Answer of question #77595-Physics-Electric Circuits

Two objects exert a force of 4.2 N on each other. The distance between the objects is 0.36 m. The charge on one object is 2.8x10^-9 C. What is the charge on the second object?

Input Data:

Distance: $r = 0.36$ m

Force: $F = 4.2$ N

$Charge_1$: $q_1 = 2.8 * 10^{-9}$ C

$k = 9 * 10^9 \ \frac{N*m^2}{C^2}$

Since the medium is not specified, - the permittivity is indicated for air $\varepsilon = 1$

Solution:

According to the law of the coulomb, the interaction force between charges is:

$$F = k\frac{q_1*q_2}{\varepsilon r^2}$$

Hence we obtain the second charge:

$$q_2 = F\frac{\varepsilon r^2}{kq_1} = 0.0216 \text{ C}$$

Answer:

To interact with such a force under these conditions, the second object must have a charge of 0.0216 C