Chapter 15 Notes

Electric Forces (F_e) and Electric Fields (E)

2 kinds of charge +q or –q; like charges repel, opposite charges attract

Charge is conserved and is quantized. Quantized means it comes in packets (whole # multiples of these packets, not partial) $1q=1.6X10^{-19}$Coulombs

1 Coulomb is the SI unit of charge

electric insulator-material in which charge does not move freely

electric conductor-material in which charge moves freely

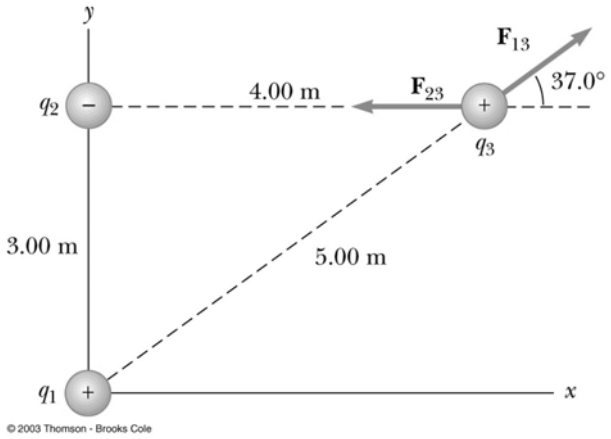
semiconductor-material with electrical properties of both conductors and insulators; also called metalloids. Good examples of useful metalloids-Silicon, Germanium (used in electronics/circuits).

Coulomb's Law-

$F_e=(k|q_1||q_2|)/r^2$ **k**=$9X10^9$ $(Nm^2)/C^2$, **r** is separation between charges q, **q** is charge

F_e is a vector

<u>Principle of Superposition</u>



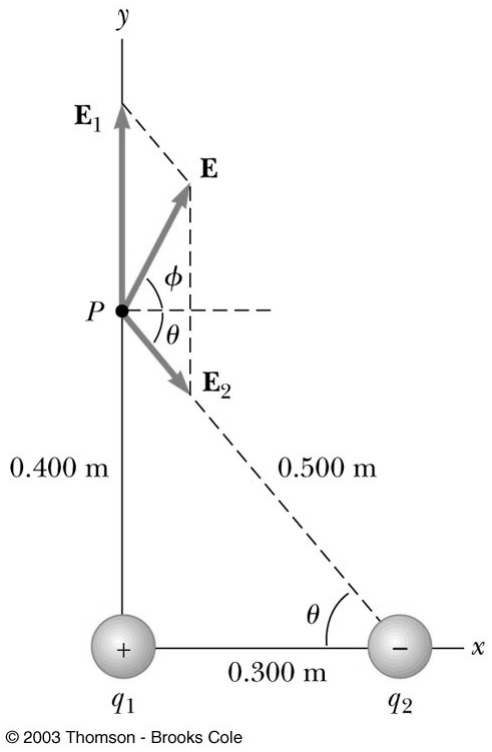
See example 15.2, p 473

Electric Field $\mathbf{E=F_e/q}$ measured in N/C

E is defined at the location of a +q, “test charge” around another object Q.

$E=(k|q|)/ r^2$

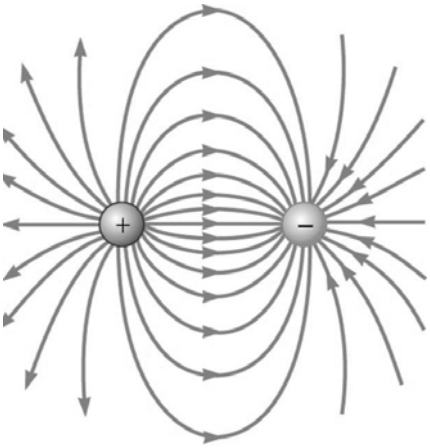
E is also a vector



See example 15.5, p. 476

Electric Field lines-an aid for visualizing electric field patterns.

- The electric field vector E is tangent to the electric field lines at each point
- The number of lines per unit area through the surface perpendicular to the lines is proportional to the strength of the electric field in a given region.



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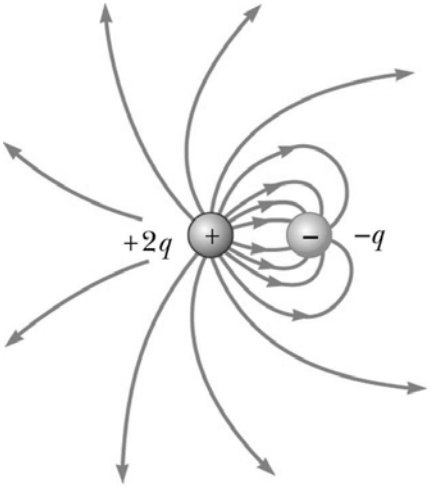

Electrostatic Equilibrium-the sum of all the forces is zero