

TERMS

Be able to define or discuss the following terms with their SI units, if any.

1. north pole
2. south pole
3. magnetic field \vec{B}
4. magnetic field lines
5. magnetic flux Φ_B
6. magnetic monopole
7. magnetic dipole
8. magnetic (dipole) moment $\vec{\mu}$
9. magnetic potential energy U
10. Hall effect

EQUATIONS

Understand the meaning and know the SI units of all the symbols in these equations—and be able to use the equations to solve problems.

1. Eqs. (27.2) (vector equation), (27.1) and (27.3) (mathematical evaluation of the magnitude F)
2. Eqs. (27.6) (definition of Φ_B) and (27.7) (for uniform \vec{B} , flat surface)
3. Eq. (27.8)
4. Eqs. (27.19) and (27.20) (vector equations) and (27.18) (mathematical evaluation of the magnitude F)
5. $\vec{\mu} = NI\vec{A}$ (vector equation)
6. Eqs. (27.26) (vector equation) and (27.25) (mathematical evaluation of the magnitude τ)
7. Eq. (27.27)

SKILLS

Use the material in these sections to be able to use right-hand rules to:

1. find the direction of the force \vec{F} exerted by an external magnetic field on a moving charged particle. (\vec{F} is in the *same* direction as $\vec{v} \times \vec{B}$ if q is positive but \vec{F} is *opposite* the direction of $\vec{v} \times \vec{B}$ if q is negative.)
2. find the direction of the force exerted by an external magnetic field on a current element.
3. relate how its current flows to the direction of both the area vector and the magnetic (dipole) moment of a magnetic dipole.
4. find the direction of the torque exerted by an external magnetic field on a magnetic dipole.

In Fig. 27.9b (page 886), all the green velocity arrows should be tangent to the curved orange path and all the red velocity arrows should be perpendicular to that path. On page 894 and elsewhere in the text, “the speed of light” refers to the “the speed of light in vacuum c (2.998×10^8 m/s)”.

Darkness cannot drive out darkness;

Only light can do that.

Hate cannot drive out hate;

Only love can do that.

Dr. Martin Luther King, Jr. in *Strength to Love*, (1963)