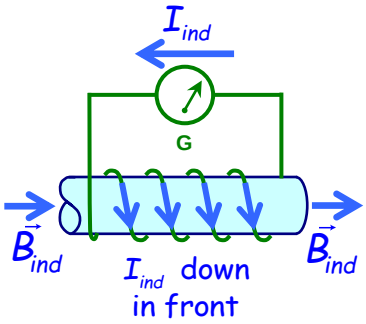
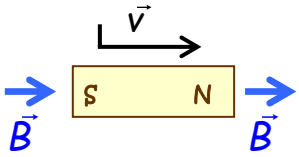
Lenz's Law Lab Worksheet

Make diagrams for magnetic poles moving toward and away from each end of a coil for a total of eight (8) diagrams. On each draw

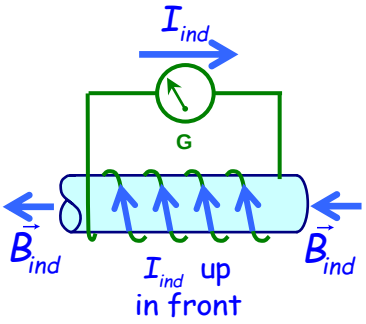
- the **DIRECTION OF** $\vec{B}$ on both poles of the magnet (labeled arrow),
- the **DIRECTION OF** $\vec{B}_{ind}$ on both ends of the coil (labeled arrow),
- the **WIRES** so they **MATCH THOSE ON YOUR COIL**,
- the direction of induced current, $\vec{I}_{ind}$ in the FRONT OF THE COIL (up or down)
- the direction of $\vec{I}_{ind}$ THROUGH THE GALVANOMETER
- the ARROW IN THE GALVANOMETER as it appeared while the magnet was moving
- circles on the right indicating the direction of the magnet's field, $\vec{B}$, in the coil due to the magnet and whether Φ is increasing or decreasing, the direction of the induced field, $\vec{B}_{ind}$, and the direction of $\vec{I}_{ind}$ through the galvanometer.

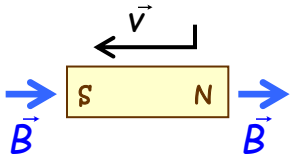
The first one, with a south pole leaving the coil is shown. You must do the other seven.



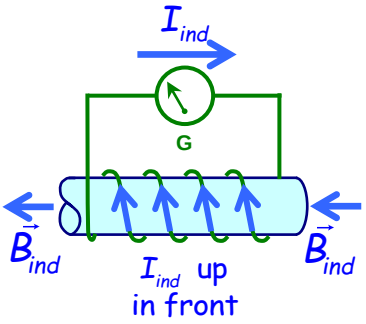


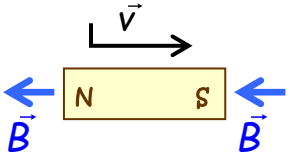
Direction of $\vec{B}$: ← (→)
Change in Φ: increase (decrease)
Direction of $\vec{B}_{ind}$: ← (→)
Direction of I_{ind} in G: (←) →



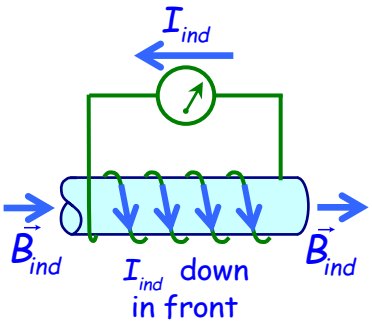


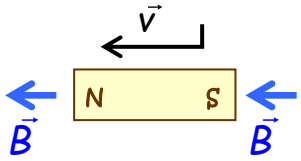
Direction of $\vec{B}$: ← (→)
Change in Φ: (increase) decrease
Direction of $\vec{B}_{ind}$: (←) →
Direction of I_{ind} in G: ← (→)



