**Worksheet 8.4 - Electromagnetic Induction**

1. A magnetic field (B=3.2x10-3 T) passes perpendicular through a circular loop of wire (radius = 5.0 cm). What is the magnetic flux through the loop?

2. A circular coil (200 turn radius of 6.0 cm) is rotated in a uniform magnetic field (B = 3.6x10-4 T) At t = 0 the coil is perpendicular to the field and at t = 0.015s the coil is parallel to the field what is the average emf induced in the coil?

3. A square loop of wire with an area of 2.5x10-3 m2 is perpendicular to a uniform magnetic field (B = 2.2x10-2 T).If the square collapsed to an area of essentially 0 m2 in a time of 0.100 s as shown in the diagram what is the average induced emf as it is collapsed and what is the direction of the induced current? (Remember to use conventional current)

X X X X

X X X X

X X X X

X X X X

X X X X

X X X X

X X X X

X X X X

4. Find the average emf induced in a circular coil (50 turns radius of 0.050 m) if the magnetic flux through the loops is changing at a rate of 15.0 Wb/s?

5. A square coil (100 turns area of each square loop = 4.0x10-3m2) is perpendicular to a uniform magnetic field. When the coil is rotated through 90o in 0.12 s, the average induced emf is 0.92 V. What is the magnetic field strength?

6. A circular coil (10 turns, diameter = 25 cm) is placed perpendicular to a uniform magnetic field (B = 2.7 x 10-3 T). If the direction of the magnetic field is reversed in 0.30s, what is the average emf induced in the coil?

7. A magnet is quickly removed from a circular coil (25 turns, area = 5.0 x 10-3 m2) changing the magnetic field within the coil at a rate of 0.40 T/s. What is the average emf induced in the coil?

8. A square loop of wire (area= 7.2 x 10-3 m2) has a resistance of 12.0Ω. Assume that the magnetic field drops uniformly from 1.6 T to zero in 0.050 s as the loop is pulled from the magnetic field.

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1. What is the average emf induced in the loop?
2. What is the current induced in the loop?
3. What is the direction of the **electron flow** in the loop?

9., A square loop of wire (4.0 cm per side) is placed in a magnetic field (B= 0.20 T).

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The magnetic field is increased to 0.50 T in 0.30 s.

1. Find the current through the loop if the resistance of the loop is 2.0 Ω.
2. Find the direction of the **electron flow** through the loop.

**Answers:**

1. (2.5x10-5 Wb)`
2. (5.4x10-2 V)
3. (5.5x10-4 V clockwise)
4. (750 V)
5. (2.8 x 10 –1 T)
6. (8.8 x 10-3 V)
7. (5.0 x 10-2 V)
8. a. (2.3 x 10-1 V) b. (1.9 x 10-2 A) c. (clockwise)
9. a. (8.0 x 10-4 A) b. (counter-clockwise)