

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Magnetic effects of electric currents Type: Conceptual Type: Definition

Multiple Choice Question MC Which of these will always produce a magneti...

4. Imagine that this classroom contains a constant magnetic field that points from the front to the back. In front of you a negative charge is slowly moving horizontally to your left. As you watch, the magnetic force on the charge

 \bigcirc deflects the charge away from you.

- \bigcirc deflects the charge into a clockwise directed vertical circle.
- \bigcirc deflects the charge toward you.
- \bigcirc has no effect on the charge.

Select

 \rightarrow \bigcirc deflects the charge into a counterclockwise vertical circle.

Accessibility: Keyboard Navigation Difficulty: Medium Topic: Magnetic effects of electric currents Type: Conceptual

Multiple Choice Question MC Imagine that this classroom contains a const...

- Select 3. When a current is induced by a changing magnetic field B₁, the current always produces a second magnetic field B₂ such that
 B₁ and B₂ completely cancel each other out.
 B₁ and B₂ combine to give a stronger magnetic field than B₁ alone.
 - \bigcirc B₁ and B₂ combine to give a weaker magnetic field than B₁ alone.
 - \rightarrow \bigcirc It is not possible to tell whether the combined field is stronger or weaker than B₁ without knowing how B₁ is changing.

Accessibility: Keyboard Navigation Difficulty: Medium Topic: Faraday's law: Electromagnetic induction Type: Conceptual

6. A permanent magnet is produced when

MC When a current is induced by a changing magn...

- \rightarrow \bigcirc magnetic fields of large groups of individual atoms are permanently aligned.
 - \bigcirc electrons become stuck and cease to move.
 - \bigcirc electrical fields exchange electrons with the magnetic fields.
 - \bigcirc current is made to circulate in a clockwise direction in a loop of wire.

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Magnets and the magnetic force Type: Conceptual Type: Definition

Accessibility: Keyboard Navigation

Difficulty: Easy Type: Conceptual

Multiple Choice Question

Multiple Choice Question

- MC A permanent magnet is produced when
- 7. A positive charge is released from rest near a bar magnet. The magnetic force on the charge
 - \rightarrow \bigcirc There is no magnetic force on the charge.
 - \bigcirc Either pole of the magnet will repel the positive charge.
 - \bigcirc can only be attracted toward the S pole of the magnet.
 - \bigcirc can only be attracted toward the N pole of the magnet.

Multiple Choice Question

MC A positive charge is released from rest near...

- 8. A bar magnet and an electrically polarized object are placed next to each other on a table. What happens?
 - \bigcirc The positive part of the object turns toward the north pole of the magnet.
 - \bigcirc The positive part of the object turns toward the south pole of the magnet.
 - \bigcirc The object and magnet accelerate toward each other until they touch and then they repel.

Select Q

Select

Select Q

 \rightarrow \bigcirc Nothing happens.

Multiple Choice Question

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Faraday's law: Electromagnetic induction Type: Conceptual

- MC A bar magnet and an electrically polarized o...9. A current flowing through a long, straight wire causes a magnetic field that points
 - \bigcirc along the wire.
 - \rightarrow $\bigcirc\,$ along concentric circles around the wire.
 - \bigcirc radially inward toward the wire.

Select

 \bigcirc radially outward from the wire.

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Faraday's law: Electromagnetic induction Type: Conceptual

- Multiple Choice Question MC A current flowing through a long, straight w...
- 10. A little magnetic compass has a needle whose tips are clearly labeled N and S. The compass is placed next to a single circular loop of wire lying flat on a wooden table. The current in the loop is clockwise. What happens?
 - \bigcirc The S tip of the needle is attracted toward the loop.

 \bigcirc The N tip of the needle is attracted toward the loop.

The needle orients itself with the N tip pointing in the direction of the current in the segment of the loop closest to the needle.

 \bigcirc The needle orients itself with the S tip pointing in the direction of the current in the segment of the loop closest to the needle.

 \rightarrow \bigcirc None of these.

Accessibility: Keyboard Navigation Difficulty: Medium Topic: Magnetic effects of current loops Type: Conceptual

Multiple Choice Question MC A little magnetic compass has a needle whose...

