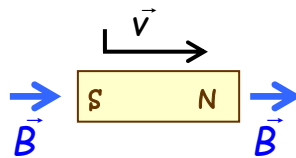
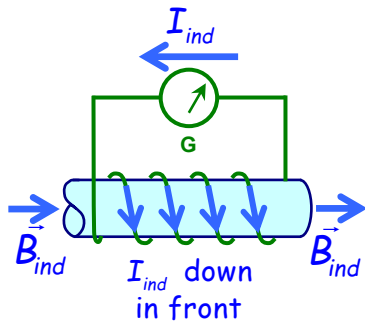


The Laws of Faraday & Lenz – Worksheet

Complete the eight (8) diagrams below for a bar magnetic moving toward and away from each end of a coil. On each draw the following:

1. The arrow in the galvanometer as it appeared while the magnet was moving
2. The direction of induced current, \vec{I}_{ind} through the galvanometer
3. The direction of \vec{I}_{ind} in the front of the coil
4. The direction of \vec{B} on both poles of the magnet (labeled arrow)
5. The direction of \vec{B}_{ind} on both ends of the coil (labeled arrow)
6. Circles on the right indicating the direction of the bar magnet's field, \vec{B} , whether the magnetic flux, Φ is increasing or decreasing, the direction of the induced field, \vec{B}_{ind} and the direction of \vec{I}_{ind} through the galvanometer

The first diagram, with a south pole leaving the right side of the coil, is drawn for you. **Test this case to make sure your observations agree with the picture.** You must then complete the other seven.

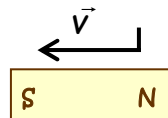
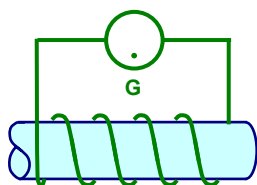


Direction of \vec{B} : ← →

Change in Φ : increase decrease

Direction of \vec{B}_{ind} : ← →

Direction of \vec{I}_{ind} in G: ← →

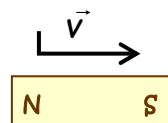
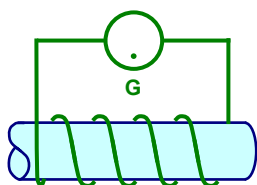


Direction of \vec{B} : ← →

Change in Φ : increase decrease

Direction of \vec{B}_{ind} : ← →

Direction of \vec{I}_{ind} in G: ← →

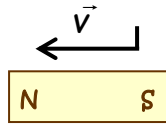
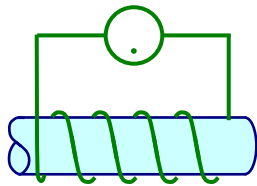


Direction of \vec{B} : ← →

Change in Φ : increase decrease

Direction of \vec{B}_{ind} : ← →

Direction of \vec{I}_{ind} in G: ← →

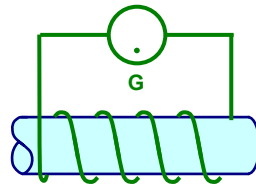
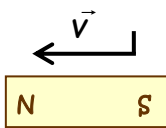


Direction of \vec{B} : ← →

Change in Φ : increase decrease

Direction of \vec{B}_{ind} : ← →

Direction of I_{ind} in G : ← →

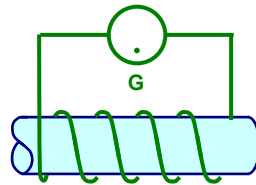
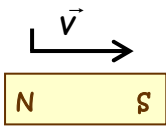


Direction of \vec{B} : ← →

Change in Φ : increase decrease

Direction of \vec{B}_{ind} : ← →

Direction of I_{ind} in G : ← →

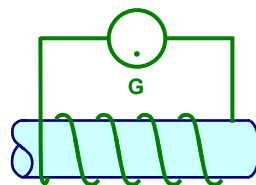
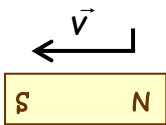


Direction of \vec{B} : ← →

Change in Φ : increase decrease

Direction of \vec{B}_{ind} : ← →

Direction of I_{ind} in G : ← →

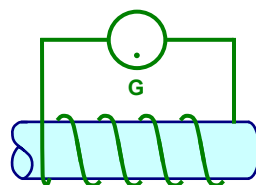
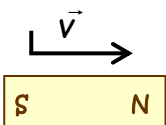


