Quiz 9

Phys 296: Summer, 2015

1. State and briefly explain Faraday's Law. (5pt)

$$\mathcal{E} = -N\frac{d\Phi}{dt}$$

2. For the setup in Figure 1, when you move the bar magnet from the right to the center of the coil, the voltmeter reads a positive voltage.

When you move the bar magnet from the center of the coil to the left, does the voltmeter read a positive or negative voltage? When you move the bar magnet from left back to the center of the coil, does the voltmeter read a positive or negative voltage? (5pt).

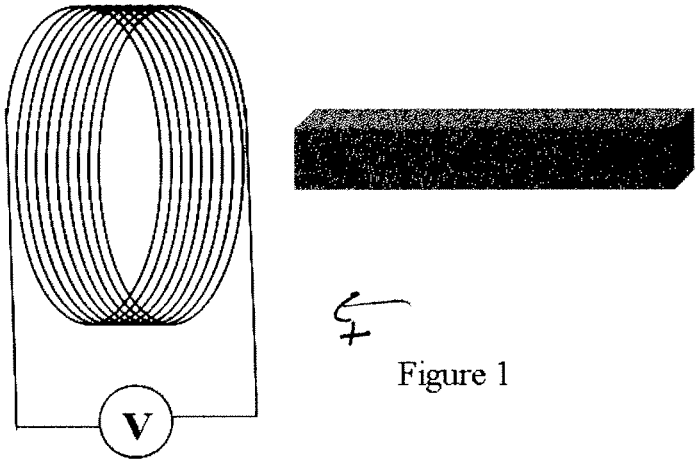

Figure 1

a) Neg

b) Pos

3.When you move the bar magnet faster through the coil, does the induced voltage increase or decrease in magnitude?(5pt)

increases due to $\Rightarrow \frac{d\Phi}{dt}$

4. A magnet with B=0.5T is moved across a coil of wire. What is the Voltage produced if the radius of the loop is 15cm? (5pt)

$v = 1\,m/s$

$$\mathcal{E} = -N\frac{d\Phi}{dt} \qquad \Phi = BA \qquad \frac{d\Phi}{dt} = B\frac{dA}{dt} \text{ or } \frac{dB}{dt}A$$

$$\frac{dB}{dt} = \frac{dB}{dx}\frac{dx}{dt} = \frac{dB}{dx}v \propto B_0 v$$

So $\mathcal{E} = -N B_0 v A \rightarrow -B_0 v A \qquad A = \pi r^2$

$$\mathcal{E} = -B_0 \pi r^2 v \qquad \mathcal{E} = -0.5 \cdot \pi \cdot (15cm)^2$$