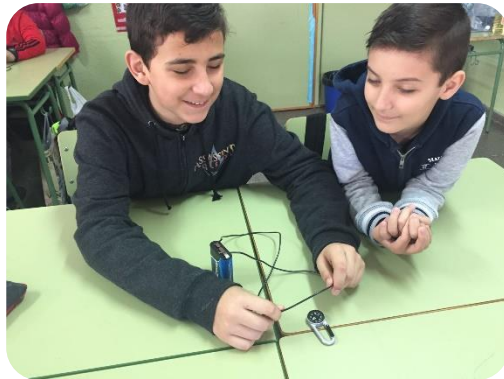


THE NATURE OF ELECTRICITY



Nuestra Señora de los Ángeles (El Esparragal-Murcia) Sixth Year Classroom

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Esta experiencia se ha llevado a cabo en la clase de Sexto de Educación Primaria del CBM Nuestra Señora de los Ángeles de El Esparragal (Murcia)

Proyecto realizado por:

- ▶ ASCENSIÓN LÓPEZ ESPÍN (MAESTRA ESPECIALISTA)
- ▶ AMPARO SOTO BALLESTER (TUTORA)
- ▶ NURIA CASTELLANOS SERNA (MAESTRA COLABORADORA)

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THE NATURE OF ELECTROMAGNETISM?

WHAT FORCES DO YOU KNOW? _____

WHAT IS MAGNETISM? _____

CAN YOU FEEL IT? _____

WHAT IS ELECTRICITY? _____

WHAT ARE MAGNETS? _____

DO YOU KNOW ABOUT ANY SCIENTIST RELATED
TO MAGNETISM OR ELECTRICITY? _____

WORK IN PAIRS AND WRITE YOUR ANSWERS IN YOUR
NOTEBOOKS

First Session Photos



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FIRST SESSION

WHAT DO YOU KNOW ABOUT ELECTRICITY AND MAGNETISM?

We start the lesson by questioning our students about what they know about magnetism and electricity (annexed 1)

1. First experiment:

We are going to rub a pvc tube with kitchen paper and we will put a can of cola on a surface. Then, we will put close the tube to the can. We will see what happen.

2. Second experiment:

We will use de pieces of plastic to do the same experiment but with plastic.

3. Third experiment:

On a surface, we will put some water. Then we will make bubbles and we will put close to the bubbles the tube.

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First session material

- ▶ Material:
- ▶ Internet
- ▶ Notebooks
- ▶ For the experiment:
- ▶ Kitchen paper
- ▶ Rubber tube
- ▶ Pieces of plastic
- ▶ Soap Bubbles
- ▶ Foil strips



First Session Conclusions

- ▶ All this experiments show us that something happens when you rub a rubber tube and has influence in different materials. The rubber tube acquires a property that does not have before...
- ▶ Conclusion: Certain materials attract others (metal, plastic, water) when they are rubbed with paper or wool.
- ▶ Static electricity

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Second session photos



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SECOND SESSION PLANNING

- As we said in the last sesión, since ancient times, the electricity has been investigated. We are already experimented static electricity. We are going to try to show what are electrical charge and electrical force.
- First experiment:
We will use the rubber tube with aluminum and we will see that the tube attracts the aluminum. We will use cans of cola, too.
Then, we will use a magnet. We will see that the magnet does not attract aluminum. WHY? (Gilbert was a scientist who said that magnetism and electricity have nothing to do).
- Second experiment:
Tie a string of cord to a clip and we will put close the rubber tube after rubbing it with kitchen paper. We will see how firstly it attracts it and then, when the clip touches the tube, it repels it.
- We carry out other experiments with balloons. We rubbed the balloons and try to put together.
- Then we put a straw with a pin attached to a ball of cork. If we rub the rubber tube and the straw, they repel each other

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Second session material

Material

- ▶ Internet
- ▶ Notebook
- ▶ Magnets
- ▶ Rubber tube
- ▶ Clips
- ▶ Kitchen paper
- ▶ Balloons
- ▶ Straws
- ▶ Pins
- ▶ Can of cola

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Second Session Conclusions

- ▶ Conclusion: There are two different forces: Attraction and Repulsion.
- ▶ Polarization phenomenon.



THIRD SESSION



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Third session planning

We are studying magnetism and electricity. We are going to start the lesson with a PPT about scientists who studied electricity and their contributions were very important to discover laws and properties of electricity.

As we already know normally all bodies have neutral charge, this means that there is a balance between positive charges and negative charges.

