Wed Jan 18, 2017

Last time

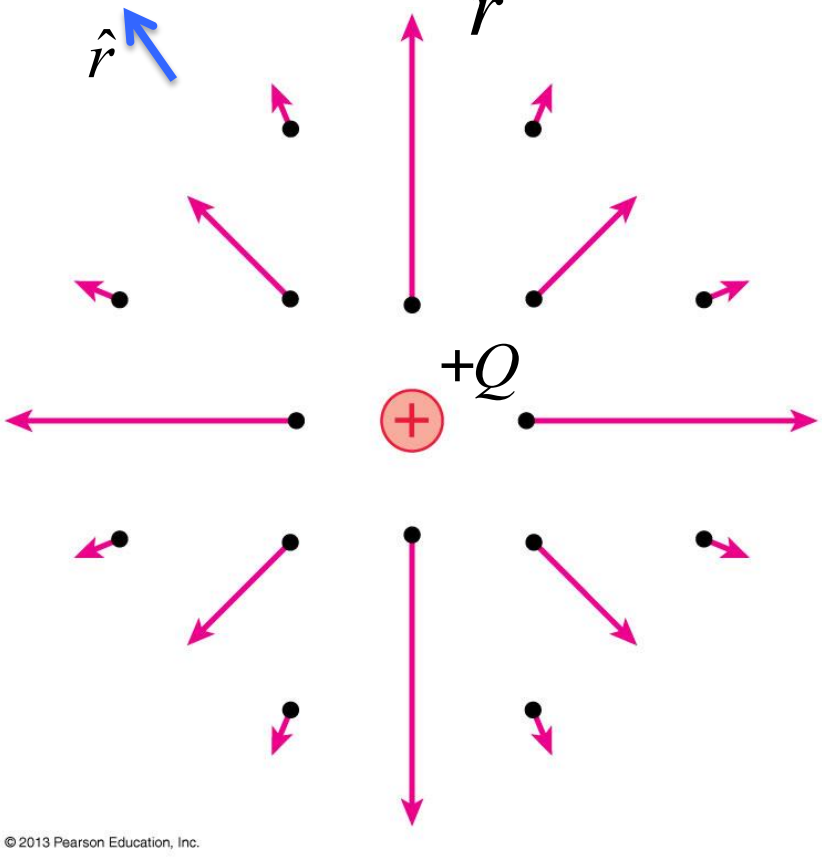
- Reminder about how to use Coulomb's Law
- TopHat questions about Coulomb's Law
- Using the superposition principle

This time

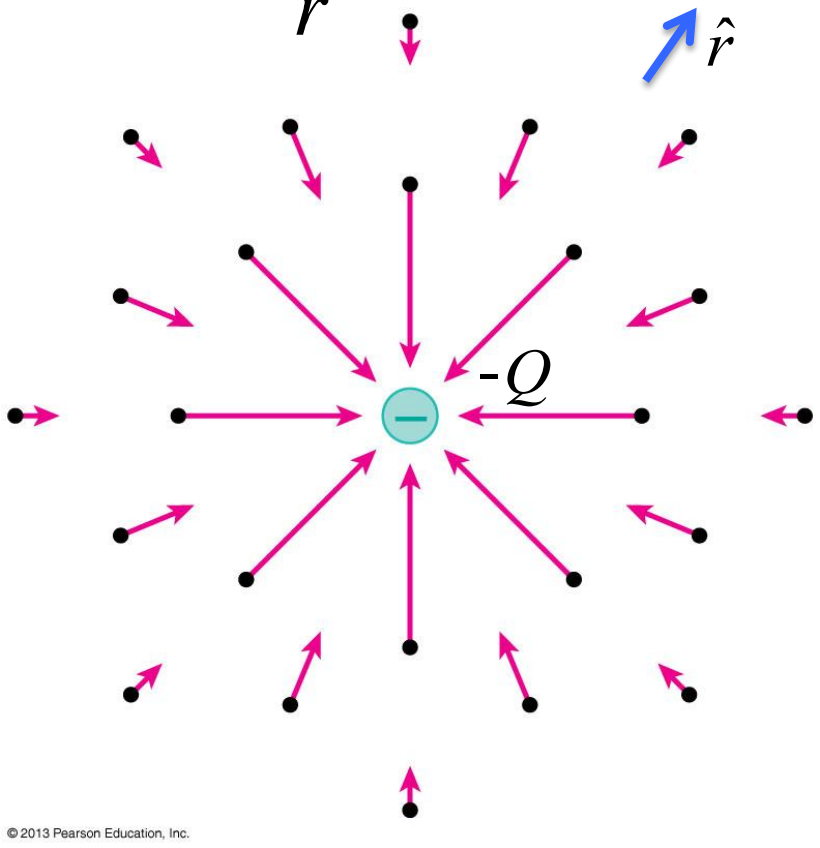
- Coulomb's Law as a fundamental building block
- Electric force due to a charged wire (slowly on doc camera)
- Electric force due to a charged ring (slowly on doc camera)

