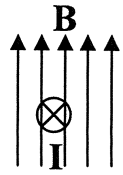


Induction KEY

1. F_B is always the direction the magnetic field (B) moves the charges. For each of the following examples figure out what the magnetic field is moving (F_B) and the charge (q).
- A wire is pushed into a magnetic field (q). A current is induced in the wire (F_B).
 - A battery (q [current in wire]) is connected to a wire that is inside a magnetic field. When the battery is on, the wire deflects forward (F_B).
 - A magnet is pushed into a solenoid (q [solenoid]) and an ammeter moves, recording current (F_B).
 - When a proton moves into a magnetic field (q), the proton moves in a circular path (F_B).

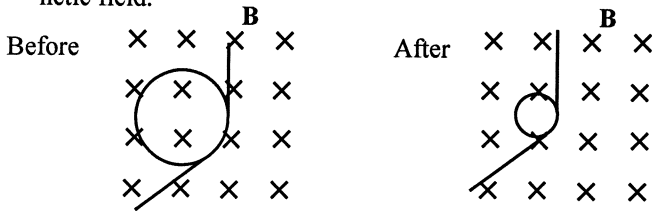
2. The X shows current being induced in a wire by the magnetic field.

- Which way is the current moving?
Into page (this is your palm)
- Which direction was the wire pushed?
Left (thumb)



3. A. What has to happen for current to be induced in a loop of wire? *Has to break magnetic field lines OR has to have a change of magnetic field inside.*
- B. Give the four ways to do this.
- Change of area of loop
 - rotate the loop while inside B
 - Change strength of B
 - Move loop into or out of B

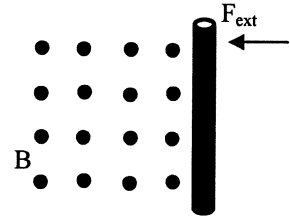
4. The area of a loop of wire is reduced inside a constant magnetic field.



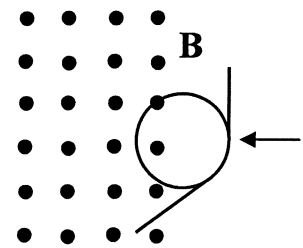
- On the left hand side of the loop, what is the direction of the induced current? *Top of page (fingers into page; thumb to right [wire]; palm is to top of page.)*
- On the right hand side of the loop, which is the direction of the induced current? *Bottom of page (fingers into page; thumb to left [wire]; palm is to bottom of page.)*
- What would be the direction of the current in the loop if the loop is pulled out of the page? *None—not breaking any field lines.*

5. The wire is pushed thru a constant magnetic field as shown. What is the direction of the induced current?

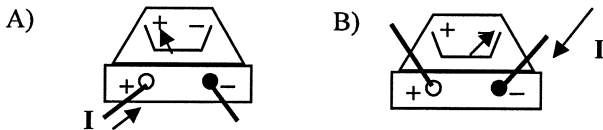
Top of page (Fingers out of page; moving wire is thumb, which is to the left)



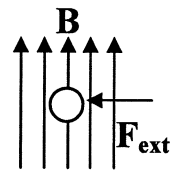
- What is the direction of the current in the left side of the loop as it enters?
Top of page (see Q5)
- Will the induced current in the wire be CW or CCW?
- What direction will be the current when the loop is completely inside B ?
None— B is not changing + 2 sides cancel



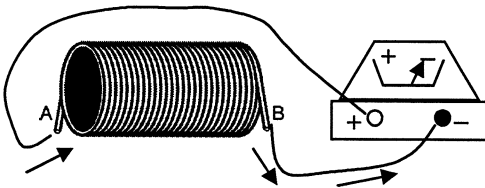
7. In each of the following situations show whether the ammeter reads positive or negative. *Which ever side I enters.*



8. The wire is pushed to the left by an external force. Which direction will the induced current move: into or out of the page? *Moving wire is q (so thumb); Fingers point toward top of page. Palm faces into page, which is the direction of the induced current.*



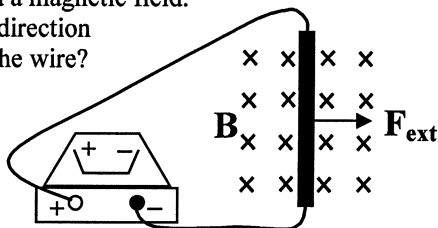
9. Which side of the solenoid is north?
 B is north



10. A wire is moved thru a magnetic field.

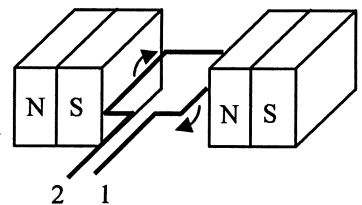
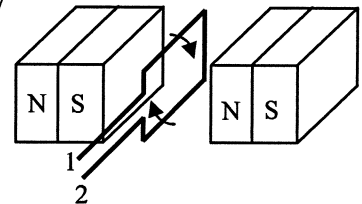
- What will be the direction of the current in the wire?
Top of page

- Will the ammeter read + or -?
+



11. A loop of wire is turned CW between the two magnets.

- Which direction is B ?
N to S, so left
- In its current position which direction will the induced I be?
None (wire is moving parallel to field)
- The loop is then turned 90° CW, so that the loop is horizontal, which side of the loop will current come out?



Fingers left; thumb to top of page (on left); palm out to end 2.