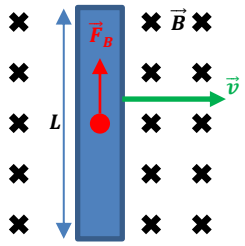
CONCEPT: MOTIONAL EMF

- Remember! A changing magnetic flux produces an *INDUCED* EMF.
  - When this happens through _____, this is called *MOTIONAL* EMF.

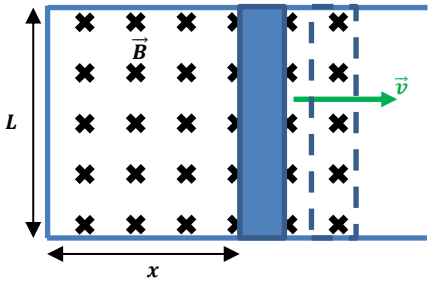


1) Conducting rod moves through a B-Field with **v**, charges feel a _____
2) **(+)** charges feel force **[UPWARD | DOWNWARD]** → Charges separate
3) Charges produces **E-Field** to eventually balance **B-Field** → $\mathbf{F_E}$ ___ $\mathbf{F_B}$

- Induced EMF $\mathcal{E} =$ _____

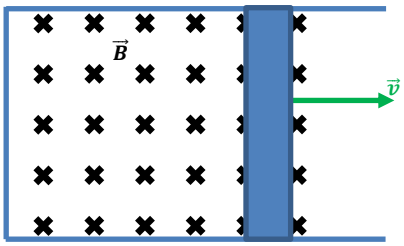
- If we attach this moving conducting rod to a U-shaped wire, we can use **Faraday's Law** on the circuit it makes!
  - As the rod slides, the **[B-Field | Area | Angle]** changes

$\frac{\Delta\Phi_B}{\Delta t} =$ _____ $=$ _____



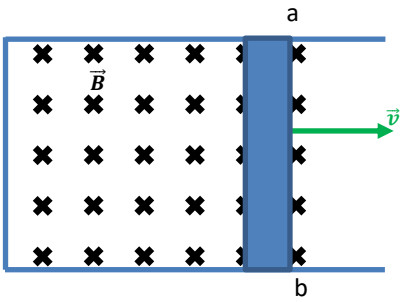
- Induced EMF $\mathcal{E} =$ _____

EXAMPLE: In the circuit below, if the wire has a resistance of 10 mΩ, **a)** what is the current induced if the length of the bar is 10 cm, the speed of the bar is 25 cm/s, and the magnetic field is 0.2 T? **b)** What about the power generated by the circuit?



PRACTICE: BAR MOVING IN UNKNOWN MAGNETIC FIELD

A thin rod moves perpendicular to a uniform magnetic field. If the length of the rod is 10 cm and the induced EMF is 1 V when it moves at 5 m/s, what is the magnitude of the magnetic field?



EXAMPLE: FORCES ON LOOPS EXITING MAGNETIC FIELD

A rectangular loop with length L = 20 cm and resistance R = 0.40Ω is pulled out of a magnetic field B = 0.5 T at a constant velocity of 12m/s**. a)** What is the magnitude and direction of the induced current in the loop at the instant when the loop is halfway out of the field? **b)** What is the magnitude of the external force needed to keep this loop exiting at constant velocity?