Answer on Question 58243, Physics, Electromagnetism

Question:

A balloon with a charge of $6.0 \cdot 10^{-5}\ C$ is held at a distance of $0.10\ m$ from a second balloon with the same charge. What is the repulsive force and why?

Solution:

We can find the magnitude of the repulsive force from the Coulomb's Law:

$$F_{repulsive} = k\frac{q_1 q_2}{r^2},$$

here, $k = \frac{1}{4\pi\varepsilon_0} = 9 \cdot 10^9\ \frac{N \cdot m^2}{C^2}$ is the Coulomb's constant, $q_1 = q_2 = 6.0 \cdot 10^{-5}\ C$ is the charges of two balloons, r is the distance between two balloons.

Then, we get:

$$F_{repulsive} = 9 \cdot 10^9\ \frac{N \cdot m^2}{C^2} \cdot \frac{6.0 \cdot 10^{-5}\ C \cdot 6.0 \cdot 10^{-5}\ C}{(0.10\ m)^2} = 3240\ N.$$

Answer:

$F_{repulsive} = 3240\ N.$