

Physics 2321. Electricity and Magnetism

Quiz 5. Magnetic Forces

Name: _____

1. (1pt) In the formula $\vec{F} = q\vec{v} \times \vec{B}$:
 - (a) F must be parallel to v
 - (b) F must be perpendicular to v but not necessarily to B
 - (c) F must be perpendicular to B and to v
 - (d) v must be perpendicular to B
 - (e) all three vectors must be mutually perpendicular
2. (1pt) T or F. If the only force acting on a charged particle is a magnetic force, the particle will not change its *speed*.
3. (1pt) By equating the centripetal force to the magnetic force on a charged particle in a uniform B-field we find that the radius of the path is
 - (a) $\frac{mv}{qB}$
 - (b) $\frac{m}{qvB}$
 - (c) $\frac{qB}{mv}$
 - (d) $\frac{v}{qmB}$
 - (e) $\frac{m}{q}$
4. (1pt) A proton and an electron fly into a chamber with a uniform B-field with the same velocity. Which one has the path with the smaller radius of curvature?
 - (a) the electron
 - (b) the proton
 - (c) same curvature, different direction
 - (d) they're completely the same
5. (1pt) A fast electron and a slow electron fly into a chamber with a uniform B-field with the same velocity. Which one has the path with the smaller radius of curvature?
 - (a) the fast electron
 - (b) the slow electron
 - (c) same curvature, different direction
 - (d) they're completely the same
6. (1pt) When a current of 4 A flows through a wire segment of length $L=50$ cm in the presence of a magnetic field, $B=4$ T, oriented perpendicular to the wire, the total force on the wire segment is _____
 - (a) 0.8 N
 - (b) 2 N
 - (c) 3 N
 - (d) 8.0 N
 - (e) 200 N
7. (1pt) Calculate the force on an electron ($q=-1.6 \times 10^{-19}$ C) moving at $\vec{v} = 20\hat{j}$ m/s through a magnetic field, $\vec{B} = -3\hat{k}$ T.