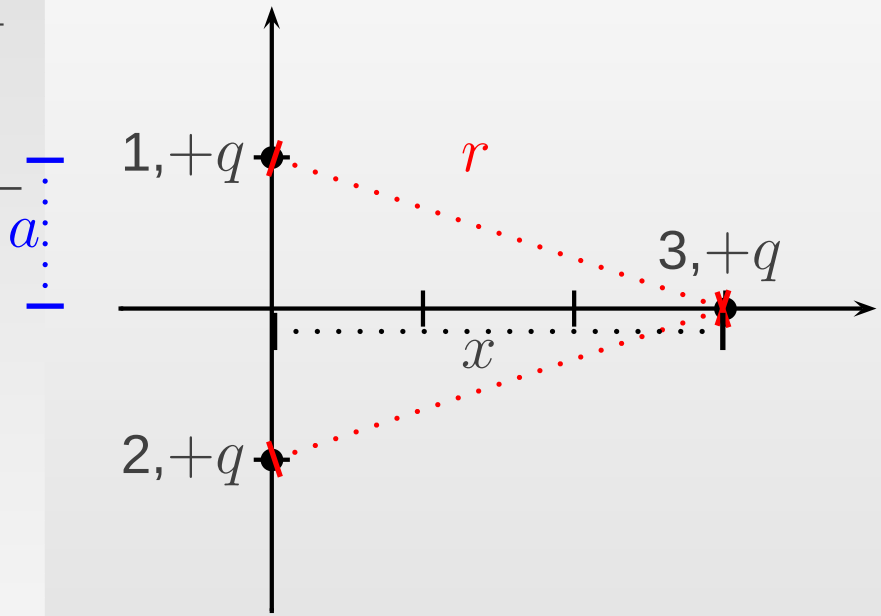
PHYS102 - Forces and Fields

Dr. Suess

January 19, 2007

Superposition of Forces

Worked Problem #2



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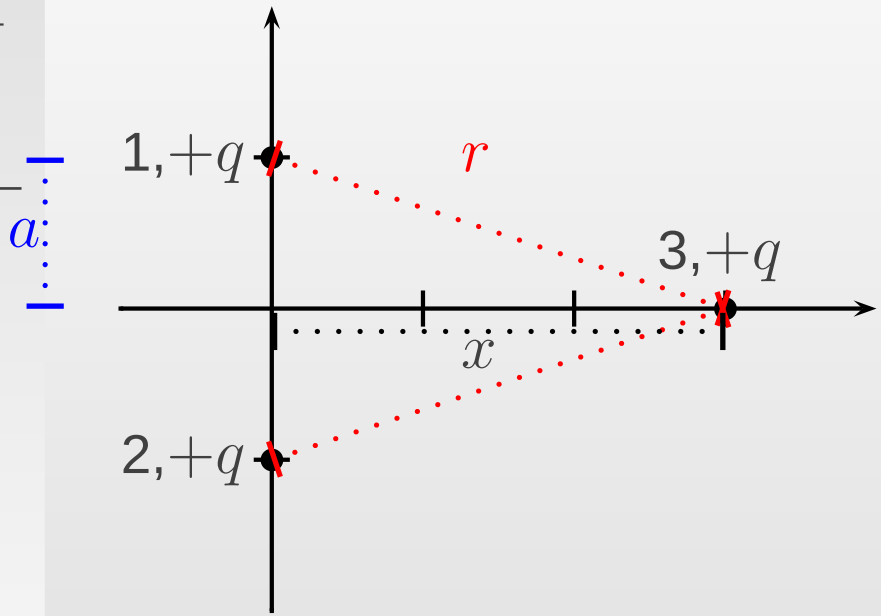

