Electricity

For a fun experiment try putting a fork in an outlet (please do not for legal reason that was a joke)

Charges

Protons/Electrons

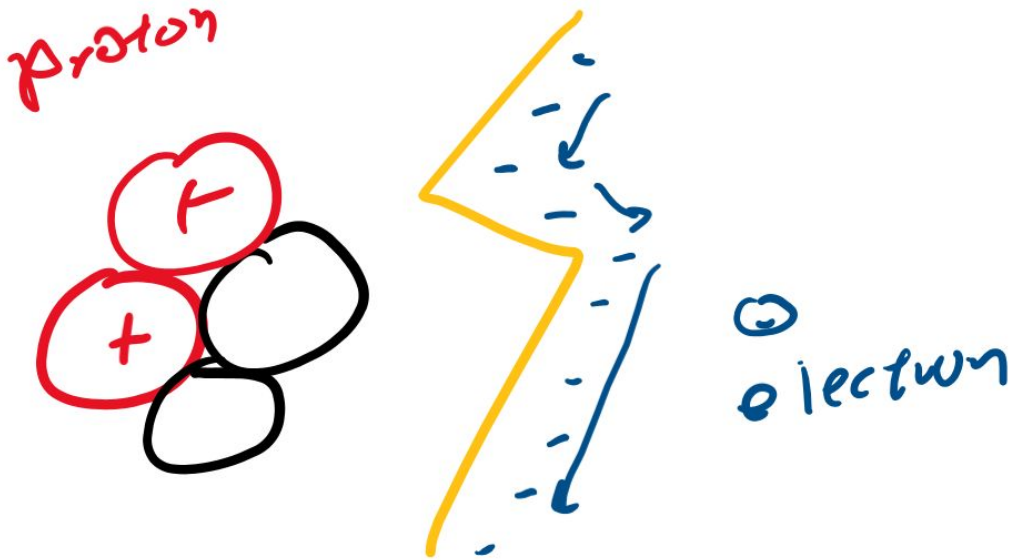
Protons: positive charge

Electrons: negative charge

Charge is the “mass” in the electricity world

Electricity is a flow of electrons

Charge is labeled (q)

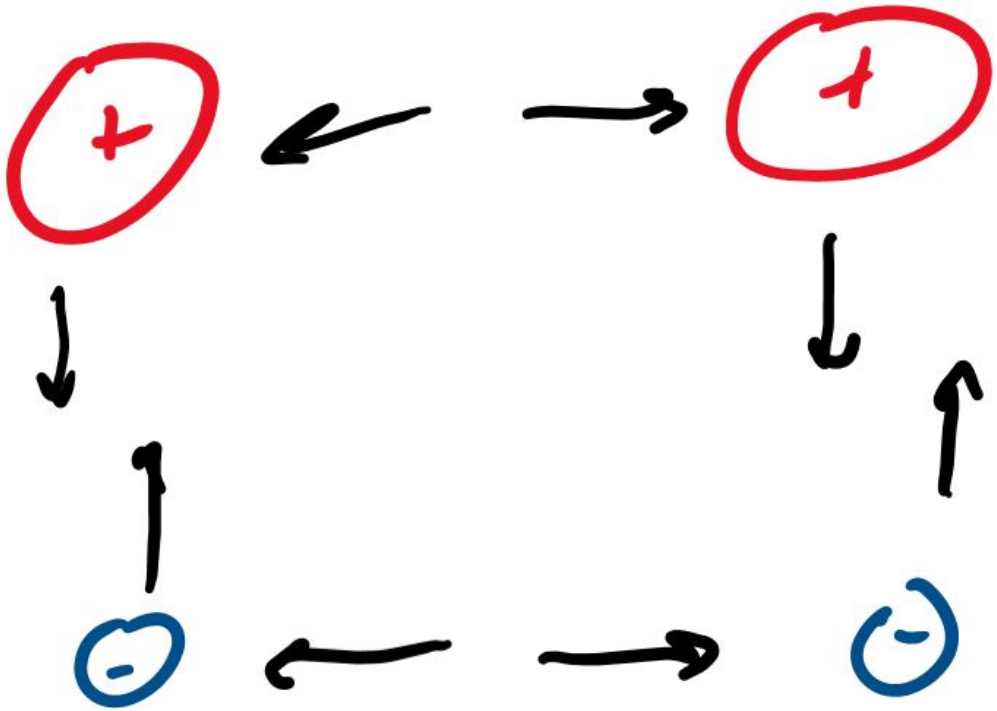


Opposites

Attract!

