43. (a) For the net force to be in the $+x$ direction, the y components of the individual forces must cancel. The angle of the force exerted by the $q_1 = 40\ \mu$C charge on $q = 20\ \mu$C is $45°$, and the angle of force exerted on q by Q is at $-\theta$ where

$$\theta = \tan^{-1}\left(\frac{2.0}{3.0}\right) = 33.7° \ .$$

Therefore, cancellation of y components requires

$$k\,\frac{q_1\,q}{\left(0.02\sqrt{2}\right)^2}\,\sin 45° = k\,\frac{|Q|\,q}{\left(\sqrt{0.03^2+0.02^2}\right)^2}\,\sin\theta$$

from which we obtain $|Q| = 82.9\ \mu$C. Charge Q is "pulling" on q, so (since $q > 0$) we conclude $Q = -82.9\ \mu$C.

(b) Now, we require that the x components cancel, and we note that in this case, the angle of force on q exerted by Q is $+\theta$ (it is repulsive, and Q is positive-valued). Therefore,

$$k\,\frac{q_1\,q}{\left(0.02\sqrt{2}\right)^2}\,\cos 45° = k\,\frac{Q\,q}{\left(\sqrt{0.03^2+0.02^2}\right)^2}\,\cos\theta$$

from which we obtain $Q = 55.2\ \mu$C.