

Tuesday Reading Assessment: Unit 0, Coulomb's Law and E-fields

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1 Memory Bank

- $\vec{F}_{12} = kq_1q_2/r^2 \hat{r}$... Coulomb force.
- $k = 8.988 \times 10^9 \text{ N C}^{-2} \text{ m}^2$... The constant of proportionality in Coulomb force.
- $\vec{F} = q\vec{E}$... Definition of an electric field.
- $1e = -1.602 \times 10^{-19} \text{ Coulombs}$... Charge of an electron.
- $1p = +1.602 \times 10^{-19} \text{ Coulombs}$... Charge of a proton.

2 Coulomb Force

1. Suppose you have a charge of +1 nC, or 10^{-9} Coulombs, separated from another identical charge by 1 mm. (a) What will be the force between them? (b) Will the charges accelerate toward each other or away from each other?

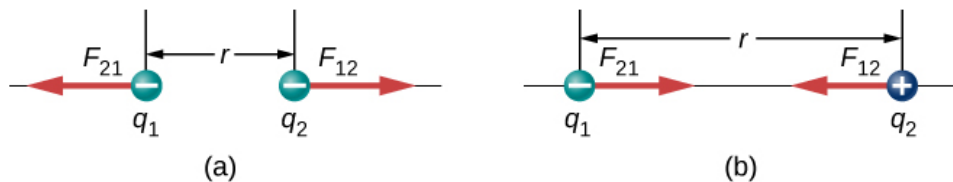


Figure 1: With the Coulomb force, like charges repel each other, and opposite charges attract.

2. How many protons are required to create a *total charge* of +1 nC, or 10^{-9} Coulombs?
3. If two charges are a distance r apart, and then r is increased by a factor of 12 by what factor does the force decrease?
 - A: 12
 - B: 24
 - C: 144
 - D: 1000