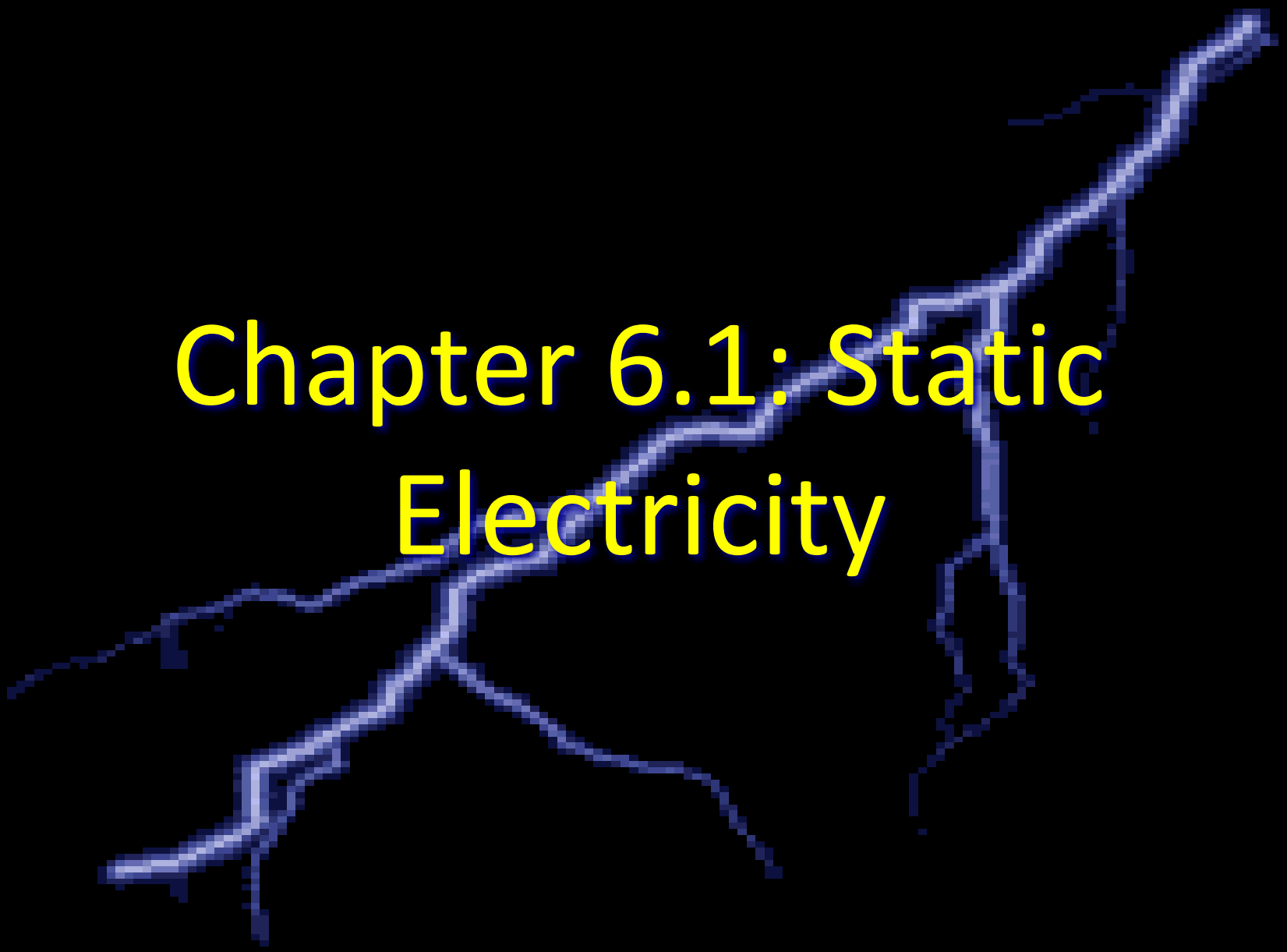
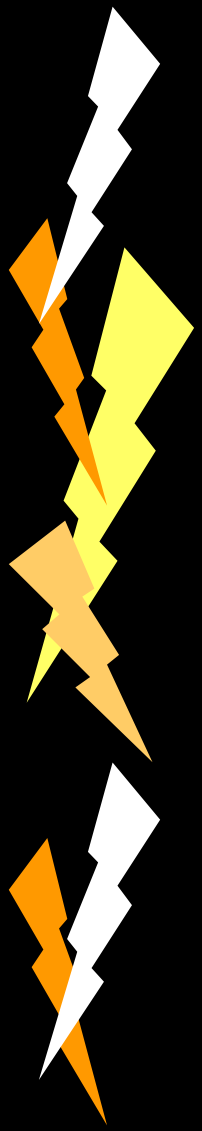
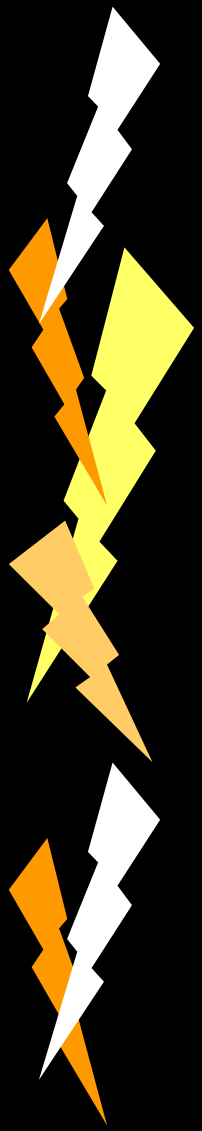


Chapter 6.1: Static Electricity



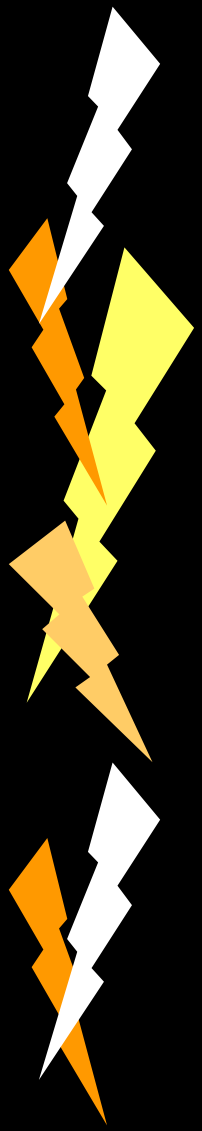
- Have you ever stuck a balloon to the wall after rubbing it on your head?
- Has your jumper ever made crackling noises when you took it off?
- Have you ever got an electric shock off your door knob?
- Have you ever seen lightening?



All these things happen because of

Static Electricity

What is Static Electricity?



