PHYS 102 Midterm examination #2 (Sample 2A)

November 19, 2004 Name_____

Time: 50 minutes Student No._____

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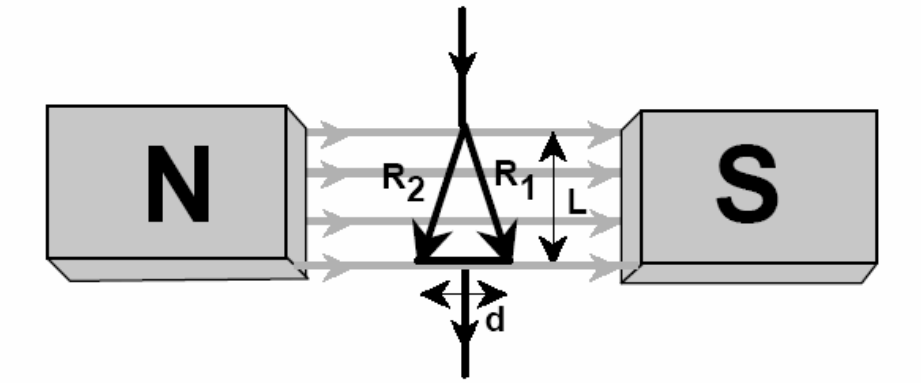
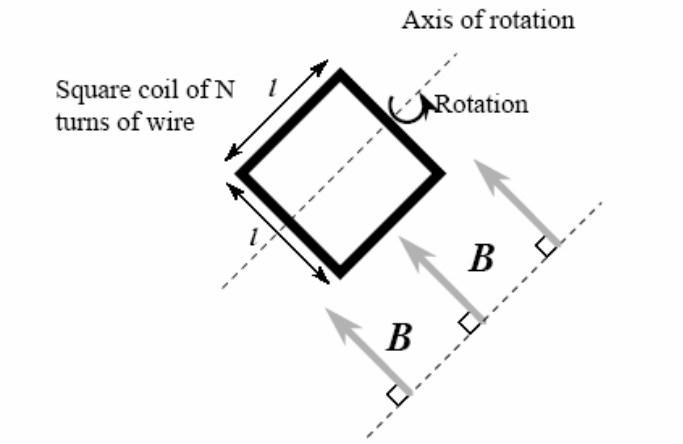
1(5/20 marks). The diagram below depicts a wire carrying a current I=4.00A. The wire splits into two channels; of resistance R_2=9.00 and R_1=5.00, and rejoins forming a current loop in the shape of an isosceles triangle with base distance d=8.00cm and height L=16.0cm. The loop is entered into the space between the two poles of a magnet with a uniform magnetic field, B=0.060T, that runs from one pole to the other. The loop is placed such that the field lies in the plane of the loop. What is the torque on the circuit about the wire's axis?



2(5/20 marks). What is the peak emf produced by a 50 turn square coil (of side l=10.0cm, as shown in the diagram below) rotating on an axis with a frequency of 30.0Hz in a uniform magnetic field of 0.750T perpendicular to the coil's axis of rotation?



3(5/20 marks). A woman stands between a vertical mirror 0.600m tall and a distant tree whose height is H. She is 3.00m from the mirror, and the tree is 18.0m from the mirror. If she sees the tree just fill the mirror, how tall is tree?

4(5/20 marks). An apple is placed 12.0cm in front of a diverging lens with a focal length of magnitude 25.0cm.

(a) What is the image distance i to the image of the apple through this lens?

(b) What is the magnification of the image of the apple?

(c) Use a ray diagram to verify your results of (a) and (b).