

Quick Review

Charged Particles

Charge measured
in Coulombs (C)

$$P = +q$$

$$e = -q$$

$$q = 1.6 \times 10^{-19} \text{ C}$$

Electric Fields

sphere of
influence
around
charged
particle.

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

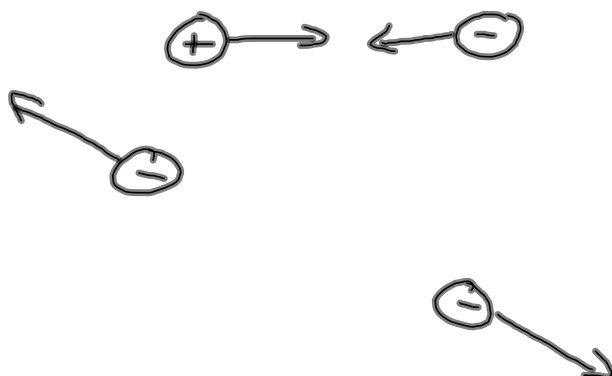
$$E = \frac{F}{q_{\text{test}}}$$

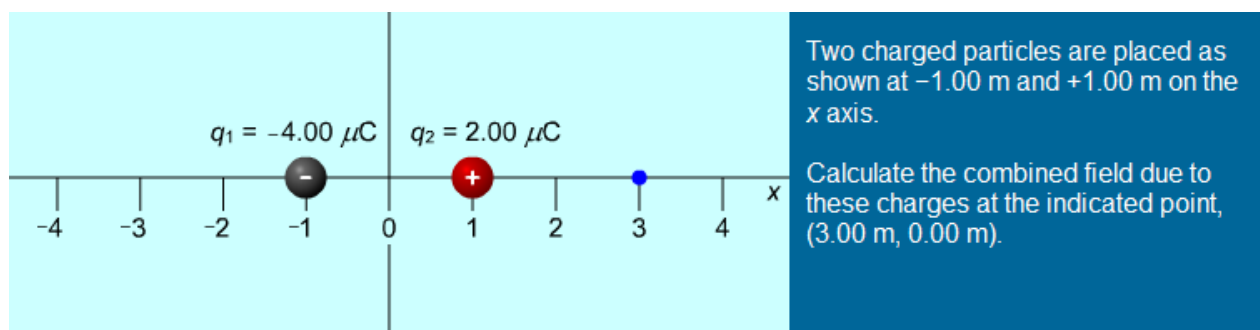
Electrostatic Force

Caused by positions of
charged particles

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

like charges repel
unlike charges attract.





Moving Electrons

In certain substances electrons can flow between atoms. Metals are able to give up an electron to a communal electron "cloud". This property is called conduction.

A conductor is a material through which electrons can flow.




An insulator is a material that doesn't give up electrons easily, so the electrons are not able to move.

This movement of electrons is:
ELECTRICAL CURRENT

Electrical Current

Electrical current is the amount of charge flowing past a point over a set period of time.



if in 6 seconds 11 electrons flow past. *→* towards R.

$$I = \frac{\Delta q}{\Delta t}$$

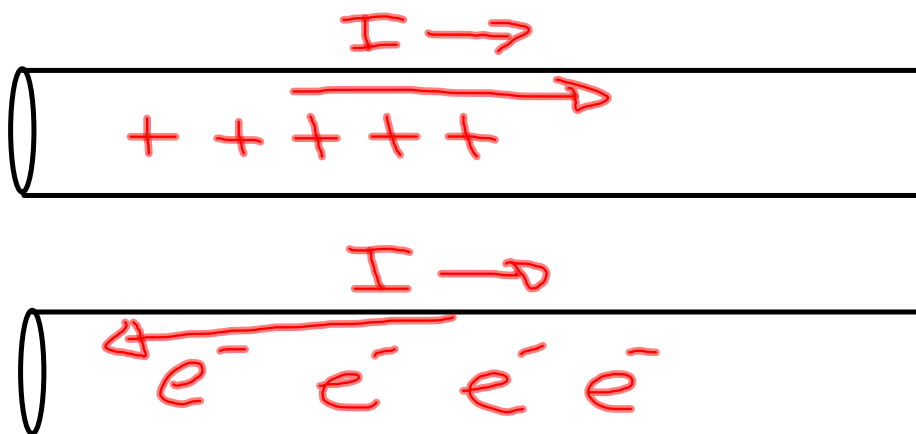
$$I = \frac{11 (1.6 \cdot 10^{-19} \text{ C})}{6 \text{ s}} = 2.9 \cdot 10^{-19} \text{ A}$$

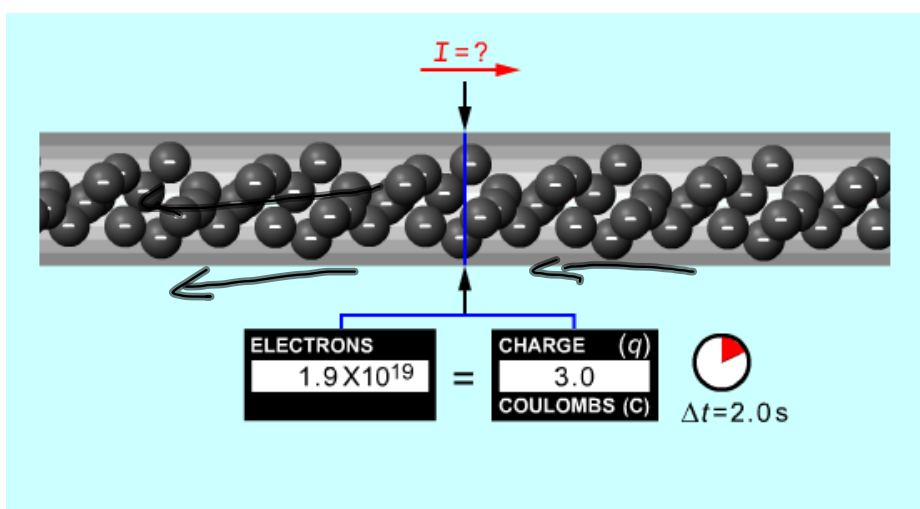
Current is measured in Amperes or Amps (A)

A Historical Inaccuracy

Before we understood atoms, we knew about electricity. We were able to determine that a charged particle was moving through the substance. However early scientists thought that it was a positively charged particle that was flowing. It wasn't until the mid 1800's that we finally understood the atom and realized that it was negatively charged electrons rather than positively charged protons that were moving. But by now people had been working with electricity long enough that the convention held.

The direction of the current is the direction of the positive charge flow, though the particles are actually moving in the opposite direction.





In 2.0 seconds, 3.0 coulombs of charge flow past this charge counter. What is the current?

$$I = \frac{\Delta q}{t} = \frac{3 \text{ C}}{2 \text{ s}} = 1.5 \text{ A}$$