- Static electricity occurs when there is a build up of electric charge on the surface of a material.
- Rubbing materials does NOT create electric charges. It just transfers charges from one material to another.

What is charge?

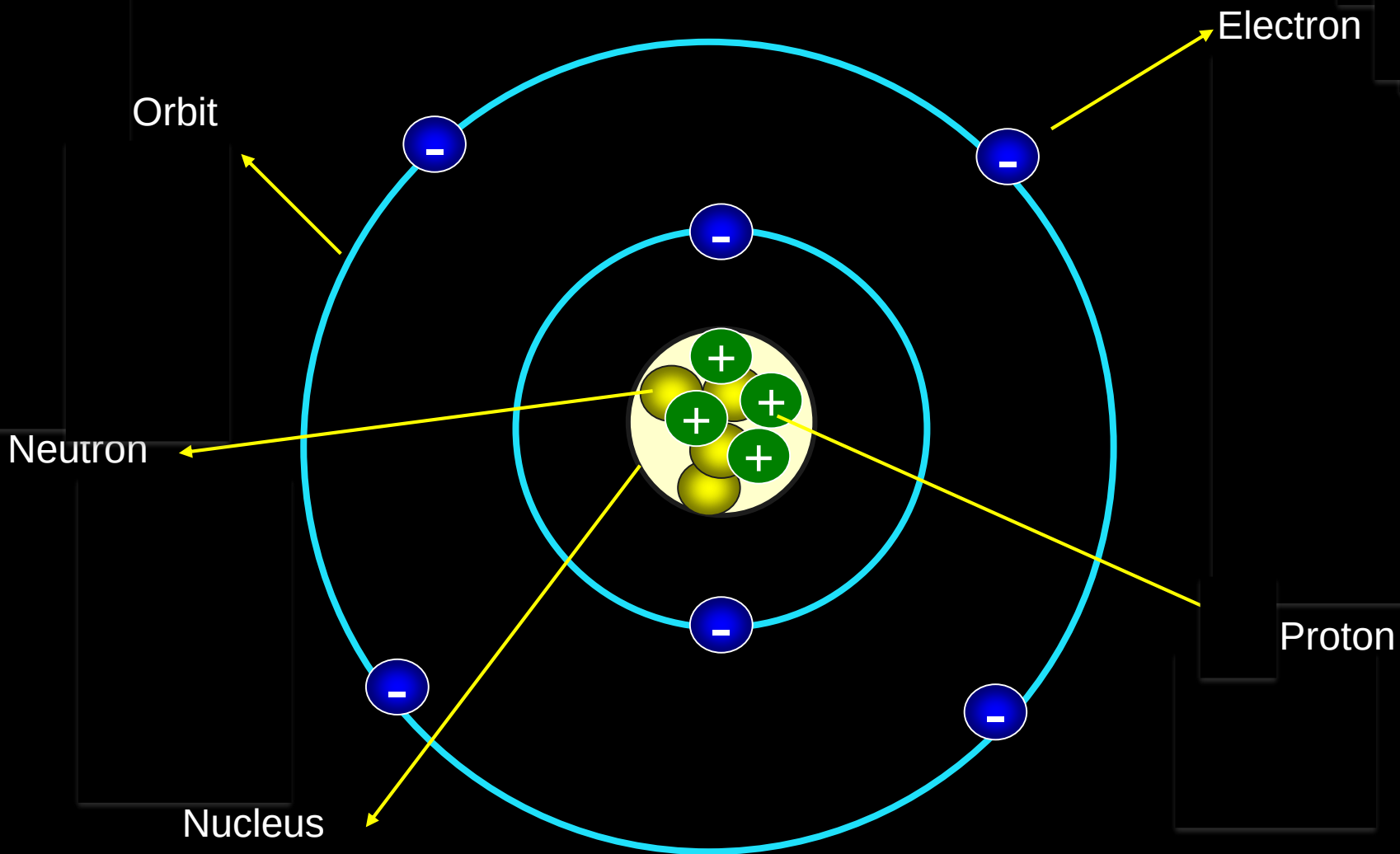
- To understand charge we have to look at things on an extremely small scale.
- We have to try and understand things that we can't even see with the most powerful microscope.

Atoms!