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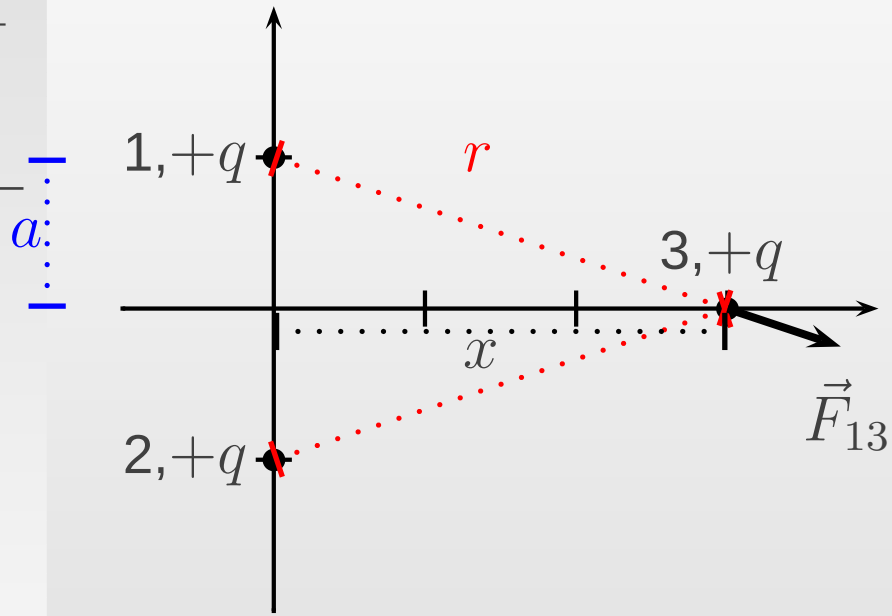

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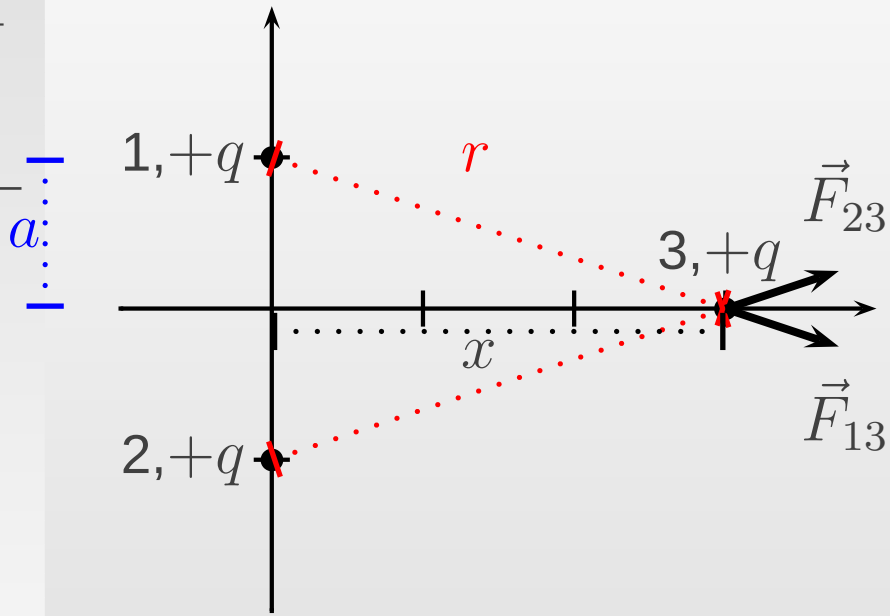

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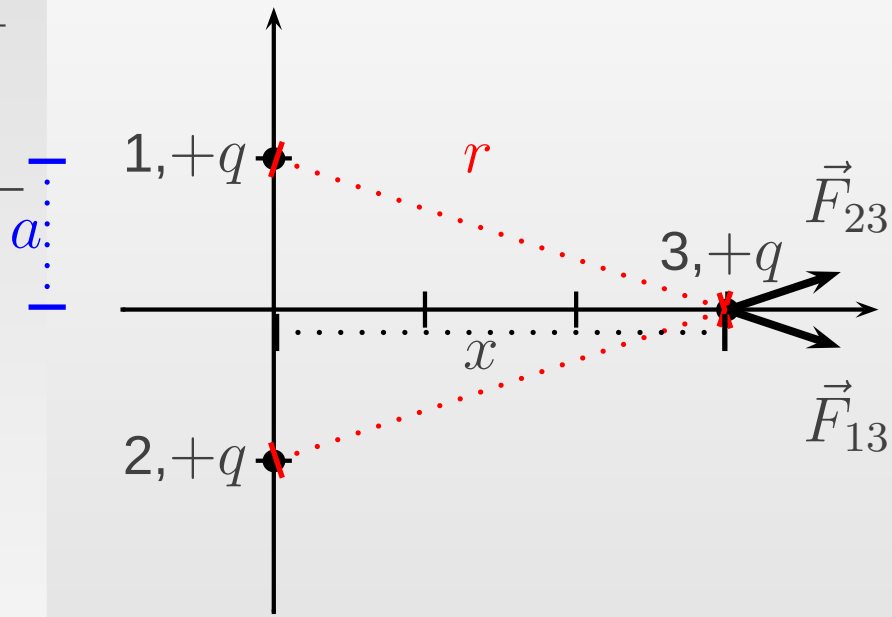