Select 🔂 11. A magnetic compass points towards the north geographic pole of the Earth because

 \bigcirc all magnetic poles, north or south, point that way due to the spin of the Earth.

 \bigcirc the static electricity in the atmosphere causes the alignment of the compass.

 \bigcirc there is a north magnetic pole near the north geographic pole.

 $\rightarrow \bigcirc$ there is a south magnetic pole near the north geographic pole.

Select

Accessibility: Keyboard Navigation Difficulty: Easy Multiple Choice Question Topic: Magnets and the magnetic force MC A magnetic compass points towards the north ... Type: Conceptual 12. Two identical coils of wire are placed on a single horizontal wooden broom handle. The coils are separated by a few centimeters. We now run identical currents in the same direction through each coil. The coils experience \bigcirc no forces because the currents are identical. \bigcirc a repulsive magnetic force. \rightarrow \bigcirc an attractive magnetic force. ○ an attractive electrostatic force because one coil is negatively charged and the other positively charged. Select \bigcirc a repulsive electrostatic force because both coils are identically charged. Accessibility: Keyboard Navigation Difficulty: Medium Topic: Magnetic effects of current loops Multiple Choice Question MC Two identical coils of wire are placed on a ... Type: Conceptual 13. Which of the following cannot induce a voltage in a loop of wire? \bigcirc Moving a magnet near the loop. \bigcirc Moving the loop near a magnet. \rightarrow \bigcirc Expanding or contracting the loop in a region where there is no magnetic field. Select 0 • Changing the current in a nearby loop. Accessibility: Keyboard Navigation Difficulty: Easy Multiple Choice Ouestion Topic: Magnetic effects of current loops MC Which of the following cannot induce a volta... Type: Conceptual 14. An ideal transformer is used to either increase or decrease the voltage in an AC circuit. When the output voltage is greater than the input voltage of a transformer then \bigcirc the power output depends on the ratio of turns in the primary and secondary. \rightarrow \bigcirc the power output is the same as the power input. \bigcirc the power output is larger than the power input. Select Q \bigcirc the power output is smaller than the power input. Accessibility: Keyboard Navigation Difficulty: Easy Topic: Generators and transformers Multiple Choice Question MC An ideal transformer is used to either increase or Type: Conceptual 15. A positively charged ping pong ball is sitting stationary on the floor in the center of a room. There is also a constant, uniform magnetic field in the room that points toward the ceiling. If I now start the ball rolling toward the back of the room, the resultant motion of the ball, as observed from the ceiling, will be \bigcirc a diagonal straight line toward the left back corner of the room. \bigcirc a diagonal straight line toward the right back corner of the room. \rightarrow \bigcirc a horizontal, clockwise circle. Select ○ a horizontal, counterclockwise circle. \bigcirc a straight line in the original direction of motion. Accessibility: Keyboard Navigation Difficulty: Easy Multiple Choice Question Topic: Magnetic effects of electric currents MC A positively charged ping pong ball is sitti... Type: Conceptual

16. A battery is causing a large current in a solenoid (helical coil of wire). A bar magnet is held at rest nearby, aligned with the axis of the solenoid, with its south pole closest to the solenoid. The bar magnet is being repelled by the solenoid. Which of the following statements is true of the conventional current in the solenoid?

- \bigcirc The current in the solenoid increases.
- \bigcirc The current in the solenoid decreases.
- \bigcirc The current in the solenoid is flowing counterclockwise as seen from the bar magnet.
- \rightarrow \bigcirc The current in the solenoid is flowing clockwise as seen from the bar magnet.
 - \bigcirc The direction of the current in the solenoid alternates with a constant frequency.

Accessibility: Keyboard Navigation Difficulty: Hard Topic: Faraday's law: Electromagnetic induction Type: Conceptual

Multiple Choice Question MC A battery is causing a large current in a ho...

- Select 🔁 17. Bar A has one end painted green and the other end red and may or may not be a magnet. A student brings the north pole of a bar magnet M close to the green end of A. He observes that the green end is attracted. He can conclude that
 - \bigcirc A is not a magnet.
 - \bigcirc A is a magnet and the green end is a north pole.
 - \bigcirc A is a magnet and the green end is a south pole.
 - \rightarrow \bigcirc A might be a magnet; this observation does not provide enough information to determine whether or not it is.



