# AP Physics C: Electricity and Magnetism Key Definitions · 核心定义

*Almost every E&M free-response question turns on choosing the right surface or loop and stating why the symmetry permits it. Write the principle, name the symmetry, then integrate.* 电磁学题的关键是选对高斯面或安培回路，并说明对称性依据。

## Electrostatics

**Electric field** 电场 — the force per unit positive charge at a point, a vector field

**Gauss's law** 高斯定律 — the flux of E through a closed surface equals the enclosed charge divided by $\varepsilon_0$; it gives the field easily only where symmetry makes E constant on the surface

**Electric flux** 电通量 — the surface integral of the field component perpendicular to the surface

**Electric potential** 电势 — the potential energy per unit charge, a scalar, equal to the negative line integral of E

**Equipotential surface** 等势面 — a surface of constant potential, always perpendicular to the field; no work is done moving a charge along it

**Conductor in electrostatic equilibrium** 静电平衡导体 — a conductor with zero internal field, all excess charge on its surface, and its whole volume at one potential

## Capacitance and circuits

**Capacitance** 电容 — the charge stored per unit potential difference, determined by geometry and the dielectric alone

**Dielectric** 电介质 — an insulator that polarises in a field, reducing the field between the plates and so increasing capacitance

**Resistivity** 电阻率 — a material property relating resistance to length and cross-sectional area, unlike resistance itself

**RC time constant** RC 时间常数 — the product RC, the time for a charging capacitor to reach $1 - 1/e$ of its final charge

**Kirchhoff's loop rule** 基尔霍夫电压定律 — the sum of potential changes around a closed loop is zero, a statement of energy conservation

## Magnetism

**Magnetic force on a charge** 洛伦兹力 — qv × B; because it is always perpendicular to velocity, a magnetic field does no work on a moving charge

**Biot-Savart law** 毕奥-萨伐尔定律 — gives the field contributed by a current element, integrated over the whole circuit

**Ampère's law** 安培定律 — the line integral of B around a closed loop equals $\mu_0$ times the enclosed current; useful only where symmetry makes B constant along the loop

**Magnetic flux** 磁通量 — the surface integral of the field component perpendicular to a surface

## Induction

**Faraday's law** 法拉第定律 — the induced emf equals the negative rate of change of magnetic flux, whether the change comes from the field, the area or the orientation

**Lenz's law** 楞次定律 — the induced current opposes the CHANGE in flux that produced it – the minus sign in Faraday's law, and a statement of energy conservation

**Inductance** 电感 — the flux linkage per unit current; an inductor opposes changes in current, not current itself

**LR time constant** LR 时间常数 — L/R, the time for the current in an inductive circuit to reach $1 - 1/e$ of its final value

**Displacement current** 位移电流 — the term Maxwell added to Ampère's law for a changing electric field, which makes the set of equations consistent and predicts electromagnetic waves