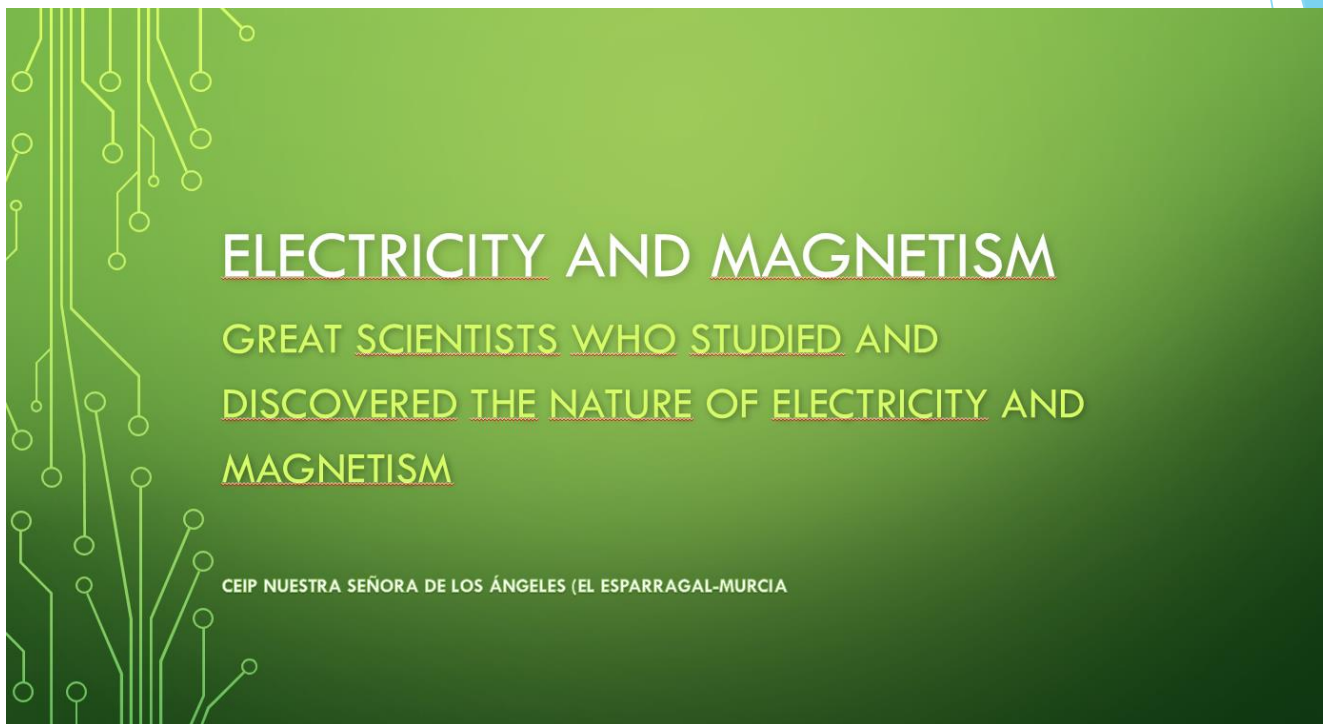
Experiments:

We are going to measure the electricity of a body or material with the electroscope (it measures and detects electrical charges).

- 1. We will build the electroscope and with it we will measure the electricity of different materials and objects.**
- 2. We are going to prepare a battery as Volta did it**



PPP Scientists who discovered the Nature of Electricity



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Third session material

- ▶ Plastic cups
- ▶ Foil strips
- ▶ Clips
- ▶ Different material /objects
- ▶ Rubber tube
- ▶ Zinc and cooper plates
- ▶ Battery charging tongs
- ▶ Vinegar

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Third Session Conclusions

- ▶ The more the foil strips open, the more electric charges the object has.
- ▶ Volta discovered how to store static electricity.
Battery.



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FOURTH SESSION



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Fourth session planning

- ▶ We are studying electricity and magnetism. We are going to start with the definition of magnet: a magnet is a material that has the property of attracting the iron, nickel and cobalt.
- ▶ Experiments:
- ▶ With magnets we are looking for magnetic objects in the classroom
- ▶ We use magnets with coins and we make a chain
- ▶ We use keys with magnets and make a chain
- ▶ What is the power of magnets that can influence the behavior of a non-magnetic object?
- ▶ Plastic cup with coins or keys inside. Using magnets, we try to move these objects.
- ▶ Tie a clip with the cord and put close a magnet. The clip spin on the air
- ▶ If we have time, we can experience how the magnets behave to each other.