Direction of \vec{B} : ← →

Change in Φ : increase decrease

Direction of \vec{B}_{ind} : ← →

Direction of I_{ind} in G : ← →



Direction of \vec{B} : ← →

Change in Φ : increase decrease

Direction of \vec{B}_{ind} : ← →

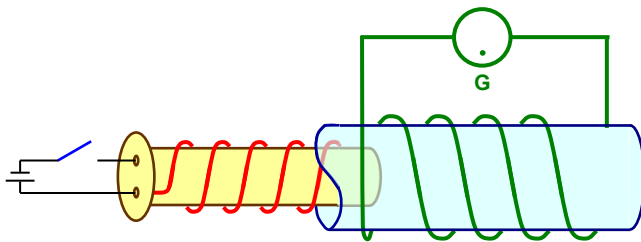
Direction of I_{ind} in G : ← →

Complete the four (4) diagrams below for two coils and a switch. On each draw the following:

- The arrow in the galvanometer as it appeared while the switch was opened or closed
- The direction of \vec{I} in the front of the small coil
- The direction of \vec{B} in the small coil
- The direction of induced current, \vec{I}_{ind} through the galvanometer
- The direction of \vec{I}_{ind} in the front of the large coil
- The direction of \vec{B}_{ind} in the large coil
- Circles on the right indicating the direction of the small coil's field, \vec{B} , whether the magnetic flux, Φ is increasing or decreasing, the direction of the induced field, \vec{B}_{ind} through the large coil, the direction of \vec{I}_{ind} through the galvanometer, and the current state in the small coil.

Complete all four diagrams below. Notice that only the current state is circled in the first diagram.

i) Switch Open



Direction of \vec{B} : ← →

Change in Φ : increase decrease constant

Direction of \vec{B}_{ind} : ← →

Direction of \vec{I}_{ind} in G: ← →

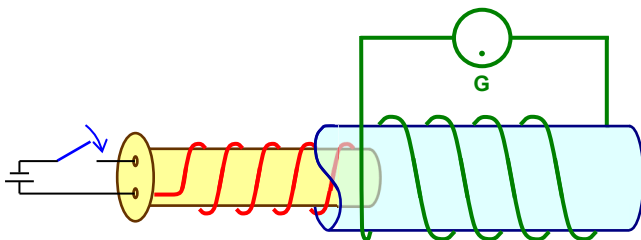
I in small coil:

On **Off**

Increasing Decreasing

Constant

ii) Switch just closed, current begins to flow



Direction of \vec{B} : ← →

Change in Φ : increase decrease constant

Direction of \vec{B}_{ind} : ← →

Direction of \vec{I}_{ind} in G: ← →

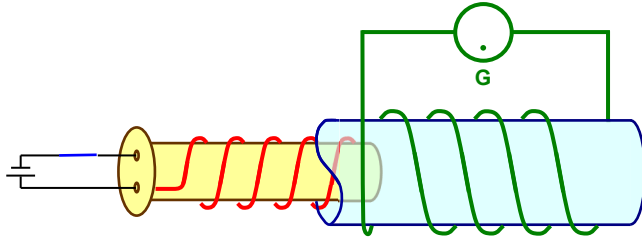
I in small coil:

On Off

Increasing Decreasing

Constant

iii) Switch closed, current flowing steadily



Direction of \vec{B} : ← →

Change in Φ : increase decrease constant

Direction of \vec{B}_{ind} : ← →

Direction of \vec{I}_{ind} in G: ← →

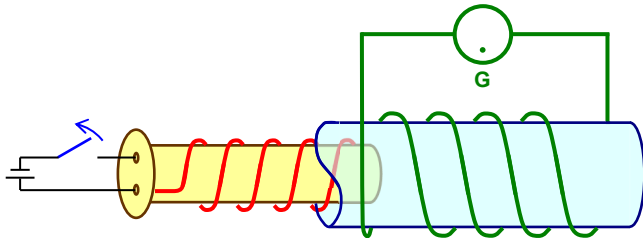
I in small coil:

On Off

Increasing Decreasing

Constant

iv) Switch just opened, current flow ending



Direction of \vec{B} : ← →

Change in Φ : increase decrease constant

Direction of \vec{B}_{ind} : ← →

Direction of \vec{I}_{ind} in G: ← →

I in small coil:

On Off

Increasing Decreasing

Constant