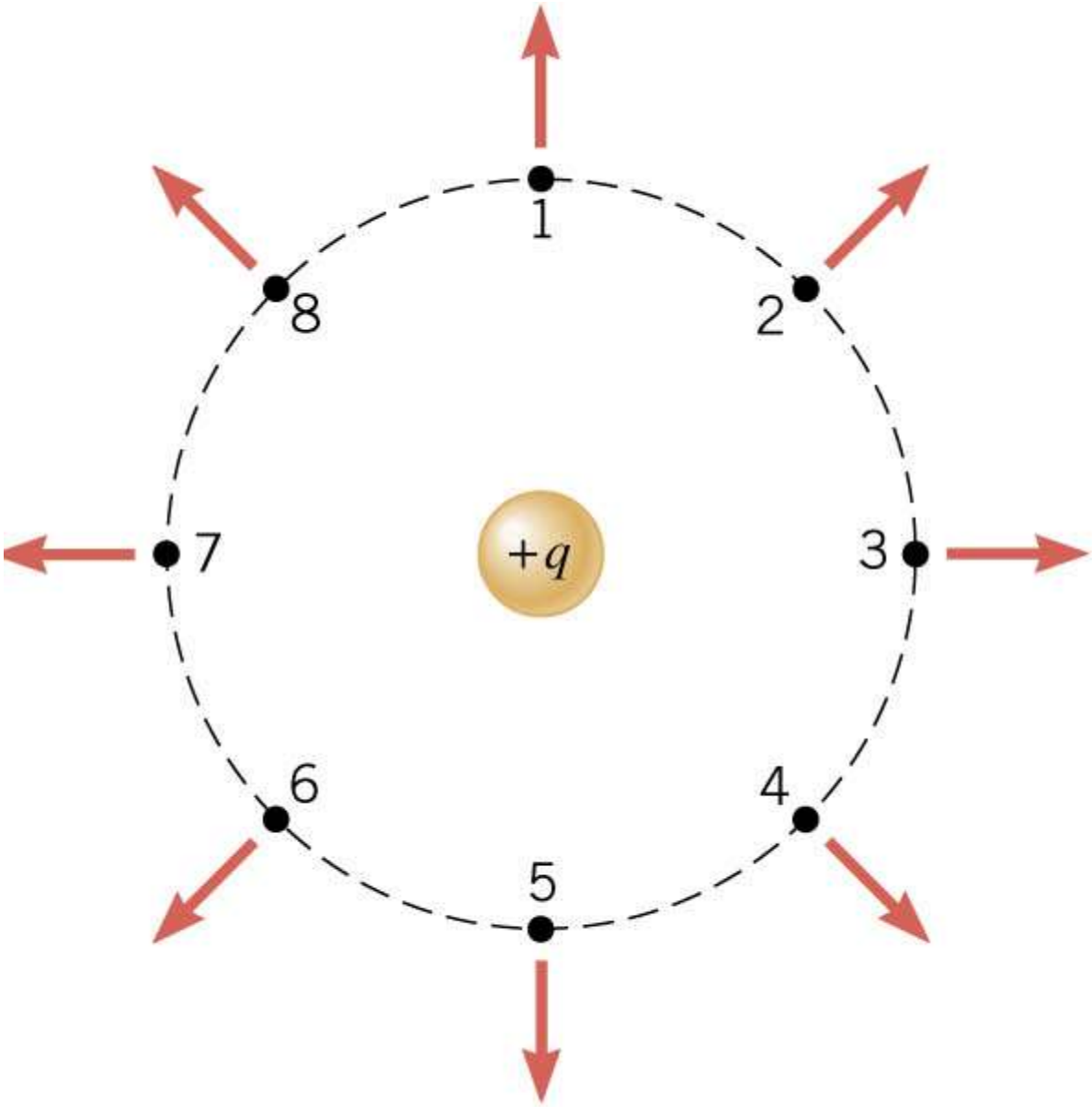
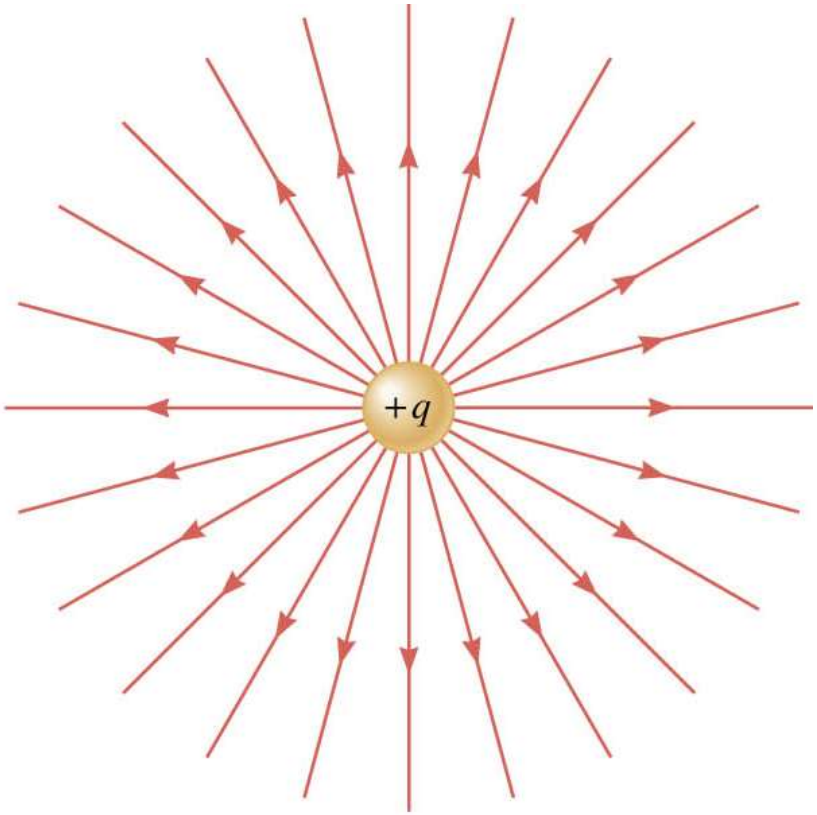
