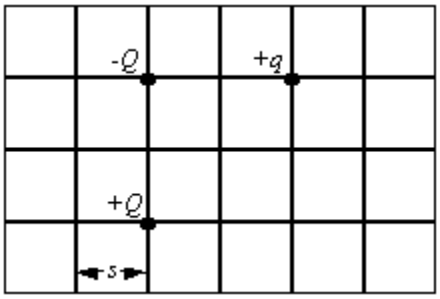
Q- Three charges are fixed in place as shown. The squares in the grid have sides of length *s* = 0.24 m. The magnitude of *q* is 3 μC, while the magnitude of *Q* is 4.5 μC. What is the magnitude of the net force on *q* due to the other two charges?

Magnitude of force of attraction on +q due to -Q charge will be given by



$$F_1 = \frac{Qq}{4\pi \in_0 (2s)^2} = \frac{9*10^9 *4.5*10^{-6} *3*10^{-6}}{(2*0.24)^2} = 0.527\,\text{N}$$

Magnitude of force of repulsion on +q due to Q charge will be given by

$$F_1 = \frac{Qq}{4\pi \in_0 (2\sqrt{2}*s)^2} = \frac{9*10^9 *4.5*10^{-6} *3*10^{-6}}{(2\sqrt{2}*0.24)^2} = 0.264\,\text{N}$$

The two forces are at an angle 135^0, hence their resultant force will be given by

$$F = \sqrt{F_1^2 + F_2^2 + 2F_1 F_2 \cos 135^0} = \sqrt{0.527^2 + 0.264^2 + 2*0.527*0.264(-0.707)}$$

Gives F = 0.388 N