

## Electric Force and Coulomb's Law

Coulomb: He established a mathematical relation between electric force and the factors that influence it (namely, the sizes of the two charges involved, in coulombs, and the distance between the two charges, in meters).

His formula :  $F = \frac{kQ_1Q_2}{d^2}$

The above formula is referred to as "Coulomb's Law".

F = force in newtons (N)

k = a constant

$Q_1$  = the first charge in coulombs (C)

$Q_2$  = the second charge in coulombs (C)

d = the distance between the two charges in meters (m)

What happens to the electric force between two charges  $Q_1$  and  $Q_2$ :

1. a) if one of the charges is doubled?

$$F = \frac{kQ_1Q_2}{d^2} \quad \uparrow F \ 2x$$

- b) if the distance is doubled?

$$F = \frac{kQ_1Q_2}{d^2} \quad F \downarrow \frac{1}{4}x$$

- c) if both charges are doubled?

$$F = \frac{kQ_1Q_2}{d^2} \quad F \uparrow 4x$$

2. a) What happens to the force exerted between two charges if the distance between them is quadrupled?

$$F = \frac{kQ_1Q_2}{d^2} \quad F \downarrow \frac{1}{16}x$$

- b) What happens to the force exerted between two charges if the distance between them is halved?

$$F = \frac{kQ_1Q_2}{d^2} \quad F \uparrow 4x$$