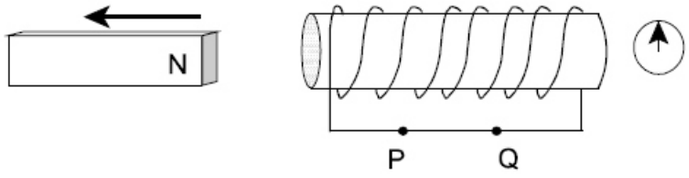
Physics 3204

Unit 2: Electromagnetism

Worksheet 9: LENZ'S LAW

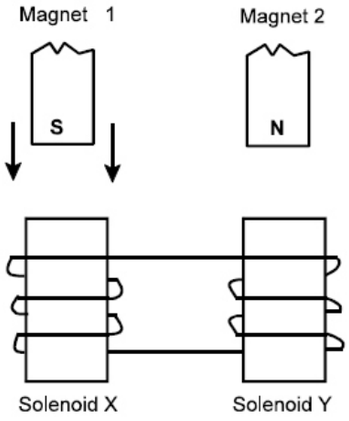
1. What is the direction of current flow and compass deflection as the magnet is pulled left in the diagram shown?



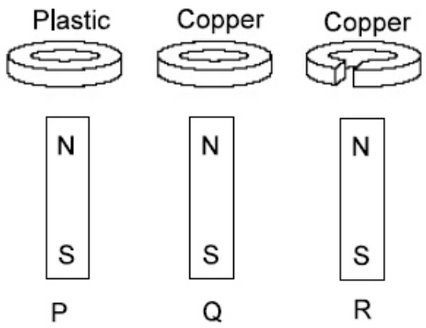
	Current Direction	Deflection of Compass
(A)	P to Q	left
(B)	P to Q	Right
(C)	Q to P	left
(D)	Q to P	right

2. Two hollow-core solenoids, X and Y, are connected by a wire, as shown in the diagram provided. Two bar magnets, 1 and 2, are suspended just above the solenoids. What will happen to magnet 2 if the south pole of magnet 1 is dropped through solenoid X?

(A) attracted by a magnetic force toward solenoid Y
(B) attracted by an electric force toward solenoid Y
(C) repelled by a magnetic force away from solenoid Y
(D) repelled by an electric force away from solenoid Y



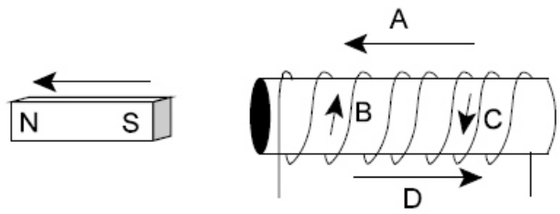
3. Three rings are dropped at the same time over identical magnets, P, Q and R, as shown below. Which describes the order in which the rings reach the bottom of the magnets?



(A) They arrive in the order P, Q, R.
(B) They arrive in the order P, R, Q.
(C) Rings P and R arrive at the same time, followed by Q.
(D) Rings Q and R arrive at the same time, followed by P

4. The bar magnet below is moved out of a solenoid as shown. What is the direction of the current induced in the solenoid?

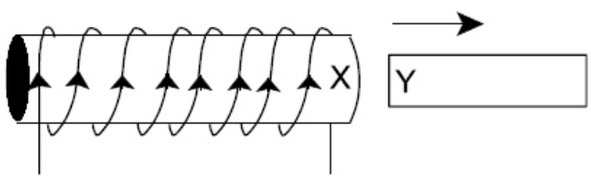
(A) A
(B) B
(C) C
(D) D



5. A student drops a bar magnet downward through a 1.0 m long plastic tube and then through a 1.0 m long copper tube of equal diameter. What will happen to the magnet in each situation?