Similar charges

Repel each other!



How much do they attract each other?

Based on the charges.

Larger charges mean more attraction.

Based on distance.

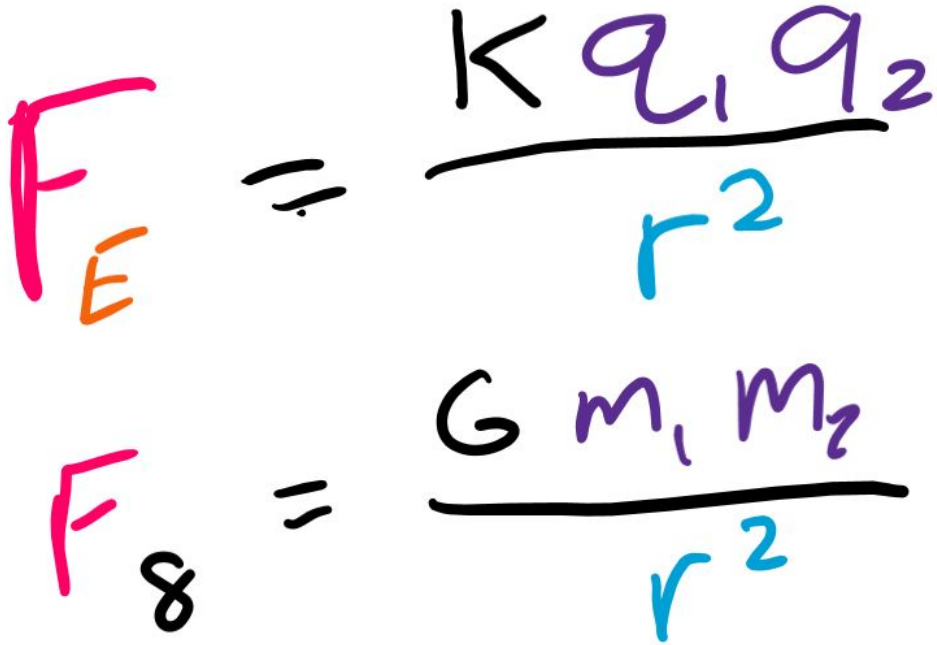
Larger distance means smaller/weaker attraction.

Then we uhh need a constant. . . (coulomb's constant -- k)

F is force, q is charge, r is distance

Comparisons

Look at the equations



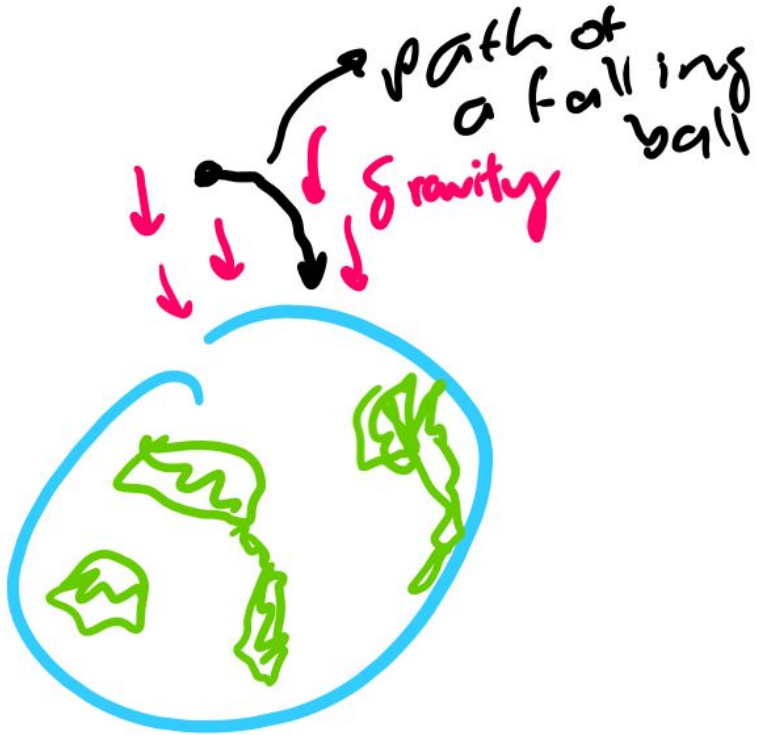
Electric field

Gravitational acceleration?

