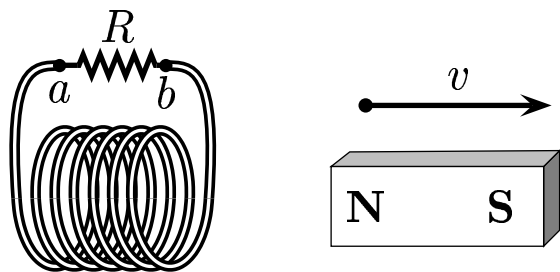


Given: A coil is suspended around an axis which is co-linear with the axis of a bar magnet. The coil is connected to a resistor with ends labeled “a” and “b”. The bar magnet moves from left to right with North and South poles labeled in the figure.



What is the direction of the induced magnetic field in the coil and the direction of the induced current in the resistor  $R$  when the bar magnet is moving left to right?

- A) ( $\Leftarrow B_{induced}$ ) right to left and ( $I \rightarrow$ ) from “a” through  $R$  to “b”.
- B) ( $B_{induced} \Rightarrow$ ) left to right and ( $I \rightarrow$ ) from “a” through  $R$  to “b”.
- C) ( $\Leftarrow B_{induced}$ ) right to left and ( $I \leftarrow$ ) from “b” through  $R$  to “a”.
- D) ( $B_{induced} \Rightarrow$ ) left to right and ( $I \leftarrow$ ) from “b” through  $R$  to “a”.

*Note:* The induced magnetic field depends on whether the flux is increasing or decreasing.

The magnetic flux through the coil is from right to left. When the magnet moves from left to right, the magnetic flux through the coils decreases.

The induced current in the coil must produce an induced magnetic field from right to left ( $\leftarrow B_{induced}$ ) to resist any change of magnetic flux in the coil (Lenz's Law).

The helical coil when viewed from the bar magnet winds around the solenoid from terminal  $b$  clockwise.

As the induced field is right to left ( $B_{induced} \leftarrow$ ), the induced current must flow clockwise and therefore it goes from " $a$ " through  $R$  to " $b$ " ( $I \rightarrow$ ).

Answer **A**.

32.04-03 Induced Current 2004-3-24