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Fourth session material

- ▶ Magnets
- ▶ Coins
- ▶ Keys
- ▶ Cord
- ▶ Clips
- ▶ Plastic cups

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Fourth session conclusions

- ▶ Magnets pull on magnetic materials, such as iron, nickel, cobalt and steel, but pull through non-magnetic things, like cardboard, glass, plastic and wood. Magnets can even travel through water.
- ▶ Only metals are attracted to magnets (but not all metals)
- ▶ No other materials are attracted to magnets i.e. wood, plastic, glass and everything else are not attracted to magnets.
- ▶ A magnet can pick up some objects like paper clips without even touching them...an invisible force. This invisible force can pull through some materials such as paper and plastic.

FIFTH SESSION



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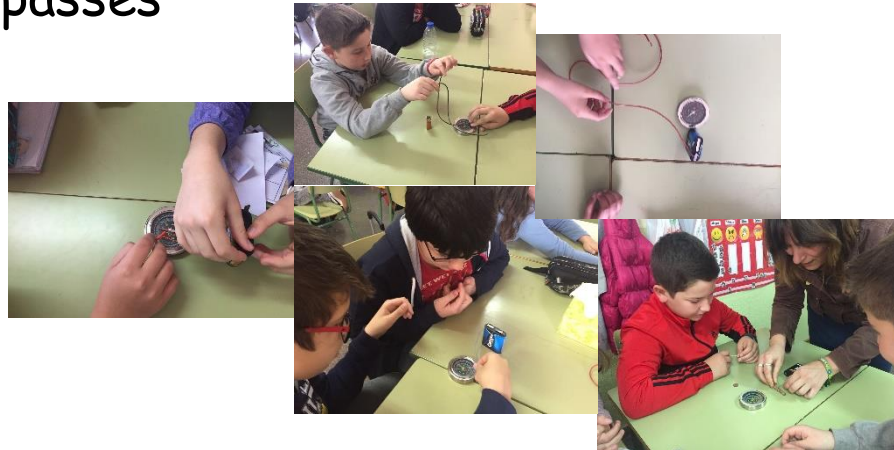
Fifth session planning

- ▶ We continue experimenting with magnets and its behavior which each other. Magnets have different regions. Regions of the same color repel each other. Regions of different color attract each other.
- ▶ We will use stickers to label the different regions.
- ▶ Having said this we are going to use compasses to experiment if electricity and magnetism are related or not.
- ▶ Oersted experiment. Law: a steady electric current creates a magnetic field around it



Fifth session material

- Magnets
- Stickers of different colours
- Batteries
- Wires
- Light bulbs
- Compasses



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Fifth session conclusions

- ▶ Laws of magnetism: the equals repel each other, the different attract.
- ▶ All magnets have two ends or poles (North & South). If you put the poles of two magnets together, they will either pull together or push apart.
- ▶ Electricity and magnetism are interdependent because a changing electricity field generates a magnetic field, and a changing magnetic field generates a electricity field.

SIXTH SESSION.....



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MAGNETIC TRAINS



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Sixth session planning

In this last session, we are going to build a magnetic train. I will start in class but they have to finish at home. We will prepare an exhibition with the models.



Six session material

- ▶ Magnetic Train:
- ▶ Battery
- ▶ Copper (unglazed)
- ▶ Wire
- ▶ Neodymium magnets.

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CONCLUSIONS

- ▶ Magnets and batteries are influenced by pull and push forces thanks to the poles of the magnets. Inside the cooper tube, these forces are limited and the energy flows through this field in one direction.



RECAP

- ▶ Magnets pull on magnetic materials, such as iron, nickel, cobalt and steel, but pull through non-magnetic things, like cardboard, glass, plastic and wood. Magnets can even travel through water.
- ▶ Electromagnetism describes the relationship between electricity and magnetism. Electricity and magnetism are interdependent because a changing electricity field generates a magnetic field, and a changing magnetic field generates a electricity field.



FINALLY

- ▶ We answer all the questions that we got at the beginning of the project.
- ▶ We will take a test with multiple choice format



Magnetism Test

SCIENCE AT SCHOOL. MAGNETISM. 2017

Name _____ Date _____

1. What is Magnetism?

- | |
|------------------------|
| a) A contact force |
| b) A non contact force |
| c) A friction force |

2. What is a magnet?

- | |
|--|
| a) Material which has the property of attracting some metals |
| b) Material which attracts paper, glass |
| c) Material which attracts |

3. All magnets

- | |
|---------------------------|
| a) Have two sides |
| b) Have two ends or poles |
| c) Have two parts |

4. Only metals are attracted by magnets

- | |
|----------------|
| a) True |
| b) False |
| c) Do not know |

5. Magnetism laws

- | |
|---|
| a) Opposite poles attract // Same poles repel |
|---|

8. Magnetism can pull through non magnetic things such as cardboard, glass, plastic and wood

- | |
|----------------|
| a) True |
| b) False |
| c) Do not know |

9. Electromagnetism is

- | |
|--|
| a) The relationship between magnetism and gravity |
| b) The relationship between electricity and magnetism |
| c) The relationship between magnetism and friction force |

10. A changing electricity field generates a magnetic field, and a changing magnetic field generates a electricity field.