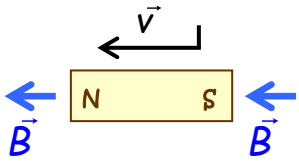


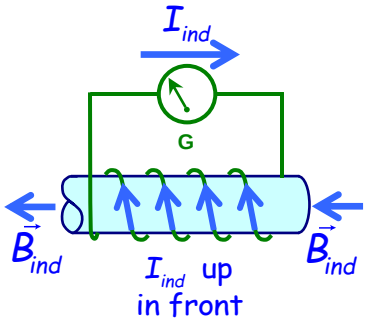
Direction of $\vec{B}$: ← (→)
Change in Φ: increase (decrease)
Direction of $\vec{B}_{ind}$: (←) →
Direction of I_{ind} in G: ← (→)



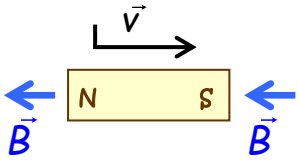


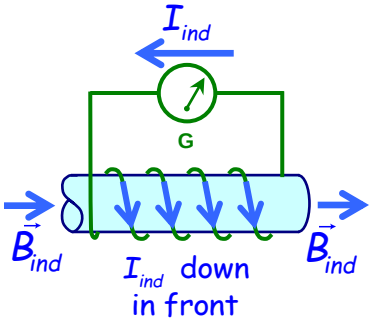
Direction of $\vec{B}$: ← →
Change in Φ: (increase) decrease
Direction of $\vec{B}_{ind}$: ← →
Direction of I_{ind} in G: ← →



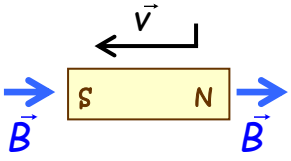


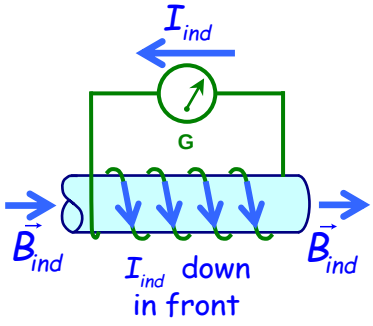
Direction of $\vec{B}$: ← →
Change in Φ: increase (decrease)
Direction of $\vec{B}_{ind}$: ← →
Direction of I_{ind} in G: ← →



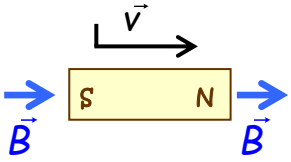


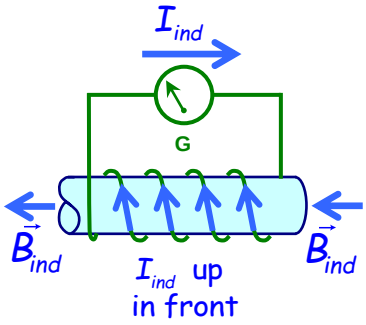
Direction of $\vec{B}$: ← →
Change in Φ: (increase) decrease
Direction of $\vec{B}_{ind}$: ← →
Direction of I_{ind} in G: ← →





Direction of $\vec{B}$: ← →
Change in Φ: increase (decrease)
Direction of $\vec{B}_{ind}$: ← →
Direction of I_{ind} in G: ← →





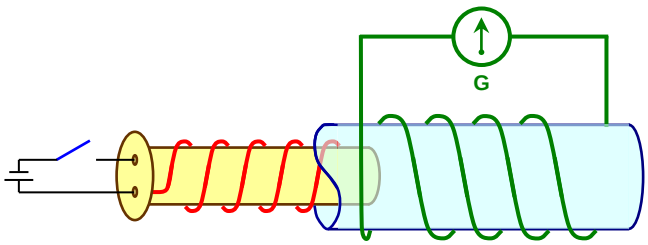
Direction of $\vec{B}$: ← →
Change in Φ: (increase) decrease
Direction of $\vec{B}_{ind}$: ← →
Direction of I_{ind} in G: ← →

Make diagrams for two coils and a knife switch. This is a total of four (4) diagrams. For each draw

