Plastic rod w/ charge $Q_p = -20\mu C$

Glass rod w/ charge $Q_g = +30\mu C$

Rub them together,
then find that plastic rod still has $Q_p' = -5\mu C$

What's Q_g' ? (answer in μC)

$$Q_{\text{net}} = Q_p + Q_g = +10\mu C$$

$$Q_g' = Q_{\text{net}} - Q_p' = 15\mu C$$

mass $m_1 = 40$ g
charge $Q_1 = +20$ μC

mass $m_2 = 8$ g
charge $Q_2 = +32$ μC

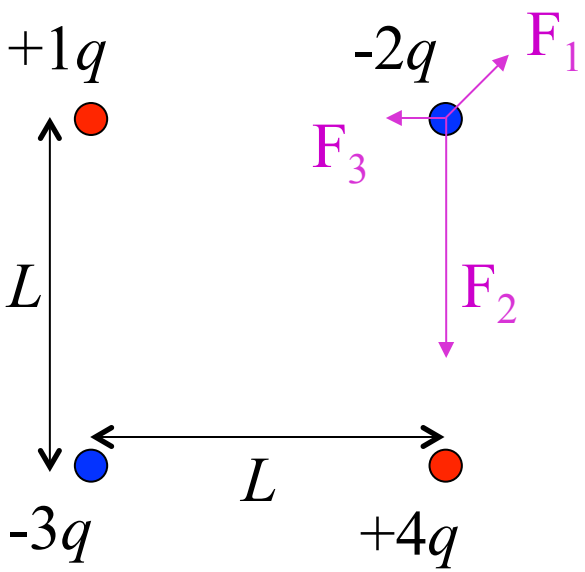
Separation d = 10 cm
What is the force on ball #1?
(answer in N, positive means to the right)

$$|\mathbf{F}| = k\frac{Q_1 Q_2}{r^2} = \left(9E9\,\frac{\mathrm{Nm}^2}{\mathrm{C}^2}\right)\frac{(32\mu\mathrm{C})(20\mu\mathrm{C})}{(0.1\mathrm{m})^2} = 576\mathrm{N}$$

TO THE LEFT!

What is the force on ball #2?

Four small charged objects are in a square. L = 1m and q = 1mC. What force does the upper right object feel?



$$|F_1| = k \cdot 6q^2 / (\sqrt{2}L)^2 = k \cdot 3q^2 / L^2$$

$$|F_2| = k \cdot 8q^2 / L^2$$

$$|F_3| = k \cdot 2q^2 / L^2$$

$$F_{1x} = F_{1y} = \frac{|F_1|}{\sqrt{2}} \qquad \text{(angle is 45°)}$$

$$F_x = (\frac{3}{\sqrt{2}} - 2)kq^2 / L^2 = 1090\,\text{N}$$

$$F_y = (\frac{3}{\sqrt{2}} - 8)kq^2 / L^2 = -52850\,\text{N}$$

Two charged balls hang from strings of length L from a common hanging point. They have the same mass m and the same charge q. How far apart are they (in equilibrium)? Give the answer as an equation for x.
(HINT: Use the small angle approximation $\theta \approx \sin\theta \approx \tan\theta$)

$$T\sin\theta = F_E = k\frac{qq}{x^2}$$

$$T\cos\theta = mg$$

$$\frac{\frac{1}{2}x}{L} \approx \tan\theta = \frac{kq^2}{mgx^2}$$

$$x = \sqrt[3]{\frac{2kq^2L}{mg}}$$