(A) come to rest about halfway down each tube
(B) take longer to fall through the copper tube
(C) take longer to fall through the plastic tube
(D) take the same time to fall through each tube

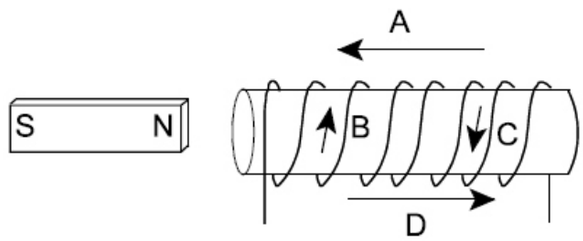
6. The bar magnet below is pulled out of a solenoid as shown. Given the direction of the induced current in the solenoid, what will be the polarity of X and Y?



	X	Y
(A)	North	North
(B)	North	South
(C)	South	North
(D)	South	South

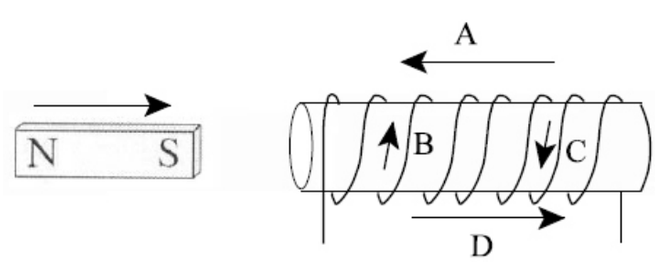
7. The bar magnet below enters a solenoid from the left. What will be the direction of the induced current in the solenoid?

(A) A
(B) B
(C) C
(D) D



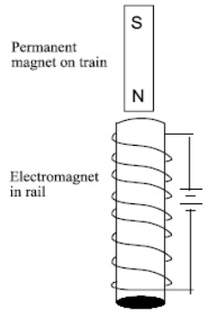
8. The bar magnet below is moved into a solenoid as shown. What will be the direction of the current induced in the solenoid?

(A) A
(B) B
(C) C
(D) D

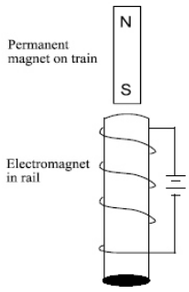


9. In a magnetically levitated train, a permanent magnet mounted on the train is repelled by an electromagnet in the rail to keep the train above the rail. If the permanent magnet in each diagram below is identical and the current is the same in each electromagnet, which design will produce the greatest repulsion?

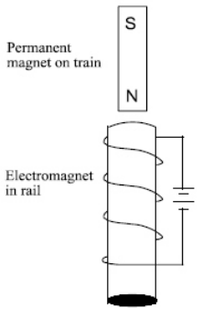
(A)



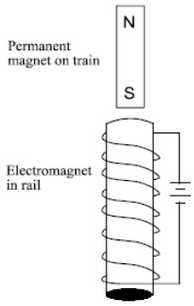
(B)



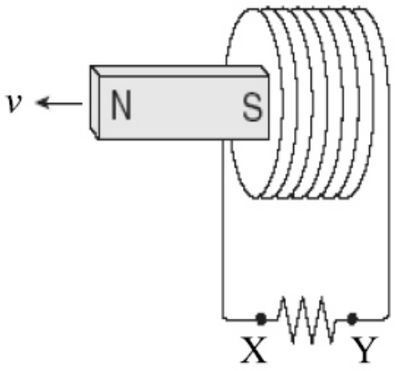
(C)



(D)

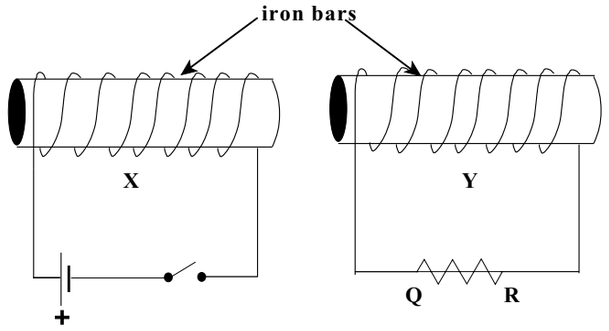


10. bar magnet is moved away from a coil as shown. What is the direction of the induced current through the resistor and the polarity of the left end of the coil?



