

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

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

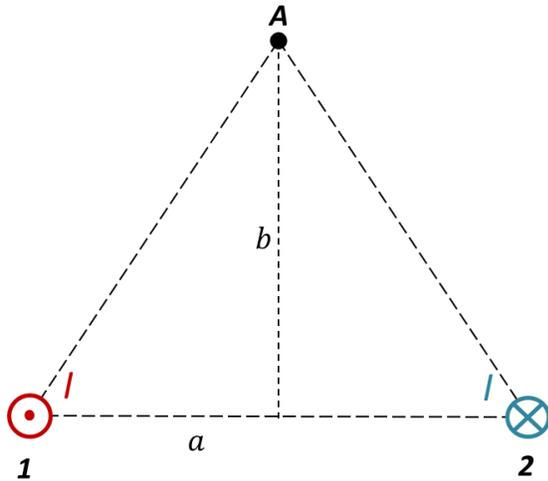
Score: \_\_\_\_ / 20

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	$\Phi = BA \cos \phi$
<b>For Problem 1</b>	
$a$	$0.2 \text{ m}$
$b$	$0.4 \text{ m}$
$I$	$0.1 \text{ A}$
$\mu_0$	$4\pi \times 10^{-7} \text{ T m/A}$
<b>Useful Information for All Problems</b>	

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.

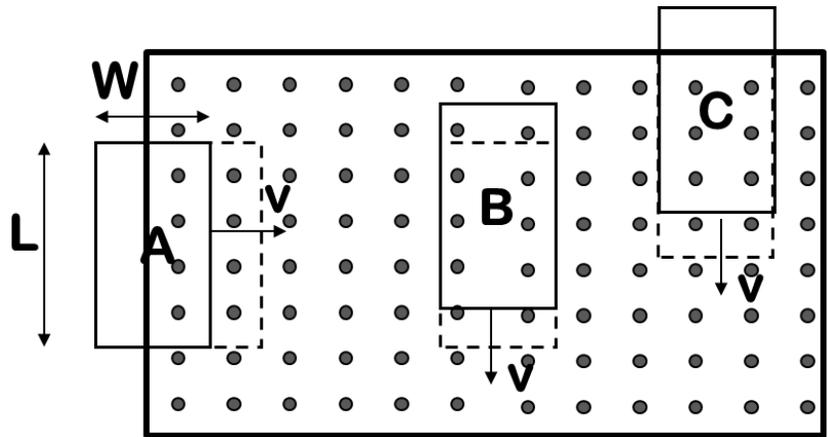
Direction 2(2 pts):

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

Magnetic field (4 pts):

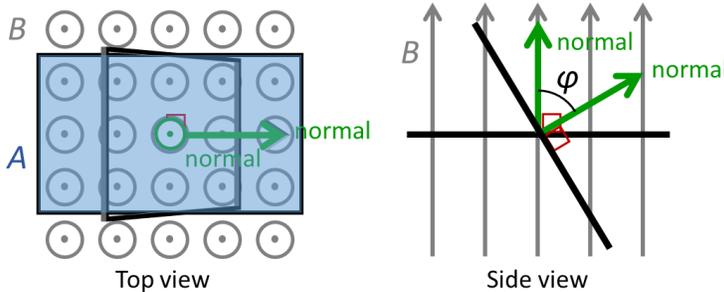
d. Calculate the *total magnetic field* at point **A**. *Show all of your work.*

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	$\omega = 5 \text{ rad/s}$
Area	$A = 0.02 \text{ m}^2$
Field	$B = 0.05 \text{ T}$
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.
- i. Clockwise
  - ii. Counter-clockwise
  - iii. No Current Flows

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