Building blocks of electric force

$$\vec{F} = \frac{KQq}{r^2}\hat{r}$$



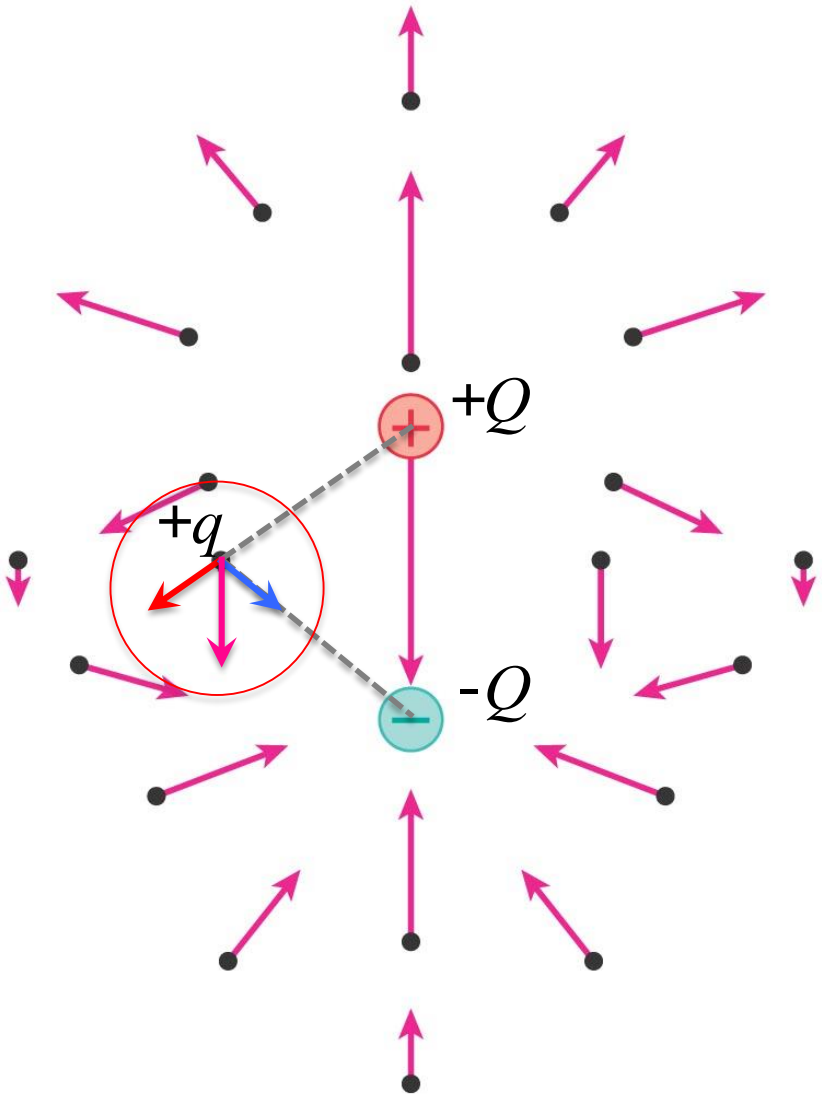
$$\vec{F} = \frac{-KQq}{r^2}\hat{r}$$



● = positive charge q at the position indicated

Superposition with Building Blocks

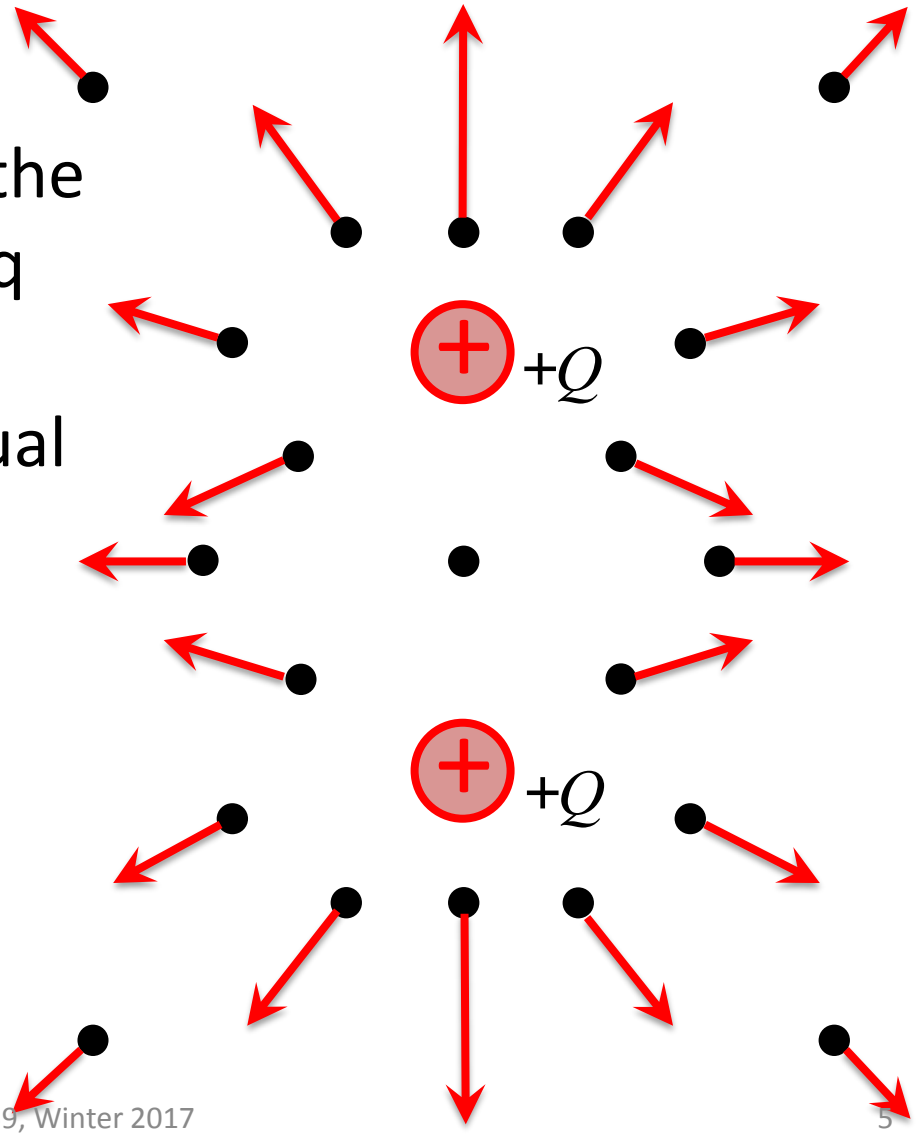
The vector represents the magnitude and direction of the electric force on the charge q **at that point**. It comes from superposition of the individual forces from +Q and –Q.