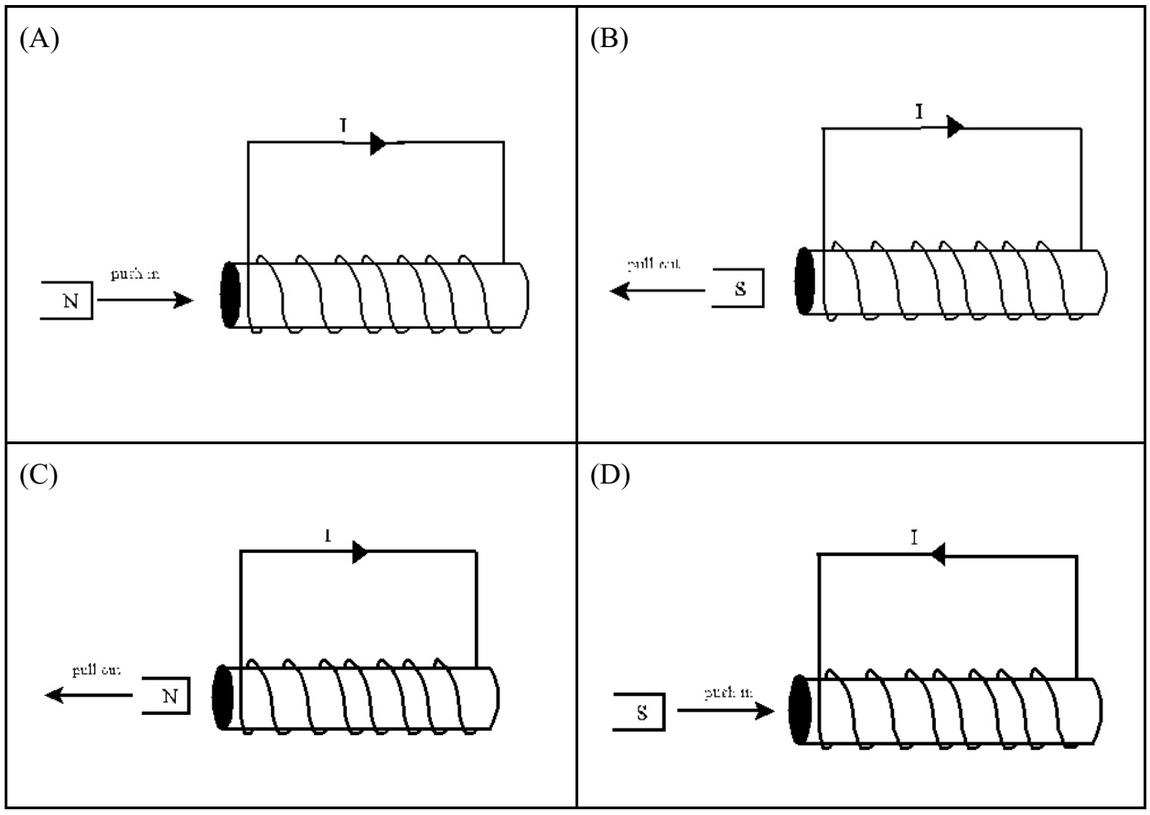
	Direction of Induced Current	Polarity of left end of coil
(A)	X to Y	north
(B)	X to Y	south
(C)	Y to X	north
(D)	Y to X	south

11. In the diagram below, the switch is closed and current flows through solenoid X. Which statement describes the current through the resistor?



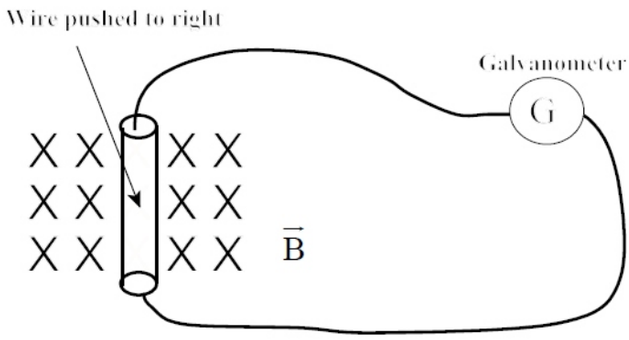
(A) A momentary current flows from Q to R.
(B) A momentary current flows from R to Q.
(C) A steady current flows from Q to R.
(D) A steady current flows from R to Q.