	Multiple Choice Question MC Bar A has one end painted green and the othe	Accessibility: Keyboard Navigation Difficulty: Medium Topic: Magnets and the magnetic force Type: Conceptual
	18. The south pole of a bar magnet is moved toward an aluminum ring, along the changing magnetic flux induces an electric current in the ring that, wh positive charge carriers flowing	the axis of the ring. As the magnet approaches, en seen from the bar magnet, corresponds to
	$\rightarrow \bigcirc$ clockwise.	
	\bigcirc counterclockwise.	
Select	\bigcirc alternating with a fixed frequency.	
	\bigcirc alternating with a frequency proportional to a speed of the bar	magnet.
		Accessibility: Keyboard Navigation
		Difficulty: Medium
	Multiple Choice Question	Topic: Faraday's law: Electromagnetic induction
	MC The south pole of a bar magnet is moved towa	Type: Conceptual
	\bigcirc straight lines perpendicular to the wire.	g magnetic field lines are
	\bigcirc parallel to the wire from west to east	
	\bigcirc parallel to the wire from east to west.	
	 closed circles perpendicular to the wire directed counterclock 	wise as viewed from the east.
Select	\rightarrow \bigcirc closed circles perpendicular to the wire directed clockwise as viewed from the east.	
		Accessibility: Keyboard Navigation
	Multiple Choice Question	Difficulty: Easy Topic: Magnetic effects of electric currents
	MC A horizontal straight wire carries a current	Type: Conceptual
	20. Magnetic fields affect	
	○ neither electric charges in motion nor electric charges at rest.	
	\bigcirc both electric charges in motion and electric charges at rest.	
	\rightarrow \bigcirc only electric charges in motion.	
Select o	\bigcirc only electric charges at rest.	
		Accessibility: Keyboard Navigation
		Difficulty: Easy
		Topic: Magnetic effects of electric currents
	Multiple Choice Question	Type: Conceptual
	21 The scientist credited with discovering that electric currents produce mag	netic fields was
	\rightarrow Oersted	nette netus was
	• Ampere	
	\bigcirc Coulomb.	
	• Tesla.	
Select	○ Faraday.	
		Accessibility: Keyboard Navigation
		Topic: Magnetic effects of electric currents
	Multiple Choice Question	Type: Conceptual
	MC The scientist credited with discovering that	Type: Definition
	22. The magnetic pole near the Earth's north geographic pole actually has to b	be
	\cup an N pole, because it repels the S pole of your compass needly	д.

 \rightarrow \bigcirc an S pole, because it attracts the N pole of your compass needle.

 \bigcirc either an N or an S pole, but scientists have not determined which one yet.

Multiple Choice Question MC The magnetic pole near the Earth's north geo...

- Accessibility: Keyboard Navigation Difficulty: Easy Topic: Magnets and the magnetic force Type: Conceptual
- 23. Two long bar magnets are aligned so that north poles face each other. The magnets are separated by 1 cm, and a repulsive force between the north poles is 0.04 N. When the separation is increased to 2 cm the force will be

→ \bigcirc 0.010 N. \bigcirc 0.020 N. \bigcirc 0.025 N. \bigcirc 0.40 N. \bigcirc 0.050 N.

> Accessibility: Keyboard Navigation Difficulty: Easy Topic: Magnets and the magnetic force Type: Numerical

Multiple Choice Question MC Two long bar magnets are aligned so that nor...

Select 24.

Select

Select o

Two current-carrying wires are parallel to one another and separated by 1 cm. If the distance between them is increased to 2 cm the new force will be what factor times the original force?

 $\bigcirc \frac{1}{4} \\ \rightarrow \bigcirc \frac{1}{2} \\ \bigcirc 1 \\ \bigcirc 2 \\ \bigcirc 4$

Multiple Choice Question MC Two current-carrying wires are parallel to o...

25.