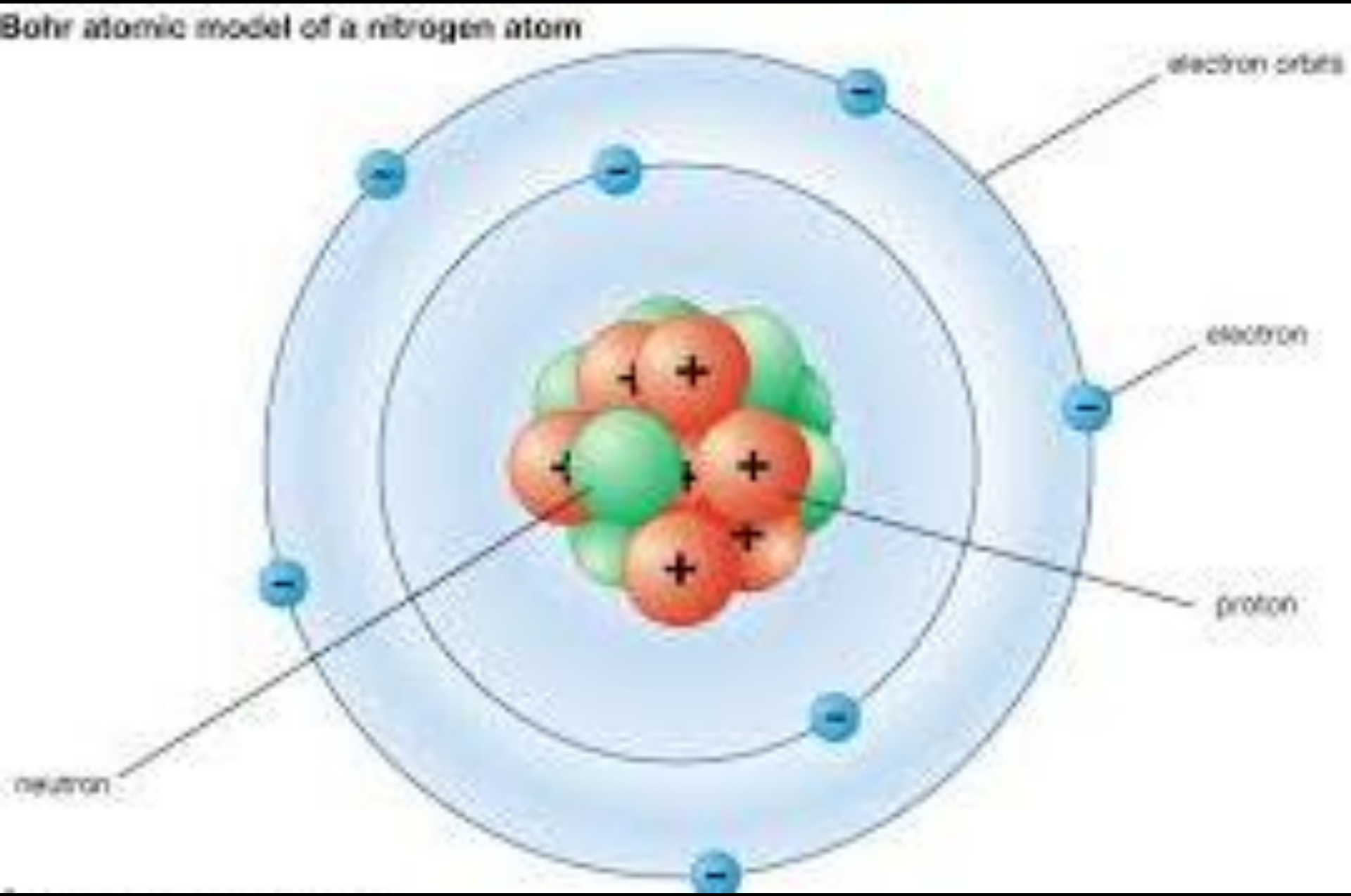
The atom

- Everything we see around us everyday is made of atoms.
- We can’t see individual atoms because they are so small.
- In fact the diameter of an atom is about 0.0000000001m
- In the air in your classroom there are about 150000000000000000000000000 atoms.

THE ATOM



A neutral atom contains same no. of protons and electrons.


Bohr atomic model of a nitrogen atom
electron orbits
electron
proton
neutron

What is inside the atom?

- The atom is made of 3 sorts of particles.

The electron

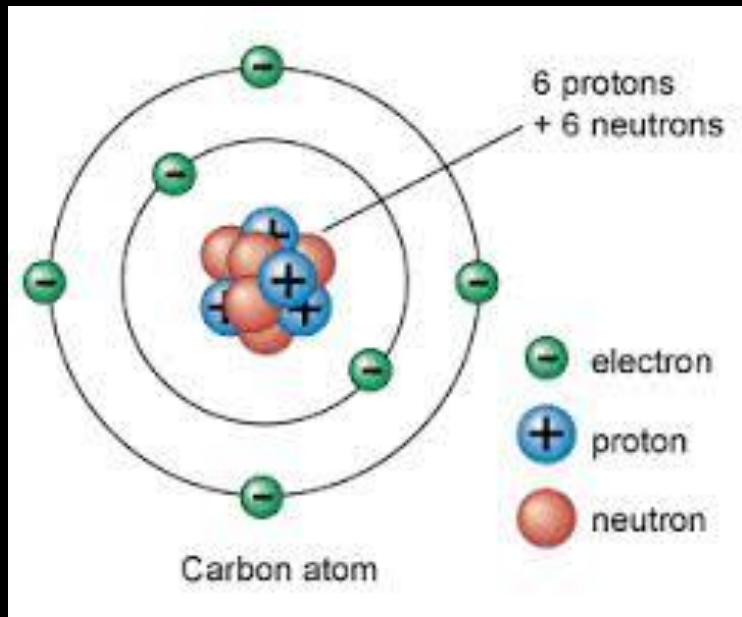
The proton

The neutron

- We can imagine each as a tiny little ball.

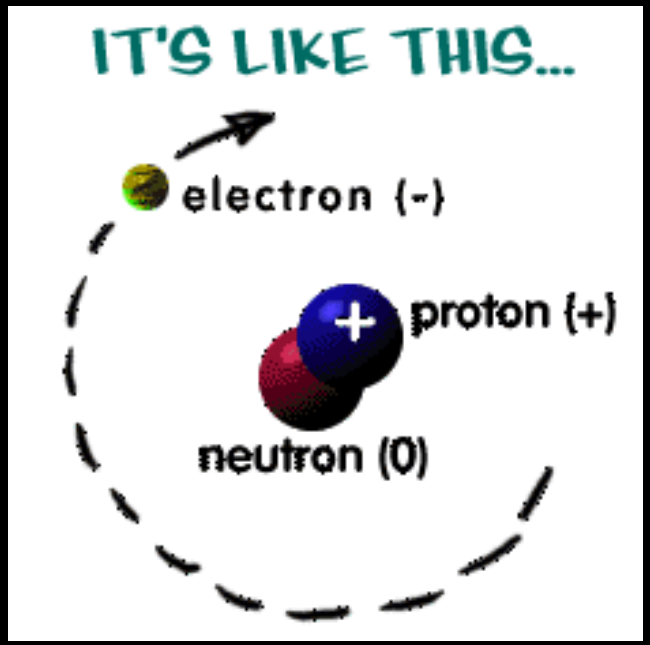
Inside an atom

- Protons and neutrons are found together in the nucleus of the atom.
- The electrons orbit around the nucleus, just how the planets orbit around the Sun.



Charge

- The electron is negatively charged.
- The proton is positively charged.
- The neutron has no charge, it is neutral.



Charge

- Most things have the same number of electrons and protons in them.
- They don't have any overall charge → neutral.
- If this isn't true interesting things can happen.

How do charges behave?

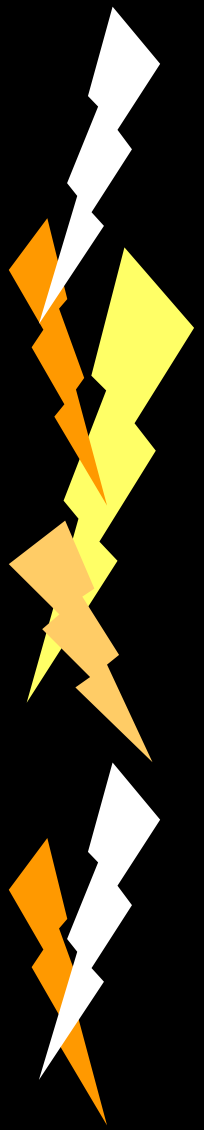
- What do you know about magnets?
- 2 north poles will repel each other, but a north and a south put together will attract one another.

opposites attract, likes repel.