- the **WIRES** so they **MATCH THOSE ON YOUR COILS** (one is done for you),
- the direction of the current, $\vec{I}$ in the FRONT OF THE SOURCE COIL
- the **DIRECTION OF** $\vec{B}$ in the source coil
- the **DIRECTION OF** $\vec{B}_{ind}$ in the detector coil,
- the direction of induced current, $\vec{I}_{ind}$ in the FRONT OF THE DETECTOR COIL
- the direction of $\vec{I}_{ind}$ THROUGH THE GALVANOMETER
- the ARROW IN THE GALVANOMETER as it appeared while the magnet was moving
- circles on the right indicating the direction of the flux, Φ in the coil due to the magnet and whether 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 one, with the switch open is shown. You must do the other three.

i) Switch Open



Direction of $\vec{B}$: ← Zero! →

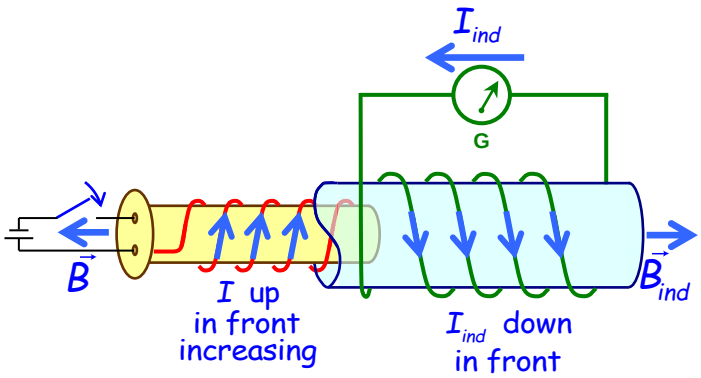
Change in Φ: increase decrease

Direction of $\vec{B}_{ind}$: ← →

Direction of I_{ind} in G: ← →

No current so no I, B, $\Delta\Phi$, B_{ind} or I_{ind}!

ii) Switch just closed, current begins to flow



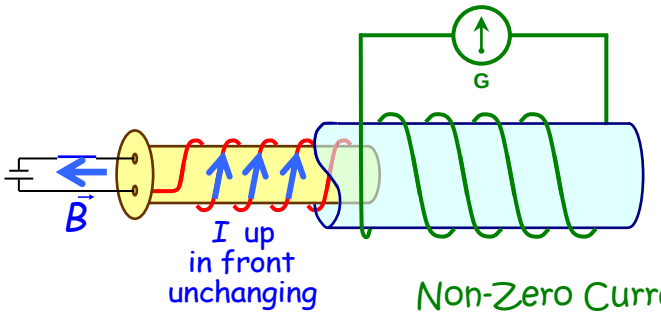
Direction of $\vec{B}$: ← →

Change in Φ: (increase) decrease

Direction of $\vec{B}_{ind}$: ← →

Direction of I_{ind} in G: ← →

iii) Switch closed, current flowing steadily



Direction of $\vec{B}$: ← →

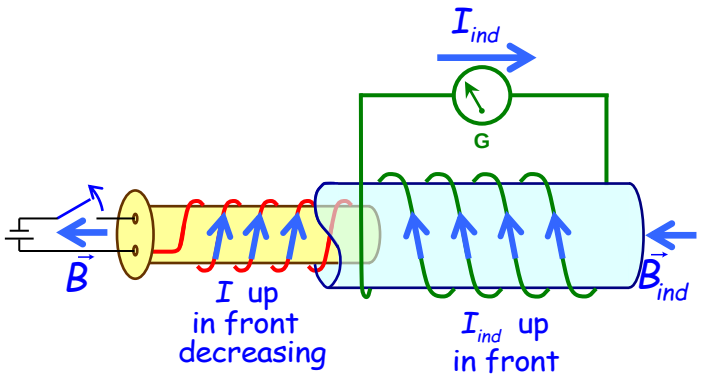
Change in Φ: increase decrease Zero!

Direction of $\vec{B}_{ind}$: ← →

Direction of I_{ind} in G: ← →

Non-Zero Current so I & B exist, but current isn't changing so $\Delta\Phi = 0$, $B_{ind} = 0$ and $I_{ind} = 0$!

iv) Switch just opened, current flow ending



Direction of $\vec{B}$: ← →

Change in Φ: increase decrease

Direction of $\vec{B}_{ind}$: ← →

Direction of I_{ind} in G: ← →

"You say you spent five years at the North Pole?"