Select Q

Select

Two current-carrying wires are parallel to o... $(\widehat{\pm})$ Accessibility: Keyboard Navigation Difficulty: Easy Topic: Faraday's law: Electromagnetic induction Type: Numerical

A long straight wire carries a current. A positive charge moves toward the wire in a direction perpendicular to the wire. The direction of the force on the charge will be

- \bigcirc parallel to the wire in the direction of the current.
- \rightarrow \bigcirc parallel to the wire opposite the direction of the current.
 - \bigcirc in the direction of the charge's velocity.
 - \bigcirc opposite the direction of the charge's velocity.
 - \bigcirc There is no force.

Multiple Choice Question

MC A long horizontal wire carries a current di...

26. Imagine a magnetic field pointing into the plane of this page. An electron moves across the paper from left to right. The direction of the magnetic force on the electron will be

- \bigcirc into the plane of the paper.
- \bigcirc out of the plane of the paper.
- \bigcirc in the plane of the paper and toward the top of the page.
- \rightarrow \bigcirc in the plane of the paper and toward the bottom of the page.
 - \bigcirc in the plane of the paper and opposite the electron's velocity.

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Magnetic effects of electric currents Type: Conceptual

Topic: Magnetic effects of electric currents

Difficulty: Medium

Type: Conceptual

Multiple Choice Question MC Imagine a magnetic field pointing into the p...

27. The correct expression for magnetic flux through area A, where B is the magnetic field and A is an area perpendicular to the field, is

 $\bigcirc B/A.$ $\rightarrow \bigcirc B \times A.$ $\bigcirc B + A.$ $\bigcirc A/B.$ $\bigcirc 1/(B \times A).$

Select

Select Q

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Faraday's law: Electromagnetic induction Type: Conceptual Type: Definition

 Multiple Choice Question
 Type: Conceptua

 MC The correct expression for magnetic flux th...
 Type: Definition

 28. Think of a closed rectangular loop of wire around the edge of this page. A magnetic field perpendicular to the page points upward and increases in strength in a certain time. During this time the conventional current induced in the loop will be

- \rightarrow \bigcirc clockwise.
 - \bigcirc counterclockwise.
 - \bigcirc zero.
 - \bigcirc continually changing direction.

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Faraday's law: Electromagnetic induction Type: Conceptual

Multiple Choice Question MC Think of a closed rectangular loop of wire a...

- Select 29. A transformer has 200 turns on the primary and 20 turns on the secondary. The primary is connected to a direct current source of 100 millivolts. The voltage in the secondary coil will be
 - \bigcirc zero.
 - \rightarrow \bigcirc 10 millivolts.
 - \bigcirc 20 millivolts.
 - \bigcirc 1000 millivolts.

 \bigcirc 4000 millivolts.

MC A transformer has 200 turns on the primary a...

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Generators and transformers Type: Numerical

30. A transformer is to be used to step down voltage from an alternating current source from 220 V to 110 V. If the primary has 120 turns, then the number of turns in the secondary is

\bigcirc	2.
\rightarrow \bigcirc	60.
\bigcirc	240.
\bigcirc	720.
\bigcirc	1320.

Multiple Choice Question

Multiple Choice Question

Select

Select

Select

Select

Select

Multiple Choice Question

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Generators and transformers Type: Numerical

- 31. The south pole of a bar magnet is moved toward a short helical coil of wire (solenoid) along the axis of the coil. The coil has 100 turns and the ends of the coil are connected to form a closed circuit. If the coil is replaced with a single loop of the same type of wire, and the magnet is moved exactly as before, the current induced in the loop is
 - \bigcirc the same as in the coil.

MC A transformer is to be used to step up volta...

- \bigcirc zero in both cases.
- \rightarrow \bigcirc 100 times smaller.
 - \bigcirc 100 times larger.

Accessibility: Keyboard Navigation Difficulty: Medium Topic: Magnetic effects of current loops Type: Numerical

MC The south pole of a bar magnet is moved towa...

- 32. The south pole of a bar magnet is moved toward a short helical coil of wire (solenoid) along the axis of the coil. The coil has 100 turns and the ends of the coil are connected to form a closed circuit. If the coil is replaced with a single loop of the same type of wire, and the magnet is moved exactly as before, the magnet experiences a force that is
 - \bigcirc the same as before.
 - \bigcirc attractive and 100 times larger.
 - \bigcirc attractive and 100 times smaller.
 - \bigcirc repulsive and 100 times larger.
 - \rightarrow \bigcirc repulsive and 100 times smaller.