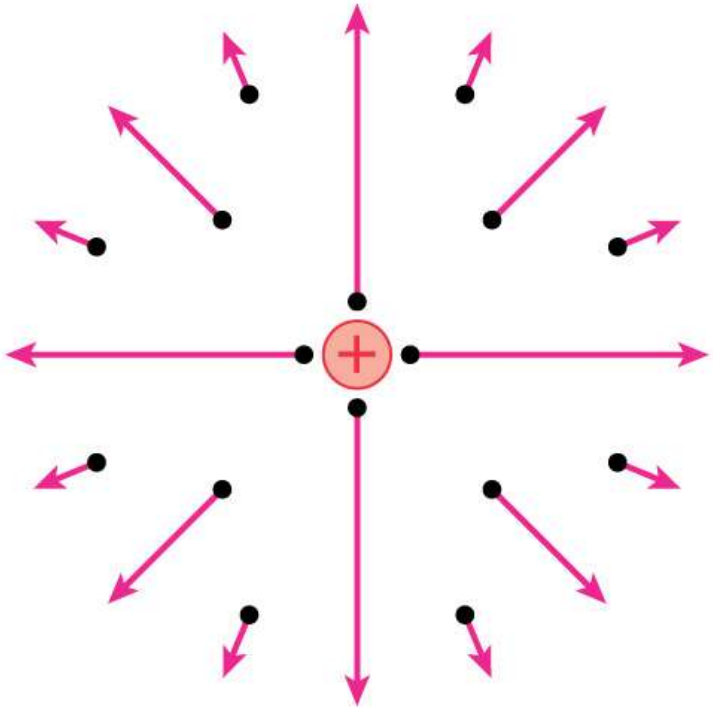
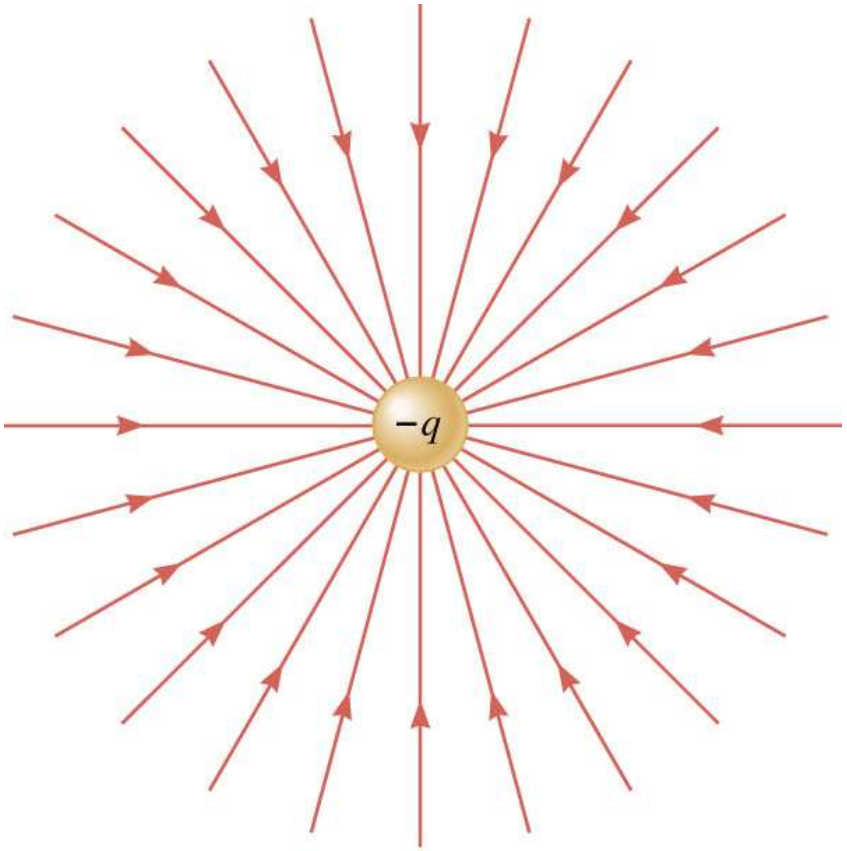

