

## Definitions and Concepts for CAIE Physics A-level

### Topic 20: Magnetic Fields

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**Electromagnetic Induction:** When an emf is induced in a wire/conducting rod when it is moved relative to a magnetic field.

**Faraday's Law:** The magnitude of an induced emf is equal to the rate of change of flux linkage through the circuit.

**Field Lines:** Lines that show the direction in which a magnetic North monopole would experience a force if placed at that point in a field. Magnetic field lines point from North to South.

**Fleming's Left-Hand Rule:** The relative direction of motion, field direction and current direction in the motor effect can be represented by the thumb, first finger and second finger of the left hand respectively. For the motion of a charged particle in a magnetic field, its direction replaces the current direction.

**Force on a Current-Carrying Conductor:** A current-carrying conductor will experience a force when placed in a magnetic field. The direction of the force can be determined using Fleming's left-hand rule.

**Lenz's Law:** The direction of an induced current is such that it opposes the current that created it.

**Magnetic Field:** A region surrounding a magnet or current-carrying wire that will exert a force on any other magnet, magnetic material or current-carrying wire placed within it.

**Magnetic Flux Density:** The force per unit current per unit length on a current-carrying wire placed at  $90^\circ$  to the field lines. Sometimes also referred to as the magnetic field strength.

**Tesla:** The unit of magnetic flux density.

**Velocity Selector:** A combination of a magnetic field and an electric field, which results in charges passing through and leaving with a specific velocity.

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