Accessibility: Keyboard Navigation Difficulty: Hard Topic: Generators and transformers Type: Numerical

Multiple Choice Question

MC The south pole of a bar magnet is moved towa...

- 33. In the southern hemisphere, the north pole of a compass needle
 - \bigcirc points toward the south geographic pole because there is a south magnetic pole there.
 - points toward the south geographic pole because that is the nearest magnetic pole.
 - \rightarrow \bigcirc points away from the south geographic pole because there is a north magnetic pole there.
 - \bigcirc spins aimlessly because the north geographic pole is beyond the horizon.

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Magnets and the magnetic force Type: Conceptual

Multiple Choice Question

MC In the southern hemisphere, the north pole o...

34. If an electron is placed at rest near a bar magnet, the electron will

 \bigcirc accelerate away from the negative pole of the magnet.

- \rightarrow \bigcirc not move at all.
 - \bigcirc be attracted to the positive pole of the magnet.
- \bigcirc move in a circular path around the north pole of the magnet.

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Magnetic effects of electric currents Type: Conceptual

Multiple Choice Question MC If an electron is placed at rest near a bar ...

Select 🔂 35. A bar magnet is broken in half and the magnetic field around one piece is mapped out. What is wrong with this picture?



- \bigcirc The field lines are pointing in the wrong direction.
- \bigcirc The field lines should converge on the "N."
- \rightarrow \bigcirc There is no south pole.
 - \bigcirc Nothing; this is how the field looks around a broken magnet.

Multiple Choice Question

MC A bar magnet is broken in half and the magne...

- Difficulty: Easy Topic: Magnets and the magnetic force Type: Conceptual Type: Graphical
- 36. The sketch below shows a bar magnet in a loop of wire with the bar perpendicular to the plane of the loop. The left-hand side shows the magnet being spun around its long axis while on the right side the magnet is turned end-over-end. Which case creates a larger induced current in the loop?



- 38. Two particles move into a magnetic field. They enter moving at the same speed and direction. The magnitude of the charge on each is known to be the same. One particle curls to the right and the other to the left upon entering the field, the one on the left moving in a larger circle than the one on the right. From this we can say that
 - \bigcirc the leftward moving particle has more mass and is positively charged.
 - \bigcirc the rightward moving particle has less mass and is positively charged.
 - \rightarrow \bigcirc the leftward moving particle has more mass and its charge is opposite the other particle.
 - \bigcirc the rightward moving particle has positive charge but we cannot say anything about its mass.

Accessibility: Keyboard Navigation Difficulty: Medium Topic: Magnetic effects of electric currents Type: Conceptual

Multiple Choice Question MC Two particles move into a magnetic field. Th...

- Select 39. If an electron moves in a magnetic field,
 - \bigcirc it always feels a force.

 \bigcirc it only feels a force if its velocity vector is parallel (or antiparallel) to the direction of the magnetic field.

→ ○ it only feels a force if its velocity vector is not parallel (or antiparallel) to the direction of the magnetic field.
 ○ it does not feel a force if it is in motion, only if stationary.

Multiple Choice Question MC If an electron moves in a magnetic field, Accessibility: Keyboard Navigation Difficulty: Easy

Select

Topic: Magnetic effects of electric currents Type: Conceptual

40. In outer space, you observe a straight stream of electrons flowing past you at 14.5 miles per second, about the same speed that Mars moves on its orbit around the sun.



Select

You maneuver your spacecraft to face the current so that the electrons are moving from left to right and so that you are 10 m from the stream. In what direction does a compass needle point?

- \rightarrow \bigcirc up \uparrow
 - 🔾 down 👃
 - \bigcirc left \leftarrow
 - \bigcirc right \rightarrow
 - \bigcirc You observe no magnetic field.

Difficulty: Easy Topic: Magnetic effects of electric currents Type: Conceptual

Type: Graphical

Multiple Choice Question MC In outer space, you observe a straight strea...

41. In outer space, you observe a straight stream of electrons flowing past you at 14.5 miles per second, about the same speed that Mars moves on its orbit around the sun.



