

8. With rightwards positive, the net force on  $q_3$  is

$$k \frac{q_1 q_3}{(2d)^2} + k \frac{q_2 q_3}{d^2} \ .$$

We note that each term exhibits the proper sign (positive for rightward, negative for leftward) for all possible signs of the charges. For example, the first term (the force exerted on  $q_3$  by  $q_1$ ) is negative if they are unlike charges, indicating that  $q_3$  is being pulled toward  $q_1$ , and it is positive if they are like charges (so  $q_3$  would be repelled from  $q_1$ ). Setting the net force equal to zero and canceling  $k$ ,  $q_3$  and  $d^2$  leads to

$$\frac{q_1}{4} + q_2 = 0 \implies q_1 = -4q_2 \ .$$