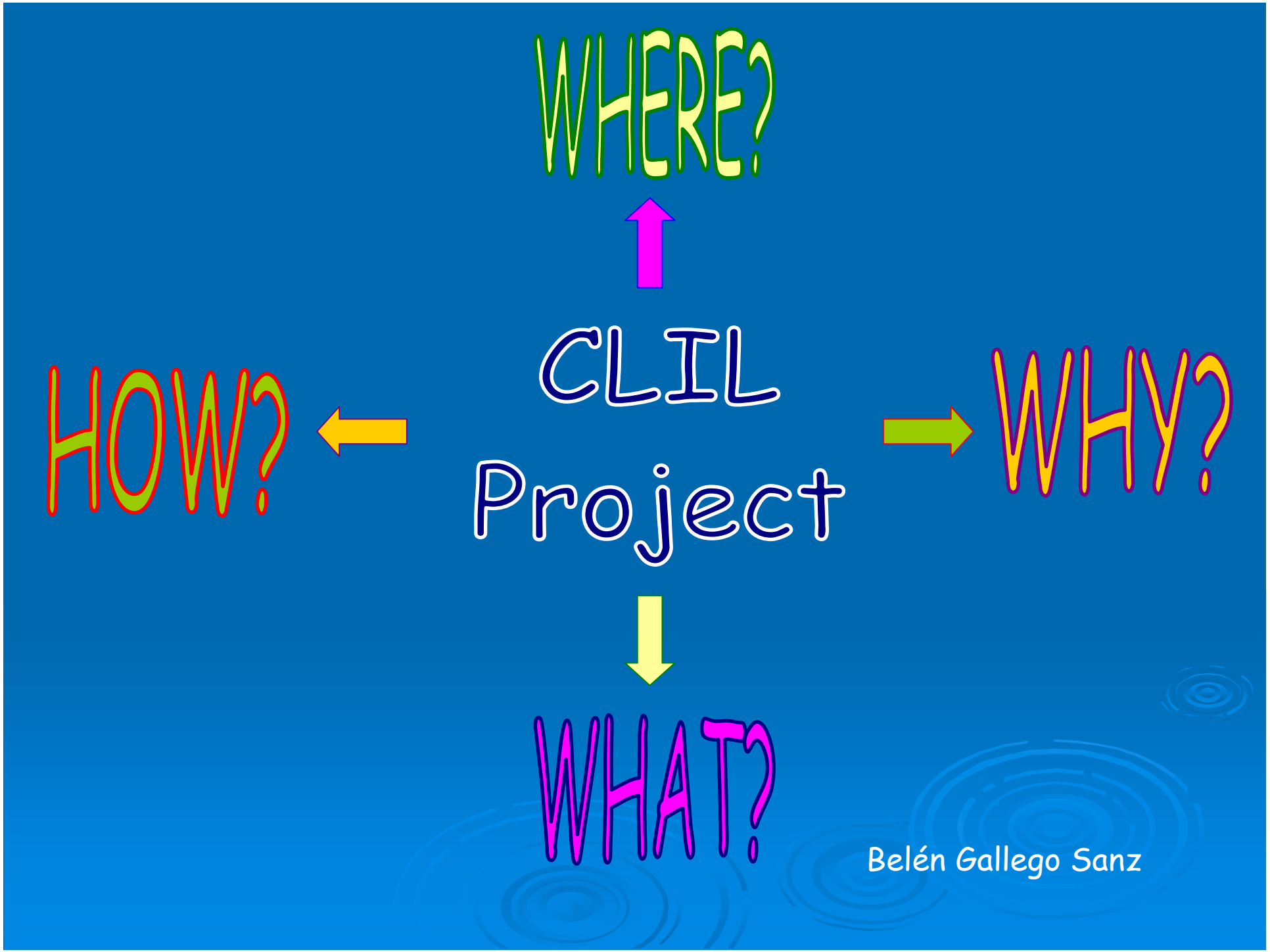

WHERE?
HOW?
CLIL
Project
WHY?
WHAT?
Belén Gallego Sanz

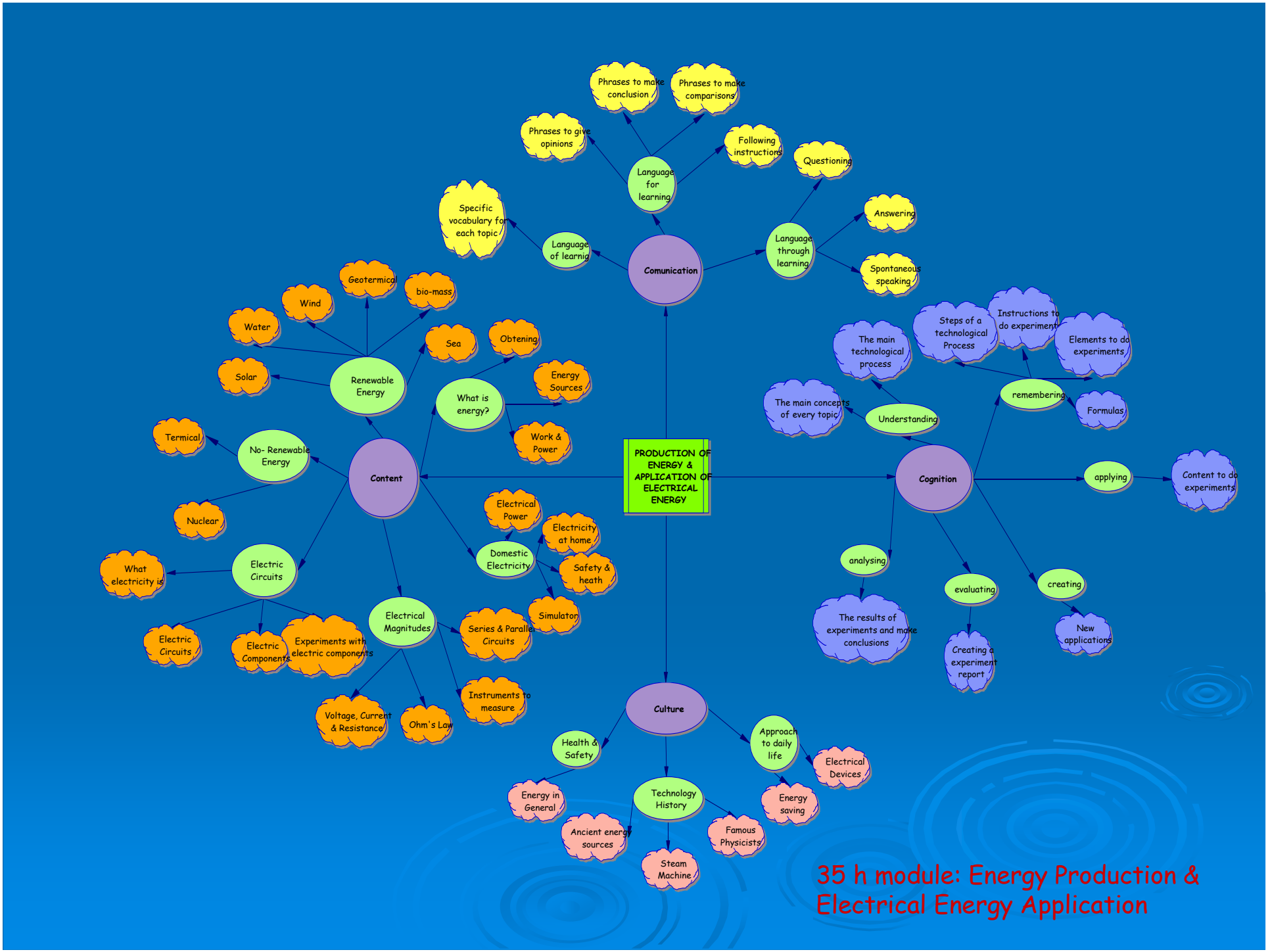
IES La Segarra

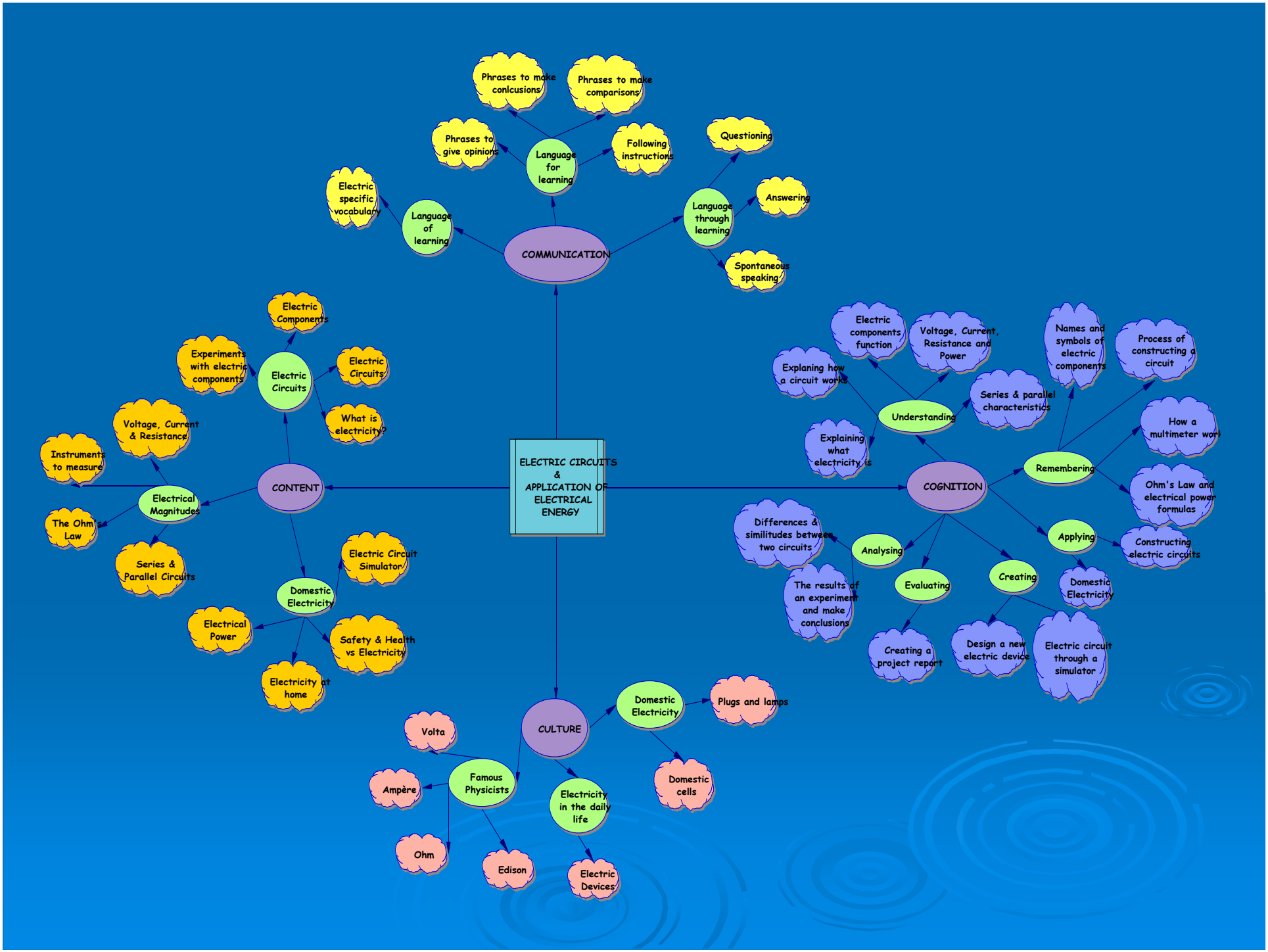
Background

- At the beginning it gave only courses of Vocational Education
- LOGSE: it became a **Compulsory Secondary School.**
- Offers:
  - ESO
  - Batxillerat
  - CFGM
  - CFGS
- 400 students:
  - Nearly 270 in ESO
  - The rest between Batxillerat and Vocational Education

Foreign Languages Innovation Programme

Proposal	Action to develop	Courses	Groups	Time
1. Practical part of Technology	1.1 Technology Workshop / Software Instructions	2nd ESO	All	1 h/weekly
2. Didactic Sequences of different Areas or Modules	2.1 Warming up & relaxing exercises in PE	3rd & 4th ESO	All	20 min/weekly
	2.2 Software of modules of ICT	1st, 2nd & 4th ESO	All	-
	2.3 Latin texts translation and Latin culture aspects	1st & 2nd Batxillerat	Humanistic	25% of the subject
	2.4 Sequences & Functions	3rd ESO	All	30 h / course
	2.5 Abstract in Treball de Recerca	1st & 2nd Batxillerat	All	-
	2.6 Technical vocabulary & the electromechanical instruction manual	5 & 6 modules	1st & 2nd of electromechanical & vehicles GFGM	30 h / course
	2.7 Telephonic calls & costumer service	1 module	Course of Administration GFGM	15 h / course


