

DO NOT WRITE ON THIS PAPER

Coulomb's Law – using the formula

Directions: show all work (GUESS method) on a separate sheet of paper. For these more complicated math problems, I am also grading you for an extra step to Simplify. Answers are given in bold so you can check your work. Practice the process until you understand the idea to come up with the right answer.

$$F = \frac{kq_1q_2}{d^2} \quad q_1 = \frac{Fd^2}{kq_2} \quad d = \sqrt{\frac{kq_1q_2}{F}} \quad k = 9 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}$$

- 1) Calculate the force between charges of $5.0 \times 10^{-8} \text{ C}$ and $1.0 \times 10^{-7} \text{ C}$ if they are 5 m apart. **$1.8 \times 10^{-6} \text{ N}$**
 - 2) What is the electric force a $1.5 \times 10^{-6} \text{ C}$ charge exerts on a $3.2 \times 10^{-4} \text{ C}$ charge located 1.5 m away? **1.92 N**
 - 3) Two equal charges of $1.1 \times 10^{-7} \text{ C}$ are placed 4.2 m apart. What is the force between them? **$6.17 \times 10^{-6} \text{ N}$**
 - 4) A charge of -2.0 C and a positive charge of 3.0 C are separated by 80 m. What is the force between the 2 charges? **-8437500 N**
 - 5) Charges of $-4.0 \times 10^{-5} \text{ C}$ and $7.0 \times 10^{-5} \text{ C}$ are separated by 0.15 m. What is the force between the 2 charges? **-1120 N**
 - 6) Two balloons are charged with an identical quantity and type of charge, $-6.25 \times 10^{-9} \text{ C}$. They are held 0.617 m apart. Determine the magnitude of the electrical force of repulsion between them. **$9.23 \times 10^{-7} \text{ N}$**
 - 7) An object with a charge of 2.0 C is separated from a charge of the same size by 1.5 m. What is the electric force between them? **$1.6 \times 10^{10} \text{ N}$**
 - 8) A $1.5 \times 10^{-2} \text{ C}$ charge is separated from a second charge, $2.5 \times 10^{-2} \text{ C}$, by a distance of 0.5 m. Calculate the force between them. **$1.35 \times 10^7 \text{ N}$**
 - 9) An electron and proton each have the same amount of charge but opposite signs, $\pm 1.6 \times 10^{-19} \text{ C}$. One of each are found to be $5.29 \times 10^{-29} \text{ m}$ apart. Calculate the force between them. **$-8.23 \times 10^{28} \text{ N}$**
 - 10) A balloon with a charge of $4.0 \times 10^{-5} \text{ C}$ is held a distance of 0.10 m from a second balloon having the same charge. Calculate the magnitude of the repulsive force. **1440 N**
 - 11) Calculate the electrical force between a balloon with a charge of $-2.6 \times 10^{-6} \text{ C}$ and a wool sweater with a charge of $+3.8 \times 10^{-6} \text{ C}$. The distance between them is 0.75 m. **-0.15808 N**
 - 12) A balloon rubbed with wool was given a charge of $-1.0 \times 10^{-6} \text{ C}$. A plastic tube with a charge of $4.0 \times 10^{-6} \text{ C}$ is held a distance of 0.50 m above the balloon. What is the electrical force between them? **-0.144 N**
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- 13) Two charges of $-5.0 \times 10^{-5} \text{ C}$ push each other apart with a force of 15 N. How far apart are the 2 charges? **1.22 m**
 - 14) Two equal charges of $1.1 \times 10^{-7} \text{ C}$ experience an electrostatic force of $4.2 \times 10^{-4} \text{ N}$. How far apart are the centers of the 2 charges? **0.51 m**
 - 15) Two balloons with charges of $3.37 \times 10^{-6} \text{ C}$ and $-8.21 \times 10^{-6} \text{ C}$ attract each other with a force of 0.0626 N. Determine the separation distance between the two balloons. **2 m**
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- 16) A negative charge of -0.0005 C exerts an attractive force of 9.0 N on a second charge 10 m away. What is the magnitude of the second charge? **$-2 \times 10^{-4} \text{ C}$**
 - 17) Two equally charged spheres attract each other with a force of 0.492 N when placed 0.291 m apart. What is the charge of each sphere? **$\pm 2.15 \times 10^{-6} \text{ C}$ each**
 - 18) Two spheres 0.04 m apart attract each other with a force of $1.2 \times 10^{-9} \text{ N}$. Determine the size of the charge on each if they are equal. What is the charge of each if one charge is twice as big as the other? **$7.11 \times 10^{-23} \text{ C}$ and $1.42 \times 10^{-22} \text{ C}$**