Induction Practice Name:_____

Reflection and Self-Assessment

Completion: Circle the statement that best describes the completion of this practice.

- I completed every question on the practice.
- I did not complete some questions on the practice because:

_____

Answer Checking: Circle the statement that best describes how you checked your answers

- I checked all my answers against the key at the back and corrected any that were incorrect.
- I did not check all my answers and correct any mistakes because:

_____

Online Worked Solution: Circle the statement that best describes how you used the online worked solutions.

- I did not use the online worked solution at all.
- I used the online solution to understand some questions I got incorrect.
- I used the online solution to help me learn how to answer some questions.

Confidence: Circle the statement that best describes your confidence in answering questions of this type in the future.

- I am confident I can answer nearly any question of this type correctly without using notes or other assistance.
- I am confident I can answer **MOST** questions of this type correctly without using notes or other assistance.
- I am **NOT** confident I can answer most questions of this type correctly without using notes or other assistance.

Time: Circle the statement below that best describes the total amount of time you spent actively working on this practice:

Less than an hour	Between one and two hours	Between two and three hours	Between three and four hours	More than four hours

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1. A magnet moved in the vicinity of a solenoid as shown. Draw the direction of conventional current generated.

a.

b.

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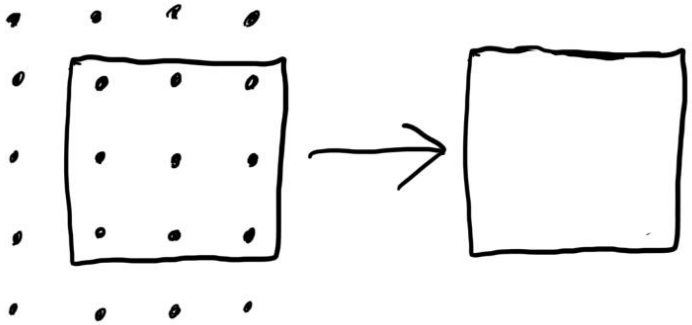
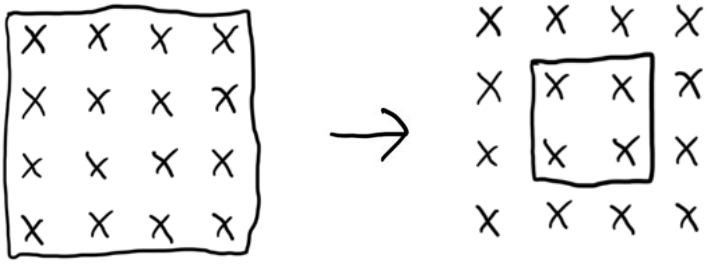
2. For each of the following:

- Describe the change in magnetic flux (e.g. more into the page)
- Give the direction of the electric field that would oppose that change in flux
- Give the direction (clockwise or counter clockwise) that current would flow in the loop.

a.



b.



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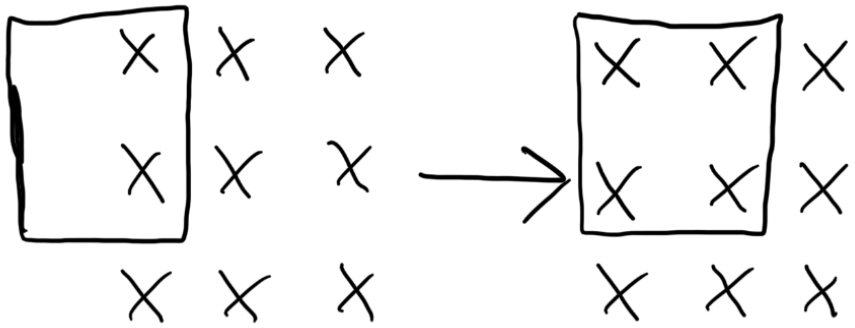
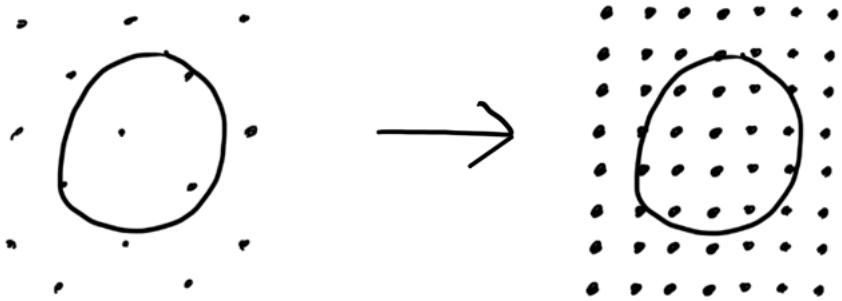
c.



d.



