Principles of Physics: Problem Set #8

Energy and Energy Conservation

$$K = \frac{1}{2}\,mv^2 \;;\; E^{\text{tot}} = K^{\text{tot}} + P^{\text{tot}} \;;\; P_g = mgh \;;\; P_{\text{spring}} = \frac{1}{2}kx^2$$

$$E^{\text{tot}}_{\text{initial}} = E^{\text{tot}}_{\text{final}} \quad \text{or} \quad E^{\text{tot}}_{\text{initial}} = E^{\text{tot}}_{\text{final}} + Q$$

Due: Friday Oct. 19 in class

Reading assignment:

for Mon, Ch 6 (pp 103-111) [Energy conservation]
for Wed, Ch 6 (pp 111-113) [Elastic-spring potential energy]
for Fri, Ch 6 (pp 113-118) [Internal energy and friction]

Problem assignment:

(WARNING - The problem naming/numbering scheme in the text is confusing, so ALWAYS double check whether a problem is guided review (**GR**), skill building (**SB**), **Synthesis**, etc.)

CHAPTER 6

SB-5 (pg 128 ... mass on a spring I)
SB-12 (pg 129 ... falling stone)
SB-13 (pg 129 ... vertical ball toss)
SB-16 (pg 129 ... mass on a spring II)
SB-19 (pg 130 ... energy transformation and force diagrams)
SB-27 (pg 131 ... sledding downhill)

GR-17,18 (pg 127 ... projectile motion using energy conservation; note that at the highest point the vertical component of the velocity is zero)

Bonus: Synth.-5 (pg 133 ... ballistic pendulum ... answer is $v = \left(\frac{m+M}{m}\right)\sqrt{2gH}$)