1
2
3
4
5
6
7
8
+q

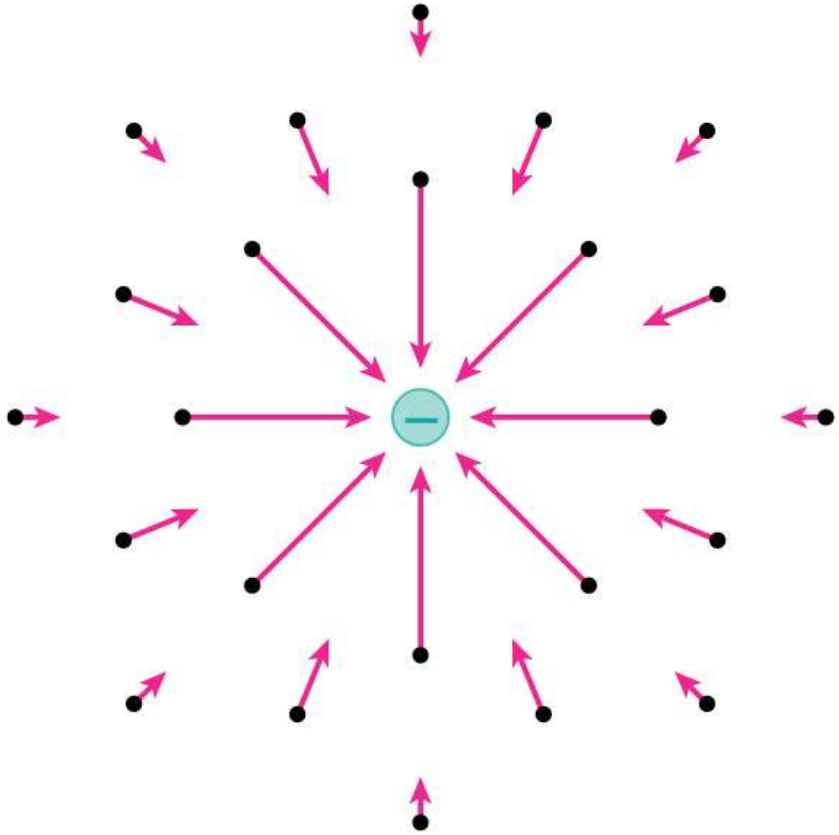


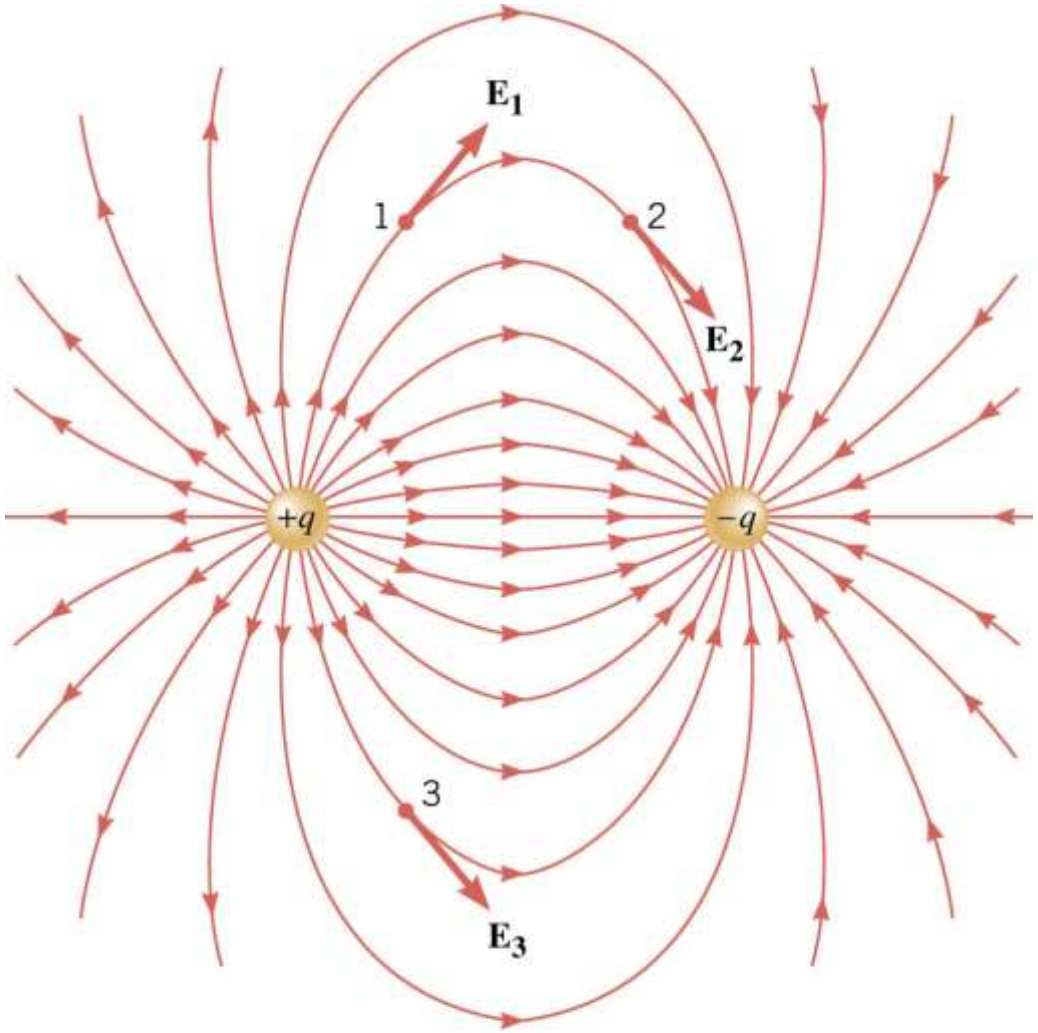
(b)