F = ma

So we said the acceleration due to gravity (on earth) can be called g

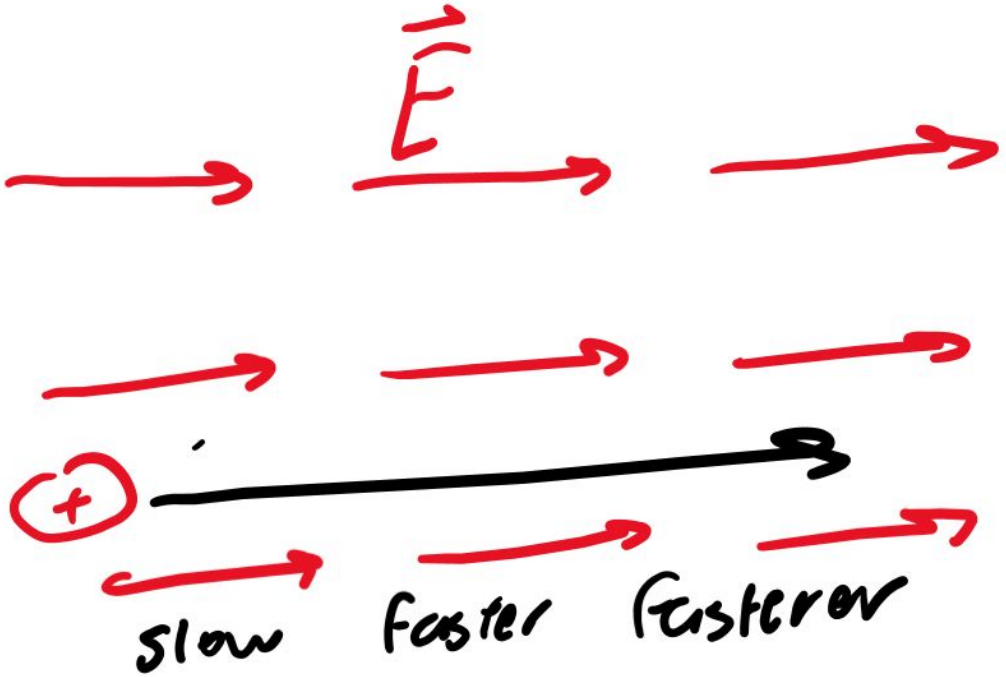
And so F = mg for gravitational force on earth



Electric “acceleration”

E stands for “electric field strength”

It’s how much a charge is “accelerated” by an electric force



How to get electric force?

F = ma

F(electric) = Eq

You can use coulomb's law to find the electric field force

Electric potential

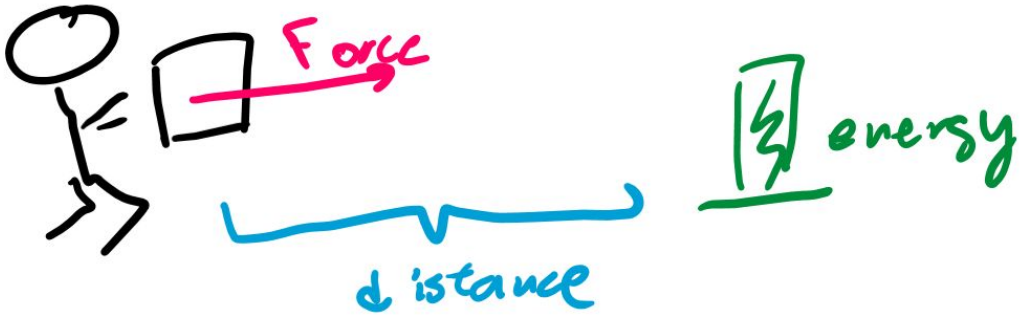
Work

If you use force you get tired, so you did work!