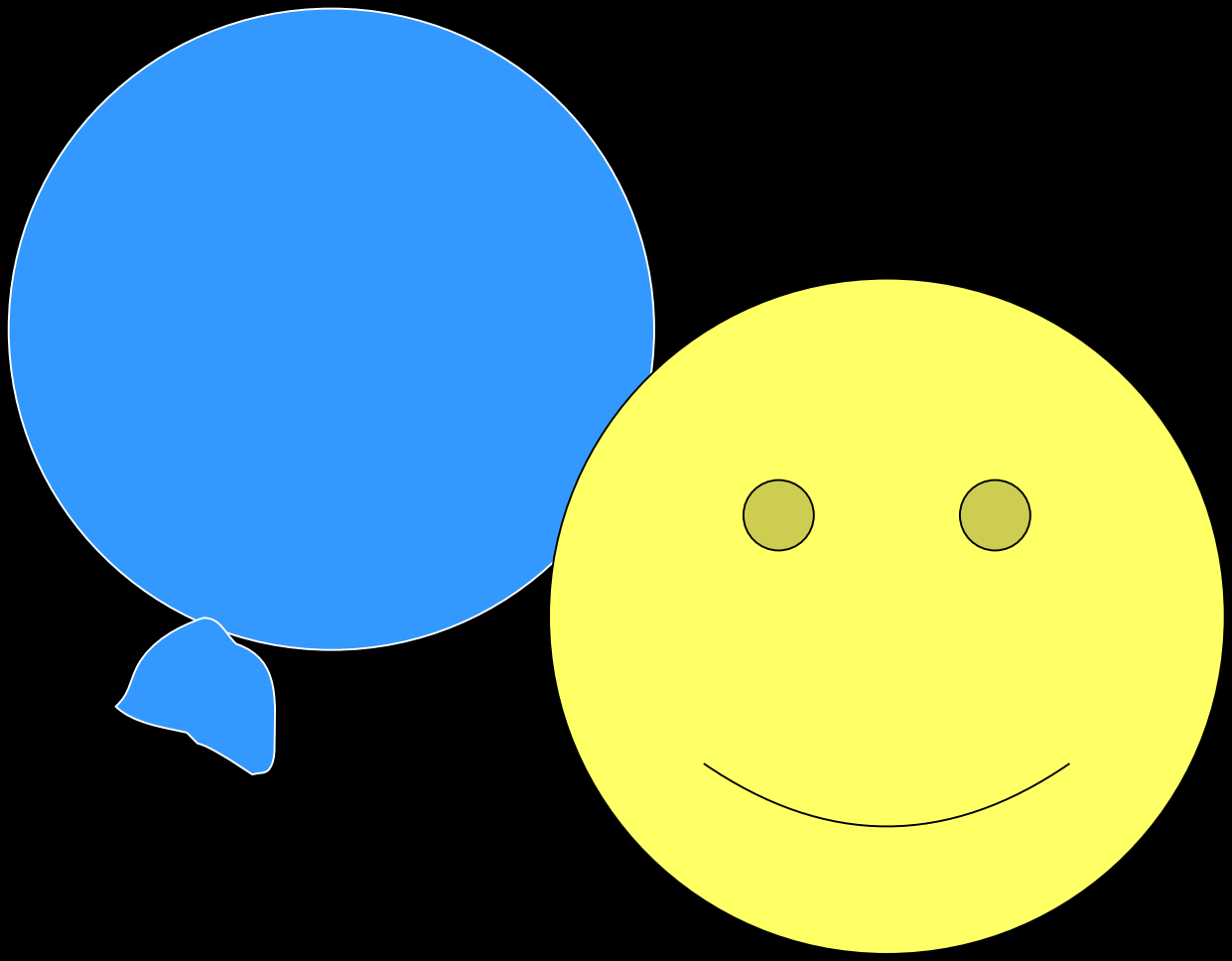
How do charges behave?

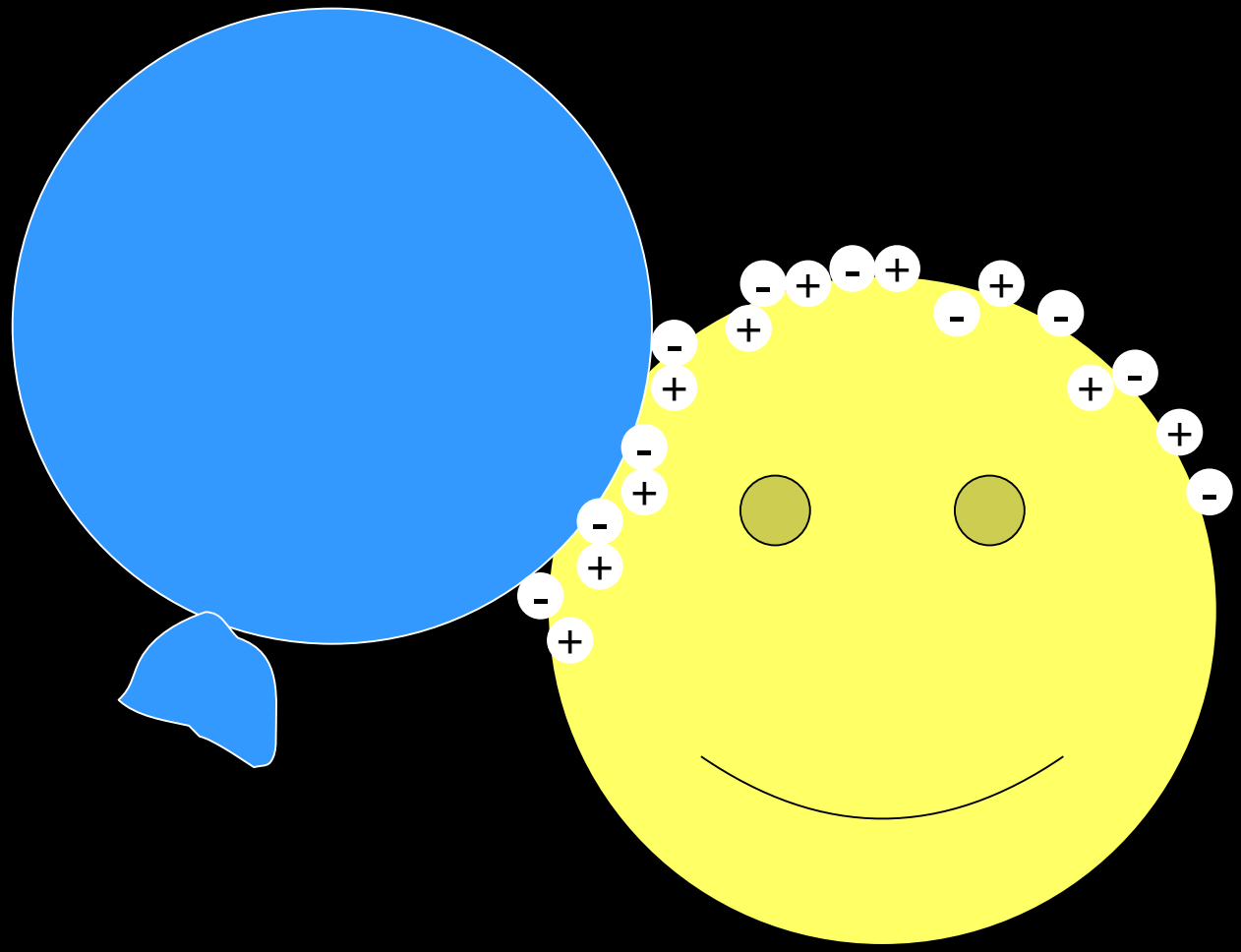
- Exactly the same thing happens with charges.
- 2 positive charges put together will repel each other.
- Put a positive charge near a negative charge and they will attract each other.
- A charged object may even attract a neutral one.

