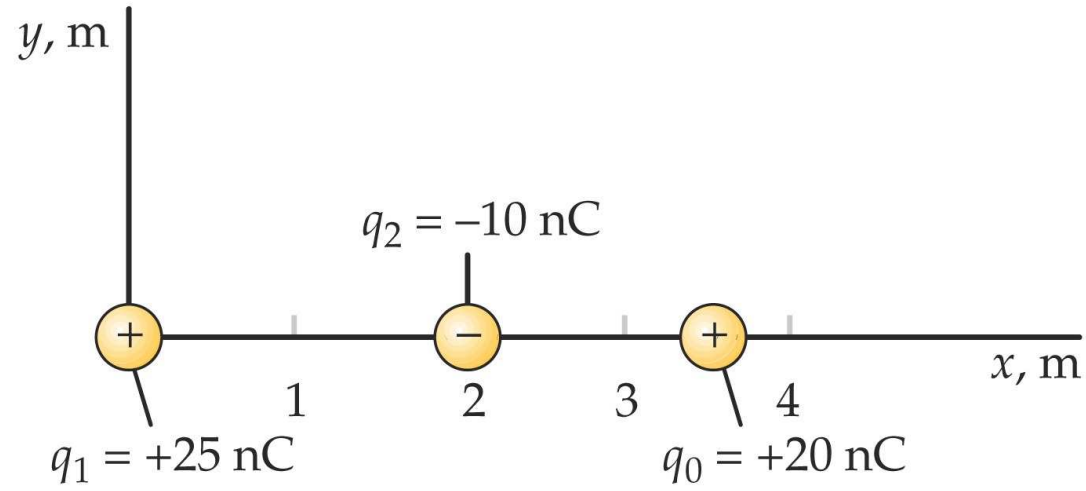
Coulomb Force in One Dimension (1)

Find net force on charge q_0 due to charges q_1 and q_2.
Consider x-component of force.

$$F_0 = +k\frac{|q_1 q_0|}{(3.5\text{m})^2} - k\frac{|q_2 q_0|}{(1.5\text{m})^2} = +3.67\times10^{-7}\text{N} - 7.99\times10^{-7}\text{N} = -4.32\times10^{-7}\text{N}.$$

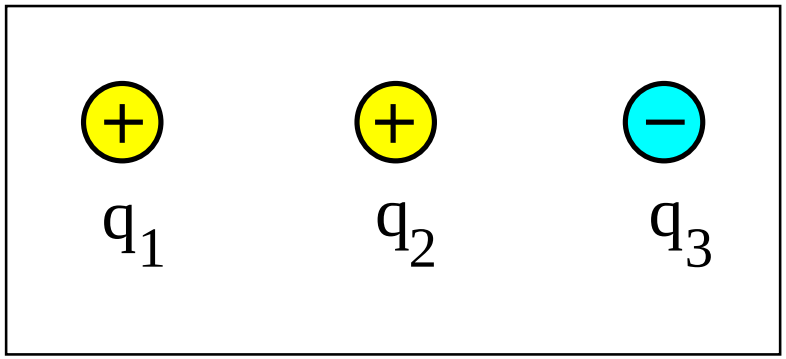
Find net force on charge q_2 due to charges q_1 and q_0.

$$F_2 = -k\frac{|q_1 q_2|}{(2.0\text{m})^2} + k\frac{|q_2 q_0|}{(1.5\text{m})^2} = -5.62\times10^{-7}\text{N} + 7.99\times10^{-7}\text{N} = +2.37\times10^{-7}\text{N}.$$



Coulomb Force in One Dimension (2)

Three particles with charges of magnitude 1C are positioned on a straight line with two equal spacings.

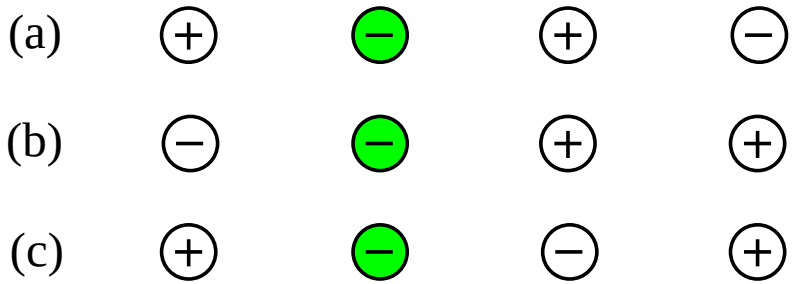


(a) Find the direction (left/right) of the net forces $\vec{F}_1, \vec{F}_2, \vec{F}_3$ on each particle.

(b) Which force is the strongest and which force is the weakest?

