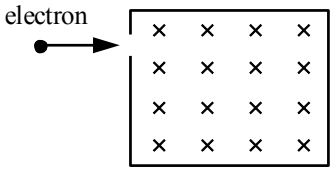
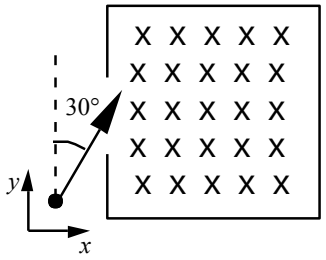
1. An electron traveling horizontally enters a region where a uniform magnetic field is directed into the plane of the paper as shown. Which one of the following phrases most accurately describes the motion of the electron once it has entered the field?



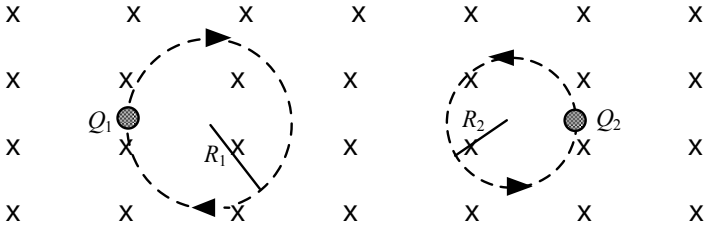
(a) upward and parabolic
(b) upward and circular
(c) downward and circular
(d) upward, along a straight line
(e) downward and parabolic

2. An electron enters a region that contains a magnetic field directed into the page as shown. The velocity vector of the electron makes an angle of 30° with the +*y* axis. What is the direction of the magnetic force on the electron when it enters the field?



(a) up, out of the page
(b) at an angle of 30° below the positive *x* axis
(c) at an angle of 30° above the positive *x* axis
(d) at an angle of 60° below the positive *x* axis
(e) at an angle of 60° above the positive *x* axis

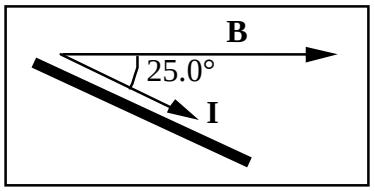
4. Two charged particles are traveling in circular orbits with the same speed in a region of uniform magnetic field that is directed into the page, as shown. The magnitude of the charge on each particle is identical, but the signs of the charges are unequal.



Which one of the entries in the table below is correct?

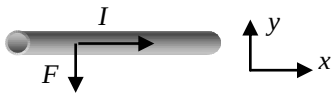
	Mass Relationship	*Sign of charge* Q_1	*Sign of charge* Q_2
(a)	$M_1 = m_2$	+	–
(b)	$M_1 > m_2$	–	+
(c)	$m_1 < m_2$	–	+
(d)	$m_1 > m_2$	+	–
(e)	$m_1 < m_2$	+	–

5. A 0.150-m wire oriented horizontally between the poles of an electromagnet carries a direct current of 12.5 A. The angle between the direction of the current and that of the magnetic field is 25.0°. If the magnetic field strength is 0.625 T, what is the magnitude and direction of the magnetic force on the wire between the poles?



(a) 1.17 N, upward
(b) 3.30 N, downward
(c) 0.792 N, upward
(d) 1.44 N, downward
(e) 0.495 N, upward

6. A long, straight wire carries a 6.0-A current that is directed in the positive *x* direction. When a uniform magnetic field is applied

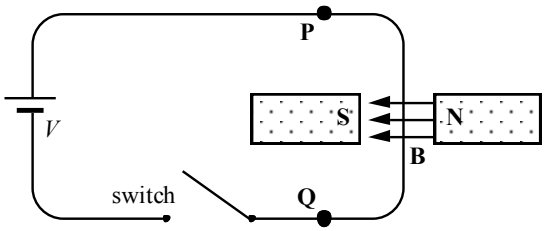


perpendicular to a 3.0-m segment of the wire, the magnetic force on the segment is 0.36 N, directed in the negative *y* direction, as shown. What are the magnitude and direction of the magnetic field?

(a) 0.020 T, out of the paper
(b) 0.020 T, into the paper
(c) 0.060 T, out of the paper
(d) 0.060 T, into the paper
(e) 0.65 T, out of the paper

Questions 7 and 8 pertain to the statement and figure below:

A long straight vertical segment of wire traverses a magnetic field of magnitude 2.0 T in the direction shown in the diagram. The length of the wire that lies in the magnetic field is 0.060 m. When the switch is closed, a current of 4.0 A flows through the wire from point **P** to point **Q**.



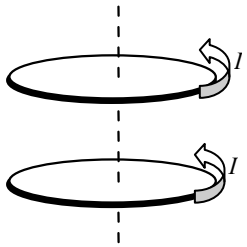
7. Which one of the following statements concerning the effect of the magnetic force on the wire is true?
(a) The wire will be pushed to the left.
(b) The wire will be pushed to the right.
(c) The wire will have no net force acting on it.
(d) The wire will be pushed downward, into the plane of the paper.
(e) The wire will be pushed upward, out of the plane of the paper.

8. What is the magnitude of the magnetic force acting on the wire?
(a) 0.12 N
(b) 0.24 N
(c) 0.48 N
(d) 67 N
(e) zero newtons

9. A solenoid of length 0.250 m and radius 0.0200 m is comprised of 120 turns of wire. Determine the magnitude of the magnetic field at the center of the solenoid when it carries a current of 15.0 A.
(a) 2.26×10^{-3} T
(b) 4.52×10^{-3} T
(c) 9.05×10^{-3} T
(d) 7.50×10^{-3} T
(e) zero tesla

11. An overhead electric power line carries a maximum current of 125 A. What is the magnitude of the maximum magnetic field at a point 4.50 m directly below the power line?
(a) 5.56×10^{-6} T
(b) 1.75×10^{-5} T
(c) 3.49×10^{-5} T
(d) 4.69×10^{-4} T
(e) 7.95×10^{-3} T

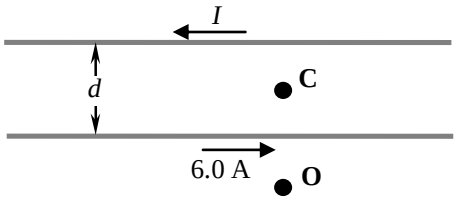
13. Two loops carry equal currents *I* in the same direction. The loops are held in the positions shown in the figure and are then released. Which one of the following statements correctly describes the subsequent behavior of the loops?



(a) Both loops move to the left.
(b) The loops remain in the positions shown.
(c) The top loop moves to the right; the bottom loop moves to the right.
(d) The loops repel each other.
(e) The loops attract each other.

Questions 14 and 15 pertain to the statement and figure below:

Two long, straight, parallel wires separated by a distance d carry currents in opposite directions as shown in the figure. The bottom wire carries a current of 6.0 A. Point **C** is at the midpoint between the wires and point **O** is a distance $0.50d$ below the 6-A wire as suggested in the figure. The total magnetic field at point **O** is zero tesla.



■ 14. Determine the value of the current, I, in the top wire.

(a) 2 A
(b) 3 A
(c) 6 A
(d) 18 A
(e) This cannot be determined since the value of d is not specified.

◘ 15. Determine the magnitude of the magnetic field at point **C** if $d = 0.10$ m.

(a) 2.4×10^{-5} T
(b) 4.8×10^{-5} T
(c) 9.6×10^{-5} T
(d) 1.1×10^{-4} T
(e) 1.4×10^{-4} T