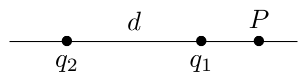
9. At points between the charges, the individual electric fields are in the same direction and do not cancel. Charge q_2 has a greater magnitude than charge q_1, so a point of zero field must be closer to q_1 than to q_2. It must be to the right of q_1 on the diagram.



We put the origin at q_2 and let x be the coordinate of P, the point where the field vanishes. Then, the total electric field at P is given by

$$E = \frac{1}{4\pi\varepsilon_0}\left(\frac{q_2}{x^2} - \frac{q_1}{(x-d)^2}\right)$$

where q_1 and q_2 are the magnitudes of the charges. If the field is to vanish,

$$\frac{q_2}{x^2} = \frac{q_1}{(x-d)^2} \, .$$

We take the square root of both sides to obtain $\sqrt{q_2}/x = \sqrt{q_1}/(x-d)$. The solution for x is

$$\begin{aligned} x &= \left(\frac{\sqrt{q_2}}{\sqrt{q_2} - \sqrt{q_1}}\right) d \\ &= \left(\frac{\sqrt{4.0q_1}}{\sqrt{4.0q_1} - \sqrt{q_1}}\right) d \\ &= \left(\frac{2.0}{2.0 - 1.0}\right) d = 2.0d \\ &= (2.0)(50\,\text{cm}) = 100 \text{ cm} \, . \end{aligned}$$

The point is 50 cm to the right of q_1.