- | |
|----------------|
| a) True |
| b) False |
| c) Do not know |

What is your favourite experiment? Draw and describe it.

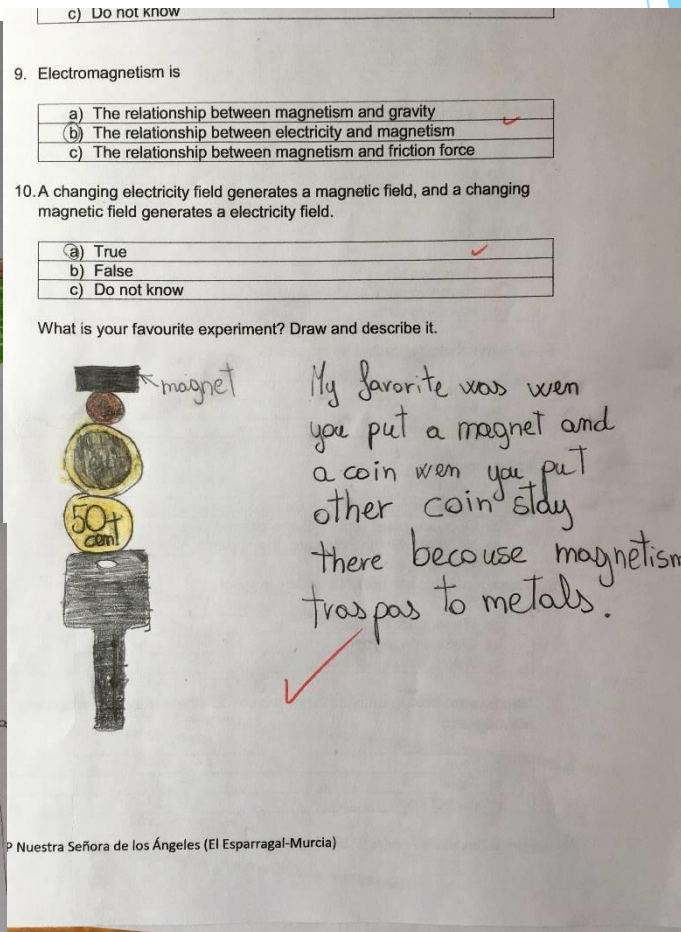
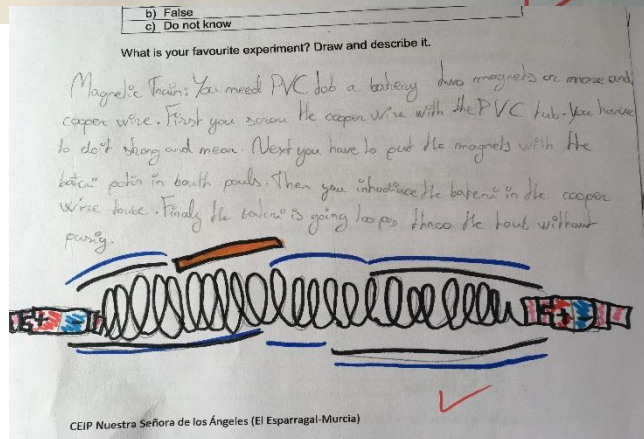
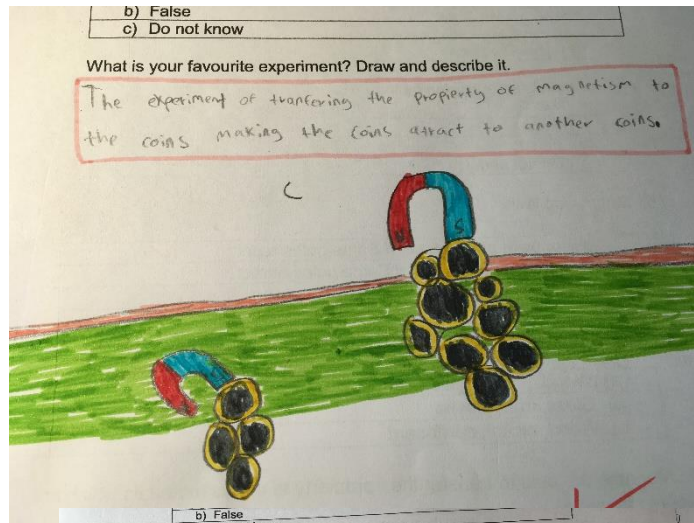
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Samples of tests