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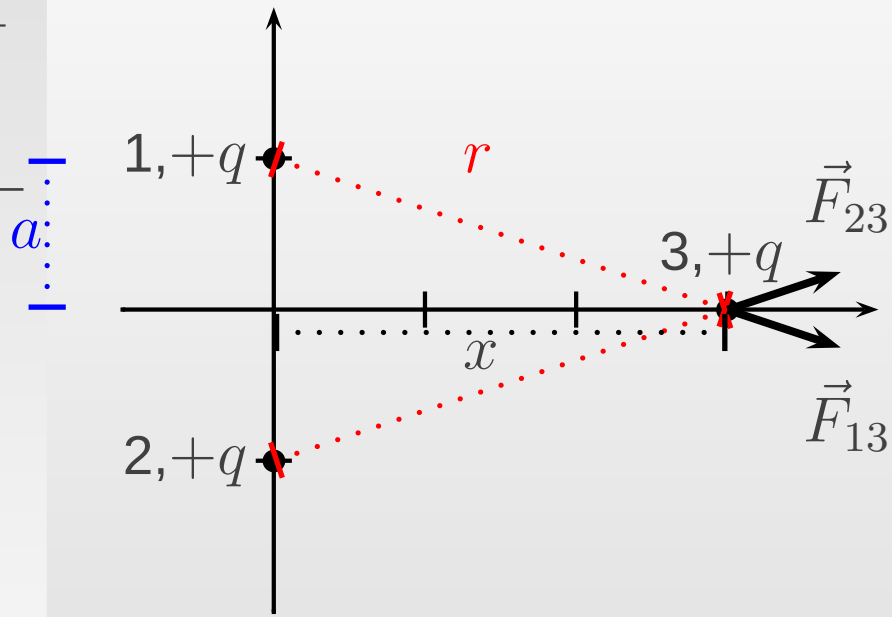

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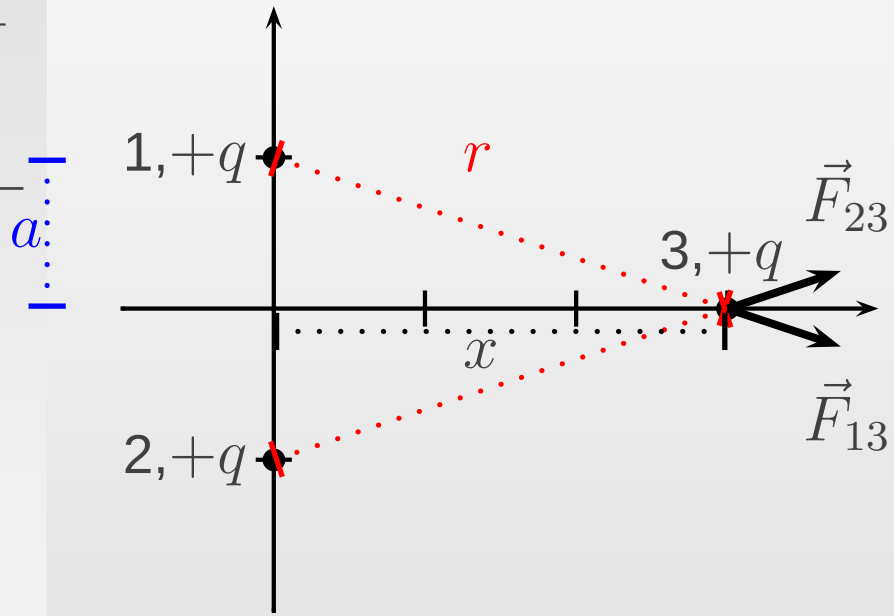

