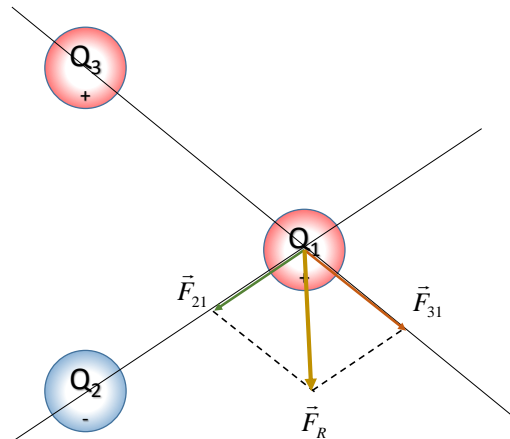
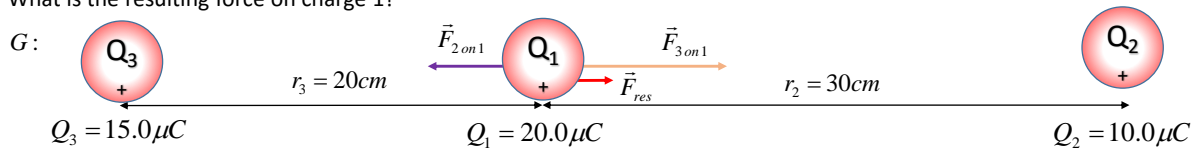


## Coulomb's law with multiple charges



## Coulomb's law with multiple charges

Three charges are located on the same line. Charge 1 is located in the middle and has a magnitude of  $20.0 \mu\text{C}$ . Charge 2 is at  $30 \text{ cm}$  on the right and has a value of  $10.0 \mu\text{C}$ . Charge 3 is at  $20 \text{ cm}$  to the left of charge 1 and has a value of  $15.0 \mu\text{C}$ . What is the resulting force on charge 1?



F : F ?

S :

~~$$|F_1| = k \frac{|Q_1||Q_2||Q_3|}{r^2}$$~~

$$|F_{2on1}| = k \frac{|Q_1||Q_2|}{r_2^2} \quad |F_{2on1}| = 8.99 \times 10^9 \frac{\text{N}\cdot\text{m}^2}{\text{C}^2} \frac{|20.0 \times 10^{-6} \text{C}||10.0 \times 10^{-6} \text{C}|}{(30 \times 10^{-2} \text{m})^2} = 20 \text{ N}$$

$$|F_{3on1}| = k \frac{|Q_1||Q_3|}{r_3^2} \quad |F_{3on1}| = 8.99 \times 10^9 \frac{\text{N}\cdot\text{m}^2}{\text{C}^2} \frac{|20.0 \times 10^{-6} \text{C}||15.0 \times 10^{-6} \text{C}|}{(20 \times 10^{-2} \text{m})^2} = 67 \text{ N}$$

$$|F_R| = |F_{3on1}| - |F_{2on1}| \quad |F_R| = 67 \text{ N} - 20 \text{ N} = 47 \text{ N}$$