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 ($\theta = 90°$). Find F (in N).

   _____ N

7. The straight-wire field strength falls off with distance as:

   ☐ $1/r$

   ☐ it stays constant

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   ☐ $1/r^3$

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

   ☐ True ☐ False

9. Magnetic field lines have no endpoints on magnetic poles; those of a bar magnet form closed loops.

   ☐ True ☐ False

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

    ☐ True ☐ False

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**

   $F = qvB = 3 \times 4 \times 2 = 24$ 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 isolated magnetic poles, magnetic field lines have no source or sink. Bar-magnet lines form loops through the magnet and surrounding space; some other fields have lines extending to infinity.

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.

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