Select

You maneuver your spacecraft to face the current so that the electrons are moving from left to right and so that you are 10 m from the stream. Now you fire your rockets and boost your speed so that you are also moving at 14.5 miles per second, exactly at the same speed and direction as the electrons. In what direction does a compass needle point now?

- ⊖ up ↑
- \bigcirc down \downarrow
- \bigcirc left \leftarrow
- \bigcirc right \rightarrow
- \rightarrow \bigcirc You observe no magnetic field.

Difficulty: Easy Topic: Magnetic effects of electric currents Type: Conceptual Type: Graphical

Multiple Choice Question

MC In outer space, you observe a straight strea...

42. You see a positively charged helium ion in space, and it is at rest with respect to your spacecraft. Since you are studying

for the final exam, you decide to experiment. You slowly push the N pole of a bar magnet closer to the helium ion. What happens to the helium ion?

 \bigcirc It experiences a magnetic force and moves off.

- \bigcirc It depends on whether it is a positive ion or a negative ion.
- \rightarrow \bigcirc Nothing happens, because the ion is not moving.

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Faraday's law: Electromagnetic induction Type: Conceptual

Multiple Choice Question MC You see a positively charged helium ion in s...

Select 43.

Select

You could use two parallel wires to move objects 1 and 2 apart if each wire is embedded in its own object and if



 \bigcirc of due north.

Accessibility: Keyboard Navigation Difficulty: Easy Topic: Magnetic effects of electric currents Type: Conceptual Type: Definition

Multiple Choice Question MC If a current of negative charge flows in a c...

47. The unit used in expressing magnetic field strength is the _____.

Tesla

Select

Select

Fill-in-the-Blank Question FB The unit used in expressing magnetic field s...

Select 🔂 48. Two parallel wires each carrying a current in opposite directions will _____

repel

Fill-in-the-Blank Question FB Two parallel wires each carrying a current i... Difficulty: Easy Topic: Magnets and the magnetic force Type: Conceptual Type: Definition one another.

> Difficulty: Easy Topic: Magnetic effects of electric currents

Type: Conceptual Type: Definition 49. When there is a changing magnetic flux through an electric circuit, the direction of the induced current in the circuit is determined by Law. Lenz's Select Difficulty: Easy Topic: Faraday's law: Electromagnetic induction Fill-in-the-Blank Question Type: Conceptual FB When there is a changing magnetic flux throu... Type: Definition 50. The north pole of a bar magnet is moved away from a single closed loop of wire along the axis of the loop. The induced current in the loop produces an effective pole toward the bar magnet. south Select Q Difficulty: Easy Fill-in-the-Blank Question Topic: Faraday's law: Electromagnetic induction FB The north pole of a bar magnet is moved away... Type: Conceptual 51. A bar magnet is held near a single closed loop of wire. The magnet is aligned with the loop axis, and the north pole is facing the loop. If the magnet is moved away, the current induced in the loop will be in a direction as viewed from the side the magnet is on. clockwise Select Q Difficulty: Medium Fill-in-the-Blank Question Topic: Faraday's law: Electromagnetic induction FB A bar magnet is held near a single closed lo... Type: Conceptual 52. A step-up transformer that doubles the input voltage is designed to work with an input voltage that varies at 60 Hz. The frequency with which the output voltage varies is Hz. 60 Select Difficulty: Easy Topic: Generators and transformers Fill-in-the-Blank Question FB A step-up transformer that doubles the input... Type: Conceptual 53. Faraday's Law states that a voltage is induced in a circuit when there is a changing passing through the circuit. magnetic flux Select Q **Difficulty:** Easy Topic: Faraday's law: Electromagnetic induction Fill-in-the-Blank Question Type: Conceptual FB Faraday's Law states that a voltage is induced... Type: Definition 54. A solenoid carrying an electric current, if free to rotate when placed in a magnetic field, will tend to orient its axis (parallel, perpendicular, anti-parallel) to the magnetic field. parallel Select Difficulty: Easy Fill-in-the-Blank Question Topic: Generators and transformers FB A solenoid carrying an electric current, if ... Type: Conceptual N N N