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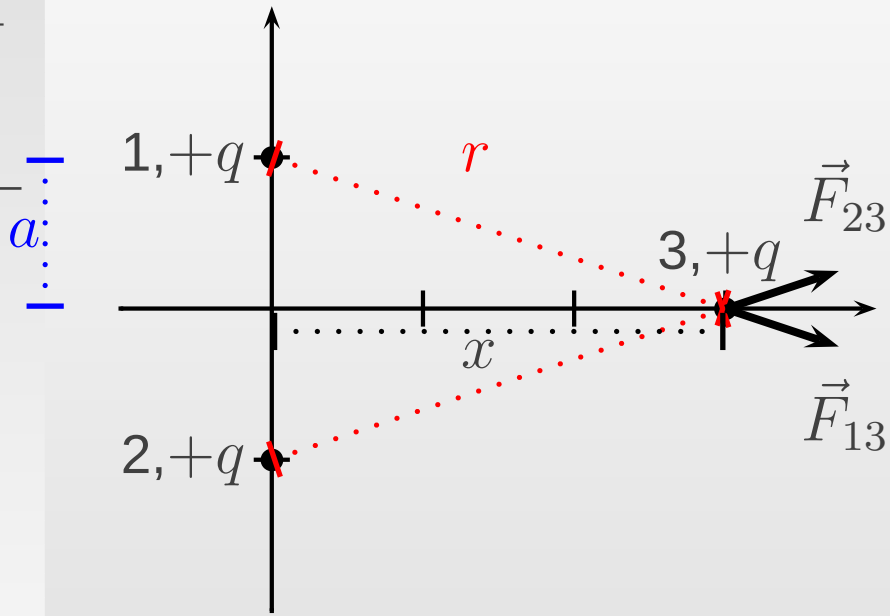

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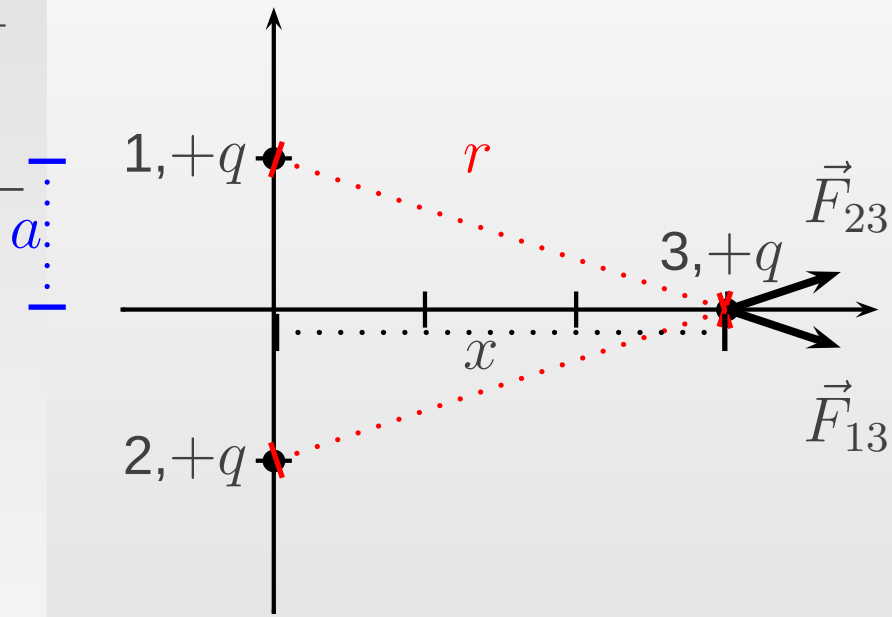

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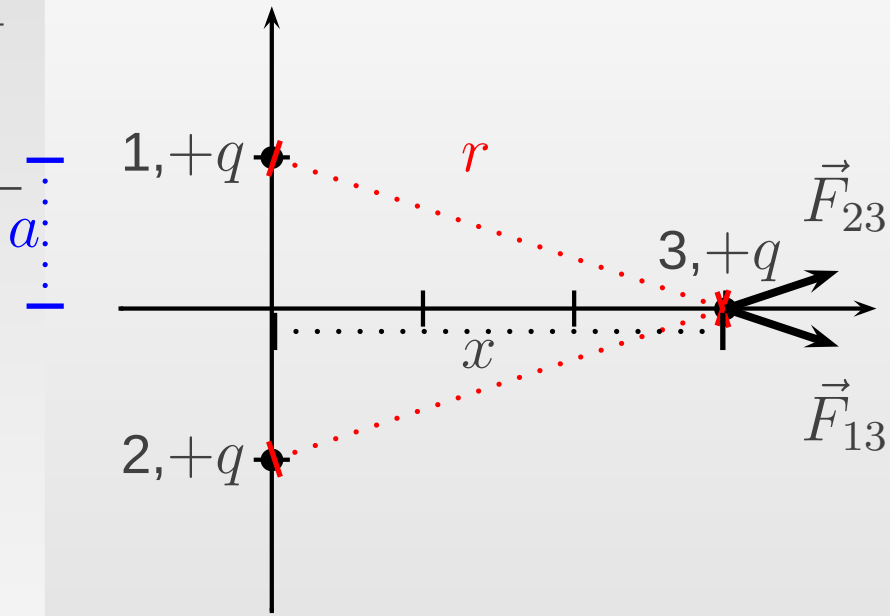

