

**TERMS**

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

- |                                      |                                    |
|--------------------------------------|------------------------------------|
| 1. magnetic constant $\mu_0$         | 7. paramagnetism                   |
| 2. law of Biot and Savart Eq. (28.6) | 8. diamagnetism                    |
| 3. Ampere's law Eq. (28.20)          | 9. ferromagnetism                  |
| 4. solenoid                          | 10. magnetic domain                |
| 5. toroid (toroidal solenoid)        | 11. magnetization curve Fig. 28.28 |
| 6. magnetization $\vec{M}$           | 12. hysteresis loop Fig. 28.29     |

**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. (28.2) (vector equation) and (28.1) (mathematical evaluation of the magnitude  $B$ )
2. Eqs. (28.6) and (28.7) (vector equations) and (28.5) (mathematical evaluation of the magnitude  $dB$ )
3. Eq. (28.9)
4. Eq. (28.16) and its special  $x = 0$  case, Eq. (28.17), changing  $B_x$  to just  $B$
5. Eq. (28.20)
6. Eq. (28.23)
7. Eq. (28.24)

**SKILLS**

Use the material in these sections to be able to:

1. determine the direction of the unit vector  $\hat{r}$ .
2. determine the direction of its  $\vec{B}$  from the charge motion (current) and the geometry.
3. determine the direction of the charge motion (current) from the direction of  $\vec{B}$  and the geometry.
4. use the facts that parallel currents attract and antiparallel currents repel.
5. explain the origin of atomic magnetic dipole moments.
6. discuss the behavior of magnetic domains in a varying applied magnetic field.
7. sketch, label, and explain magnetization curves and hysteresis loops.

This is the way of peace: Overcome evil with good, falsehood with truth, and hatred with love.

–Peace Pilgrim