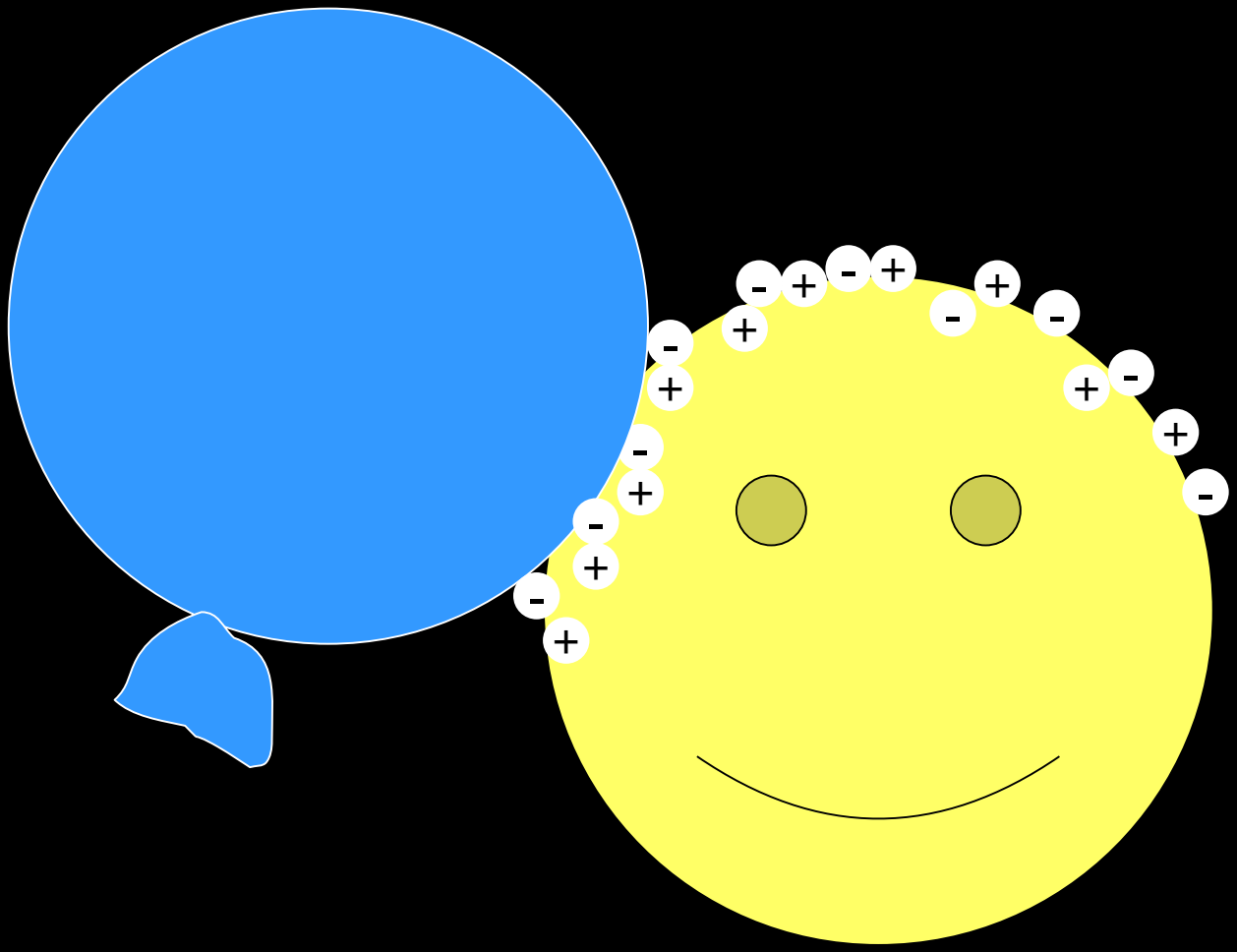
Static electricity

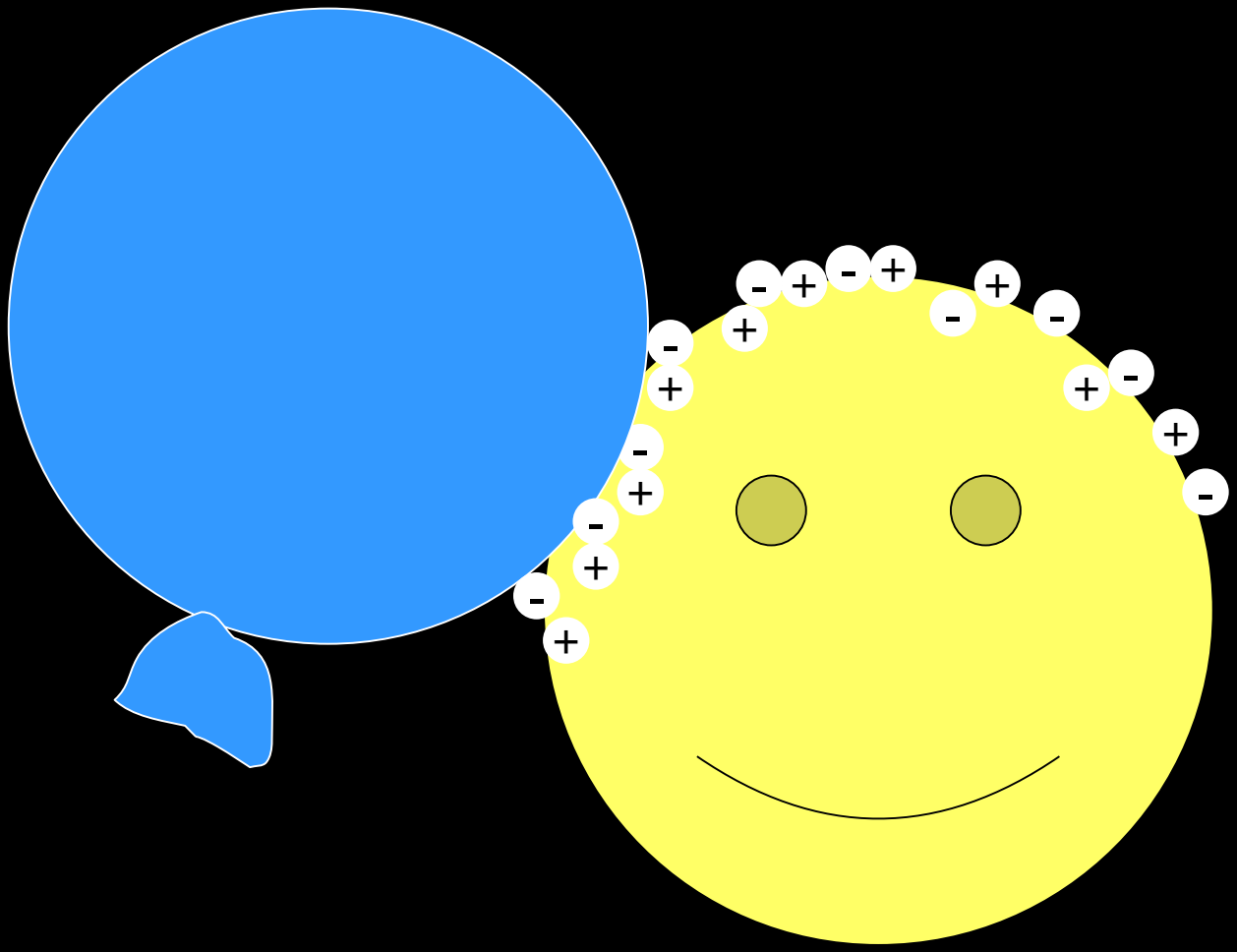


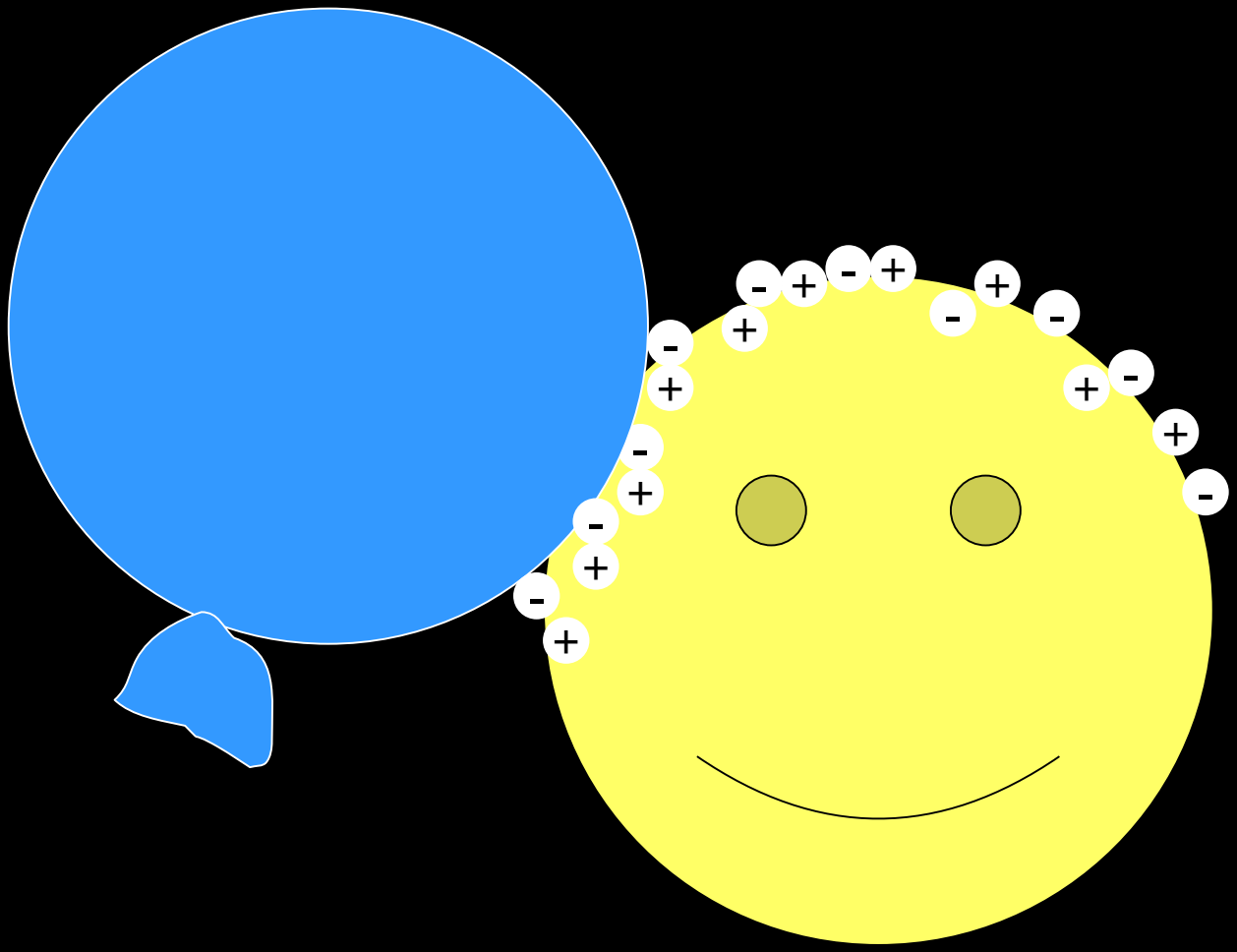
- Static electricity is caused when certain materials are rubbed against each other.
- Electrons can be rubbed off one material and on to another.
- The material that has got extra electrons is now negatively charged
- The material which has lost electrons is positively charged.

