Dimension Formula Of Electric Potential

== Overview == 1a5e6b4d4d Electric power, like mechanical power, is the rate of doing work, measured in watts, and represented by the letter P. The term wattage is used colloquially to mean "electric power in watts". The electric power in watts produced by an electric current I consisting of a charge of Q coulombs every t seconds passing... 1a5e6b4d4d SI units predominate in most fields, and continue to increase in popularity at the expense of Gaussian units. Alternative unit systems also exist. Conversions between quantities in the Gaussian and SI systems are not direct unit conversions, because the quantities themselves are defined differently in each system. This means that the equations that express physical laws of electromagnetism—such as Maxwell's equations—will change depending on the system of quantities that is employed. As an example, quantities that are dimensionless in one system may have dimension in the other. 1a5e6b4d4d In common parlance, electric power is the production and delivery of electrical energy, an essential public utility in much of the world. Electric power is usually produced by electric generators, but can also be supplied by sources such as electric batteries. It is usually supplied to businesses and homes (as domestic mains electricity) by the electric power industry through an electrical grid. 1a5e6b4d4d

Electric power Standard prefixes apply to watts as with other SI units: thousands, millions and billions of watts are called kilowatts, megawatts and gigawatts respectively. Its SI unit is the watt, the general unit of power, defined as one joule per second. charge of Q coulombs every t seconds passing through an electric potential (voltage) difference of V is: Work done per unit time = P = W t = V × I {\displaystyle Electric power is the rate of transfer of electrical energy within a circuit 1a5e6b4d4d

The voltage between points can be caused by the build-up of electric charge (e.g., a capacitor), and from an electromotive force (e.g., electromagnetic induction in a generator). On a macroscopic scale, a potential difference can be caused by electrochemical processes (e.g., cells and batteries), the pressure-induced piezoelectric effect, photovoltaic effect, and the thermoelectric effect. Since voltage is the difference in electric potential, it is a physical scalar quantity. 1a5e6b4d4d

Surface charge A surface charge is an electric charge present on a two-dimensional surface. The electric potential is continuous across a surface charge and the electric field is discontinuous, but not infinite; this is unless the surface charge consists of a dipole layer. In comparison, the potential and electric field both diverge at any point charge or linear charge. These electric charges are constrained on this 2-D surface, and surface charge A surface charge is an electric charge present on a two-dimensional surface. These electric charges are constrained on this 2-D surface, and surface charge density, measured in coulombs per square meter (C•m−2), is used to describe the charge distribution on the surface 1a5e6b4d4d

In chemistry, there are many different processes... 1a5e6b4d4d A scalar potential is a fundamental concept in vector analysis and physics (the adjective scalar is frequently omitted if there is no danger of confusion with vector potential). The scalar potential is an example of a scalar field. Given a vector field F, the scalar potential P is defined such that: 1a5e6b4d4d Any physically meaningful equation or inequality must have the same dimensions on its left and right sides, a property known as dimensional homogeneity. Checking for dimensional homogeneity is a common... 1a5e6b4d4d A voltmeter can be used to measure the voltage between two points in a system. Often a common reference potential such as the ground of the system is used as one of the points. In this case, voltage is often mentioned at a point without completely mentioning the other measurement point. A voltage can be associated with... 1a5e6b4d4d

Electric flux Thus, the unit of electric flux expressed in terms of SI base units is kg·m3·s−3·A−1. (N·m2·C−1). Its dimensional formula is L3MT−3I−1. Magnetic flux In electromagnetism, electric flux is the total electric field that crosses a given surface. The electric flux through a closed surface is directly proportional to the total charge contained within that surface 1a5e6b4d4d

Electric power can be delivered over long distances by transmission lines and used for applications such as motion, light or heat with high efficiency. 1a5e6b4d4d

Electric potential Electric potential, also known as the electrostatic potential or electric field potential, is a field of scalar quantities through space, often denoted Electric potential, also known as the electrostatic potential or electric field potential, is a field of scalar quantities through space, often denoted with the letter 1a5e6b4d4d

== Alternative unit systems == 1a5e6b4d4d

Scalar potential A familiar example is potential energy due to gravity. a function of position. In electrostatics the electric potential is the scalar In mathematical physics, scalar potential describes the situation where the difference in the potential energies of an object in two different positions depends only on the positions, not upon the path taken by the object in traveling from one position to the other. It is a scalar field in three-space: a directionless value (scalar) that depends only on its location. The gravity potential is the gravitational potential energy per unit mass 1a5e6b4d4d

== Definition == 1a5e6b4d4d The concepts of dimensional analysis and quantity dimension were introduced by Joseph Fourier in 1822. 1a5e6b4d4d
== Magnetic scalar potential == 1a5e6b4d4d

