

Principles of Physics II (PHY 112)
Spring 2004

Exam 3

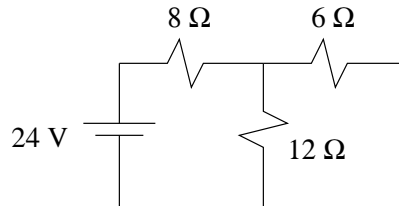
Question 1 (4 points) Draw a loop of wire in the plane of the page. Imagine that a magnetic field is pointing into the page, but decreasing. In what direction is the induced magnetic flux? In what direction is the induced emf? How do you know?

Question 2 (4 points) An electron moves south in a magnetic field that points west. Does the electron feel a force? If so in what direction? Draw a picture showing the subsequent motion of the electron.

Question 3 (4 points) Consider four identical light bulbs, and suppose that they are Ohmic. Two of these light bulbs are given to Paul, and two are given to Sarah. Paul connects his two light bulbs in parallel and then connects the parallel combination to a battery. Sarah connects her two light bulbs in series and then connects the series combination to an identical battery. Which circuit produces more light? By what factor is the intensity of the brighter circuit higher than the intensity of the dimmer circuit? Explain how you know.

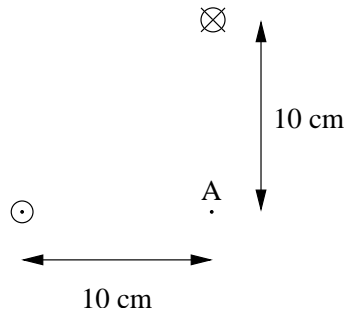
Question 4 (4 points) Consider a circular loop of current. Draw a picture of this loop of current and sketch the magnetic field (or magnetic field lines) produced by the current.

Problem 1 (8 points) Analyze the circuit below. Give the voltage across each resistor and the current through each resistor in the box provided.



	Voltage across	with high potential on which side? (left, right, top, bottom)	Current through	with current flowing toward what direction? (left, right, up,down)
8 Ω				
12 Ω				

Problem 2 (8 points) Two wires carry current. Each carries the same current of 3 A. The lower wire carries current out of the page. The upper wire carries current into the page. What is the magnitude and direction of the magnetic field at point A? You may assume that the three locations in the figure form a right triangle.



Problem 3 (8 points) Thirty turns of wire are wrapped into a coil 20 cm in diameter. The diameter of the wire is 0.1 cm. A magnetic field perpendicular to the plane of the coil points toward an observer (you). The magnetic field changes from 0.5 T to 0.2 T over a period of 6 s. Find the magnitude and direction of the induced emf.