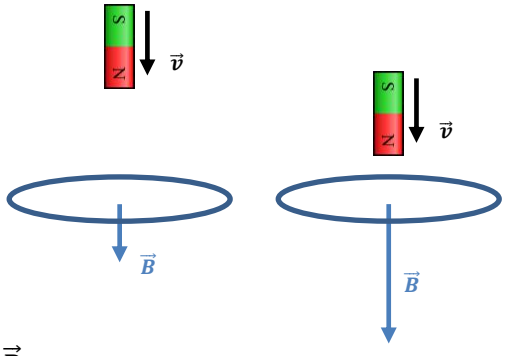
CONCEPT: LENZ'S LAW

- Faraday's Law gives us the ***magnitude*** of the induced EMF / Current.
  - To find _____ of induced current, we use **Lenz's Law**.

- **Lenz's Law:** The direction of induced current creates an induced B-field to _____ *CHANGES* in magnetic flux.
  - Remember your Right-Hand Rule for circular currents!  Thumb → $\vec{B}_{induced}$; Fingers → i_{ind}

- You may see Faraday's Law represented as: $\mathcal{E} = N\frac{\Delta\Phi_B}{\Delta t}$

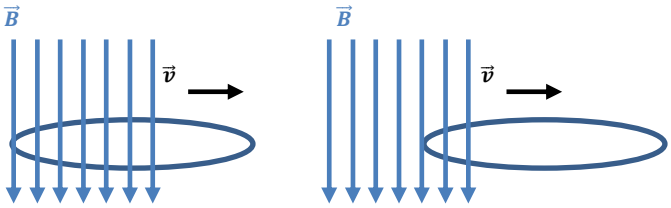
Moving Bar Magnet



$\vec{B}$: ____

$\Delta\Phi_B$: ____

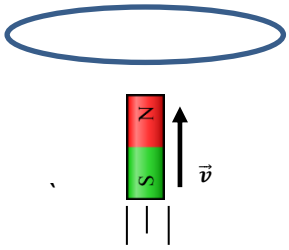
Moving Loop In/Out of Magnetic Field



$\vec{B}$: ____

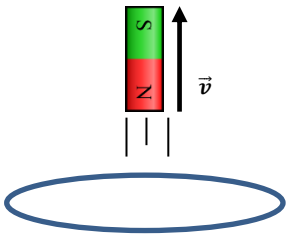
$\Delta\Phi_B$: ____

EXAMPLE: In the following scenarios, find the direction of the current induced on the conducting wires.



$\vec{B}$: ____ $\vec{B}_{ind}$: ____

$\Delta\Phi$: ____ i_{ind}: **[CW | CCW]**



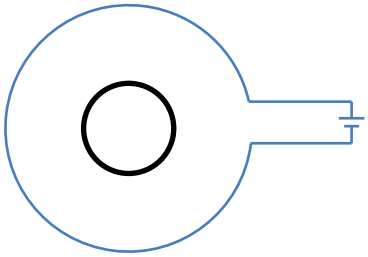
$\vec{B}$: ____ $\vec{B}_{ind}$: ____

$\Delta\Phi$: ____ i_{ind}: **[CW | CCW]**

- Induced $\vec{B}_{ind}$ is always directed **[ALONG | OPPOSITE]** *increasing* B-Field.
- Induced $\vec{B}_{ind}$ is always directed **[ALONG | OPPOSITE]** *decreasing* B-Field.

PRACTICE: DIRECTION OF INDUCED CURRENT IN A RING

An outer ring is connected to a variable voltage source. If the battery's voltage is continuously INCREASING, what is the direction of the induced current in the inner ring, centered inside of the outer ring?



EXAMPLE: LENZ'S LAW FOR LONG STRAIGHT WIRE

A long straight wire on a horizontal surface in the xy-plane carries a constantly increasing current in the +y direction. A square loop of wire lies flat on the surface to the right of the wire. When viewed from above, what is the direction of the induced current in the square loop?