Science, technology, engineering and mathematics

Discover electricity

Do an experiment and discover electricity with John TraVOLTAGE and other schocking stuff!

Discipline area	Science
Topic	Technology
Estimated time	60'
Learning goals	If you go through this unit, you will • discover the common dynamics of static electricity • use your learnings for your own purposes.

Warm-up

Did it ever happen to you that you got a *shock* while touching something or someone touching you? How does it happen and why? Discuss with your buddy!

And now watch the image!

It is all about static electricity: it is produced by a transfer of electrons from the body of one object to another.

Not all materials allow this transfer, therefore, if you ever experience that someone is taking an electric shock, you can help the person! You can push the person away not with plain hands, but using something out of an insulating material, for example a wooden chair or rubber shoe soles.

Learn

1

Has ever happened to you something similar?

Exchange your memories with your buddy and make assumptions on this question: **what makes the hair fly?**

2

When you have an answer,
check if your assumptions are correct:

Two electrically charged bodies placed at a certain distance between them exert forces.

They are repulsive if the charges of the bodies are of the same sign, attractive if not.

Everything, including hair, is composed of atoms.

In every atom there are protons which are particles carrying positive charge and electrons carrying negative charge.

A body is said to be neutral when positive charges equal negative charges.

A body is said to be electrically charged when the balance between positive and negative charges is altered.

Usually hair is neutral.

There are three ways to charge an object:

1. ***by rubbing:** when there is friction between two bodies, atoms in one lose electrons keeping an excess of positive charge and give them to the atoms of the other that will have an excess of negative charge acquiring the majority of electrons.*
2. ***by induction:** charge happens when we approach a charged object to a neutral one. However if we move away the charged body without contact, the neutral body remains neutral.*
3. ***by contact:** when we put a neutral body in contact with a charged body, part of the charge is transferred from one to the other.*

So the answer is:

The balloon got charged by rubbing with the t-shirt, and the hair has been attracted by induction to it!

Create

Want to do an experiment together? Create electricity using a lemon! What do you need?

- a lemon
- a coin or other bronze object
- a nail or other galvanised object
- two electric cables with an alligator clip
- a small LED (small bulb or light).

Start by rolling the lemon on a flat surface, applying light pressure with your hand. This will allow a small amount of juice to permeate all over the peel.

Now make two notches in the lemon peel with a knife, about two or three centimetres deep.

Insert the two small bronze and zinc coins (two nails are fine, as long as they are made of the same material) into the notches and connect the two poles of the tester to check that they produce energy (approximately 1 volt).

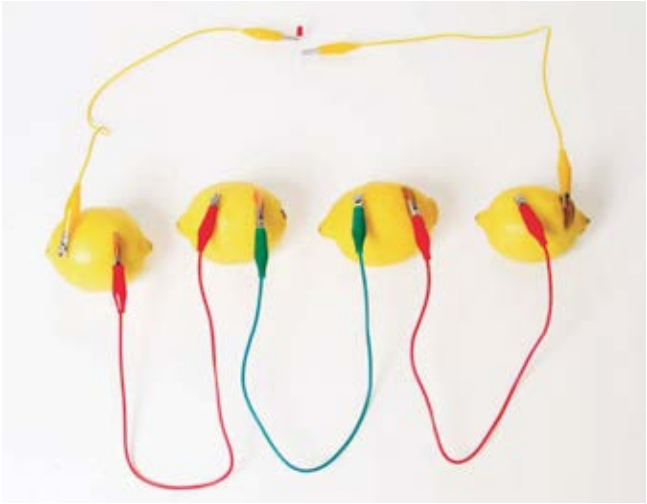
Now you only need to connect the wires to the two electrodes and the two poles of the light bulb to see it turn on! If it is not turning on, you need more lemons and cables to produce enough energy...

Tip

Don't you have alligator clips? Just remove the insulation from one end of the cable and turn the stripped wire into a thick circle which you insert directly in the lemon, instead of the coin. On the side of the nail, twist the copper wire around it.

Do you lack a small LED? If you have 1 lemon and headphones you can anyway hear the sound of electricity!

How? Insert their plug in the tight circle you make for them with one of the cables. With the other cable, touch the plug!



Reflect

Have you thought about **how we could produce and use electricity in a sustainable way?**

Share your reflections and ideas with your buddy!