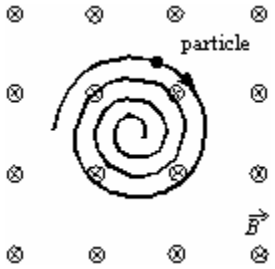
1. A magnetic field CANNOT:
   A) exert a force on a charge
   B) accelerate a charge
   C) change the momentum of a charge
   D) change the kinetic energy of a charge
   E) exist

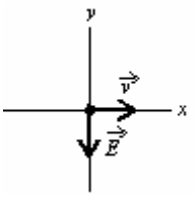
2. At one instant an electron (charge = -1.6×10^{-19} C) is moving in the *xy* plane, the components of its velocity being $v_x = 5 \times 10^5$ m/s and $v_y = 3 \times 10^5$ m/s. A magnetic field of 0.8 T is in the positive *x* direction. At that instant the magnitude of the magnetic force on the electron is:
   A) 0
   B) 3.8×10^{-14} N
   C) 5.1×10^{-14} N
   D) 6.4×10^{-14} N
   E) 7.5×10^{-14} N

3. A uniform magnetic field is directed into the page. A charged particle, moving in the plane of the page, follows a clockwise spiral of decreasing radius as shown. A reasonable explanation is:



   A) the charge is positive and slowing down
   B) the charge is negative and slowing down
   C) the charge is positive and speeding up
   D) the charge is negative and speeding up
   E) none of the above

4. An electron is traveling in the positive *x* direction. A uniform electric field *E* is in the negative *y* direction. If a uniform magnetic field with the appropriate magnitude and direction also exists in the region, the total force on the electron will be zero. The appropriate direction for the magnetic field is:

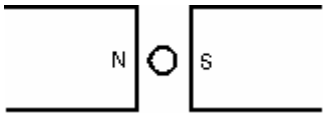


A) the positive *y* direction
B) the negative *y* direction
C) into the page
D) out of the page
E) the negative *x* direction

5. Electrons (mass *m*, charge –*e*) are accelerated from rest through a potential difference *V* and are then deflected by a magnetic field *B* that is perpendicular to their velocity. The radius of the resulting electron trajectory is:

A) $\left(\sqrt{2eV/m}\right)/B$
B) $B\sqrt{2eV}/m$
C) $\left(\sqrt{2mV/e}\right)/B$
D) $B\sqrt{2mV}/e$
E) none of these

6. The diagram shows a straight wire carrying a flow of electrons into the page. The wire is between the poles of a permanent magnet (The direction of the magnetic field is from North pole to South pole). The direction of the magnetic force exerted on the wire is:



A) ↑
B) ↓
C) ←
D) →
E) into the page

Answer Key --

1. D
2. B
3. B
4. C
5. C
6. A