

$$F_{el} = k \frac{Q_1 Q_2}{d^2} \quad k = 9.0 \times 10^9 \frac{\text{n}\cdot\text{m}^2}{\text{C}^2}$$

- Find the force between charges of $+10.0 \mu\text{C}$ and $-50.0 \mu\text{C}$ located 20.0 cm apart.
- Two spheres have identical charges and are 75 cm apart. The force between them is $+0.30 \text{ N}$. What is the magnitude of the charge on each sphere? (*Let $x = \text{charge}$*)

What can you tell about the charge signs on the spheres? _____

- Consider the electric force between a pair of charged particles a certain distance apart. By Coulomb's Law:
 - If the charge of one of the particles is doubled, the force is-
(unchanged) (halved) (doubled) (quadrupled)
 - If, instead, the charge of both particles is doubled, the force is-
(unchanged) (halved) (doubled) (quadrupled)
 - If, instead, the distance between the particles is doubled, the force becomes- **(one fourth) (half) (double) (4 times)**
 - If the distance is halved and the charges of both particles are doubled, the force is _____ as great.
- What is the distance between two spheres, each with a charge of $2.5 \times 10^{-6} \text{ C}$, when the force between them is 0.50 N ?

Name: _____

Period: _____ Subject: _____

Date: _____

Worksheet - Coulomb's Law

1. A negative charge of -2.0 C and a positive charge of 3.0 C are separated by 80 m . What is the force between the two charges?
2. A negative charge of -0.0005 C exerts an attractive force of 9.0 N on a second charge that is 10 m away. What is the magnitude of the second charge?
3. Two negative charges that are both -3.0 C push each other apart with a force of 19.2 N . How far apart are the two charges?

Unit I - Worksheet 3: Coulomb's Law Key

1. Given the mathematical representation of Coulomb's Law, $F = k \frac{q_1 q_2}{r^2}$, where $k = 9.0 \times 10^9 \text{ Nm}^2/\text{C}^2$, describe in words the relationship among electric force, charge, and distance.

The first six problems on this page are more repetitions of the early problems.

2. By how much does the electric force between a pair of charged bodies diminish when their separation is doubled? tripled?

Feel free to skip the first 6 problems. The final 3 problems are more advanced

3. Two positive charges of $6.0 \times 10^{-6} \text{ C}$ 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?

than anything previous. Give them a shot!!

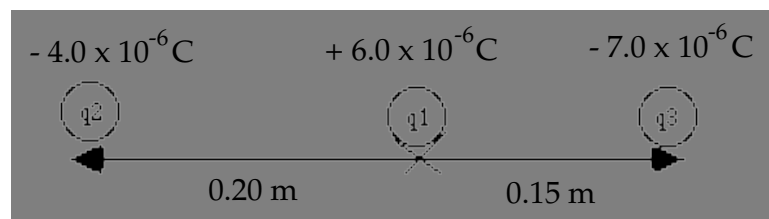
4. A negative charge of $2.0 \times 10^{-4} \text{ C}$ and a positive charge of $8.0 \times 10^{-4} \text{ C}$ are separated by 0.30 m. What is the magnitude of the force between the charges? Is this force repulsive or attractive?


5. A young man accumulates a charge q_1 of $+2.0 \times 10^{-5} \text{ C}$ while sliding out of the front seat of a car. His girlfriend, who had been waiting in the wind, has picked up some extra electrons and now has a charge q_2 of $-8.0 \times 10^{-5} \text{ C}$.

Draw a sketch of the situation. Estimate the magnitude of the electrical force that each person exerts on the other when separated by a distance of 6.0 m. Is the force attractive or repulsive?

6. Suppose the two people in the previous problem move toward each other. Calculate the magnitude of the electrical force of one on the other when their separation is reduced by a factor of 10.

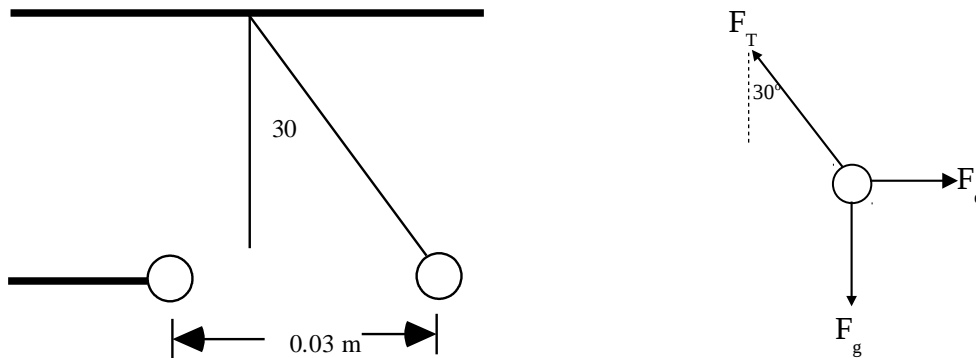
7. The figure below shows three point charges that lie along the x axis. Determine the magnitude and direction of the net electrostatic force on charge q_1 .



8.  Two pith balls shown in the diagram below have a mass of 1.0 g each and have equal charges. One pith ball is suspended by an insulating thread. The other charge is brought to within 3.0 cm of the suspended ball ($r = 0.03$ m). The suspended pith ball is deflected from its rest position until the thread forms an angle of 30° with the vertical. At this angle, the ball is in equilibrium.

a) Draw a force diagram depicting the forces acting on the suspended ball.

Calculate (b) mg (c) F_E (d) the charge on the pith balls



9. Three charges are placed as shown below. Determine the magnitude and direction of the net electrostatic force on charge q_1 . As part of the solution, include a force diagram.