PRODUCTION OF ENERGY & APPLICATION OF ELECTRICAL ENERGY
Content
Comunication
Cognition
Culture
Renewable Energy
Geotermical
bio-mass
Wind
Water
Sea
Solar
Obtening
What is energy?
Energy Sources
Work & Power
No- Renewable Energy
Termical
Nuclear
Electric Circuits
What electricity is
Electric Circuits
Electric Components
Experiments with electric components
Electrical Magnitudes
Voltage, Current & Resistance
Ohm's Law
Instruments to measure
Series & Parallel Circuits
Simulator
Domestic Electricity
Electrical Power
Electricity at home
Safety & heath
Language for learning
Phrases to make conclusion
Phrases to make comparisons
Following instructions
Questioning
Language through learning
Answering
Spontaneous speaking
Language of learnig
Specific vocabulary for each topic
Phrases to give opinions
Understanding
The main technological process
The main concepts of every topic
remembering
Steps of a technological Process
Instructions to do experiment
Elements to do experiments
Formulas
applying
Content to do experiments
analysing
The results of experiments and make conclusions
evaluating
Creating a experiment report
creating
New applications
Culture
Health & Safety
Energy in General
Approach to daily life
Electrical Devices
Energy saving
Technology History
Ancient energy sources
Famous Physicists
Steam Machine
35 h module: Energy Production & Electrical Energy Application


ELECTRIC CIRCUITS & APPLICATION OF ELECTRICAL ENERGY
COMMUNICATION
Language of learning
Electric specific vocabulary
Language for learning
Phrases to make conlcusions
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Electric Components
Experiments with electric components
Electric Circuits
What is electricity?
Electrical Magnitudes
Voltage, Current & Resistance
Instruments to measure
The Ohm's Law
Series & Parallel Circuits
Domestic Electricity
Electric Circuit Simulator
Electrical Power
Safety & Health vs Electricity
Electricity at home
COGNITION
Understanding
Explaning how a circuit works
Electric components function
Voltage, Current, Resistance and Power
Explaining what electricity is
Series & parallel characteristics
Remembering
Names and symbols of electric components
Process of constructing a circuit
How a multimeter work
Ohm's Law and electrical power formulas
Applying
Constructing electric circuits
Domestic Electricity
Analysing
Differences & similitudes between two circuits
The results of an experiment and make conclusions
Evaluating
Creating
Creating a project report
Design a new electric device
Electric circuit through a simulator
CULTURE
Famous Physicists
Volta
Ampère
Ohm
Edison
Electricity in the daily life
Electric Devices
Domestic Electricity
Plugs and lamps
Domestic cells