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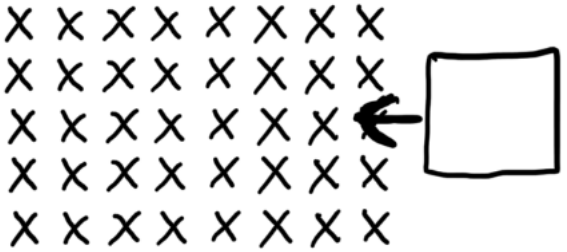
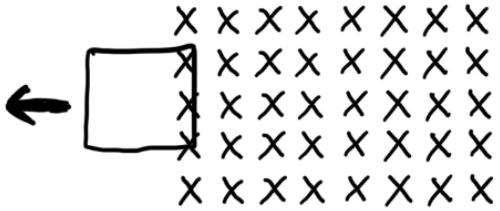
3. A loop of wire is moved as shown over a fixed permanent magnet which generates a magnetic field pointed into the page.

   a. Draw the direction of conventional current generated as the loop enters the magnetic field.



   b. Draw the direction of conventional current generated as the loop leaves the magnetic field.



   c. While the loop is moving through the uniform magnetic field is any current generated?

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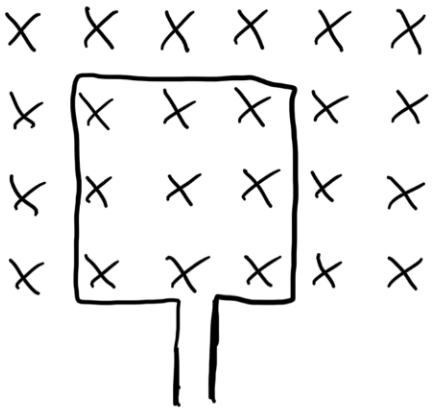
4. A coil of wire initially perpendicular to a magnetic field as shown is rotated to being parallel to the field and so the flux drops to zero.



   a. As it is rotating which direction will conventional current flow in the wire.

   b. Label the two ends of the wire as positive and negative.

   c. If the magnetic field strength is 0.023 T, the area of the coil is 0.025 m^2 and it takes 0.015 seconds to rotate from perpendicular to parallel what will the EMF induced by each loop be?

   d. What will the total EMF induced be if there are 250 loops of wire in the coil?

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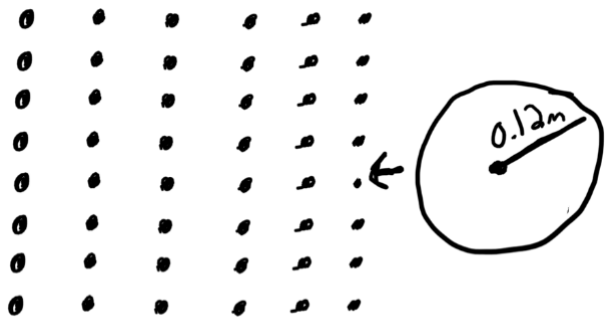
5. A circular loop of wire of radius 0.12m enters a 0.026 T magnetic field directed out of the page as shown.



   a. What is the area of the loop?

   b. What is the flux of the loop when it is fully in the magnetic field?

   c. What is the induced EMF in the loop if it takes 0.23 seconds for the loop to move from fully out of to fully in the magnetic field?

   d. Draw the direction current will flow in the loop.

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6. A coil of 35 loops of wire with area of 0.25 square metres is perpendicular to a 0.085 T magnetic field and is rotated so that it is parallel to the field in 0.017 seconds.

    a. During that time what is the EMF generated?

    b. If the wire is connected to a lightbulb that has resistance of $15\ \Omega$, how much current will flow through the wire (Remember $V = IR$)

7. A coil of 250 loops of circular wire with radius of 0.26 metres is perpendicular to a magnetic field of strength 0.52 T, the magnetic field strength is slowly decreased to 0.23 T in 15.0 seconds.

    a. During that time what is the EMF generated?

    b. If the wire is connected to a lightbulb that has resistance of $8.0\ \Omega$, how much current will flow through the wire?

    c. How much power is the lightbulb drawing? (Remember $P = VI$)

    d. How much electrical energy is generated in those 15 seconds? $\left(P = \frac{W}{t}\right)$

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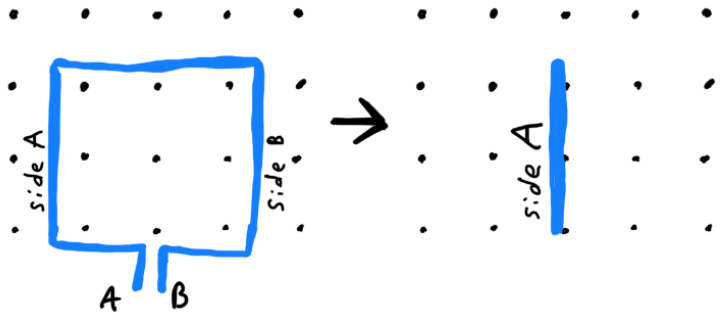
8. A coil of wire of area 0.152 square metres is initially perpendicular to a magnetic field of strength 0.272 T directed out of the page.