Step 1: draw the lines connecting the charge pairs
Step 2: draw the force vector for each charge pair
Step 3: sum all forces to find net force

Superposition with Building Blocks

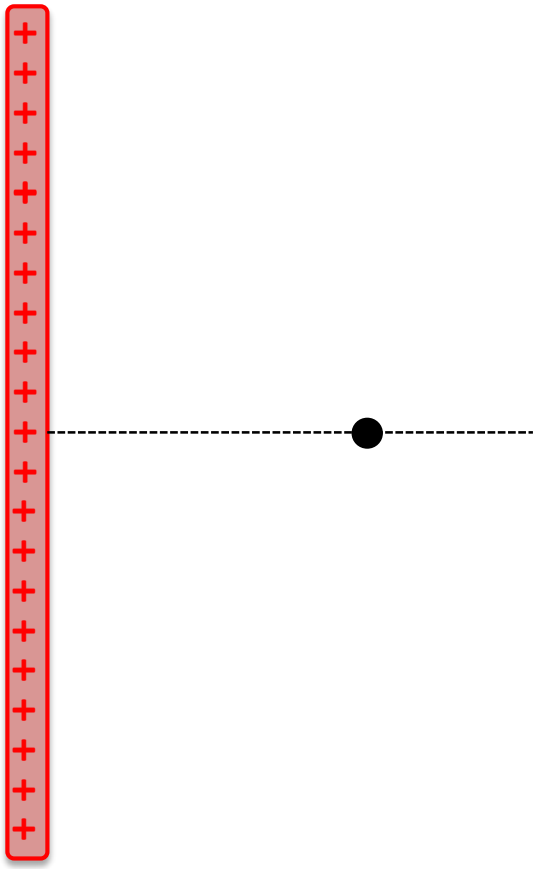
The vector represents the magnitude and direction of the electric force on the charge q **at that point**. It comes from superposition of the individual forces from +Q and +Q.