If you move a distance you get tired, so you did work!

Work is related to force and distance.

Doing work converts energy.

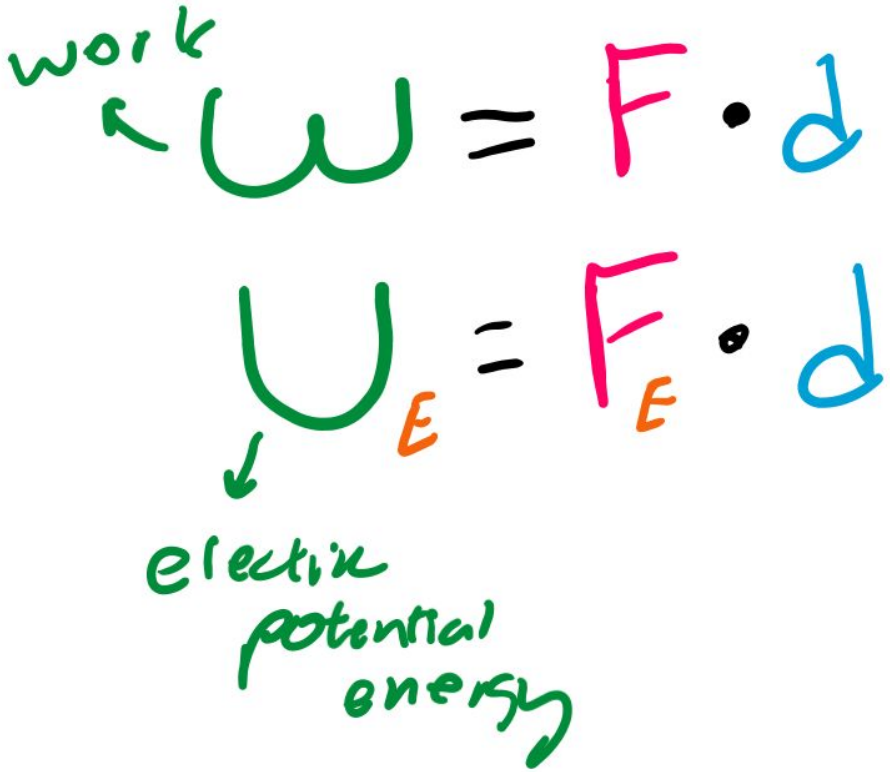


Work in electricity

Electric force times distance would be electric work!

Work takes energy.

The energy we make by doing work in electric fields is electric potential energy!

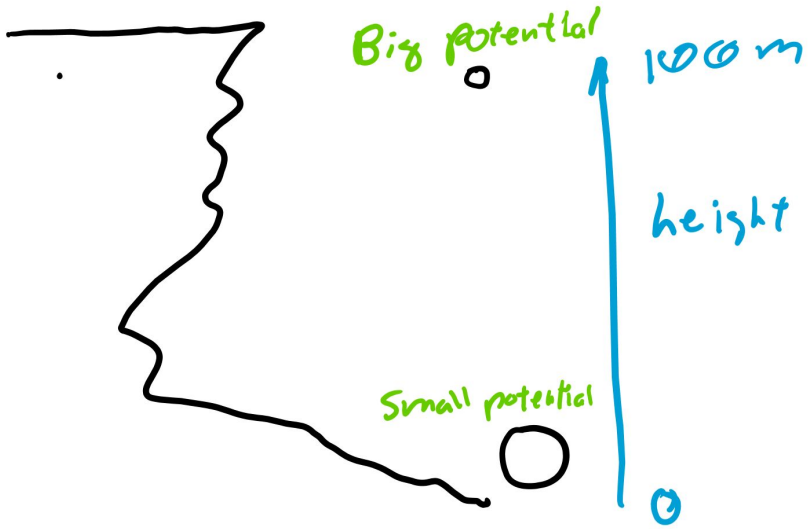


Electric potential (no energy)

$$V = \frac{U_E}{q} = \frac{F_E \cdot d}{q} = E \cdot d$$

Tells us how much potential energy a charge would have

Potential energy divided by charge gives the potential.



Particles in various fields

Drawing field lines

Emit from positive

Go into negative

High potential near positive charge

Low potential near negative charge