Phys.G12-Q4W2-Magnetism-Test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

Choose the best answer from the options that follow each question.

_____ 1. An electron moves north at a velocity of 4.5×10^4 m/s and has a force of 7.2×10^{-18} N exerted on it. If the magnetic field points upward, what is the magnitude of the magnetic field?
  a. 2.0 mT
  b. 1.0 mT
  c. 3.6 mT
  d. 4.8 mT

_____ 2. A 2.0 m wire segment carrying a current of 0.60 A oriented parallel to a uniform magnetic field of 0.50 T experiences a force of what magnitude?
  a. 0.30 N
  b. 0.0 N
  c. 0.60 N
  d. 0.15 N

_____ 3. Which of the following statements about Earth's magnetic field is true?
  a. The geographic South Pole of Earth and Earth's magnetic north pole are relatively close to each other.
  b. The north needle of a compass always points to the geographic North Pole of Earth.
  c. The geographic North Pole of Earth and Earth's magnetic north pole are at the same location.
  d. The north needle of a compass points to Earth's magnetic north pole.

_____ 4. A solenoid is in an upright position on a table. A counterclockwise current of electrons—when viewed from above—causes the solenoid to have a _____ magnetic pole at its bottom end. If a compass is placed at the top of the solenoid, the north pole of the compass would be _____.
  a. south; repelled   c. north; attracted
  b. south; attracted   d. north; repelled

Choose the best answer from the options that follow each question.

_____ 5. Given the following equation, $B = \dfrac{F_{magnetic}}{qv}$, which of the following statements is true?
  a. The magnetic field, **B**, is directly proportional to $F_{magnetic}$, q, and v.
  b. The magnetic field, **B**, is directly proportional to q.
  c. The magnetic field, **B**, is directly proportional to v.
  d. The magnetic field, **B**, is directly proportional to $F_{magnetic}$.

_____ 6. Which of the following statements about the right-hand rule is *not* true?
  a. The direction of the magnetic force exerted on a proton is out of the palm of the hand.
  b. The direction of the magnetic force is always parallel to the magnetic field.
  c. The thumb indicates the direction of a particle? 's movement in the magnetic field.
  d. The fingers indicate the direction of the magnetic field.

Choose the best answer from the options that follow each question.

7. Which of the following terms correctly describes the shape of the magnetic field around a long, straight current-carrying wire?
    a. perpendicular
    b. parallel
    c. elliptical
    d. cylindrical

8. According to the right-hand rule, in what direction will the fingers curl?
    a. in the direction of the magnetic field, **B**
    b. in the direction of the magnetic field's movement
    c. in the direction of the current
    d. in the direction of the magnetic field's force

Choose the best answer from the options that follow each question.

9. According to the right-hand rule, if a current-carrying wire is grasped in the right hand with the thumb in the direction of the current, the four fingers will curl in the direction of
    a. the magnetic force, $F_{magnetic}$.
    b. the current's velocity, v.
    c. the current's path, P.
    d. the magnetic field, B.

10. What is the path of an electron moving parallel to a uniform magnetic field?
    a. straight line
    b. ellipse
    c. parabola
    d. circle

11. Where is the magnitude of the magnetic field around a permanent magnet greatest?
    a. The magnitude depends on the material of the magnet.
    b. close to the poles
    c. The magnitude is equal at all points on the field.
    d. far from the poles

12. Consider two long, straight, parallel wires, each carrying a current I. If the currents move in the same direction,
    a. the two wires will repel each other.
    b. the two wires will attract each other.
    c. the two wires will exert a torque on each other.
    d. neither wire will exert a force on the other.

13. Consider two long, straight, parallel wires, each carrying a current I. If the currents move in opposite directions,
    a. the two wires will exert a torque on each other.
    b. the two wires will attract each other.
    c. the two wires will repel each other.
    d. neither wire will exert a force on the other.

Choose the best answer from the options that follow each question.

____ 14. What describes Φ_M?
   a. $AB\cos\theta$
   b. magnetic flux
   c. the number of field lines that cross a certain area
   d. all of the above

____ 15. Which of the following statements correctly describes the behavior of magnets?
   a. Both like and unlike poles can attract and repel each other depending on the surrounding materials.
   b. Like poles attract each other, and unlike poles repel each other.
   c. Like poles repel each other, and unlike poles attract each other.
   d. none of the above

____ 16. What do physicists call large groups of atoms whose net spins are aligned because of strong coupling between neighboring atoms?
   a. magnetic regions
   b. magnetic zones
   c. magnetic sectors
   d. magnetic domains

____ 17. According to the right-hand rule, if a current-carrying wire is grasped in the right hand with the thumb in the direction of the current, the four fingers will curl in the direction of
   a. the magnetic force, $\mathbf{F}_{\text{magnetic}}$.   c. the current's path, $\mathbf{P}$.
   b. the current's velocity, $\mathbf{v}$.   d. the magnetic field, $\mathbf{B}$.

____ 18. Consider two long, straight, parallel wires, each carrying a current I. If the currents move in the same direction,
   a. the two wires will attract each other.
   b. the two wires will repel each other.
   c. neither wire will exert a force on the other.
   d. the two wires will exert a torque on each other.

____ 19. In a permanent magnet,
   a. domain alignment persists after the external magnetic field is removed.
   b. domains are always randomly oriented.
   c. domain alignment becomes random after the external magnetic field is removed.
   d. the magnetic fields of the domains cancel each other.

____ 20. A current-carrying wire 0.50 m long is positioned perpendicular to a uniform magnetic field. If the current is 10.0 A and there is a resultant force of 3.0 N on the wire due to the interaction of the current and field, what is the magnetic field strength?
   a. 0.60 T   c. 6.7×10^3 T
   b. 15 T   d. 1.8×10^3 T

____ 21. One useful way to model magnetic field strength is to define a quantity called magnetic flux Φ_M. Which of the following definitions for magnetic flux, Φ_M, is correct?
   a. (surface area) × (magnetic field component normal to the plane of surface)
   b. $AB\cos\theta$
   c. the number of field lines that cross a certain area
   d. all of the above

_____ 22. What is the path of an electron moving perpendicular to a uniform magnetic field?
    a. ellipse   c. parabola
    b. straight line   d. circle

_____ 23. A current-carrying conductor in and perpendicular to a magnetic field experiences a force that is
    a. perpendicular to the current.
    b. inversely proportional to the potential difference.
    c. parallel to the current.
    d. inversely proportional to the velocity.

_____ 24. In a magnetized substance, the domains
    a. line up mainly in one direction.   c. can never be reoriented.
    b. are randomly oriented.   d. cancel each other.

_____ 25. The lines of the magnetic field around a current-carrying wire
    a. point toward the wire.
    b. point away from the wire.
    c. are parallel with the wire.
    d. form concentric circles around the wire.

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