Ch 21 Electric Charge & Electric Field

Season 2 Episode 5 - *STYLE*

In this episode of LARC Physics 3B, we're going to . . .

- Create your own approach to solving "Electric field" & "Coulomb's Law" problems.

Lecture Review

In Ch 21, we'll be working largely with just two equations: Electric Field & Coulomb's Law

The electric field E is given by

$$E = k\frac{q}{r^2}$$

where $q :=$ source charge $\quad r :=$ distance between q and some reference point

The electrostatic force F is given by Coulomb's Law

$$F = k\frac{q_1\, q_2}{r^2}$$

where $q_1 :=$ Charge 1 $\quad q_2 :=$ Charge 2 $\quad r :=$ distance between q_1 and q_2

Guided Practice

Create our own cookbook recipe for finding the net Electric Field!

Recipe to Find $\vec{E}_{\mathbf{net}}$

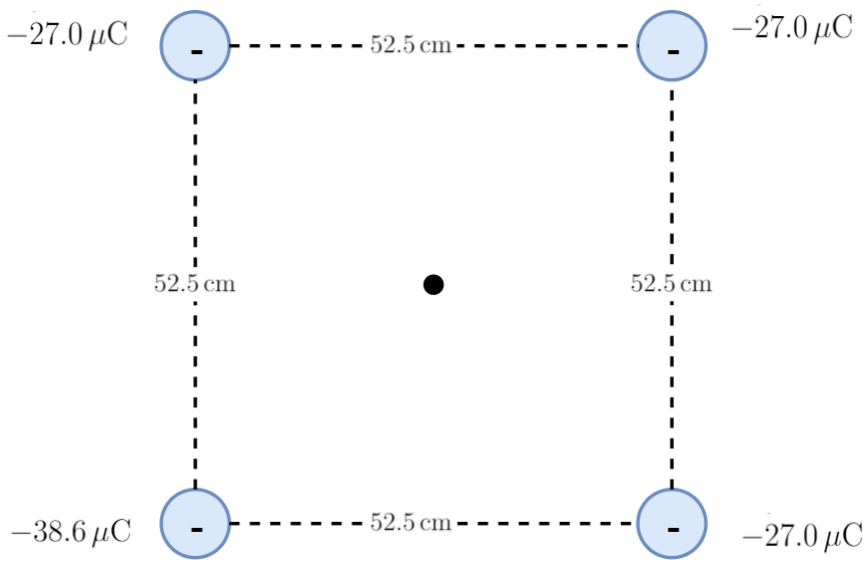
1.
2.
3.
4.

Breakout-Room Activity

Find the magnitude & direction of the $\vec{E}$ at the center of a square with sidelength 52.5 cm if one corner is occupied by a $-38.6\,\mu$C charge and the other three are occupied by $-27.0\,\mu$C charges.

Hint: Use symmetry to your advantage!

Answer: $\left|\vec{E}\right| = 7.6 \times 10^5\,\text{N/C}$, towards the $-38.6\,\mu$C charge i.e. 225° from the $+x$ axis



Breakout-Room Activity

Find the magnitude & direction of the force on each charge shown in the figure below.

Hint: There's definitely some clever trick involving the symmetry . . . but what is it??!

Answer: $\left|\vec{F}\right| = 1.4 \times 10^7\,\text{N}$ and the direction for each charge is basically just towards the center of the square.