A wire loop is being pulled through a uniform magnetic field. What is the direction of the induced current?

1) clockwise
2) counterclockwise
3) no induced current
A wire loop is being pulled through a uniform magnetic field. What is the direction of the induced current?

1) clockwise
2) counterclockwise
3) no induced current

Follow-up: What happens if the loop moves out of the page? Since the magnetic field is uniform, the magnetic flux through the loop is not changing. Thus no current is induced.
ConcepTest 30.4 Shrinkage Wire Loop

If a coil is shrinking in a magnetic field pointing into the page, in what direction is the induced current?

1) clockwise
2) counterclockwise
3) no induced current
The magnetic flux through the loop is **decreasing**, so the induced B field must try to reinforce it and therefore points in the same direction — **into the page**. According to the right-hand rule, an induced **clockwise** current will generate a magnetic field **into the page**.

**ConcepTest 30.4 Shrinking Wire Loop**

If a coil is shrinking in a magnetic field pointing into the page, in what direction is the induced current?

1) clockwise
2) counterclockwise
3) no induced current

**Follow-up:** What if the $B$ field is oriented at 90° to its present direction?
ConcepTest 30.6b  Voltage and Current II

Wire #1 (length $L$) forms a one-turn loop, and a bar magnet is dropped through.  
Wire #2 (length $2L$) forms a two-turn loop, and the same magnet is dropped through.  

Compare the magnitude of the induced currents in these two cases.

1) $I_1 > I_2$  
2) $I_1 < I_2$  
3) $I_1 = I_2 \neq 0$  
4) $I_1 = I_2 = 0$
**ConcepTest 30.6b Voltage and Current II**

Wire #1 (length $L$) forms a one-turn loop, and a bar magnet is dropped through. 
Wire #2 (length $2L$) forms a two-turn loop, and the same magnet is dropped through. 

Compare the magnitude of the induced currents in these two cases.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Condition</th>
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<tbody>
<tr>
<td>1)</td>
<td>$I_1 &gt; I_2$</td>
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<tr>
<td>2)</td>
<td>$I_1 &lt; I_2$</td>
</tr>
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</tr>
</tbody>
</table>

Faraday's law: 

$$\varepsilon = -N \frac{\Delta \Phi_B}{\Delta t}$$

says that the induced emf is **twice** as large in the wire with 2 loops. 
The current is given by Ohm's law: 

$$I = \frac{V}{R}$$. Since wire #2 is twice as long as wire #1, it has **twice** the resistance, so the current in both wires is the same.
ConcepTest 30.8a  Loop and Wire I

A wire loop is being pulled away from a current-carrying wire.
What is the direction of the induced current in the loop?

1) clockwise
2) counterclockwise
3) no induced current
A wire loop is being pulled away from a current-carrying wire. What is the direction of the induced current in the loop?

The magnetic flux is into the page on the right side of the wire and decreasing due to the fact that the loop is being pulled away. By Lenz’s Law, the induced $B$ field will oppose this decrease. Thus, the new $B$ field points into the page, which requires an induced clockwise current to produce such a $B$ field.

ConcepTest 30.8a Loop and Wire I

1) clockwise
2) counterclockwise
3) no induced current