

Name: \_\_\_\_\_

DISC: \_\_\_\_\_

Score: \_\_\_\_ / 20

## Instructions:

- Do your own work.
- Answer the questions below in the space provided.
- Make sure you show all your work and any equations that you use.
- Please place a box around your answers.
- Remember to give the correct units with all numerical answers

Q1

Q2

Q3

Q4

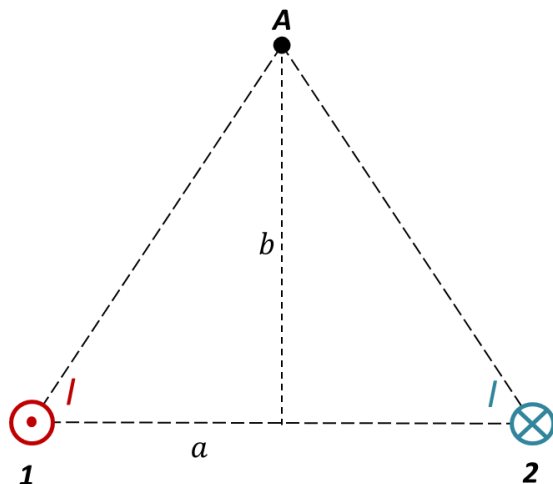
10

5

5

5

1. Consider the two parallel wires shown in the diagram below. Each wire carries the same current  $I$

 $B$  from a wire

$$B = \frac{\mu_0 I}{2 \pi r}$$

FORCE

$$F = IBL$$

MAGNETIC FLUX

$$\Phi = BA \cos \phi$$

## For Problem 1

 $a$ 

0.4 m

 $b$ 

0.8 m

 $I$ 

0.4 A

 $\mu_0$  $4\pi \times 10^{-7} \text{ T m/A}$ 

## Useful Information for All Problems

Direction 1 (2 pts):

- a. At point **A** draw and label the direction of the magnetic field *from wire 1* on the diagram.

Direction 2(2 pts):

- b. At point **A** draw and label the direction of the magnetic field *from wire 2* on the diagram.

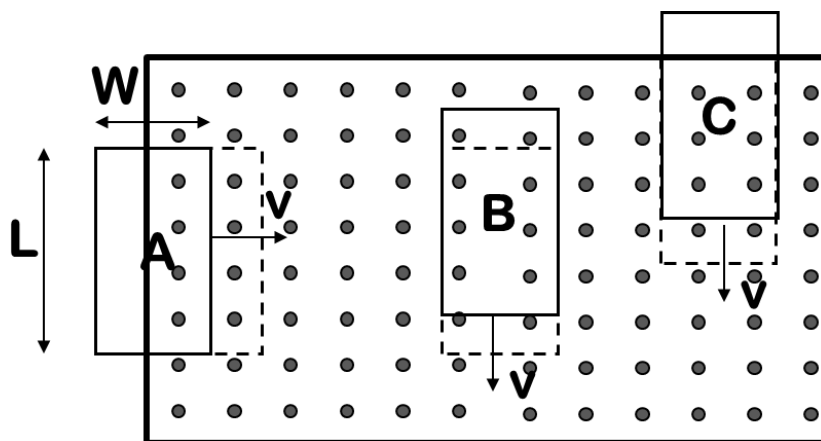
Direction 2(2 pts):

- c. At point **A** draw and label the direction of the *total magnetic field* on the diagram.

Magnetic field (4 pts):

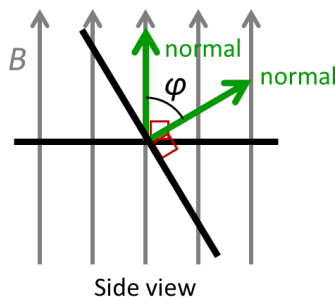
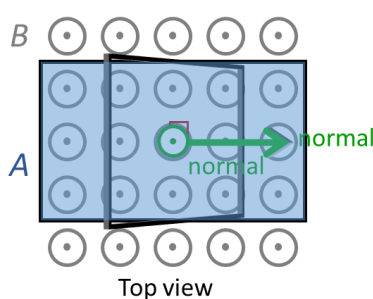
- d. Calculate the *total magnetic field* at point **A**. *Show all of your work.*

2. Each current loop moves through a magnetic field as shown. Which loop experiences the greatest induced EMF and why?



Choice &  
Explanation (5 pts):

3. A loop starts at  $t = 0$  s with its normal parallel to a constant magnetic field and rotates with constant angular velocity as shown in the diagram:



	For Problem 2
Angular Velocity	$\omega = 2 \text{ rad/s}$
Area	$A = 0.02 \text{ m}^2$
Field	$B = 0.08 \text{ T}$
Radians to Degrees	$180^\circ = \pi$

Initial Flux (1 pts):

- a. What is the flux through the loop just before the loop starts to rotate?

Final Flux (1 pts):

- b. What is the flux through the loop at  $t = 0.5$  s?

Angle (1 pts):

- c. At what angle is the normal pointed at  $t = 0.5$  s?

Current direction: (2 pts):

- d. As viewed from the top, in what direction does the current flow at  $t = 0.5$  s? Choose one of the options below and explain your answer.
- Clockwise
  - Counter-clockwise
  - No Current Flows

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