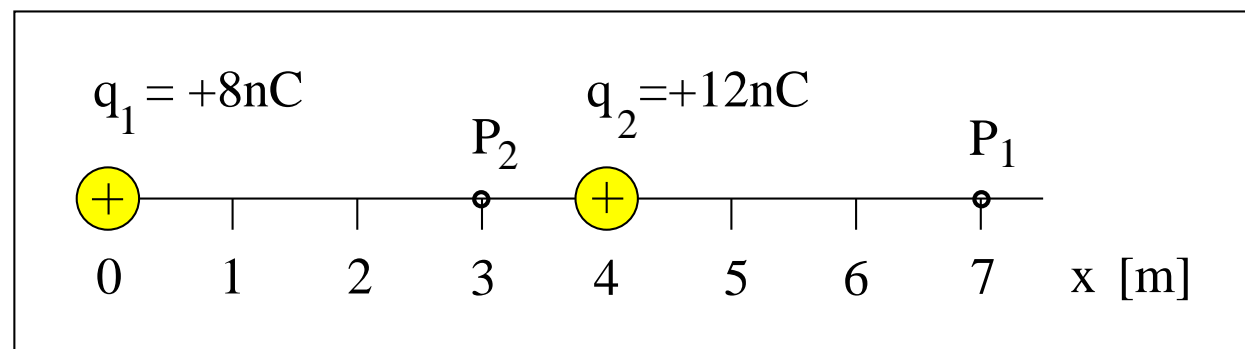Consider the x-component of the electric field.

- Electric field at point P_1:

$$E = E_1 + E_2 = \frac{kq_1}{(7\text{m})^2} + \frac{kq_2}{(3\text{m})^2} = 1.47\text{N/C} + 12.0\text{N/C} = 13.5\text{N/C}.$$
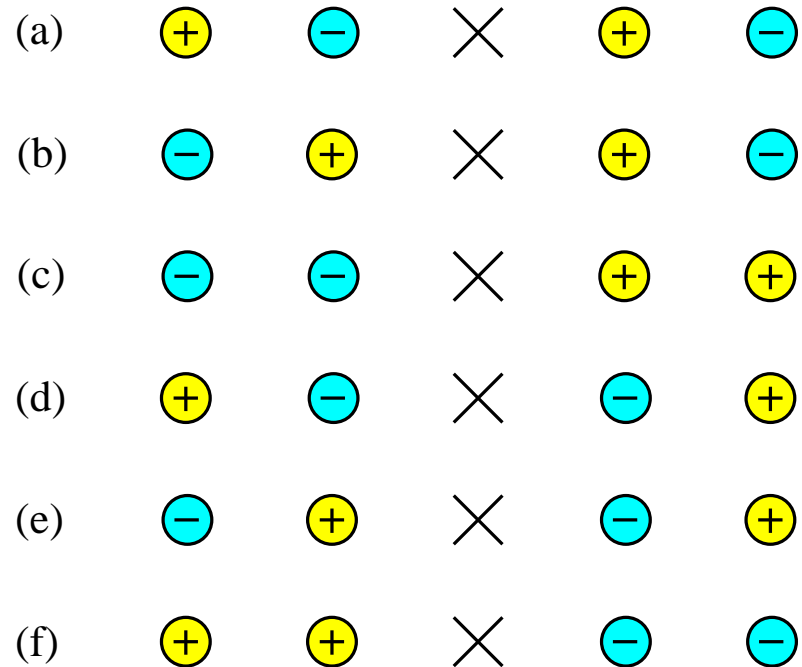
- Electric field at point P_2:

$$E = E_1 + E_2 = \frac{kq_1}{(3\text{m})^2} - \frac{kq_2}{(1\text{m})^2} = 7.99\text{N/C} - 108\text{N/C} = -100\text{N/C}.$$

Four particles with charges of equal magnitude are positioned on a horizontal line in six different configurations.

(a)   (+)   (−)   ×   (+)   (−)

(b)   (−)   (+)   ×   (+)   (−)

(c)   (−)   (−)   ×   (+)   (+)

(d)   (+)   (−)   ×   (−)   (+)

(e)   (−)   (+)   ×   (−)   (+)

(f)   (+)   (+)   ×   (−)   (−)

Determine for each configuration the direction of the resultant electric field (left/right/zero) at the location indicated by ×.

- Is the unknown charge positive or negative?
- What is the value of the unknown charge?

(a)

2m   3m

?   9nC   E=0

(b)

2m   3m

?   E=0   9nC