1. A long straight wire has an internal resistance of 2.5 Ω/m. If it moves at 4 m/s in a 5 T magnetic field, what is the magnitude of the force per unit length opposing its motion?

A)   5 N/m

B)   8 N/m

C)   10 N/m

D)   20 N/m

E)   40 N/m

2.
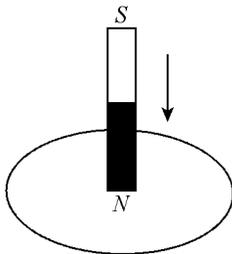
A permanent bar magnet is pulled through a wire loop with a constant velocity as shown above. Which of the following best describes the current in the wire loop? (looking down on the loop from above)

A)   No current is induced in the loop.

B)   Always clockwise.

C)   Always counterclockwise.

D)   First counterclockwise, then changes to clockwise.

E)   First clockwise, then changes to counterclockwise.

3. Lenz's law concerning induced emf can be shown to directly follow from

A)   Gauss's Law

B)   Coulomb's Law

C)   Conservation of Charge

D)   Conservation of Energy

E)   Newton's Second Law of Motion

4. The principle of the conservation of energy is shown most directly by which of the following phenomena?

A)   Lenz's law concerning induced emf

B)   The proportionality of force to acceleration

C)   The velocity of two objects after they collide

D)   The pattern of light and dark bands seen in Young's double-slit experiment

E)   The photoelectric effect

5. A magnetic field that is increasing with time is directed out of the page and passes through a circular loop of wire in the plane of the page. Which of the following is true?

A)   There is an induced current in the loop that is clockwise in direction.

B)   There is an induced current in the loop that is counterclockwise in direction.

C)   The loop will rotate about a diameter.

D)   The loop will rotate about an axis perpendicular to the plane of the page.

E)   No change will occur in the loop.

6.
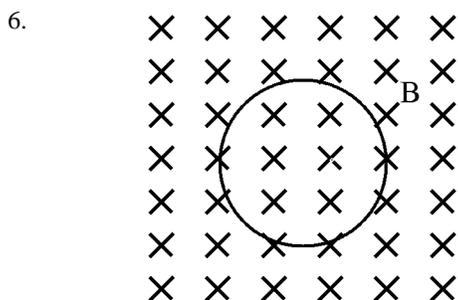
The above diagram shows a circular wire loop in the plane of the page in a uniform magnetic field B that points into the page. If the magnitude of the magnetic field is decreasing, the induced current in the wire is

A) directed upward out of the page

B) directed downward into the page

C) clockwise around the loop

D) counterclockwise around the loop

E) no current is induced in the loop

7. Lenz's Law indicates which of the following?

A) There are no magnetic monopoles.

B) The induced EMF is equal to the change in magnetic flux.

C) The induced EMF produces a magnetic field that opposes the change that produced the EMF.

D) The force exerted by a magnetic field is perpendicular to both the motion of the charged particle and the direction of the magnetic field.

E) Light incident on a concave mirror produces a virtual image.

8. Lenz's is most directly a consequence of

A) the law of conservation of charge

B) the law of conservation of momentum

C) the law of conservation of energy

D) Kirchoff's loop rule

E) the right hand rule

9. According to Lenz's Law, which of the following is true about the induced current in a loop of wire due to a changing magnetic field?

A) The induced current produces a magnetic field such that the net flux is zero.

B) The induced current produces a magnetic field such that the net flux is greater than the original.

C) The induced current produces a magnetic field such that the net flux is less than the original.

D) The induced current produces a magnetic field such that the net flux is opposite of the original flux.

E) The induced current produces a magnetic field such that the net flux is unchanged.

10. If the magnetic field B through a loop of wire is increasing, the induced magnetic field will be

A) in the same direction as B

B) in the opposite direction as B

C) perpendicular to B

D) at an acute angle to B

E) there is no induced magnetic field

11. If the magnetic field B through a loop of wire is decreasing, the induced magnetic field will be

A) in the same direction as B

B) in the opposite direction of B

C) perpendicular to B

D) at an acute angle to B

E) there is no induced magnetic field

12. A bar magnet is dropped through a loop of wire at a constant velocity. The net amount of current that flowed through a given point in the wire is I when the magnet is exactly halfway through the loop. What is the total amount of current that will have flowed through the same point when the magnet has passed completely through the loop?

A) $-2I$

B) $-I$

C) 0

D) I

E) $2I$

13. Based on Lenz's Law, the force on a moving wire loop that experiences a change in magnetic flux is always

A) in the direction of its motion

B) perpendicular to the direction of its motion in the direction of the magnetic field

C) perpendicular to the direction of its motion and perpendicular to the direction of the magnetic field

D) opposite to the direction of its motion

E) there is no force created in this situation

Answer Key
Induced Currents MC Questions [Mar 28, 2011]

1.   E

2.   D

3.   D

4.   A

5.   A

6.   C

7.   C

8.   C

9.   E

10.   B

11.   A

12.   C

13.   D

Name _____   Class _____   Date _____

1. _____

2. _____

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12. _____

13. _____