

# **IND Worksheet**

Revised March 30, 2017

**Your Name:** \_\_\_\_\_ **Signature:** \_\_\_\_\_

**Lab partner(s):** \_\_\_\_\_

**Course & Section:** \_\_\_\_\_ **Station #** \_\_\_\_\_ **Date:** \_\_\_\_\_

---

## **1. For section D.2.2, with the rectangular coil:**

What was the largest (positive or negative) induced EMF you found for:

- i. motion of the coil outside the magnet, about 40 cm away: \_\_\_\_\_
- ii. motion over the magnet with coil ends kept from crossing the boundary: \_\_\_\_\_
- iii. 40 cm-to-center motion: \_\_\_\_\_ ; center-to-40 cm: \_\_\_\_\_

Explain why the sign of the EMF change between these two directions.

Record the values of the integrals for each part of the motion (*Don't forget units.*):

40 cm-to-center motion: \_\_\_\_\_ ; center-to-40 cm: \_\_\_\_\_

Why should these two integrals be equal in magnitude and opposite in sign.

**Remember to attach a copy of your *LoggerPro* scan for measurement iii.**

- iv. Record the maximum magnitude of the EMF for your two other speeds?

Motion 40 cm to center: slower: \_\_\_\_\_ faster: \_\_\_\_\_

motion center to 40 cm: slower: \_\_\_\_\_ faster: \_\_\_\_\_

Explain why the magnitude changed with speed.

Record the value of the integral over time of the EMF for

fast motion: \_\_\_\_\_ slow motion: : \_\_\_\_\_

Are the integrals for the two different speeds the same? Should they be? Explain why or why not.

v. Record the values of the integrals for:

moving the coil onto the magnet: \_\_\_\_\_ lifting it up and back: \_\_\_\_\_

Are these values equal but opposite? Is this behavior expected? Explain why or why not.

**2. For section D.3 with rotating coils:** (*Attach a copy of the printout as requested.*)

Record the values of the integrated areas for the  $90^\circ$  flips? (*average of two values*)

Fast: \_\_\_\_\_ Slow: \_\_\_\_\_

Record the average time integral for your four  $180^\circ$  flips. \_\_\_\_\_

Determine the strength of the magnet from these flips. \_\_\_\_\_

**3. Section D.4 - Coupled Circuits**

Explain the shape of the induced waveform in relation to the input waveform.

What are the EMFs for the coils with different number of turns at 20Hz?

16 turn: \_\_\_\_\_ 160 turn \_\_\_\_\_ 1600 turn \_\_\_\_\_

Compare this behavior to theory.

**GRADE:** \_\_\_\_\_  
(out of 30 points)

**GRADED BY** \_\_\_\_\_  
(TA's initials)