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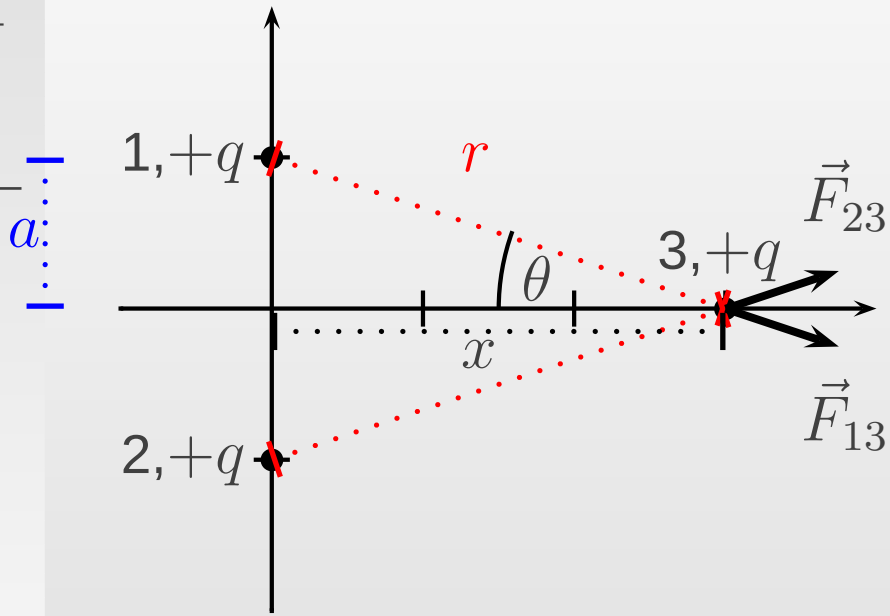

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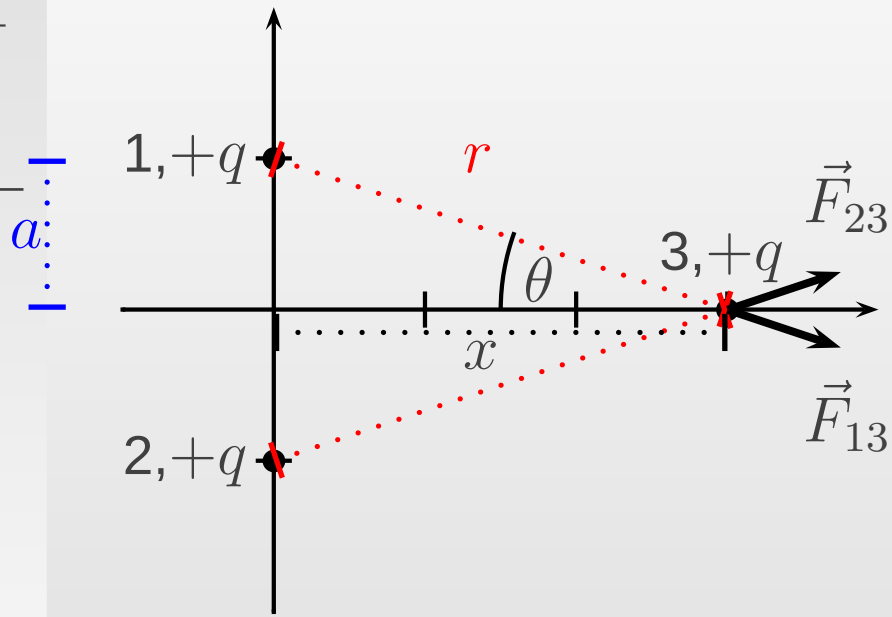

