SP 212 Worksheet
Lesson 26: Ch. 30.2, Induction & Energy Transfer

1) A metal rod is forced to move with constant velocity along two parallel metal rails, connected with a strip of metal at one end. A magnetic field of magnitude $B = 0.50 \text{T}$ points out of the page. (a) If the rails are separated by $L = 20 \text{ cm}$ and the speed of the rod is $v = 58 \text{ cm/s}$, what is the magnitude of the emf generated in volts? (b) If the rod has a resistance of $18 \Omega$ and the rails and connector have negligible resistance, what is the current in amperes in the rod? (c) At what rate is energy being transferred to thermal energy?

*Hint: Remember that $P = \vec{F} \cdot \vec{v}$, and that power is a rate of energy transfer!*

2) A long rectangular conducting loop of width $L = 13 \text{ cm}$, resistance $R = 9.2 \Omega$, and mass $m = 0.12 \text{ kg}$, is hung in a horizontal, uniform magnetic field of magnitude $1.4 \text{T}$ that is directed into the page and that exists only above the horizontal dashed line. The loop is then dropped; during its fall, it accelerates until it reaches a certain terminal speed $v_t$. Ignoring air drag, find the terminal speed.

*Hint: At the terminal speed, $\vec{F}_{\text{net}} = 0!$*