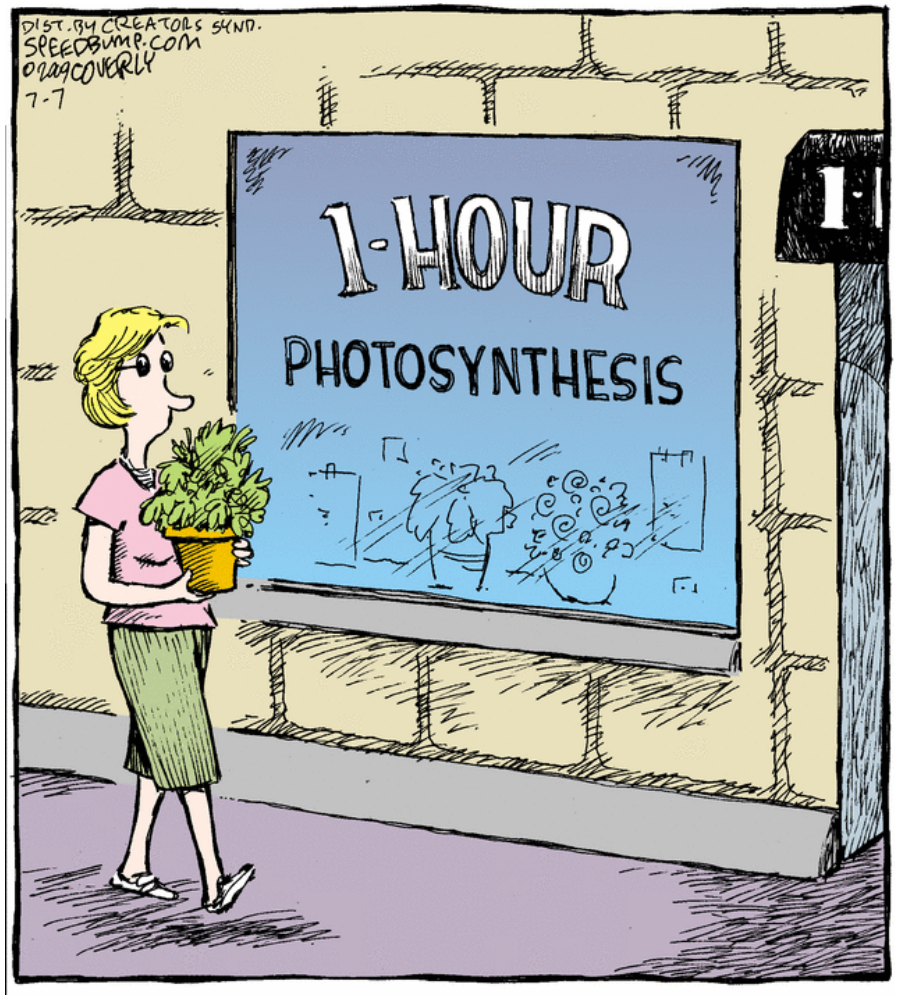
- **Theme Music:**
  Earth, Wind, & Fire

  Energy

- **Cartoon:**
  DaveCoverley

  Speed Bump



Foothold ideas: Potential Energy

- For some forces work only depends on the change in position. Then the work done can be written $\vec{F} \cdot \Delta\vec{r} = -\Delta U$

  U is called a *potential energy*.

- For gravity, $U_{gravity} = mgh$

  For a spring, $U_{spring} = \frac{1}{2}\, kx^2$

  For electric force, $U_{electric} = k_C Q_1 Q_2 / r_{12}$

Foothold ideas: Conservation of Mechanical Energy

- Mechanical energy
  - The mechanical energy of a system of objects is conserved if resistive forces can be ignored.

$$\Delta\left(KE + PE\right) = 0$$

$$KE_{initial} + PE_{initial} = KE_{final} + PE_{final}$$

- Thermal energy
  - Resistive forces transform coherent energy of motion (energy associated with a net momentum) into *thermal energy* (energy associated with internal chaotic motions and no net momentum)