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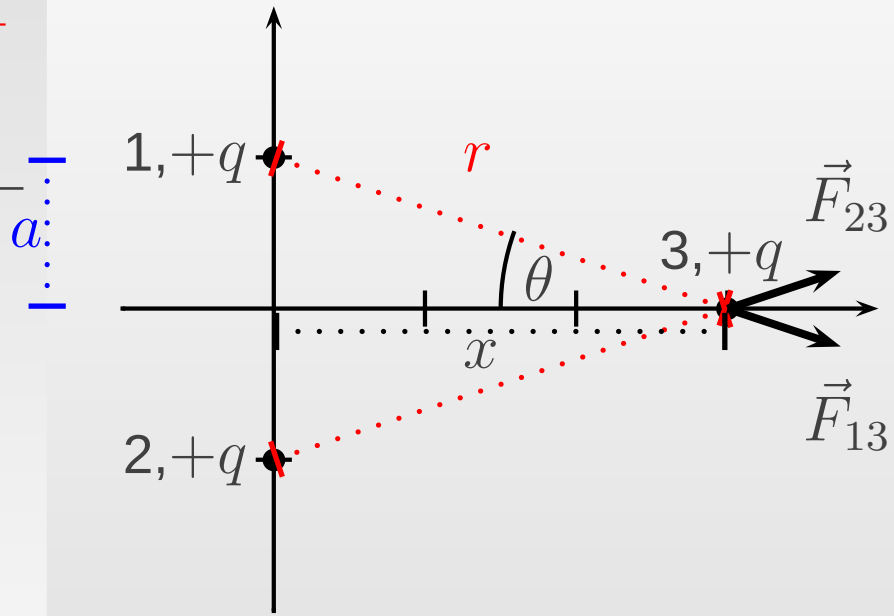

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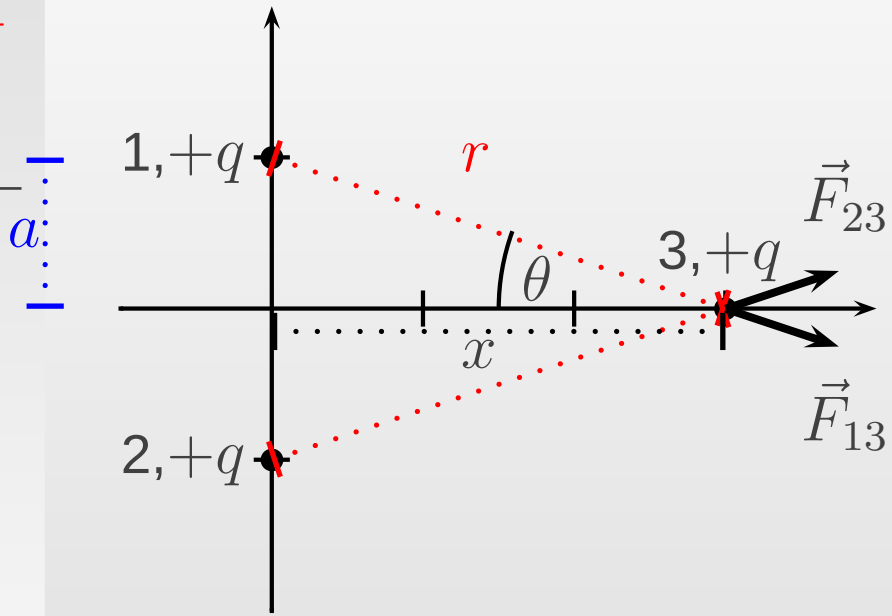

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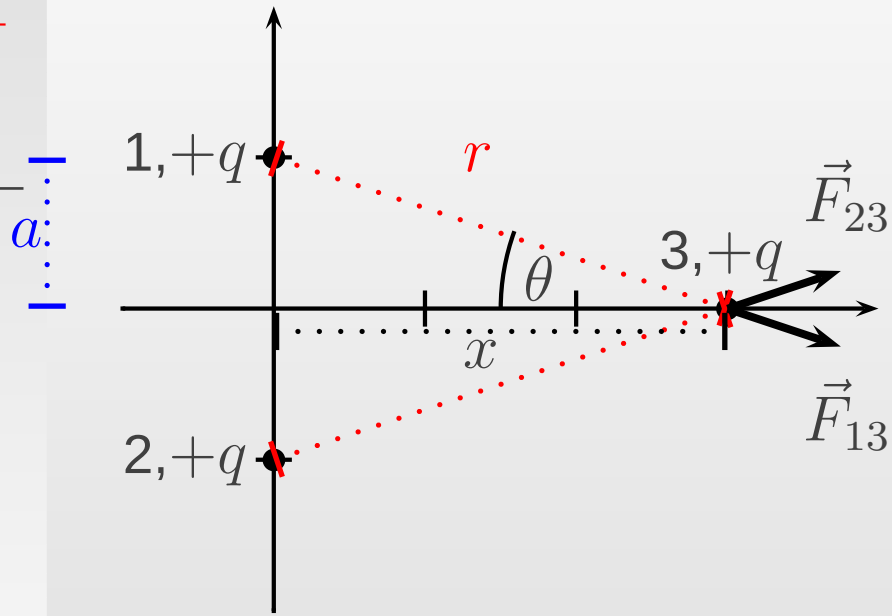

