

GRADE 9 | 2024

Physics: Motion, Electricity and Magnetism

Natural Sciences

CAPS ALIGNED

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1. Motion

FORMULA: Speed = distance / time (m/s)

Velocity = displacement / time (has direction)

Acceleration = change in velocity / time

Distance-time graphs: slope = speed. Velocity-time graphs: slope = acceleration, area under graph = distance.

Newton's Laws of Motion

- First law (Inertia): an object stays at rest or moves at constant velocity unless acted on by a resultant force
- Second law: $F = ma$ (force = mass x acceleration)
- Third law: for every action there is an equal and opposite reaction

2. Electric Circuits

Series Circuits

- Components connected in a single path
- Same current flows through all components
- Total resistance: $R_{\text{total}} = R_1 + R_2 + R_3$
- If one component fails, the whole circuit fails

Parallel Circuits

- Components connected between the same two points
- Same voltage across all components
- Total resistance: $1/R_{\text{total}} = 1/R_1 + 1/R_2$
- If one component fails, others still work

FORMULA: Ohm's Law: $V = IR$ (Voltage = Current x Resistance)

Power: $P = VI = I^2R = V^2/R$

3. Magnetism

Magnets have a north and south pole. Like poles repel; unlike poles attract. Magnetic field lines run from north to south outside the magnet.

Electromagnetism

A current-carrying wire produces a magnetic field. An electromagnet uses current to create a magnetic field.

KEY POINT: Right-hand rule: wrap your right hand around the wire with thumb pointing in direction of current - fingers show direction of magnetic field.