Coulomb Force in One Dimension (3)

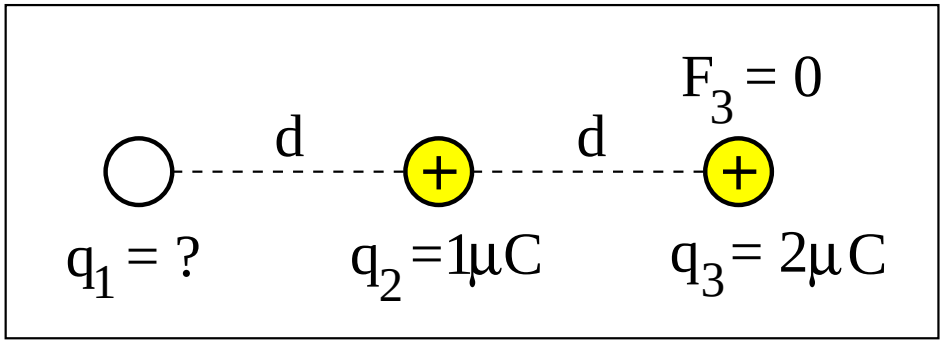
Four point charges equal magnitude are lined up in three different configurations.
The Coulomb force between nearest neighbors is 4N.



Find direction and magnitude of the net force experienced by the green particle in each configuration.

Coulomb Force in One Dimension (4)

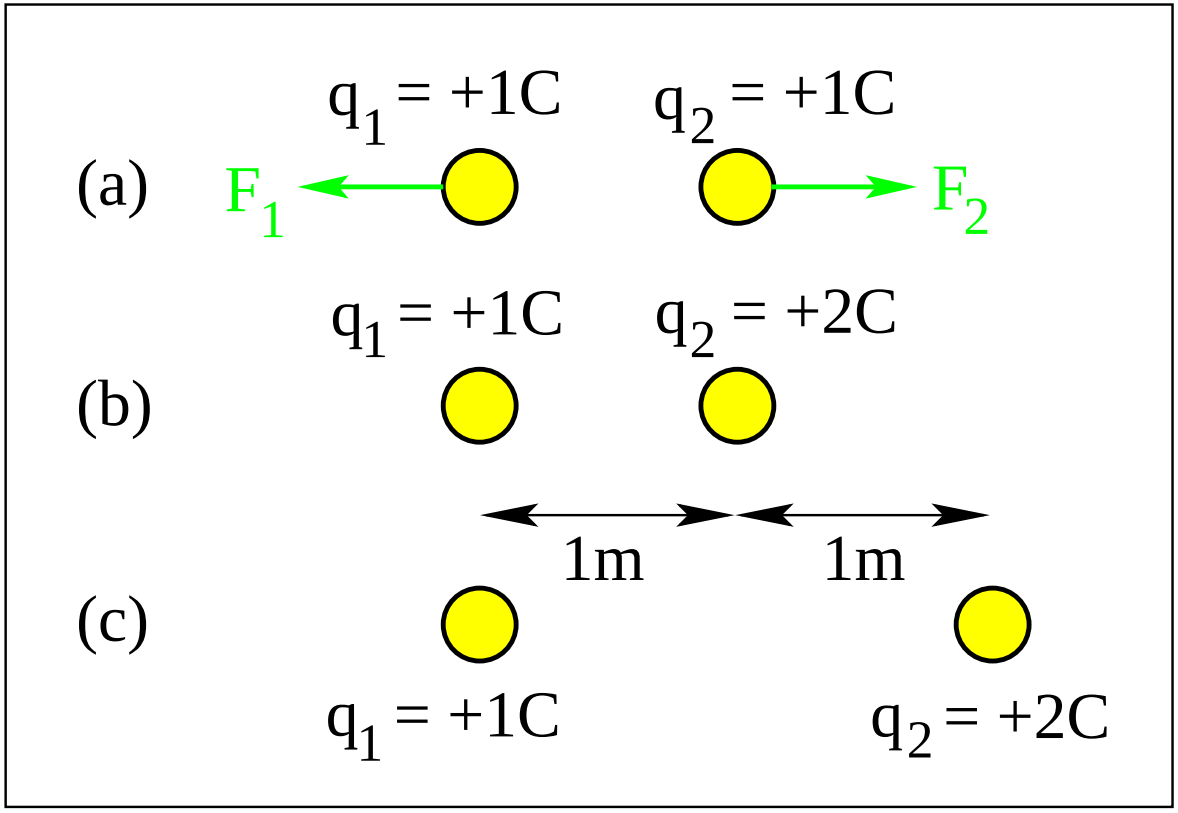
Three charged particles are positioned along a straight line with two equal spacings .
The net Coulomb force on charge q_3 happens to vanish.



What is the value of q_1?

Coulomb Force in One Dimension (5)

How are the forces $\vec{F}_1$ and $\vec{F}_2$ in (a) affected by the changes made in (b) and (c)?



What changes if the charge q_2 is made negative?