Name_____

**Phys 2020 (NSCC), Spring 2008**
Problem Set #6

1. The plane of a rectangular coil, 5.0 cm by 8.0 cm is perpendicular to the direction of a magnetic field B. If the coil has 75 turns and a total resistance of $8.0\,\Omega$, at what rate must the magnitude of B change to induce a current of 0.10 A in the windings of the coil?

2. A 100–turn wire coil of area 0.040 m^2 rotates about a vertical axis at 1500 rev/min, as shown at the right. The horizontal component of the Earth's magnetic field at the location of the loop is 2.0×10^{-5} T. Calculate the maximum emf induced in the coil by the Earth's field.

20 cm

20 cm

ω
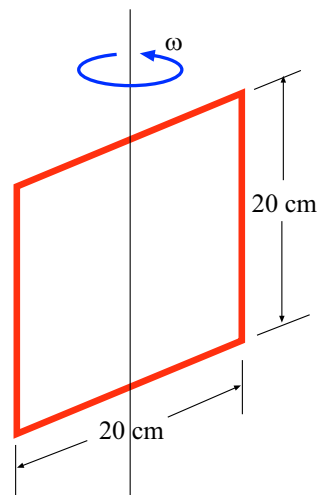
3. In the figure at the right the magnet is being moved toward the loop. Find the direction of the current through the resistor R and justify the answer with Lenz's law.
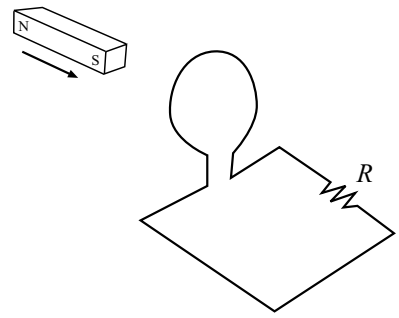
4. A coil has an inductance of 3.0 mH, and the current in it changes from 0.20 A to 1.5 A in 0.20 s. Find the magnitude of the average induced emf in the coil during this period.

5. A solenoid of radius 2.5 cm has 400 turns and a length of 20 cm. Find (a) its inductance and (b) the rate at which current must change through it to produce an emf of 75 mV.

6. (a) If an inductor carrying a 1.70 A current stores an energy of 0.300 mJ, what is its inductance? (b) How much energy does the same inductor store if it carries a 3.0 A current?

7. A microwave oven generates electromagnetic waves of frequency 2.45 GHz. Find the wavelength of these waves.

8. What are the wavelength ranges in (a) the AM radio band (540 – 1600 kHz) and (b) the FM radio band (88– 108 MHz)?