

A-Level Physics

Name: _____ Score: _____

1. A magnetic field is a region where:
 - ☐ light always bends
 - ☐ a moving charge or current feels a force
 - ☐ sound travels faster
 - ☐ any mass feels a force
2. The force on a current-carrying wire in a magnetic field is:
 - ☐ $BIL \sin \theta$
 - ☐ $\frac{BL}{I}$
 - ☐ BIL^2
 - ☐ $\frac{BI}{L}$
3. A 2.0 C charge moves at $3.0 \frac{\text{m}}{\text{s}}$ at right angles to a 0.50 T field. What is the force?
_____ N
4. The magnetic field around a long straight wire forms:
 - ☐ no field at all
 - ☐ straight lines along the wire
 - ☐ circles around the wire
 - ☐ a single point
5. The magnetic flux through an area A at right angles to a field B is:
 - ☐ BA^2
 - ☐ BA
 - ☐ $\frac{B}{A}$
 - ☐ $B + A$
6. A magnetic field is a region in which a force acts on which of these? Select **all** that apply.
 - ☐ a magnetic material
 - ☐ a current-carrying conductor
 - ☐ a moving charge
 - ☐ a stationary charge

Tick every correct option.

7. The force on the wire is zero when it lies along the field.

☐ True ☐ False

8. For motion at right angles, the magnetic force on a moving charge is $F = BQ$ _____.

9. The right-hand grip rule gives the direction of the field around a current-carrying wire.

☐ True ☐ False

10. A 0.50 m^2 coil sits at right angles to a 0.20 T field. What is the flux?

_____ Wb

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1. **a moving charge or current feels a force**

Magnetic forces act only on **moving** charges (and currents) – a charge at rest feels nothing.

2. $BIL \sin \theta$

Largest when the wire is perpendicular to the field ($\sin 90^\circ = 1$, so $F = BIL$).

3. **3 N**

$$F = BQv = 0.50 \times 2.0 \times 3.0 = 3.0 \text{ N.}$$

4. **circles around the wire**

Concentric circles, with the direction given by the right-hand grip rule.

5. BA

$\Phi = BA$ (weber). For a coil of N turns the flux linkage is $N\Phi$.

6. **a magnetic material; a current-carrying conductor; a moving charge**

A stationary charge feels no magnetic force at all, which is exactly what distinguishes a magnetic field from an electric one.

7. **True**

With the wire parallel to the field, $\theta = 0$ and $\sin \theta = 0$, so there is no force.

8. **v**

$F = BQv$ – proportional to the charge's speed.

9. **True**

Thumb along the current, curled fingers show the way the circular field points.

10. **0.1 Wb**

$$\Phi = BA = 0.20 \times 0.50 = 0.10 \text{ Wb.}$$