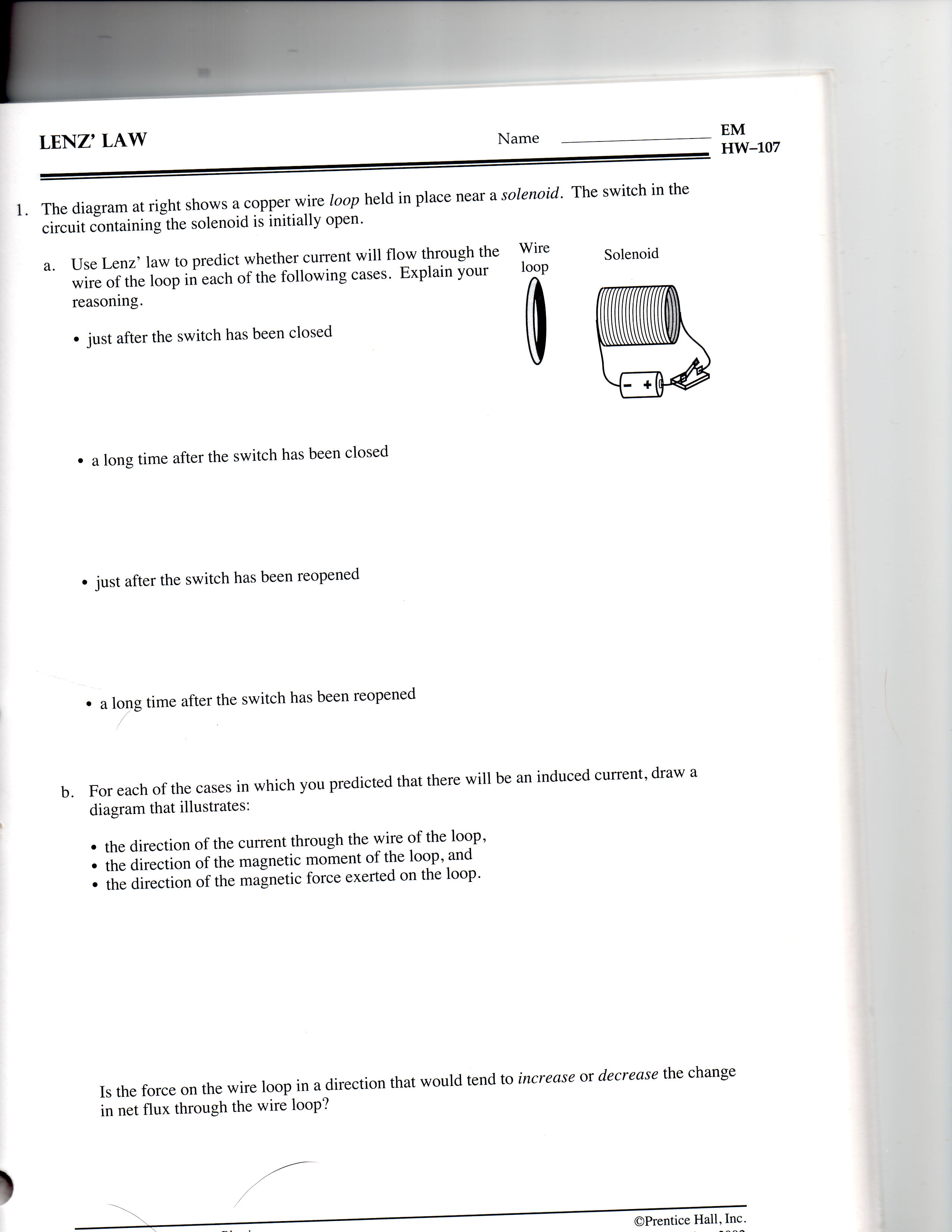
PY212

**Discussion Worksheet 8**

Please work with your partners on the following exercises.

1. In the diagram to the right you have a copper wire *loop* held in place near a *solenoid*. The switch in the circuit is initially open.

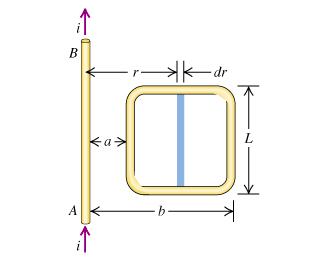


1. Use Lenz’s Law to predict whether current will flow through the wire of the loop in each of the following cases. Please explain your reasoning.

* just after the switch has been closed
* a long time after the switch has been closed
* just after the switch has been reopened
* a long time after the switch has been reopened

1. For each of the cases in which you predicted that there will be an induced current, draw a diagram that illustrates:
   * The direction of the current through the wire of the loop
   * The direction of the magnetic moment of the loop
   * The direction of the magnetic force exerted on the loop
2. Suppose the loop was made of *wood* instead of *copper*.

* Would there still be an emf in the loop? Explain.
* Would there still be a current induced in the wood loop? Explain.

2. A time-dependent current  in a long wire *AB* with resistance *R* is directed upward as shown in the figure and increasing at a rate . Answer the following questions about the rectangular loop a distance *a* away from the wire.

1. At an instant when the current in the straight wire is *i*, what is the magnitude and direction of the magnetic field a distance *r* away?
2. What is the flux through the narrow shaded stripe in the figure?
3. What is the total flux through the rectangular loop?
4. In order to have an *emf* there must be flux changing with time. What is changing with time in this problem? How would this be different if instead the loop was moving?
5. What is the induced emf in the loop? What is the direction of the induced current?
6. Which of your previous answers would change if instead the current were decreasing, i.e. negative , instead of increasing?