Tuesday Reading Assessment: Unit 4, Field Induction and Inductance

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1 Memory Bank

- $\epsilon = -N\Delta\phi_m/\Delta t$ ... Faraday's Law
- $\frac{\epsilon_2}{\epsilon_1} = \frac{N_2}{N_1}$ ... Transformer equation.

2 Transformers

1. Consider Fig. 1, which depicts a *transformer*. There are two solenoids, the *primary* and *secondary* solenoid. Using Faraday's law, convince yourself that
$$\frac{V_p}{V_s} = \frac{N_P}{N_S} \tag{1}$$
This is because the flux is the same through each solenoid.

2. A battery charger meant for a series connection of ten nickel-cadmium batteries (total emf of 12.5 V DC) needs to have a 15.0 V output to charge the batteries. It uses a step-down transformer with a 200-loop primary and a 120 V input. (a) How many loops should there be in the secondary coil? (b) If the charging current is 16.0 A, what is the input current?

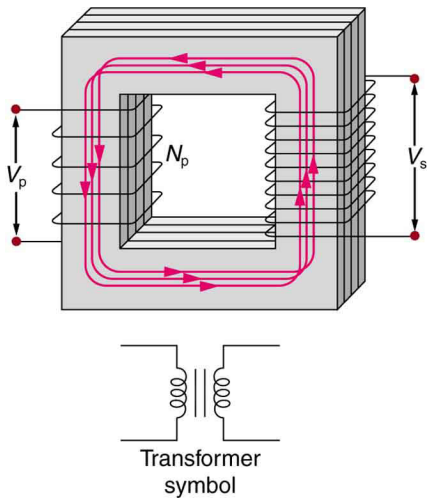

Figure 1: A basic diagram of a transformer with primary and secondary coils. The iron core magnetizes and transfers flux from one coil to the other.