1. A small light rests on the bottom of a swimming pool 1.6 meters deep. Though the light radiates uniformly in all directions, from above the light emerging from the water (n=1.34) surface forms a circle. What is the diameter of the circle? (Hint- total internal reflection limits the size of the circle that emerges from the water surface into air.)

You should expect problems involving refraction and/or total internal reflection. This is only one example.

2. A) 10 rectangular loops (25 cm by 10 cm) with a total resistance of $\frac{1}{2}$ ohm are being pulled from right to left into the magnetic field which points into the page. In what direction is the induced current?

B) Find the current in the resistor if you start with the area completely out of the field and have moved it completely into the field (a length of 10 centimeters) at a constant speed over a time of .01 seconds.

C) Using conservation of energy and realizing that you must put in all of the energy that is dissipated in the resistance (which is (power x time)) by doing work, find what force you must apply to move the loops into the field.
3. For the pictures shown mark the direction of the missing vector (v, F, or B) in the \[ \mathbf{F} = q \mathbf{v} \times \mathbf{B} \] equation.

Examples of these kind of questions are in the book and homework so no new ones are shown here.

4. A positive ion and a negative ion with the same mass and the same magnitude charge but of course with opposite signs are fired into a constant magnetic field of 0.1Tesla. The mass of each is \(6.68 \times 10^{-27}\) kg and their charges are 2 electronic charges (2 x \(1.6 \times 10^{-19}\) coulomb). If they pass though a velocity selector with E= 10000 nt/C, and B=.0.1Tesla, show the direction they each bend, and their separation when they hit the “wall” of the chamber.

5. Given the straight wire-loop arrangements shown, with the loop current directions shown indicate whether the line current is increasing, decreasing or remaining constant.

(These are similar to those discussed in class. i.e – Straight wire carrying current either increasing or decreasing next to a closed loop of wire which experiences an induced current.)