

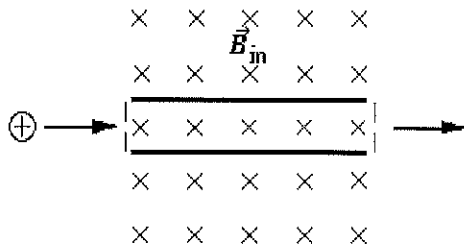
Name: _____ Date: _____

Magnetic Force Practice Test

Chapter 26 AP Physics C

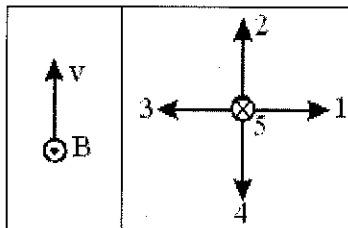
1. A proton with a charge $+e$ is moving with a speed v at 50° to the direction of a magnetic field \vec{B} . The component of the resulting force on the proton in the direction of \vec{B} is
 - A) $evB \sin 50^\circ \cos 50^\circ$
 - B) $evB \cos 50^\circ$
 - C) zero
 - D) $evB \sin 50^\circ$
 - E) None of these is correct.
2. The phenomenon of magnetism is best understood in terms of
 - A) the existence of magnetic poles.
 - B) the magnetic fields associated with the movement of charged particles.
 - C) gravitational forces between nuclei and orbital electrons.
 - D) electrical fluids.
 - E) None of these is correct.
3. A positively charged particle is moving northward in a magnetic field. The magnetic force on the particle is toward the northeast. What is the direction of the magnetic field?
 - A) up
 - B) west
 - C) south
 - D) down
 - E) This situation cannot exist.
4. An alpha particle has a charge of $+2e$ ($e = 1.6 \times 10^{-19}$ C) and is moving at right angles to a magnetic field $B = 0.27$ T with a speed $v = 6.15 \times 10^5$ m/s. The force acting on this charged particle is
 - A) zero
 - B) 5.3×10^{-14} N
 - C) 3.3×10^5 N
 - D) 2.7×10^{-14} N
 - E) 4.8×10^5 N
5. A straight wire segment 3.0 m long makes an angle of 28° with a uniform magnetic field of 1.0 T. The magnitude of the force on the wire if it carries a current of 1.5 A is approximately
 - A) 2.1 N
 - B) 4.0 N
 - C) 1.4 N
 - D) 0.70 N
 - E) 4.7 N
6. An alpha particle with a charge of $2e$ ($e = 1.6 \times 10^{-19}$ C) and a mass of $4(1.66 \times 10^{-27}$ kg) is moving at right angles to a uniform magnetic field of 1.20 T. The radius of curvature of the track of the particle is 0.20 m. What is the momentum of the alpha particle?
 - A) The question cannot be answered because the speed of the particle is not given.
 - B) 7.7×10^{-20} kg m/s
 - C) 3.1×10^{-19} kg m/s
 - D) 0.77 kg m/s
 - E) 4.6×10^{-21} kg m/s

7. The apparatus in the figure consists of two parallel plates (shown on edge) and a large magnet (not shown). The field of the magnet is uniform, perpendicular to the electric field between the plates, and directed into the plane of the paper. The magnitude of \vec{B} is 0.40 T. Charged particles with speeds of 5.0×10^5 m/s enter this region through the slit at the left and emerge through the exit slit at the right. What magnitude and direction must the \vec{E} field have so that positively charged particles entering from the left will traverse to the exit slit undeviated?



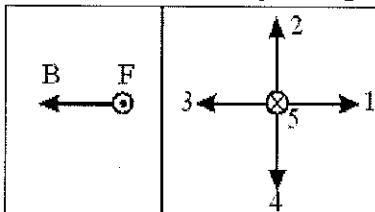
- A) 2.0×10^5 V/m up
 B) 2.0×10^5 V/m down
 C) 1.2×10^6 V/m down
 D) 1.2×10^6 V/m up
 E) 2.4×10^6 V/m down
8. An electron is accelerated from rest by an electric field. After the acceleration, the electron is injected into a uniform magnetic field of 1.27×10^{-3} T. The velocity of the electron and the magnetic field lines are perpendicular to one another. The electron remains in the magnetic field for 5.00×10^{-9} s. The angle between the initial electron velocity and the final electron velocity is
- A) 1.1 rad
 B) 5.8×10^{-2} rad
 C) 8.68×10^{-2} rad
 D) 6.5×10^{-2} rad
 E) 2.3 rad
9. A deuteron is moving with a speed of 2.0×10^6 m/s at right angles to a magnetic field. The field is uniform, with magnitude $B = 0.40$ T. The mass and charge of a deuteron are 3.3×10^{-27} kg and 1.6×10^{-19} C, respectively. The radius of the deuteron orbit is approximately
- A) 0.21 m B) 1.8 m C) 6.3 m D) 10 cm E) 27 cm
10. The radius of the orbit of an electron moving with a speed of 10^8 m/s perpendicular to a magnetic field of 5.0×10^{-3} T is approximately
- A) 1.1 m B) 0.11 m C) 0.34 m D) 0.011 m E) 8.9 m

11. When a compass needle is in stable equilibrium in a magnetic field \vec{B} ,
- the needle axis is at 45° to the \vec{B} field.
 - the south pole points in the positive direction of \vec{B} .
 - the north pole points in the positive direction of \vec{B} .
 - the needle axis is perpendicular to \vec{B} .
 - none of these occurs.
12. One Tesla is equal to
- 10 G
 - 100 G
 - 1000 G
 - 10000 G
 - 10^4 G
13. Which of the following statements is *false*?
- Electric field lines due to an electric dipole and magnetic field lines due a magnetic dipole have similar configuration.
 - Electric field starts from a positive charge and ends at a negative charge.
 - Magnetic field starts at the north pole and ends at the south pole.
 - Magnetic poles always occur in pairs.
 - Magnetic fields result from the flow of charges.
14. The left diagram shows a positively charged particle is moving with velocity v in a magnetic field B . Using the right diagram, the direction of the magnetic force on the particle is



- A) 1 B) 2 C) 3 D) 4 E) 5

15. The left diagram shows a force F on a negatively charged particle moving a magnetic field B . Using the right diagram, the direction of the velocity of the particle is



- A) 1 B) 2 C) 3 D) 4 E) 5

Answer Key

1. C
2. B
3. E
4. B
5. A
6. B
7. B
8. A
9. D
10. B
11. C
12. D
13. C
14. A
15. D