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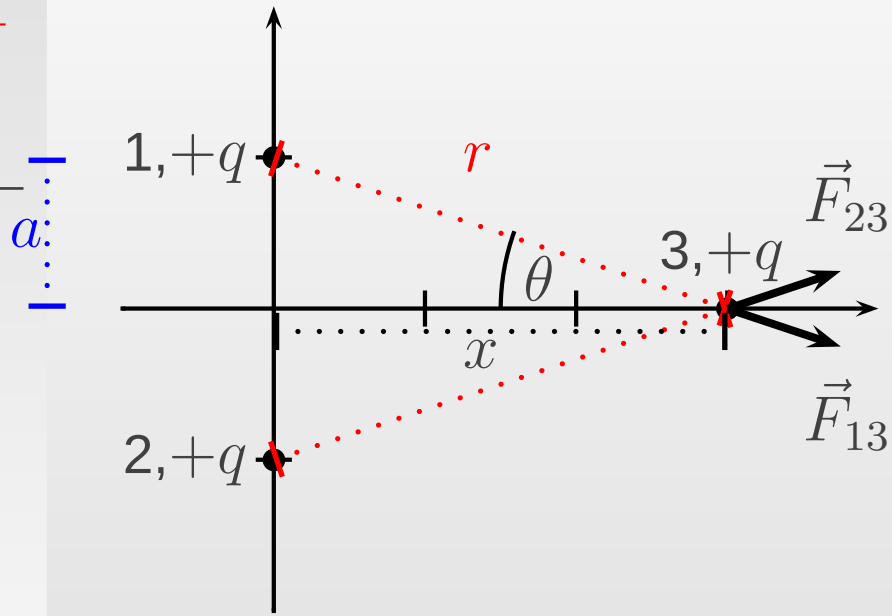

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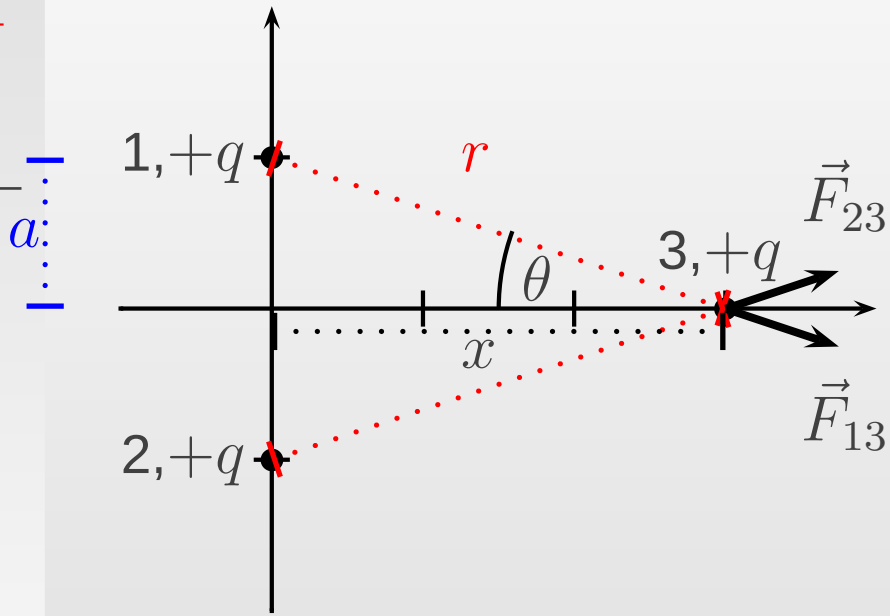

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Answer: $x = \frac{a}{\sqrt{2}}$

Graphing

Let’s move to the board to graph the force we just found.

