

Electrostatics Worksheet

_____ Name _____ Period _____

Electric Force: $F = \frac{kq_1q_2}{r^2}$

Gravity Force: $F = \frac{G m_1m_2}{r^2}$

$1 \text{ C} = 6.241 \times 10^{18} \text{ electrons}$

Electric Potential: $V = PE_e/q$

$k = 9 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}$

$G = 6.67 \times 10^{-11} \frac{\text{Nm}^2}{\text{kg}^2}$

$1 \text{ amp} = 1 \text{ C/s}$

Electric Field: $E = \frac{kq}{r^2}$ $F = qE$

$e^- \text{ mass} = 9.11 \times 10^{-31} \text{ kg}$

$e^- \text{ charge} = -1.6 \times 10^{-19} \text{ C}$

Proton mass = $1.67 \times 10^{-27} \text{ kg}$

Proton charge = $-1.6 \times 10^{-19} \text{ C}$

SHOW ALL WORK ON A SEPARATE SHEET

- The electron and proton of a hydrogen atom are separated, on average, by a distance of about $5.3 \times 10^{-11} \text{ m}$.
 - Find the magnitude of the electric force that each particle exerts on the other. [8.2E-8N]
 - Find the gravitational force between the two. [3.6E-47]
 - Calculate how many times larger the electrostatic force is. [2.2E39]
- Two protons in the iron nucleus are $4.0 \text{E-}15$ meters.
 - What is the Coulomb force that exists between them? [14.4N]
 - What other forces stop the nucleus from flying apart?
- Two electrostatic point charges of $+60.0 \mu\text{C}$ and $+50.0 \mu\text{C}$ exert a repulsive force on each other of 175 N. What is the distance between the two charges/
- Two identical conducting spheres are placed with their centers 0.30 m apart. One is given a charge of $+12 \times 10^{-9} \text{C}$ and the other is given a charge of $-18 \times 10^{-9} \text{C}$.
 - Find the electric force exerted on one sphere by the other. The spheres are connected by a conducting wire.
 - After equilibrium has occurred, find the electric force between the two spheres.
- What is the electric force between a glass ball with $+2.5 \mu\text{C}$ of charge and a rubber ball with $-5.0 \mu\text{C}$ of charge when they are separated by 5.0 cm?
- Two charged spheres are on a friction-less horizontal surface. One has a charge of $+3.0 \text{E-}6 \text{ C}$, the other a $+6.0 \text{E-}6 \text{ C}$ charge.
 - Calculate the force between them.
 - Sketch the two spheres, showing all forces on them. Make the length of your force arrows proportional to the strength of the forces.
- Two positive charges of $6.0 \text{E-}6 \text{ C}$ are separated by 0.50 m. Draw a force diagram for each of the charges, considering only electrostatic forces. What is the magnitude of the force between the charges? Is this force repulsive or attractive?
- A negative charge of $2.0 \text{E-}4 \text{ C}$ and a positive charge of $8.0 \text{E-}4 \text{ C}$ are separated by 0.30 m. What is the magnitude of the force between the charges? Is this force repulsive or attractive?