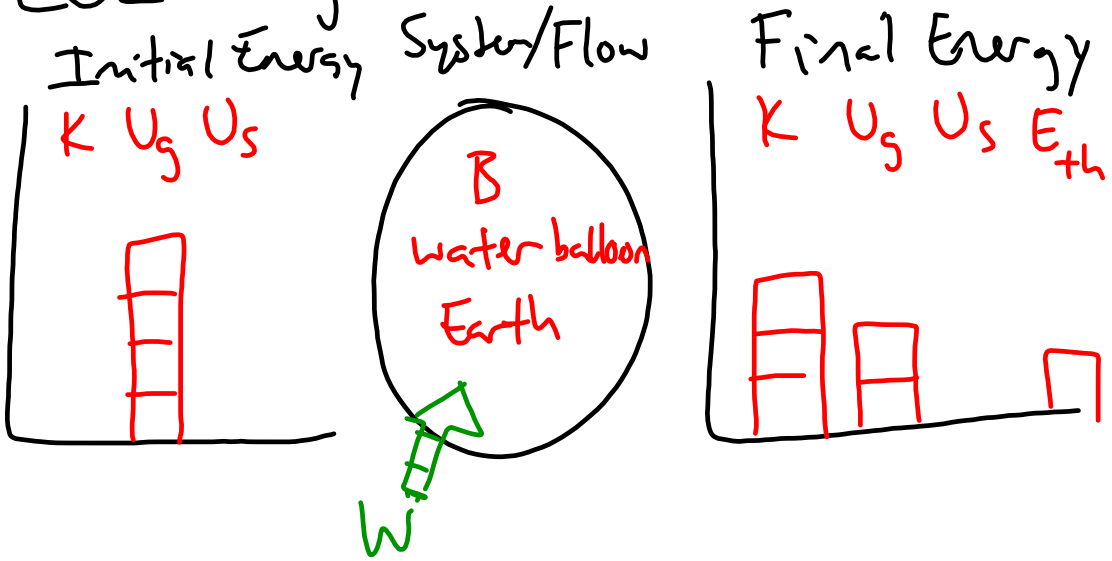


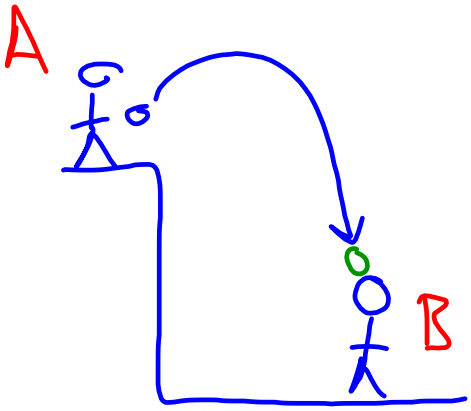
- W → Working: transfer of energy by forces that cause displacement

- Q → heating: energy transfer when differences in temperature exist

- R → radiating: energy transfer associated with electromagnetic radiation

- LOL Diagram





Steps:

1. estabish system.
2. Draw initial energy.
3. Draw working into/out of system.
4. Draw final energy.

- Writing Equation:

$$E_{initial} + W_{in} = W_{out} + E_{final}$$

$$U_{gi} + W_{in} = \emptyset + K + U_g + E_{th}$$

TIPERs

- B4-RT45

Initial U_g = Final K

$mgh = K_f$

F A = C E B D

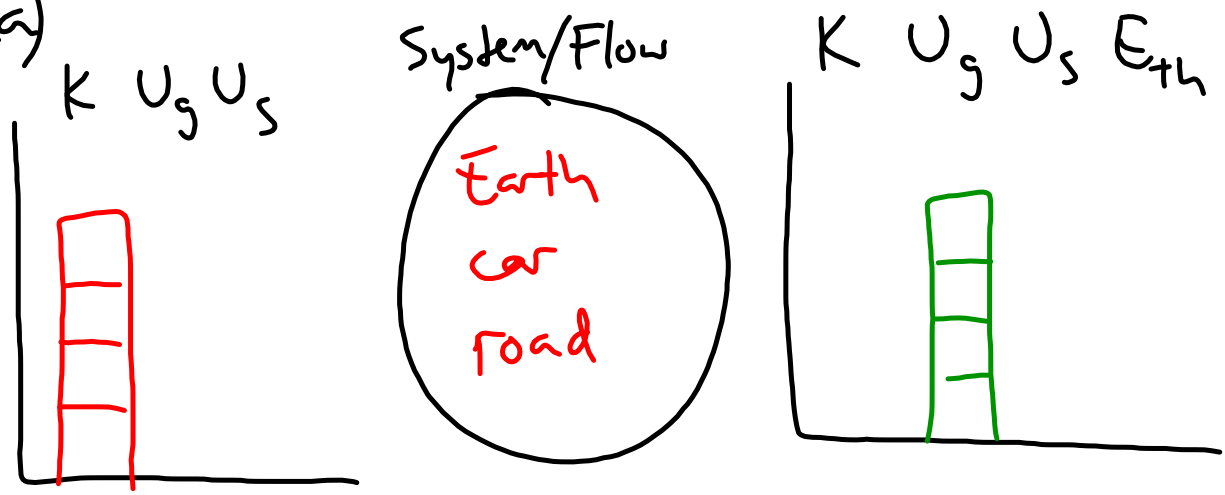
- B4-RT46

The same!

F A=C E B D

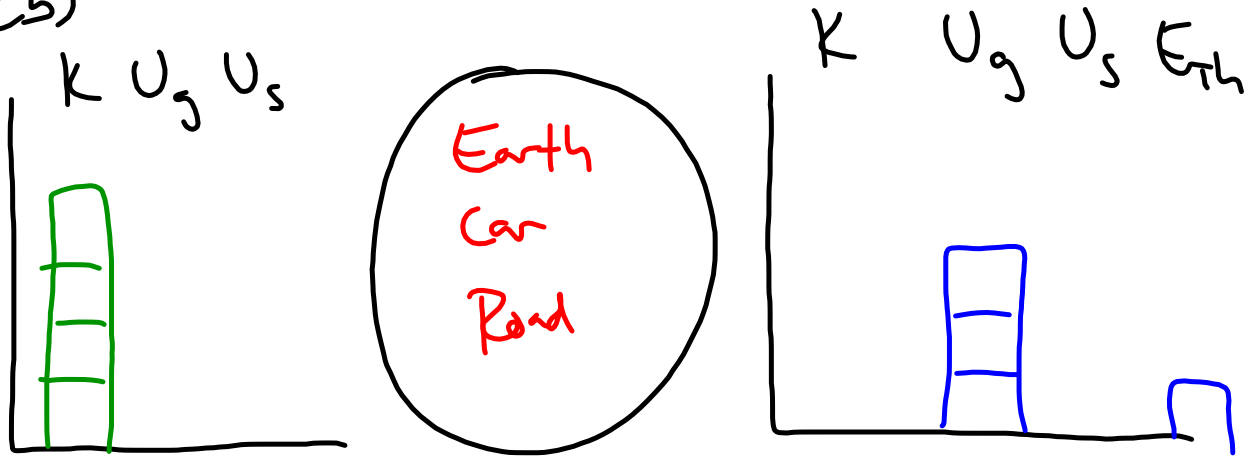
Qualitative Energy Storage and Transfer

2a)



Equation: $K_i = U_{gf}$

2b)



$$K_i = U_{gf} + E_{th}$$

Quantitative Energy Calculations

7)

$$K_i = U_{sf}$$

$$\frac{1}{2} m v_i^2 = \frac{1}{2} k x^2$$

$$x = \sqrt{\frac{m v_i^2}{k}}$$

$$= \sqrt{\frac{(8\,kg)(5\,m/s)^2}{(50\,N/m)}}$$

$$= 2\,m$$

- Gravitational Potential Energy → can be positive or negative, depending on your choice of the Ø point