The electric field diagram of a positive point charge



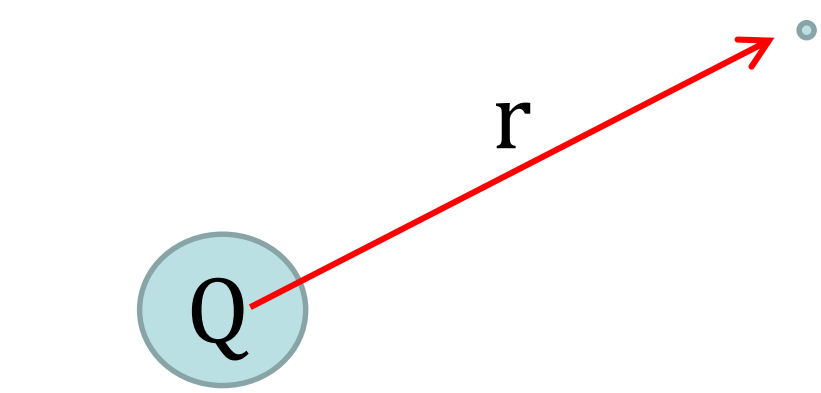




Simulation

Calculating $\vec{E}$

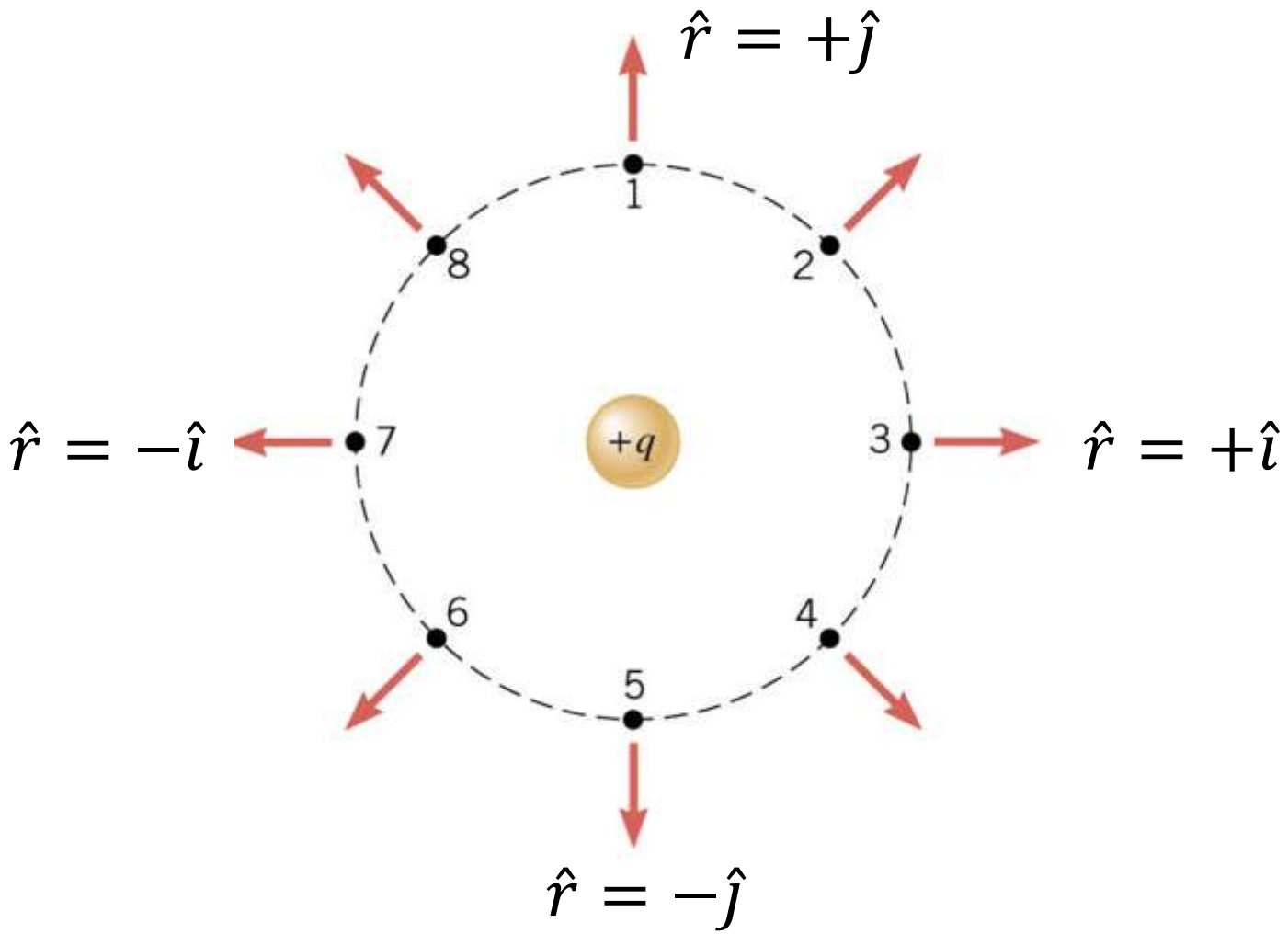
$$\vec{E} = \frac{kQ}{r^2}\hat{r} \quad \text{or} \quad \vec{E} = \frac{kQ}{r^3}\vec{r}$$