Fields

The Electric Field

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View interaction as one of charge 1 directly with charge 2.

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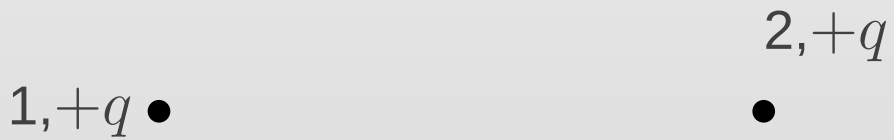

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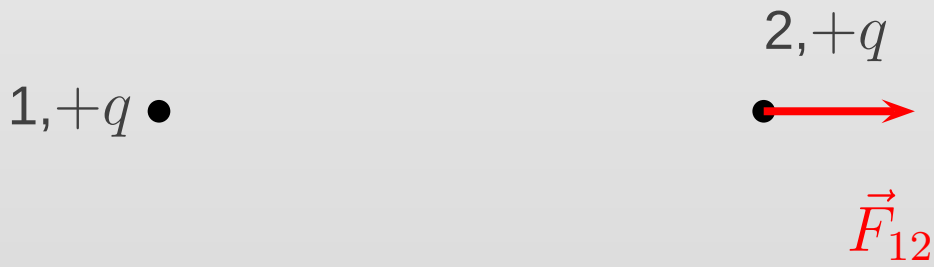

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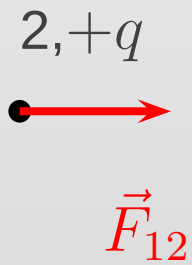

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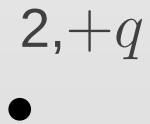

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      - Don't forget all the techniques involved with ***non***-constant forces.

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- Solution: define the electric field in terms of the force per unit charge.

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- The electric field, $\vec{E}$, is a vector field (magnitude and direction at every point in space).

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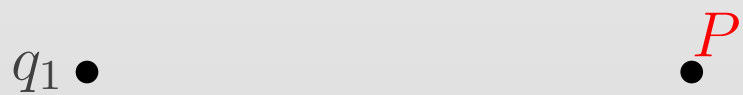

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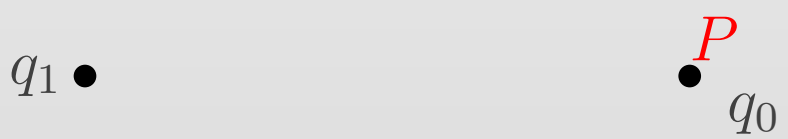

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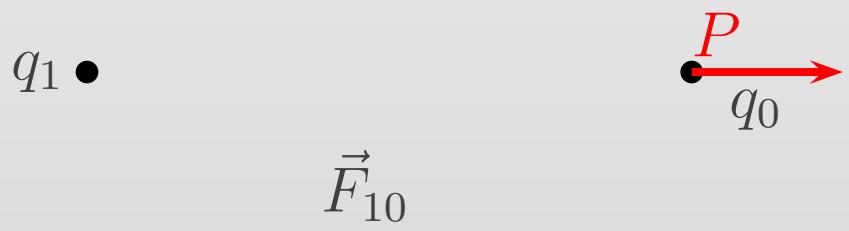

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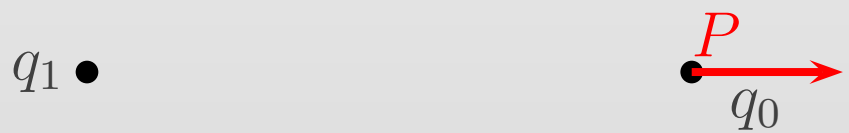

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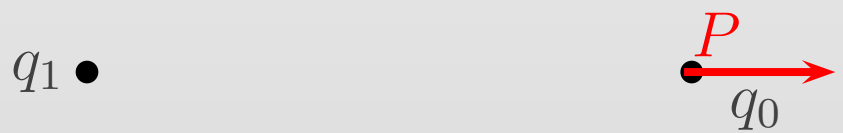

$$\vec{F}_{10} = \frac{k\,q_1\,q_0}{r^2}\,\hat{r}_{10} \Rightarrow \vec{E} = \frac{k\,q_1}{r^2}\,\hat{r}_{1P}$$

Properties of the Electric Field

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- This is the *electric field* generated by a *point charge* (q) at a position P a distance r away from the charge.