12. Which diagram shows the direction of the induced current?

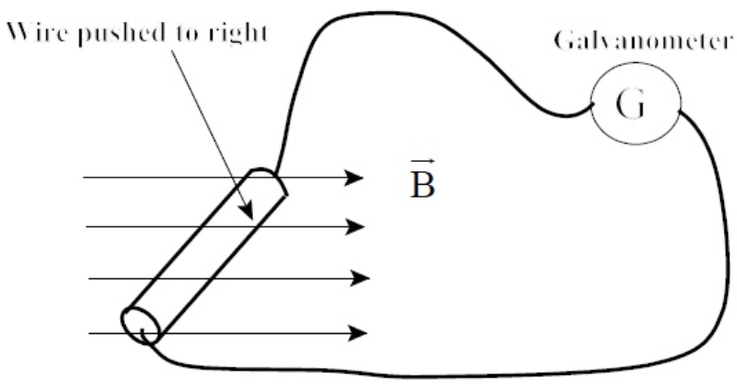


13. In the two situations below, a wire is pulled through a region with a given magnetic field as shown. Determine whether a current will be induced in the wire and show its direction. AUGUST 2004

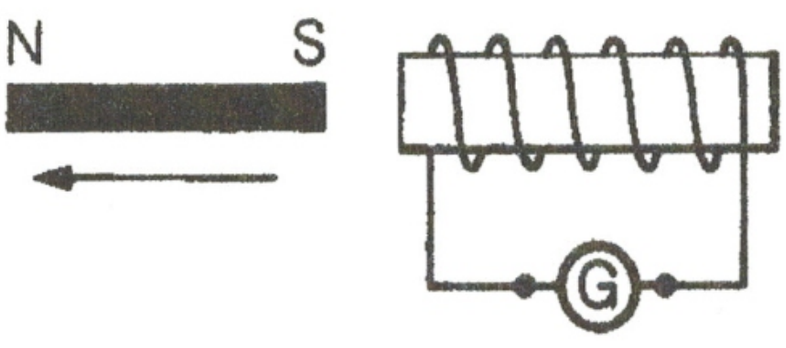
(I)



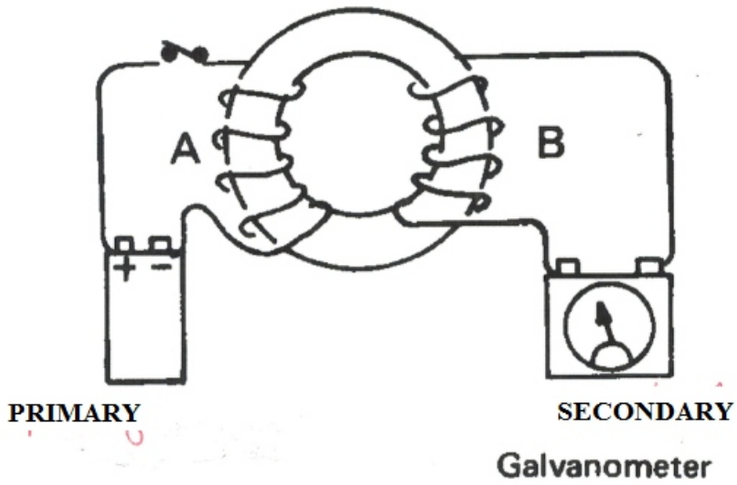
(II)



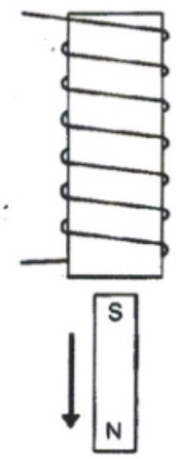
14. In the following diagram, show the the direction of the current and label all appropriate parts.



15. Use the following diagram to show that you understand the principle of electromagnetic induction.



16. Determine the direction of the electron flow for the induced current in the diagram illustrated below.



17. Determine the pole of the bar magnet that is being inserted into the induction coil illustrated.