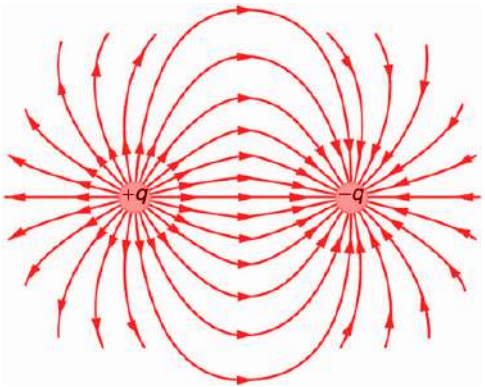
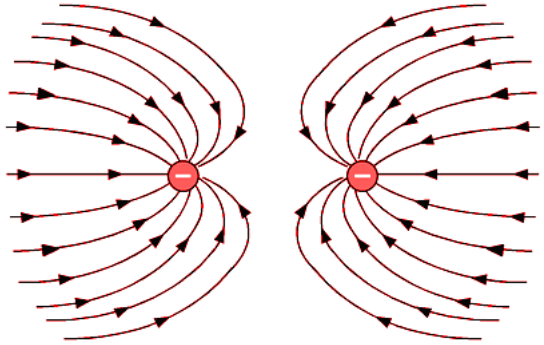
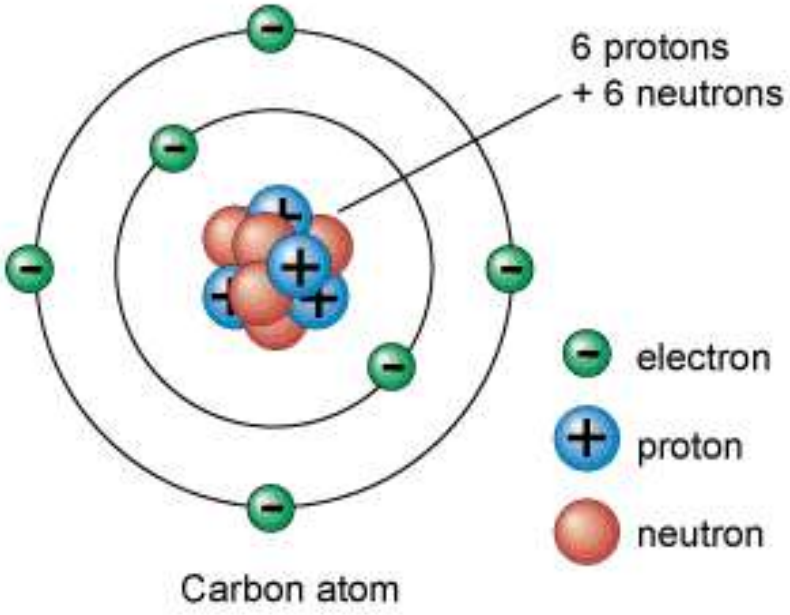
Electric Charges Flipped Lesson





Set up of the atom



Only the electron is free to move about and jump from object to object.

Elementary Charge, e

All electrons have exactly the same charge. Protons also have a charge of the same magnitude, but with an opposite sign.

Magnitude of an Electron's Charge, *e*

$e = 1.60 \times 10^{-19}\ \text{C}$

SI unit: coulomb, C

$$Q = ne$$

Q = Total charge
n = Number of electrons or protons
e = Charge of 1 electron or proton

Example

1. Find the net charge of a system consisting of 4.1×10^{-7} electrons.

1. If a piece of tape has a charge of 1.328×10^{-17} C, how many electrons are on the piece of tape?

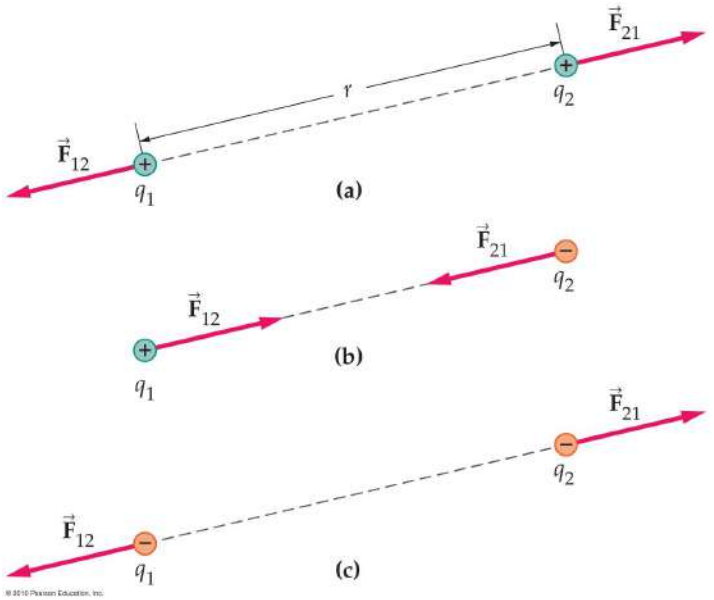
Electric Force

Coulomb's Law gives the force between two charged objects:

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

SI unit: newton, N

$$k = 8.99 \times 10^9\ \mathrm{N \cdot m^2/C^2}$$



Example

A charge q1= -5.4×10^{-6} Coulombs is at the origin, and a charge q2 = -2.2×10^{-6} Coulombs is on the x-axis at x=1 meter.

1. Find the electric force between the two charges.

1. Is the force attractive or repulsive?