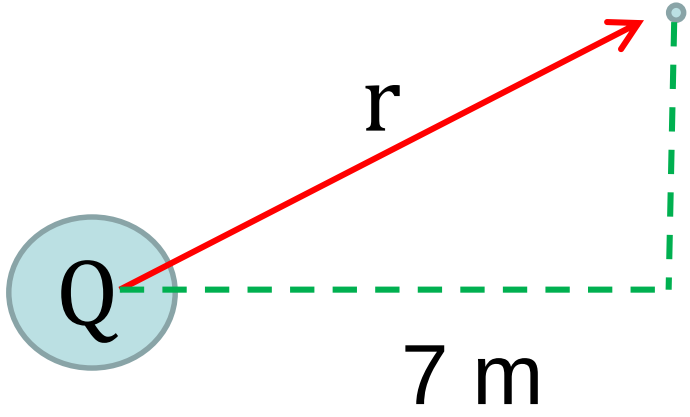
$$\hat{r} = \frac{\vec{r}}{r}$$

is direction

Finding $\hat{r}$



2D cases



Source charge
Q = 5 μC

$$\vec{r} = 7\hat{\imath} + 3\hat{\jmath}$$

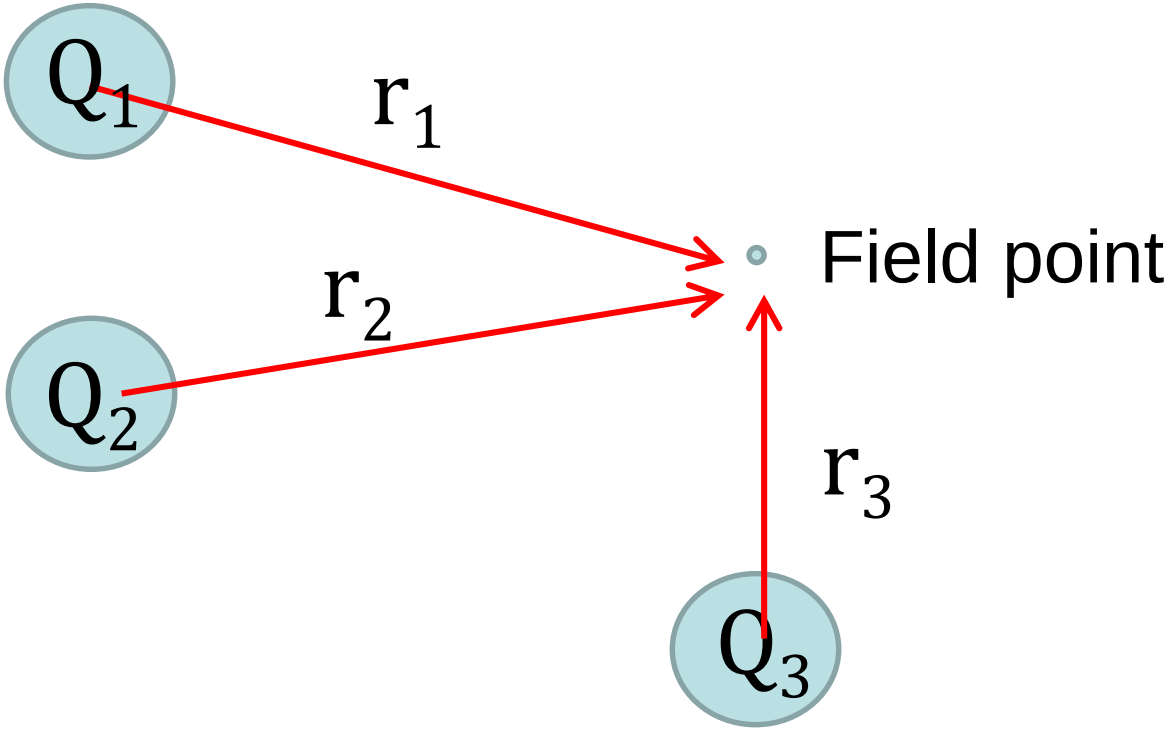
$$r = \sqrt{7^2 + 3^2} = 7.616$$

$$\hat{r} = \frac{\vec{r}}{r} = \frac{7}{7.616}\hat{\imath} + \frac{3}{7.616}\hat{\jmath}$$

$$\vec{E} = \frac{kQ}{r^2}\hat{r} = \frac{(8.99 \times 10^9)(5 \times 10^{-6})}{7.616^2}\left(\frac{7}{7.616}\hat{\imath} + \frac{3}{7.616}\hat{\jmath}\right)$$