Magnetic scalar potential One important use of ψ is to determine the magnetic field due to permanent magnets when their magnetization is known. The potential is valid in any simply connected region with zero current density, thus if currents are confined to wires or surfaces, piecemeal solutions can be stitched together to provide a description of the magnetic field at all points in space. It is used to specify the magnetic H-field in cases when

there are no free currents, in a manner analogous to using the electric potential to determine the electric field in electrostatics. One important use of ψ is to determine the magnetic Magnetic scalar potential, ψ, is a physical quantity in classical electromagnetism analogous to electric potential. manner analogous to using the electric potential to determine the electric field in electrostatics 1a5e6b4d4d

Electric field Similarly, an electric field is stronger nearer charged objects and weaker further away. In classical electromagnetism, the electric field of a single charge (or group of charges) describes their capacity to exert attractive or repulsive forces on another charged object. Charged particles exert attractive forces on each other when the sign of their charges are opposite, one being positive while the other is negative, and repel each other when the signs of the charges are the same. Electric fields and magnetic fields are both manifestations of the electromagnetic field. this formula gives the electric field magnitude and direction at any point r 0 {\displaystyle \mathbf {r} _{0}} in space (except at the location of the An electric field (sometimes called E-field) is a physical field that surrounds electrically charged particles such as electrons. These forces are described by Coulomb's law, which says that the greater the magnitude of the charges, the greater the force, and the greater the distance between them, the weaker the force. Electromagnetism is one of the four fundamental. Electric fields originate from electric charges and time-varying electric currents. Informally, the greater the charge of an object, the stronger its electric field. Because these forces are exerted mutually, two charges must be present for the forces to take place 1a5e6b4d4d

Dimensional analysis), and tracking these dimensions as calculations or comparisons are performed. engineering and science, dimensional analysis of different physical quantities is the analysis of their physical dimension or quantity dimension, defined as a mathematical In engineering and science, dimensional analysis of different physical quantities is the analysis of their physical dimension or quantity dimension, defined as a mathematical expression identifying the powers of the base quantities involved (such as length, mass, time, etc 1a5e6b4d4d

Gaussian units It is also called the Gaussian unit system, Gaussian-cgs units, or often just cgs units. The term "cgs units" is ambiguous and therefore to be avoided if possible: there are several variants of CGS, which have conflicting definitions of electromagnetic quantities and units. This system is the most common of the several electromagnetic unit systems based on the centimetre–gram–second system of units (CGS). ISQ, 1/ε0 converts or scales electric flux density, D, to the corresponding electric field, E (the latter has dimension of force per charge), while in Gaussian units constitute a metric system of units of measurement 1a5e6b4d4d

In physics, at equilibrium, an ideal conductor has no charge on its interior; instead, the entirety of the charge of the conductor resides on the surface. However, this only applies to the ideal case of infinite electrical conductivity; the majority of the charge of an actual conductor resides within the skin depth of the conductor's surface. For dielectric materials, upon the application of an external electric field, the positive charges and negative charges in the material will slightly move in opposite directions, resulting in polarization density in the bulk body and bound charge at the surface. 1a5e6b4d4d The electric field E can exert a force on an electric charge at any point in space. The electric field is the gradient of the electric potential. 1a5e6b4d4d φ 1a5e6b4d4d Commensurable physical quantities have the same dimension and are of the same kind, so they can be directly compared

to each other, even if they are expressed in differing units of measurement; e.g., metres and feet, grams and pounds, seconds and years. Incommensurable physical quantities have different dimensions, so can not be directly compared to each other, no matter what units they are expressed in, e.g. metres and grams, seconds and grams, metres and seconds. For example, asking whether a gram is larger than an hour is meaningless. 1a5e6b4d4d

Voltage In the International System of Units (SI), the derived unit for voltage is the volt (V). (electrical) potential difference, electric pressure, or electric tension, is the difference in electric potential between two points. In a static electric field, it corresponds to the work needed per unit of charge to move a positive test charge from the first point to the second point. In a static electric field Voltage, also known as (electrical) potential difference, electric pressure, or electric tension, is the difference in electric potential between two points 1a5e6b4d4d

An electric charge, such as a single electron in space, has an electric field surrounding it. In pictorial form, this electric field is shown as "lines of flux" being radiated from a dot (the charge). These are called Gauss lines. Note that field lines are a graphic illustration of field strength and direction and have no physical meaning as isolated lines. The density of these lines corresponds to the electric field strength, which could also be called the electric flux density: the number of "lines" per unit area. Electric flux is directly proportional to the total number of electric field lines going through a surface. For simplicity in calculations it is often convenient to consider a surface perpendicular to the flux lines. If the electric field is uniform, the electric flux passing through a surface of vector... 1a5e6b4d4d