

magnetism - practice problems

1. A positive particle moves north through a magnetic field pointed east in a lab diagram viewed from above. What direction is the magnetic force?
2. An electron moves north through a magnetic field pointed east. What direction is the magnetic force?
3. A positive particle moves toward the top of the page through a magnetic field coming out of the page. What direction is the magnetic force?
4. An electron moves to the right through a magnetic field directed into the page. What direction is the magnetic force?

5. A $+4.0\ \mu\text{C}$ charge moves west at $1200\ \text{m/s}$ through a $0.30\ \text{T}$ magnetic field also directed west. What is the magnetic force magnitude?

6. A $+3.0\ \mu\text{C}$ particle moves at $2.0\ \text{km/s}$ through a $40\ \text{mT}$ magnetic field in a detector region. The velocity and field are perpendicular, and the detector is $12\ \text{cm}$ wide. What magnetic force magnitude acts on it?

7. A $+2.0\ \mu\text{C}$ particle moves at $1500\ \text{m/s}$ through a $0.25\ \text{T}$ magnetic field. The velocity is 30 degrees from the field. What magnetic force magnitude acts on it?

8. A particle with charge $+4.0\ \mu\text{C}$ moves perpendicular to a magnetic field at $3000\ \text{m/s}$ and feels a $0.012\ \text{N}$ magnetic force. What is the magnetic field strength?

9. An electron moves perpendicular to a 30 mT magnetic field at 2.0×10^6 m/s. What is the electron's acceleration magnitude?

10. A charged particle moves through a magnetic field and curves in a circle at constant speed. Is the magnetic field doing work on the particle?

11. A straight wire carries 8.0 A through 15 cm of wire inside a 0.40 T magnetic field. The wire and field are perpendicular. What force acts on the wire?

12. A 250 mA current flows through 8.0 cm of wire in a 0.60 T magnetic field. The wire and field are perpendicular. What magnetic force acts on the wire?

13. A $+3.0 \mu\text{C}$ particle moves at 1200 m/s through a 0.40 T magnetic field. What magnetic force acts on it?

14. A wire carrying 3.0 A feels a 0.36 N force in a 0.20 T magnetic field. The wire and field are perpendicular. How much wire is inside the magnetic field?

15. A 1.5 m wire carrying 12 A feels a 0.72 N force. The wire is perpendicular to the magnetic field. What is the field strength?

16. A wire carries conventional current north through a magnetic field pointed upward. What direction is the force on the wire?

17. A wire carries conventional current west through a magnetic field pointed downward. What direction is the force on the wire?

18. Electrons drift south through a straight wire while the magnetic field points out of the page. What direction is the force on the wire?

19. A straight wire carries current out of the page in a flat page diagram. At a point higher on the page than the wire, what direction is the magnetic field from the wire?

20. A vertical wire on the page carries current toward the top of the page. At a point to the right of the wire, what direction is the magnetic field from the wire?

21. Two long parallel wires carry current in the same direction. Do the wires attract or repel? What if the currents are opposite directions?

22. An electron moves at 4.0×10^6 m/s perpendicular to a 20 mT magnetic field. What is the radius of its circular path?

23. A proton from the solar wind moves at 800 km/s perpendicular to a $50 \mu\text{T}$ part of Earth's magnetic field. What is the radius of its circular path?

24. A singly charged ion has mass 2.0×10^{-26} kg and moves at 6.0×10^5 m/s perpendicular to a 0.30 T magnetic field. What circular radius does it follow?

25. An electron curves in a circular path with radius 4.0 cm inside a 0.50 T magnetic field. What speed does the electron have?

26. A proton starts from rest and is accelerated through a 2.0 kV potential difference. It then enters a 0.12 T magnetic field at a right angle inside a small vacuum chamber. What is the radius of its path?