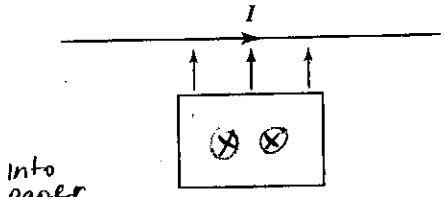
A long, straight wire carries a steady current $I$. A rectangular conducting loop lies in the same plane as the wire, with two sides parallel to the wire and two sides perpendicular. Suppose the loop is pushed toward the wire as shown. Given the direction of $I$, the induced current in the loop is

$B \propto \frac{1}{r}$




into paper at loop by RH12

flux through loop increases as loop approaches wire

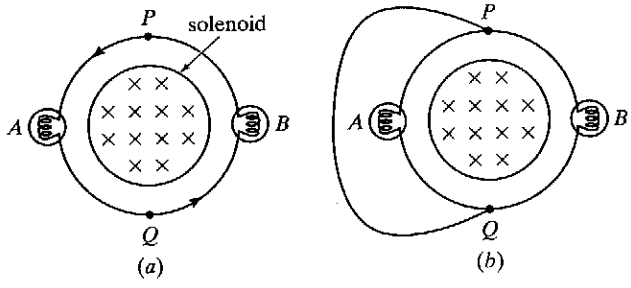
⇓

wire $I_{ind}$ tries to oppose ⇒ produces B in ⊙ dir

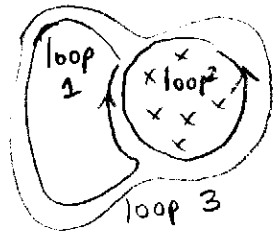
⇒ CCW

1. clockwise.
2. counterclockwise.
3. need more information

**12.** In figure (*a*), a solenoid produces a magnetic field whose strength increases into the plane of the page. An induced emf is established in a conducting loop surrounding the solenoid, and this emf lights bulbs $A$ and $B$. In figure (*b*), points $P$ and $Q$ are shorted. After the short is inserted,




After




Loop 1 has no flux

⇒ no current ⇒ no current through A

Loops 2 & 3 have changing flux

Loop 2 has changing flux 2, but no current because all current flows around "short" PQ. Less R ⇒ B brighter

1. bulb $A$ goes out; bulb $B$ gets brighter.
2. bulb $B$ goes out; bulb $A$ gets brighter.
3. bulb $A$ goes out; bulb $B$ gets dimmer.
4. bulb $B$ goes out; bulb $A$ gets dimmer.
5. both bulbs go out.
6. none of the above