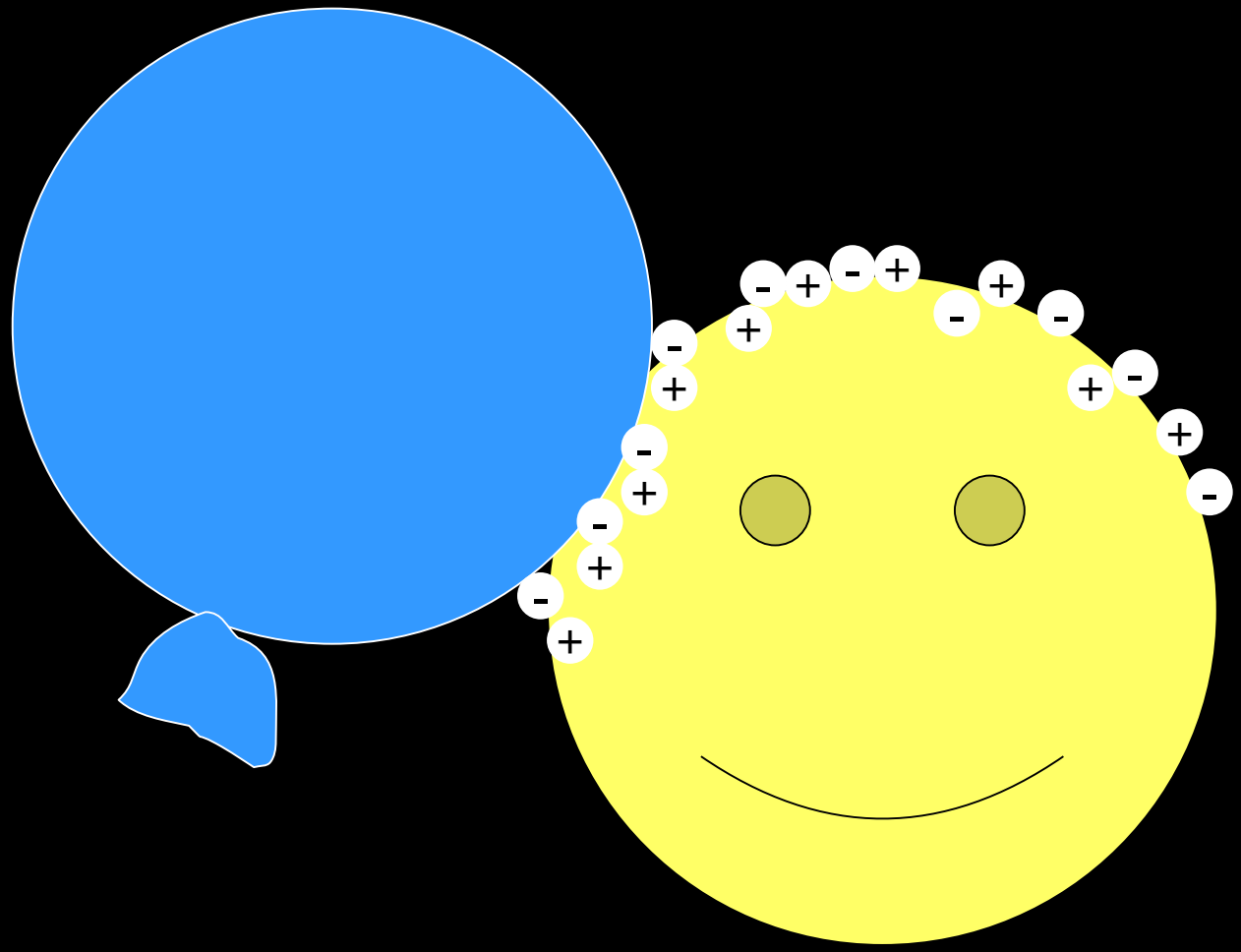


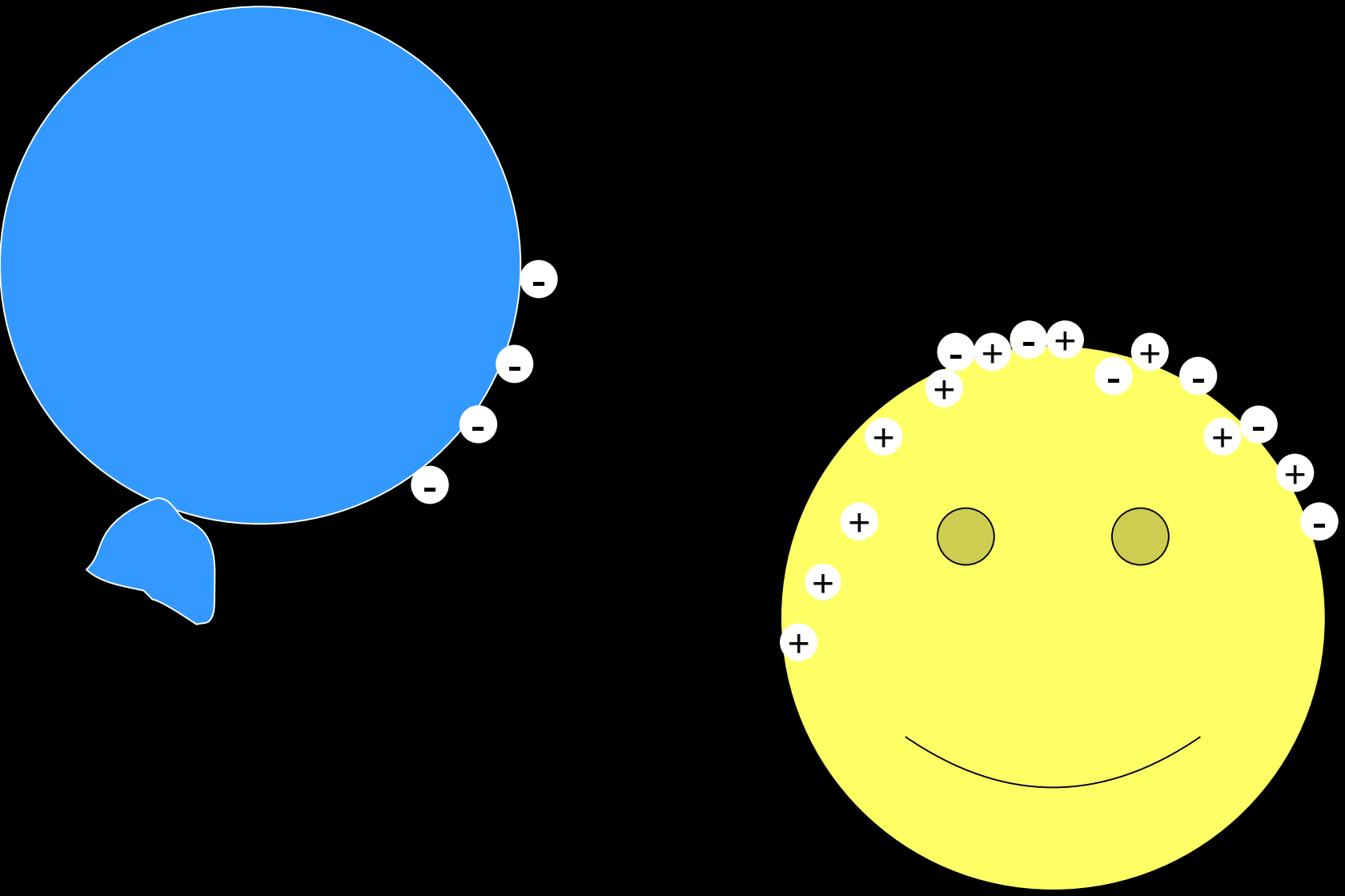






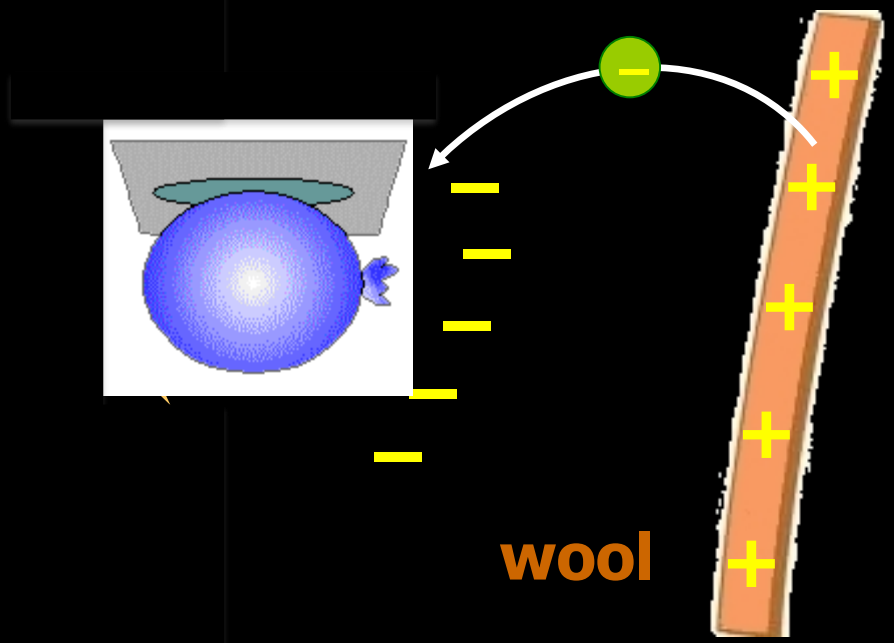






Where do charges come from?

When a balloon rubs a piece of wool...



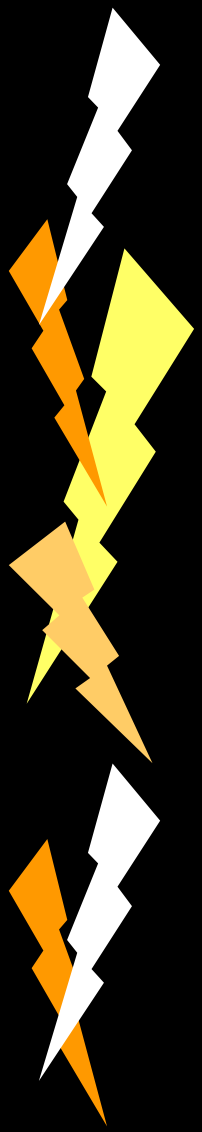
When the balloon is rubbed with wool, electrons from the wool are transferred to the balloon.

The balloon has more electrons than usual.

The balloon: – charged,
The wool: + charged

Static electricity

- It is this imbalance of positive and negative charges that causes:
  - Balloons to stick to walls.
  - Your hair to stand on end when brush your hair on a dry day.
  - And the electric shock you sometimes get from the door handle.



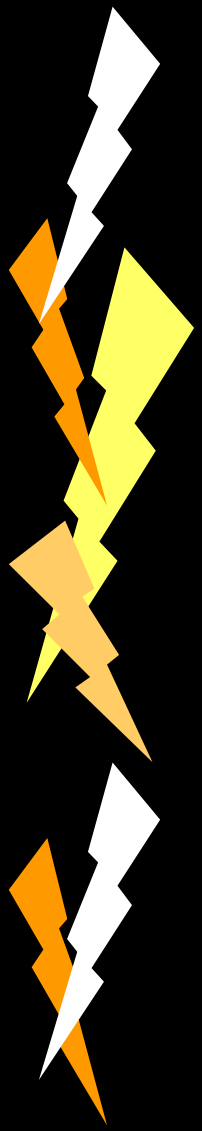
Your Turn to Experiment

Lightning

What causes lightning?

- Lightning is actually just static electricity on a much larger scale.
- The rubbing is caused by air moving around
- In thunderclouds bottom is usually negative and top is positive.

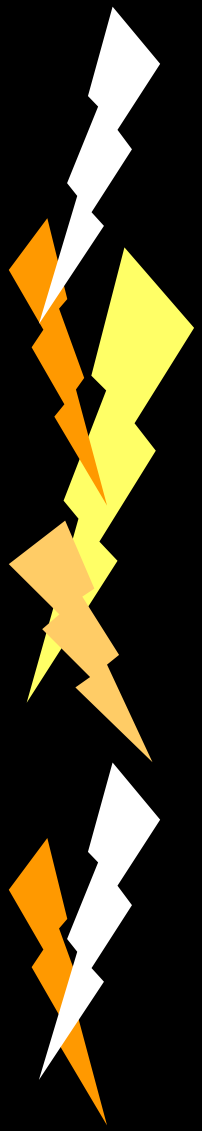
Thunder