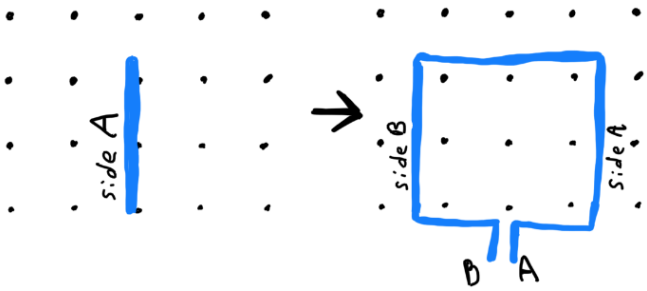
   a. It rotates so that side A lifts out of the page and side B rotates into the page until the coil is parallel to the field and the flux becomes zero.

      Label the direction current is flowing in the wire and label the A and B ends of the wire as being either positive or negative during this rotation.



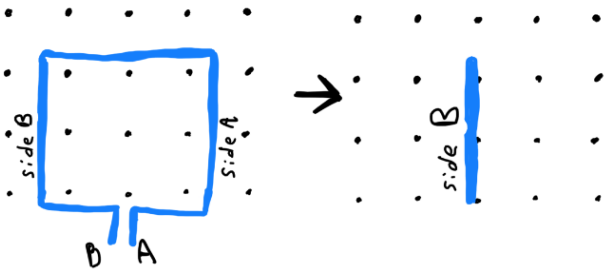
   b. After the coil is parallel to the field it continues to rotate until it is perpendicular to the magnetic field again.

      Label the direction current is flowing in the wire during this rotation.



   c. The coil continues its rotation until it is parallel with the field with side B on top.

      Label the direction current is flowing in the wire rotation.



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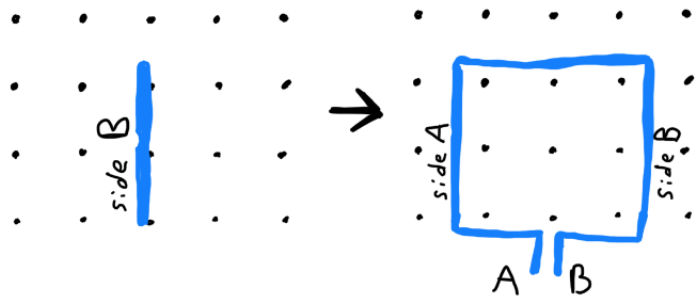
d. The coil rotates until it is back to its original position.

Label the direction current is flowing in the wire during this rotation.



e. As the coil spins describe how direction of the electric current charges throughout the rotation.

f. If the coil spins at 30 rotations per second how many times does the direction of the current change per second?

g. If the coil spins at 30 rotations per second what is the average EMF during each quarter rotation?

h. If the wires are connected to a 12 Ω lightbulb what will the average current flowing through the wires be?

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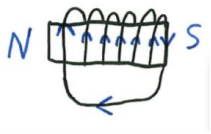
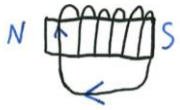
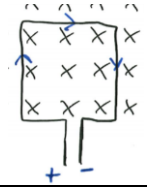
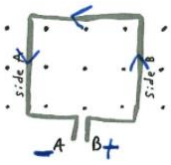
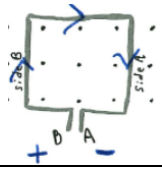
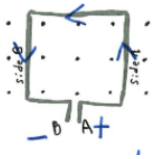
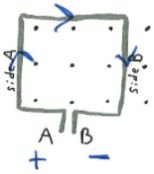
Answer Key				
1a) 	1b) 	2a)CHANGE:Less flux out of page DIRECTION OF OPPOSITIONAL FIELD: out of page DIRECTION: Counter clockwise	2b)CHANGE:Less flux into page DIRECTION OF OPPOSITIONAL FIELD: into page DIRECTION: Clockwise	2c)CHANGE: More into page DIRECTION OF OPPOSITIONAL FIELD: out of page DIRECTION: Counter clockwise
2d)CHANGE:More flux out of page DIRECTION OF OPPOSITIONAL FIELD: into page DIRECTION: Clockwise	3a) Counterclockwise	3b) Clockwise	3c) No	4a) Clockwise
4b) 	4c) 0.038 V	4d) 9.6 V	5a) 0.045 m^2	5b) 0.0012 Tm^2
5c) 0.0051 V	5d) Clockwise	6a) 44V	6b) 2.9 A	7a) 1.0 V
7b) 0.13 A	7c) 0.13 W	7d) 2.0 J	8a) 	8b) 
8c) 	8d) 	8e) Half the rotation the current flows in one direction, other half the other direction	8f)60 times per second	8g)4.96 V
8h) 0.41 A				

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