Short Answer

20.1 Magnetic Fields, Field Lines, and Force 35.

Given a bar magnet, a needle, a cork, and a bowl full of water, describe how to make a compass.

a. Magnetize the needle by holding it perpendicular to a bar magnet's north pole and pierce the cork along its longitudinal axis by the needle and place the needle-cork combination in the water. The needle now orients itself along the magnetic field lines of Earth.
b. Magnetize the needle by holding it perpendicular to a bar magnet's north pole and pierce the cork along its longitudinal axis by the needle and place the needle-cork combination in the water. The needle now orients itself perpendicular to the magnetic field lines of Earth.
c. Magnetize the needle by holding its axis parallel to the axis of a bar magnet and pierce the cork along its longitudinal axis by the needle and place the needle-cork combination in the water. The needle now orients itself along the magnetic field lines of Earth.
d. Magnetize the needle by holding its axis parallel to the axis of a bar magnet and pierce the cork along its longitudinal axis by the needle and place the needle-cork combination in the water. The needle now orients itself perpendicular to the magnetic field lines of Earth.

36.

Give two differences between electric field lines and magnetic field lines.

a. Electric field lines begin and end on opposite charges and the electric force on a charge is in the direction of field, while magnetic fields form a loop and the magnetic force on a charge is perpendicular to the field.
b. Electric field lines form a loop and the electric force on a charge is in the direction of field, while magnetic fields begin and end on opposite charge and the magnetic force on a charge is perpendicular to the field.
c. Electric field lines begin and end on opposite charges and the electric force on a charge is in the perpendicular direction of field, while magnetic fields form a loop and the magnetic force on a charge is in the direction of the field.
d. Electric field lines form a loop and the electric force on a charge is in the perpendicular direction of field, while magnetic fields begin and end on opposite charge and the magnetic force on a charge is in the direction of the field.

37.

To produce a magnetic field of 0.0020 T, what current is required in a 500-turn solenoid that is 25 cm long?

a. 0.80 A
b. 1.60 A

c. 80 A
d. 160 A

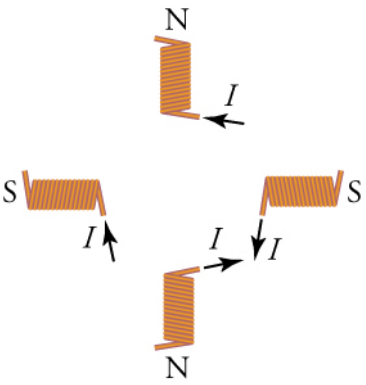
38.

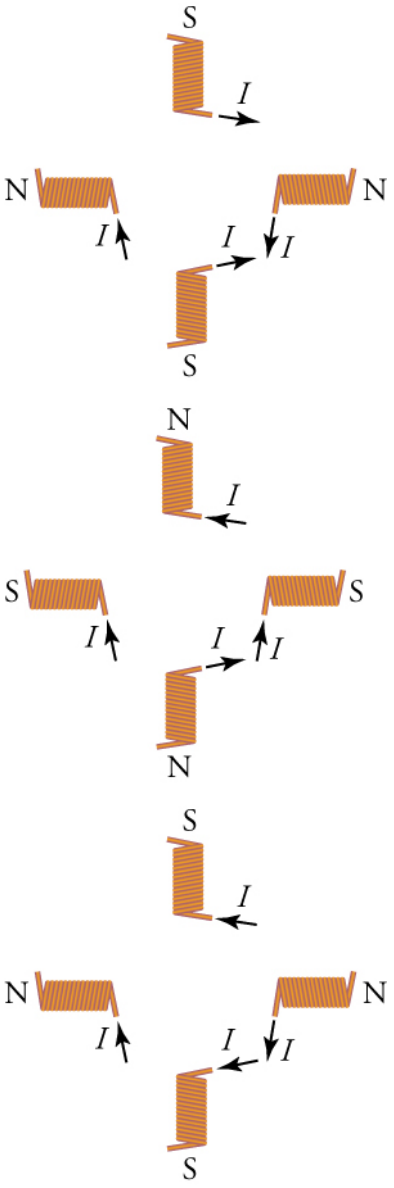
A needle is magnetized by aligning it along the axis of a bar magnet and just outside the north pole of the magnet. Will the point of the needle that was closest to the bar magnet then be attracted to or repelled from the south pole of another magnet?

a. The needle will magnetize and the point of needle kept closer to the north pole will act as a south pole. Hence, it will repel the south pole of other magnet.
b. The needle will magnetize and the point of needle kept closer to the north pole will act as a south pole. Hence, it will attract the south pole of other magnet.
c. The needle will magnetize and the point of a needle kept closer to the north pole will act as a north pole. Hence, it will repel the south pole of the other magnet.
d. The needle will magnetize and the point of needle kept closer to the north pole will act as a north pole. Hence, it will attract the south pole of other magnet.

