

AP Physics C: Electricity and Magnetism

Name: _____ Score: _____

1. Outside a bar magnet, the field lines run:
 - ☐ in no particular direction
 - ☐ from N to S
 - ☐ straight up
 - ☐ from S to N
2. A magnetic field exerts a force on a charge only when the charge is:
 - ☐ positive
 - ☐ moving
 - ☐ at rest
 - ☐ very large
3. The magnetic field around a long straight wire forms:
 - ☐ no field at all
 - ☐ circles around the wire
 - ☐ straight lines pointing away
 - ☐ a uniform field
4. In Ampère's law, the field summed around a loop equals:
 - ☐ μ_0 times the enclosed current
 - ☐ the total current in the universe
 - ☐ the enclosed charge over ε_0
 - ☐ zero always
5. The SI unit of magnetic field strength is the _____.

6. A 3 C charge moves at 4 m/s across a 2 T field ($\theta = 90^\circ$). Find F (in N).
_____ N
7. The straight-wire field strength falls off with distance as:
 - ☐ $1/r$
 - ☐ it stays constant

☐ $1/r^2$

☐ $1/r^3$

8. A current outside an Amperian loop contributes nothing to the line integral of B .

☐ True ☐ False

9. Magnetic field lines always form closed loops because there are no magnetic monopoles.

☐ True ☐ False

10. A charge moving exactly along the magnetic field feels the maximum magnetic force.

☐ True ☐ False

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1. **from N to S**

Outside, field lines run from the north pole to the south pole.

2. **moving**

The magnetic force $F = qvB$ needs a nonzero velocity.

3. **circles around the wire**

Field lines circle the wire; $B = \mu_0 I / 2\pi r$.

4. **μ_0 times the enclosed current**

$$\oint \vec{B} \cdot d\vec{\ell} = \mu_0 I_{\text{enc}}.$$

5. **tesla**

Magnetic field B is measured in tesla (T).

6. **24 N**

$$F = qvB = 3 \times 4 \times 2 = 24 \text{ N}.$$

7. **$1/r$**

$B = \mu_0 I / 2\pi r$ – a $1/r$ falloff.

8. **True**

Only the enclosed current counts; outside current cancels around the loop.

9. **True**

With no monopoles, lines have nowhere to start or stop – they close.

10. **False**

False. $F = qvB \sin \theta$ and $\sin 0 = 0$, so a charge moving along the field feels no magnetic force. The force is largest when it moves perpendicular to B .