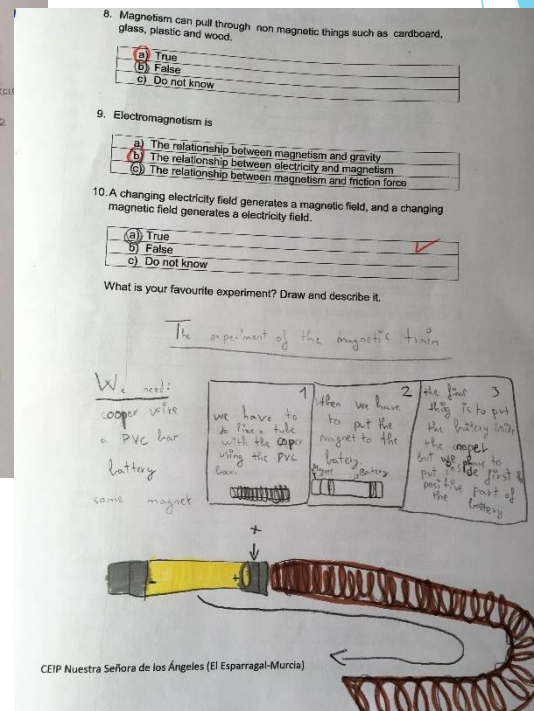
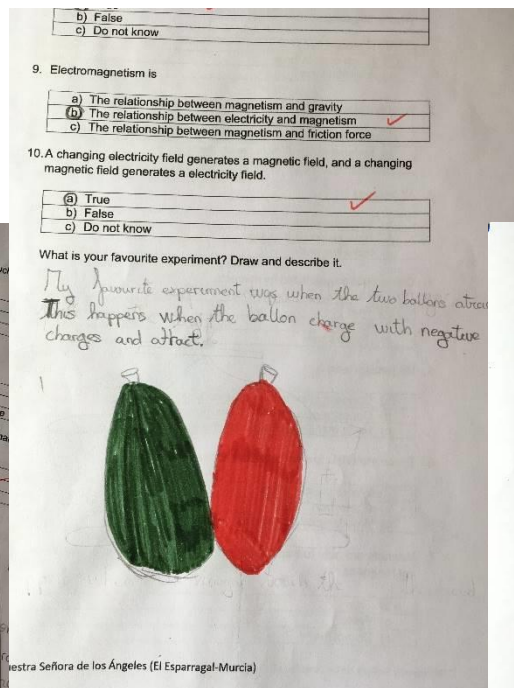
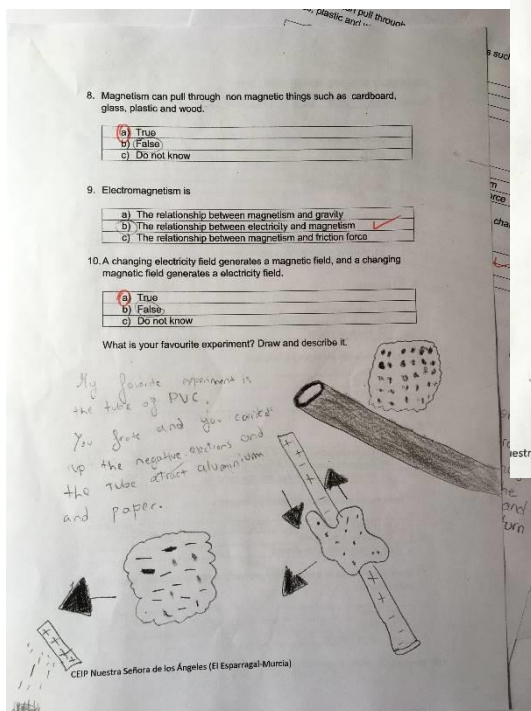
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More samples...



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CAN YOU FEEL IT? _____

WHAT IS ELECTRICITY? _____

WHAT ARE MAGNETS? _____

DO YOU KNOW ABOUT ANY SCIENTIST RELATED
TO MAGNETISM OR ELECTRICITY? _____

WORK IN PAIRS AND WRITE YOUR ANSWERS IN YOUR
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