39.

Using four solenoids of the same size, describe how to orient them and in which direction the current should flow to make a magnet with two opposite-facing north poles and two opposite-facing south poles.





40.

How far from a straight wire carrying 0.45 A is the magnetic field strength 0.040 T?

a. 0.23 µm
b. 0.72 µm
c. 2.3 µm
d. 7.2 µm

20.2 Motors, Generators, and Transformers 41.

A laminated-coil transformer has a wire coiled 12 times around one of its sides. How many coils should you wrap around the opposite side to get a voltage output that is one half of the input voltage? Explain.

a. six output coils because the ratio of output to input voltage is the same as the ratio of number of output coils to input coils
b. 12 output coils because the ratio of output to input voltage is the same as the ratio of number of output coils to input coils
c. 24 output coils because the ratio of output to input voltage is half the ratio of the number of output coils to input coils
d. 36 output coils because the ratio of output to input voltage is three times the ratio of the number of output coils to input coils

42.

Explain why long-distance electrical power lines are designed to carry very high voltages.

a. $P_{\text{transmitted}} = I_{\text{transmitted}>}{}^2 \ R_{\text{wire}}$ and $P_{\text{lost}} = I_{\text{transmitted}} \ V_{\text{transmitted}}$, so V must be low to make the current transmitted as high as possible.
b. $P_{\text{transmitted}} = I_{\text{transmitted}>}{}^2 \ R_{\text{wire}}$ and $P_{\text{lost}} = I_{\text{lost}} \ V_{\text{lost}}$, so V must be low to make the current transmitted as high as possible.
c. $P_{\text{transmitted}} = I_{\text{transmitted}>}{}^2 \ R_{\text{wire}}$ and $P_{\text{lost}} = I_{\text{transmitted}} \ V_{\text{transmitted}}$, so V must be high to make the current transmitted as low as possible
d. $P_{\text{lost}} = I_{\text{transmitted}}{}^2 \ R_{\text{wire}}$ and $P_{\text{transmitted}} = I_{\text{transmitted}} \ V_{\text{transmitted}}$, so V must be high to make the current transmitted as low as possible.

43.

How is the output emf of a generator affected if you double the frequency of rotation of its coil?

a. The output emf will be doubled.
b. The output emf will be halved.
c. The output emf will be quadrupled.
d. The output emf will be tripled.

44.

In a hydroelectric dam, what is used to power the electrical generators that provide electric power? Explain.

a. The electric potential energy of stored water is used to produce emf with the help of a turbine.
b. The electric potential energy of stored water is used to produce resistance with the help of a turbine.
c. Gravitational potential energy of stored water is used to produce resistance with the help of a turbine.

d. Gravitational potential energy of stored water is used to produce emf with the help of a turbine.

20.3 Electromagnetic Induction 45.

A uniform magnetic field is perpendicular to the plane of a wire loop. If the loop accelerates in the direction of the field, will a current be induced in the loop? Explain why or why not.

a. No, because magnetic flux through the loop remains constant.
b. No, because magnetic flux through the loop changes continuously.
c. Yes, because magnetic flux through the loop remains constant.
d. Yes, because magnetic flux through the loop changes continuously.

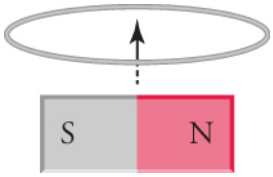
46.

The plane of a square wire circuit with side 4.0 cm long is at an angle of 45° with respect to a uniform magnetic field of 0.25 T. The wires have a resistance per unit length of 0.2. If the field drops to zero in 2.5 s, what magnitude current is induced in the square circuit?

a. 35 µA
b. 87.5 µA
c. 3.5 mA
d. 35 A

47.

Yes or no—If a bar magnet moves through a wire loop as shown in the figure, is a current induced in the loop? Explain why or why not.



a. No, because the net magnetic field passing through the loop is zero.
b. No, because the net magnetic field passing through the loop is nonzero.
c. Yes, because the net magnetic field passing through the loop is zero.
d. Yes, because the net magnetic field line passing through the loop is nonzero.

48.

What is the magnetic flux through an equilateral triangle with side 60 cm long and whose plane makes a 60° angle with a uniform magnetic field of 0.33 T?

a. 0.045 Wb
b. 0.09 Wb
c. 0.405 Wb

d. 4.5 Wb