

Chapter 10: Magnetism

Introduction to Magnetism

- **Lodestone (Fe_3O_4)** was the first naturally found magnet, discovered in **Magnesia** (Asia Minor).
 - Lodestone showed two key properties:
 1. **Attraction** to small pieces of iron.
 2. **Alignment** along a fixed direction when freely suspended.
 - The term “**magnet**” is derived from **Magnesia**.
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Magnetic Poles

- **Like poles repel** (N–N or S–S).
 - **Unlike poles attract** (N–S).
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Induced Magnetism

- Magnetic materials (like iron) can become **temporarily magnetized** when placed **near or in contact with a magnet**.
 - The **near end** gets **opposite polarity**, while the **far end** gets **similar polarity**.
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Magnetic Field

- The space around a magnet where magnetic effects are experienced.
 - Represented by **magnetic field lines** – these are **vector quantities**.
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Properties of Magnetic Field Lines

1. They are **closed and continuous** curves.
2. **Outside the magnet**, they go from **North to South**.
3. A **tangent** at any point gives the **direction of the magnetic field**.
4. **Field lines never intersect**.
5. **Stronger field near poles** (lines are crowded); **weaker** away from magnet (lines are far apart).
6. **Parallel and equidistant lines** indicate a **uniform magnetic field**.
7. They act like **stretched elastic strings**.

🌐 Earth's Magnetic Field

- Earth behaves like a **huge magnet**.
- Evidences:
 1. A **freely suspended magnet** aligns itself in **geographic north-south** direction.
 2. An **iron rod** buried along north-south becomes **magnetized**.
 3. **Neutral points** appear while plotting magnetic field lines.
 4. A **magnetic needle** makes **different angles** at different places on Earth.

Important Terms:

- **Magnetic Poles:** Points where a needle becomes **vertical**.
- **Magnetic Equator:** Line joining places where needle is **horizontal**.

📍 Neutral Points

- Points where **two magnetic fields** (e.g., magnet + Earth's field) are **equal in magnitude but opposite in direction**.
 - Net magnetic field = **zero** at a neutral point.
 - A **compass needle** placed here can rest in **any direction**.
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