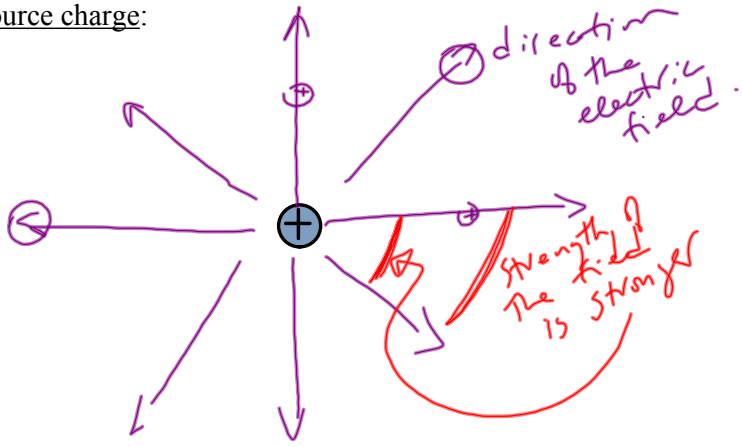
Electric Fields

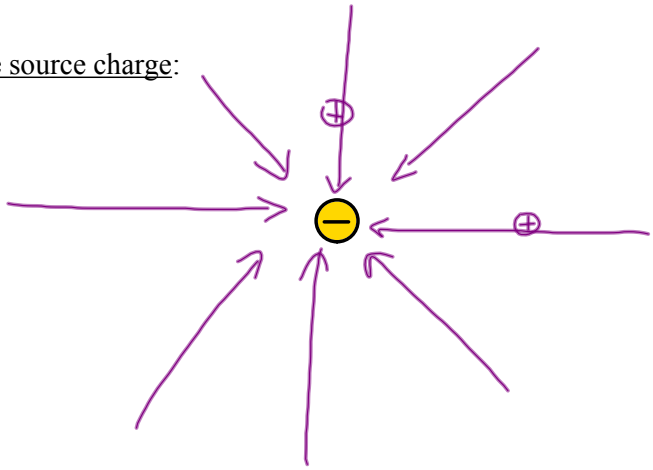
A charge creates an electric field around itself in all directions. If a second charge is placed at some point in the field, the second charge interacts with the field at that point.

One way to represent electric fields involves the use of a **positive test charge** and imaginary electric field lines (sometimes called force lines).

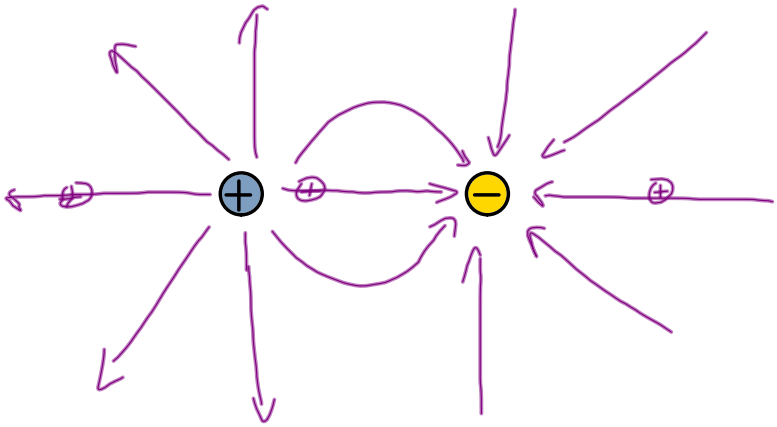
positive source charge:



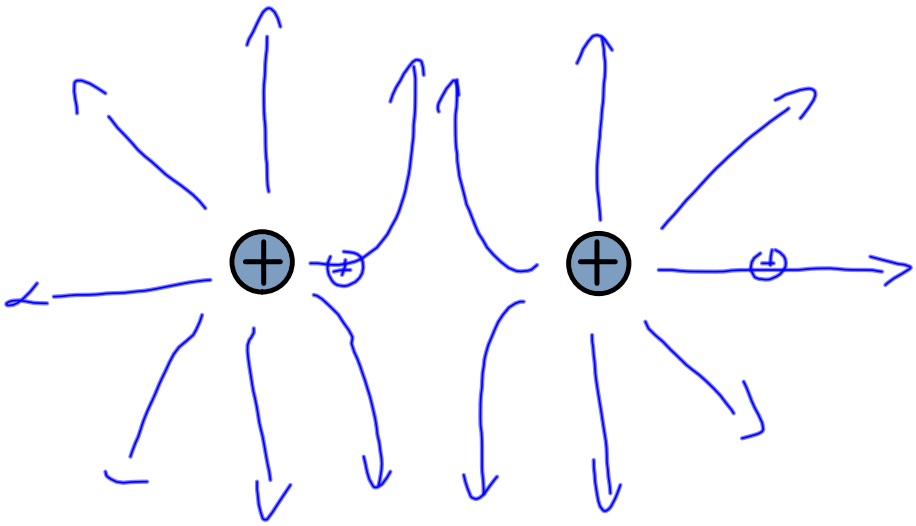
negative source charge:



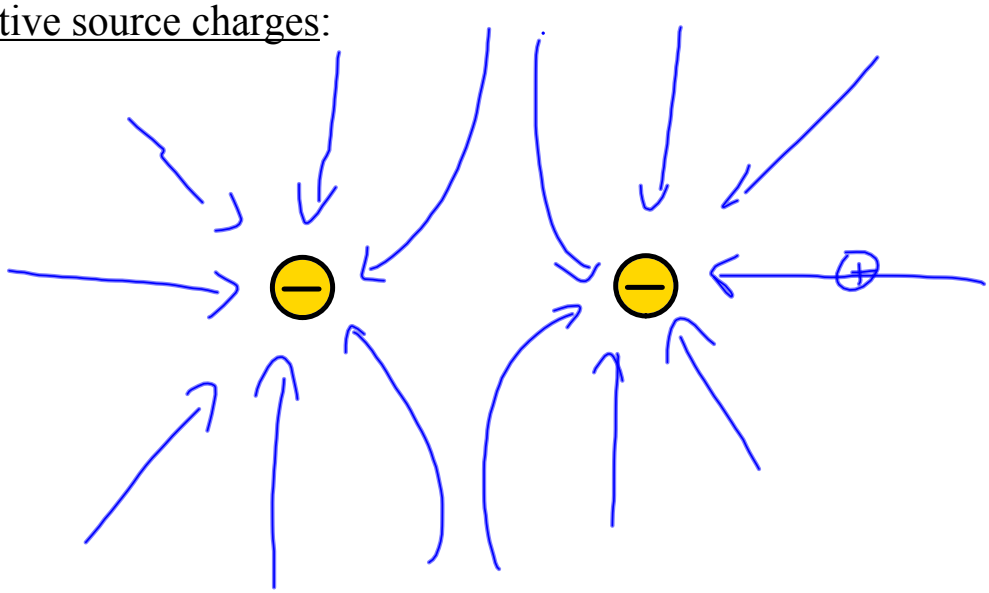
a positive source charge and a negative source charge:



two positive source charges:



two negative source charges:



Strength or Intensity of an Electric Field

Coulomb's Law can be written to describe the force between q and q_t.

$$F = \frac{kqq_t}{r^2}$$

q => source charge

q_t => test charge

Divide both sides by q_t.

$$\frac{F}{q_t} = \frac{kqq_t}{r^2 q_t}$$

$$\frac{F}{q_t} = \frac{kq}{r^2}$$

$$\boxed{E = \frac{F}{q_t}}$$

E - magnitude of electric field intensity (N/C)

F - magnitude of electric force (N)

q_t - charge of the test charge (C)

$$\boxed{E = \frac{kq}{r^2}}$$

E - magnitude of electric field intensity (N/C)

k - Coulomb's constant

q - source charge (C)

r - distance between q and q_t (m)

Textbook: Page 646, #11-14

Textbook: Page 655, #20-24