- When the lightning flash happens it heats the air to a temperature 5 times hotter than the surface of the sun.

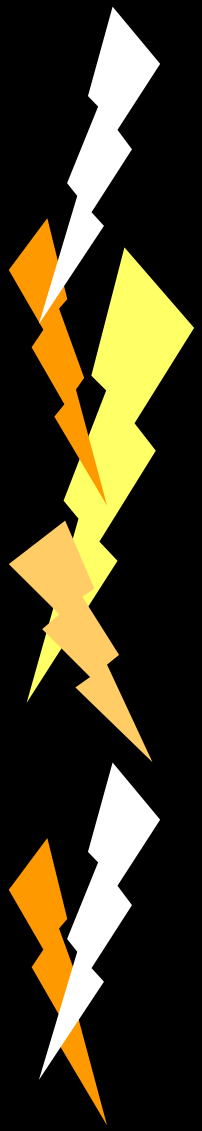
- This causes nearby air to expand and vibrate forming the sound we hear as thunder.

Interesting facts



- Lightning bolts can travel at speeds of up to 60,000 miles per second.
- Every second around 100 bolts of lightning strike the Earth.
- One lightning bolt has enough electricity to power 200,000 homes.
- You are more likely to be struck by lightning than be eaten by a shark.

Some myths



- Lightning never strikes in the same place twice.
- False, the Empire State Building is reportedly struck 100 times a year.
- Wearing rubber shoes will protect me in a thunder storm.
- False, Lighting is too powerful to be stopped by half an inch of rubber or several hundred feet of rubber for that matter.


2000 Dave Crowley www.stormguy.com
OTV6 strike - downtown Tulsa Ok Jun 2000


Broken Arrow Ok Aug 27 1
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