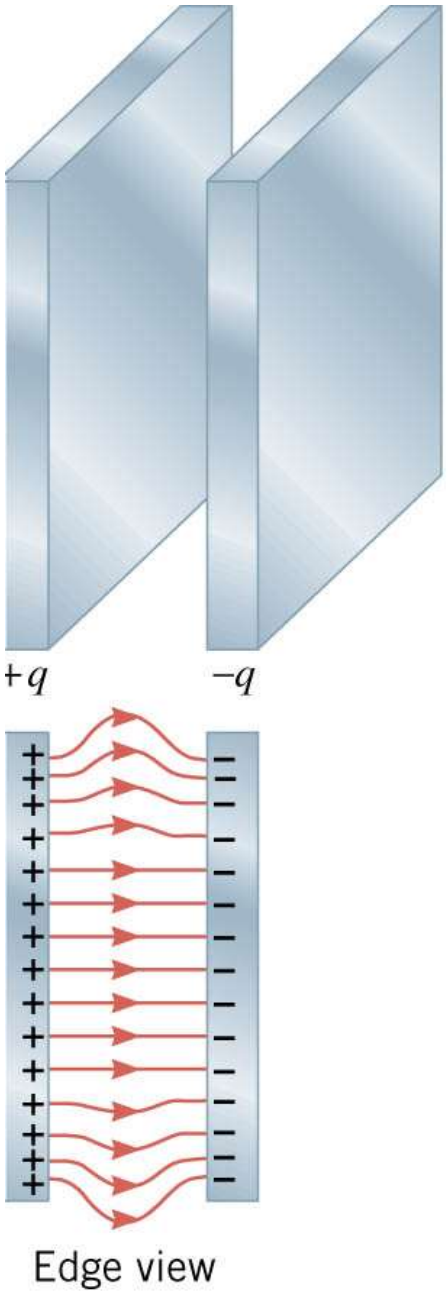
$$= 712.3\hat{\imath} + 302.2\,\hat{\jmath}\ \text{N/C}$$