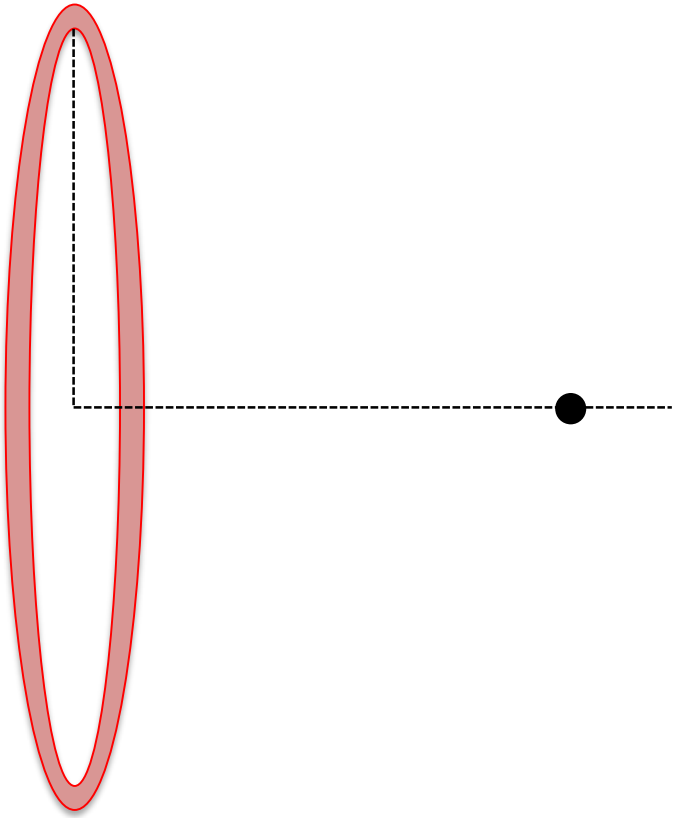
Direction again comes from superposition! Same steps as previous apply here too.

Superposition with Building Blocks

1. Force from a line of charge



2. Force from a ring of charge



Why should we care? Applications:

Attractor plate in 2D plotter

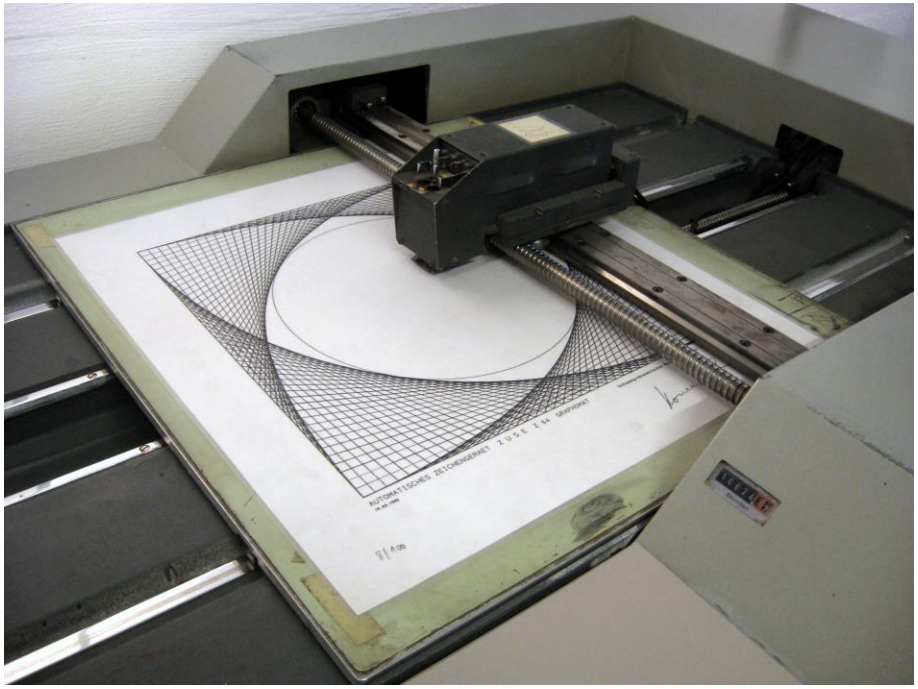


Photo taken from https://en.wikipedia.org/wiki/Plotter

Ring antenna (very directional)

Photo taken from https://en.wikipedia.org/wiki/Loop_antenna