Electric Charges, Fields, and Gauss's Law

AP Physics C: Electricity and Magnetism · Vocabulary in context

Word	Example
electric charge /ɪ'lektrɪk tʃɑːdʒ/	A rubbed balloon has an **electric charge**.
quantized /'kwɒntaɪzd/	Charge is **quantized**: it comes in whole multiples of e. e
elementary charge /ˌelɪ'mentəri tʃɑːdʒ/	The charge on one electron is the **elementary charge**.
conservation of charge /ˌkɒnsə'veɪʃn ɒv tʃɑːdʒ/	**Conservation of charge** means charge is never lost.
point charge /pɔɪnt tʃɑːdʒ/	Treat the small ball as a **point charge**.
Coulomb's law /'kuːlɒmz lɔː/	**Coulomb's law** gives the force between two charges.
inverse-square /ɪn'vɜːs skweə/	Gravity follows an **inverse-square** law: double the distance, a quarter of the force.
superposition /ˌsuːpəpə'zɪʃn/	When two waves meet, **superposition** adds them together.
fundamental property /ˌfʌndə'mentl 'prɒpəti/	Charge is a **fundamental property** of matter, like mass.
permittivity of free space /ˌpɜːmɪ'tɪvəti ɒv friː speɪs/	The **permittivity of free space** ε_0 sets the value of k. ε_0 k
conductor /kən'dʌktə/	Copper is a good **conductor** of electricity.
insulator /'ɪnsjuːleɪtə/	Plastic is an **insulator**.

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charging by friction /ˈtʃɑːdʒɪŋ baɪ ˈfrɪkʃn/	**Charging by friction** happens when you rub a balloon on your hair.
charging by conduction /ˈtʃɑːdʒɪŋ baɪ kənˈdʌkʃn/	**Charging by conduction** happens when a charged rod touches a metal sphere.
charging by induction /ˈtʃɑːdʒɪŋ baɪ ɪnˈdʌkʃn/	**Charging by induction** charges a sphere without touching it.
ground /graʊnd/	**Ground** the sphere by joining it to the Earth with a wire.
polarization /ˌpəʊləraɪˈzeɪʃn/	**Polarization** moves the charges in a neutral object slightly apart.
electroscope /ɪˌlektrəʊˈskəʊp/	The leaves of an **electroscope** spread apart when it is charged.
electric field /ɪˈlektrɪk fiːld/	A charged ball has an **electric field** around it.
test charge /test tʃɑːdʒ/	A small positive **test charge** feels a force in the field.
field lines /fiːld laɪnz/	**Field lines** point away from positive charge and never cross.
uniform /ˈjuːnɪfɔːm/	The weight of a **uniform** rod acts at its middle.
continuous charge distribution /kənˈtɪnjuːəs tʃɑːdʒ ˌdɪstrɪˈbjuːʃn/	A charged rod is a **continuous charge distribution**.
linear charge density /ˈlɪnɪə tʃɑːdʒ ˈdensɪti/	A wire's **linear charge density** is its charge per metre.

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surface charge density /ˈsɜːfɪs tʃɑːdʒ ˈdensɪti/	A plate's **surface charge density** is its charge per square metre.
volume charge density /ˈvɒljuːm tʃɑːdʒ ˈdensɪti/	A ball's **volume charge density** is its charge per cubic metre.
symmetry /ˈsɪmətri/	The rose curve has **symmetry**: each petal looks the same.
electric flux /ɪˈlektrɪk flʌks/	The **electric flux** through a closed surface equals the enclosed charge divided by ε_0. ε_0
area vector /ˈeərɪə ˈvektə/	The **area vector** points straight out of the surface.
Gauss's law /ˈgaʊsɪz lɔː/	**Gauss's law** links the electric field through a closed surface to the charge inside.
Gaussian surface /ˈgaʊʃn ˈsɜːfɪs/	Choose a **Gaussian surface** that matches the shape of the charge.
spherical symmetry /sˈferɪkl ˈsɪmətri/	A charged ball has **spherical symmetry**.
cylindrical symmetry /sɪˈlɪndrɪkl ˈsɪmətri/	A long charged wire has **cylindrical symmetry**.
planar symmetry /ˈpleɪnə ˈsɪmətri/	A large charged sheet has **planar symmetry**.

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