E from Multiple Charges



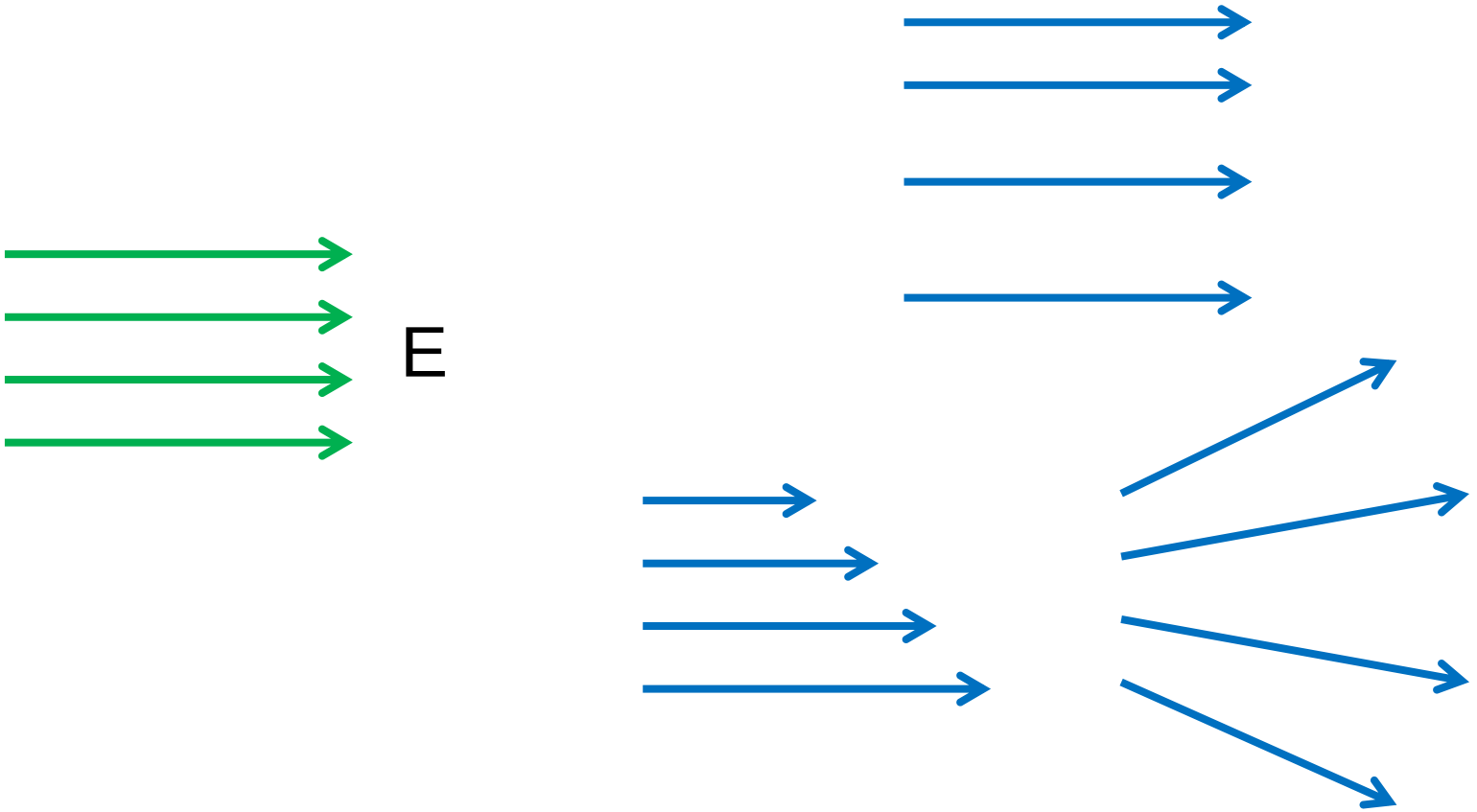
Charges do not block or screen one another

$$\vec{E}_{net} = \vec{E}_1 + \vec{E}_2 + \vec{E}_3$$

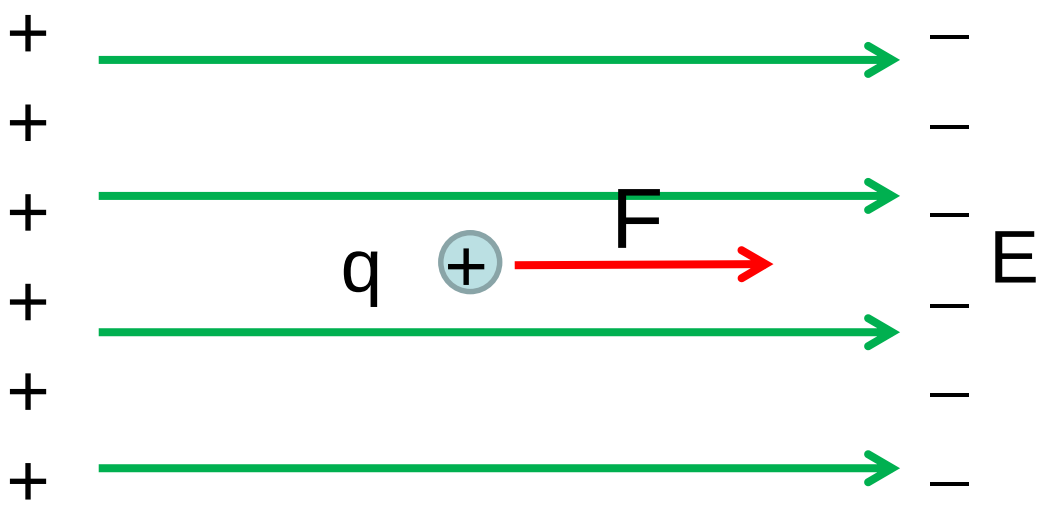


Capacitors can produce a uniform electric field

Uniform Fields



Force on a Charge in E Field



Which way is the force on the charge?

Remember, E runs from + to – external charge

$\vec{F} = q\vec{E}$

if q > 0, $\vec{E}$ & $\vec{F}$ are parallel

if q < 0, $\vec{E}$ & $\vec{F}$ are antiparallel