Important Electrostatics Formulas PDF

Formulas

Examples

with Units

List of 13
Important Electrostatics Formulas

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1) Electric Current given Drift Velocity Formula

Evaluate Formula

Formula

$I = n \cdot [\text{Charge-e}] \cdot A \cdot V_d$

Example with Units

$1.6\text{E-}27\,_A = 7 \cdot 1.6\text{E-}19\,_C \cdot 14\,_{mm^2} \cdot 0.1\,_{mm/s}$

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2) Electric Dipole Moment Formula

Evaluate Formula

Formula

$p = Q \cdot d$

Example with Units

$0.6\,_{C^*m} = 0.3\,_C \cdot 2\,_m$

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3) Electric Field Formula

Evaluate Formula

Formula

$E = \dfrac{\Delta V}{l}$

Example with Units

$20\,_{V/m} = \dfrac{18\,_V}{0.9\,_m}$

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4) Electric Field between Two Oppositely Charged Parallel Plates Formula

Evaluate Formula

Formula

$E = \dfrac{\sigma}{[\text{Permitivity-vacuum}]}$

Example with Units

$2.8\text{E+}11\,_{V/m} = \dfrac{2.5\,_{C/m^2}}{8.9\text{E-}12\,_{F/m}}$

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5) Electric Field due to Infinite Sheet Formula

Evaluate Formula

Formula

$E = \dfrac{\sigma}{2 \cdot [\text{Permitivity-vacuum}]}$

Example with Units

$1.4\text{E+}11\,_{V/m} = \dfrac{2.5\,_{C/m^2}}{2 \cdot 8.9\text{E-}12\,_{F/m}}$

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6) Electric Field due to Line Charge Formula

Evaluate Formula

Formula

$E = \dfrac{2 \cdot [\text{Coulomb}] \cdot \lambda}{r_{ring}}$

Example with Units

$2.2\text{E+}10\,_{V/m} = \dfrac{2 \cdot 9\text{E+}9 \cdot 6\,_{C/m}}{5\,_m}$

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7) Electric Field due to Point Charge Formula 📲

Formula

$$E = \frac{[\text{Coulomb}] \cdot Q}{d^2}$$

Example with Units

$$6.7\text{E}+8\,\text{V/m} = \frac{9\text{E}+9 \cdot 0.3\,\text{C}}{2\,\text{m}^2}$$

8) Electric Field for Uniformly Charged Ring Formula 📲

Formula

$$E = \frac{[\text{Coulomb}] \cdot Q \cdot x}{\left(r_{ring}^2 + x^2\right)^{\frac{3}{2}}}$$

Example with Units

$$2.6\text{E}+7\,\text{V/m} = \frac{9\text{E}+9 \cdot 0.3\,\text{C} \cdot 8\,\text{m}}{\left(5\,\text{m}^2 + 8\,\text{m}^2\right)^{\frac{3}{2}}}$$

9) Electric Field Intensity Formula 📲

Formula

$$E = \frac{F}{q}$$

Example with Units

$$3.4286\,\text{V/m} = \frac{2.4\,\text{N}}{0.7\,\text{C}}$$

10) Electric Force by Coulomb's Law Formula 📲

Formula

$$F = \frac{[\text{Coulomb}] \cdot q_1 \cdot q_2}{d^2}$$

Example with Units

$$2.7\text{E}+10\,\text{N} = \frac{9\text{E}+9 \cdot 4\,\text{C} \cdot 3\,\text{C}}{2\,\text{m}^2}$$

11) Electric Potential of Dipole Formula 📲

Formula

$$V = \frac{[\text{Coulomb}] \cdot p \cdot \cos(\theta)}{r^2}$$

Example with Units

$$0.128\,\text{V} = \frac{9\text{E}+9 \cdot 12\,\text{C*m} \cdot \cos(90°)}{0.5\,\text{m}^2}$$

12) Electrostatic Potential due to Point Charge Formula 📲

Formula

$$V = \frac{[\text{Coulomb}] \cdot Q}{d}$$

Example with Units

$$1.3\text{E}+9\,\text{V} = \frac{9\text{E}+9 \cdot 0.3\,\text{C}}{2\,\text{m}}$$

13) Electrostatic Potential Energy of Point Charge or System of Charges Formula 📲

Formula

$$U_e = \frac{[\text{Coulomb}] \cdot q_1 \cdot q_2}{d}$$

Example with Units

$$5.4\text{E}+10\,\text{J} = \frac{9\text{E}+9 \cdot 4\,\text{C} \cdot 3\,\text{C}}{2\,\text{m}}$$

- **A** Cross-Sectional Area *(Square Millimeter)*
- **d** Separation between Charges *(Meter)*
- **E** Electric Field *(Volt per Meter)*
- **F** Electric Force *(Newton)*
- **I** Electric Current *(Ampere)*
- **l** Length of Conductor *(Meter)*
- **n** Number of Free Charge Particles per Unit Volume
- **p** Electric Dipole Moment *(Coulomb Meter)*
- **q** Electric Charge *(Coulomb)*
- **Q** Charge *(Coulomb)*
- **q$_1$** Charge 1 *(Coulomb)*
- **q$_2$** Charge 2 *(Coulomb)*
- **r** Magnitude of Position Vector *(Meter)*
- **r$_{ring}$** Radius of Ring *(Meter)*
- **U$_e$** Electrostatic Potential Energy *(Joule)*
- **V** Electrostatic Potential *(Volt)*
- **V$_d$** Drift Speed *(Millimeter per Second)*
- **x** Distance *(Meter)*
- **ΔV** Electric Potential Difference *(Volt)*
- **θ** Angle between any two vectors *(Degree)*
- **λ** Linear Charge Density *(Coulomb per Meter)*
- **σ** Surface Charge Density *(Coulomb per Square Meter)*

- constant(s): **[Charge-e]**, 1.60217662E-19
  Charge of electron
- constant(s): **[Coulomb]**, 8.9875E+9
  Coulomb constant
- constant(s): **[Permitivity-vacuum]**, 8.85E-12
  Permittivity of vacuum
- Functions: **cos**, cos(Angle)
  Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion 📤
- Measurement: **Electric Current** in Ampere (A)
  Electric Current Unit Conversion 📤
- Measurement: **Area** in Square Millimeter (mm²)
  Area Unit Conversion 📤
- Measurement: **Speed** in Millimeter per Second (mm/s)
  Speed Unit Conversion 📤
- Measurement: **Energy** in Joule (J)
  Energy Unit Conversion 📤
- Measurement: **Electric Charge** in Coulomb (C)
  Electric Charge Unit Conversion 📤
- Measurement: **Force** in Newton (N)
  Force Unit Conversion 📤
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion 📤
- Measurement: **Linear Charge Density** in Coulomb per Meter (C/m)
  Linear Charge Density Unit Conversion 📤
- Measurement: **Surface Charge Density** in Coulomb per Square Meter (C/m²)
  Surface Charge Density Unit Conversion 📤
- Measurement: **Electric Field Strength** in Volt per Meter (V/m)
  Electric Field Strength Unit Conversion 📤
- Measurement: **Electric Potential** in Volt (V)
  Electric Potential Unit Conversion 📤
- Measurement: **Electric Dipole Moment** in Coulomb Meter (C*m)

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