CONTENT
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Electric Components
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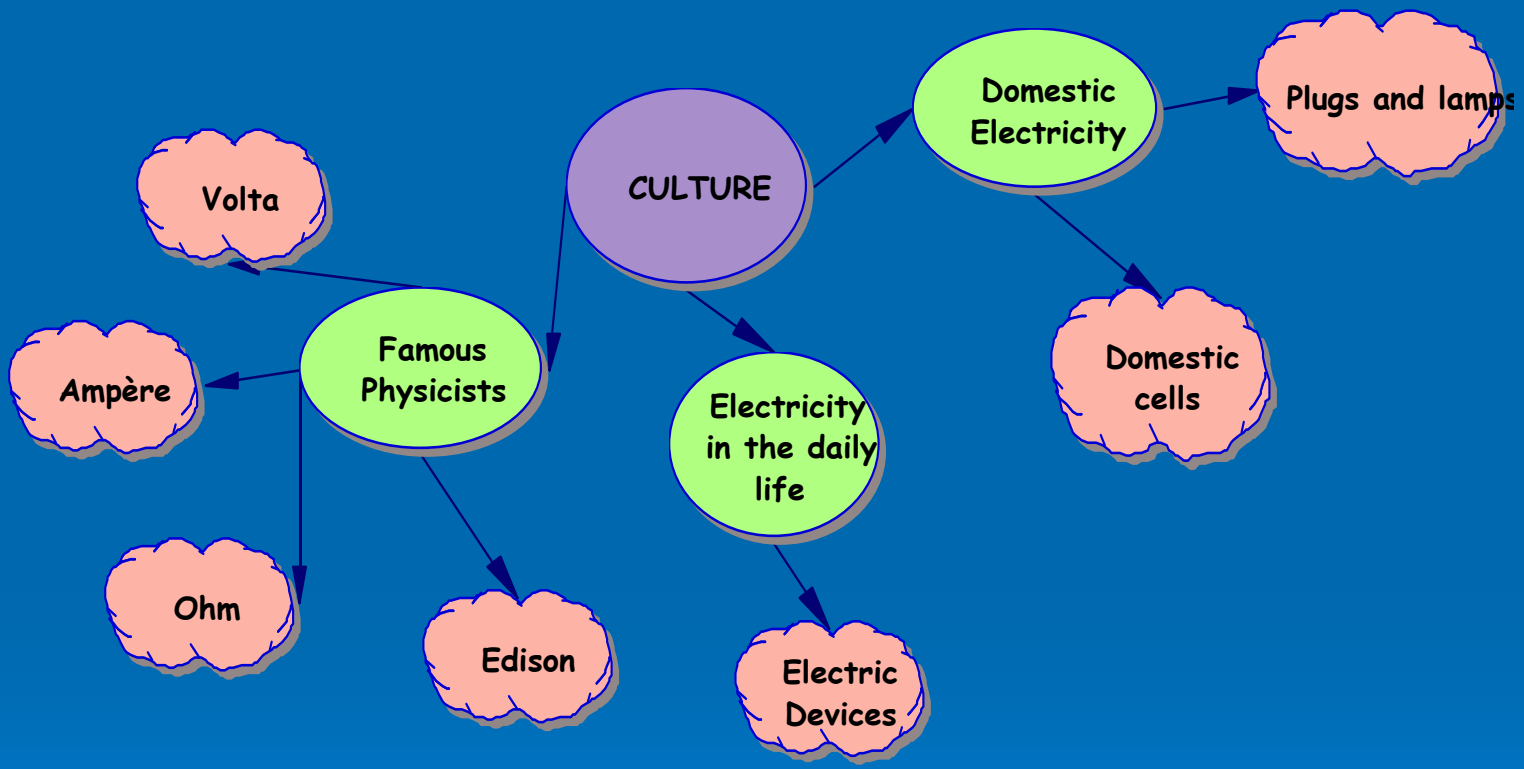
CULTURE
Famous Physicists
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Edison
Electricity in the daily life
Electric Devices
Domestic Electricity
Plugs and lamps
Domestic cells

Materials

Technology Subject are divided in 2 parts:

- theoretical 1 h / weekly
- Practical 1 h / weekly

Example 1

Example 2 Assessment

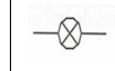
Example 3

Theoretical: Lesson 3

GENERATORS

DC				
Picture	Name	Symbol	Energy transformation	Characteristics
	Cell		Chemical-Electrical	Non-rechargeable
	Accumulator		Chemical-Electrical	Rechargeable
	Battery		Chemical-Electrical	Group of accumulators. Rechargeable.
	Dynamo		Mechanical-Electrical	-

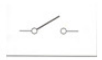
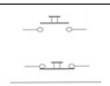
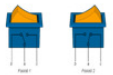
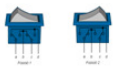
RECEIVERS

Picture	Name	Symbol	Energy transformation
	Bulb		Electrical- Light
	Buzzer		Electrical-Sound
	Bell		Electrical-Sound
	Engine	 Depends on the current	Electrical-Mechanical

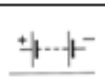
CONDUCTORS

Picture	Name	Symbol
	Cables/Wires	
 Conductor:copper Insulator:plastic		

CONTROLLERS

Picture	Name	Symbol	Characteristics
	Switch		1 entry-1 exit
	Push switch NO Push switch NC		1 entry-1 exit
	Two-way switch		1 entry-2 exits
	Double pole switch		2 entries-2 exits

6.- Complete the chart below.

Electric Component	Name	Symbol	Energy Transformation
Generator	Accumulator		
			
			DC. Mechanical- Electrical
			AC. Mechanical- Electrical
			
			Electrical- Sound
	Bulb		
	Engine		

7.- Match the names with the right symbol.

Battery	
Push switch NC	
Two-way switch	
Double pole switch	
Accumulator	
Push switch NO	

8.- Put the names of the components of this wire:

Practical: Lesson 4

DOING EXPERIMENTS

EXPERIMENT 1

Material:

- 1 battery 1,5 V
- 2 wires
- 1 buzzer
- push switch

Picture

What's happened?

Underline the most suitable word in these sentences:

When the push switch is in OFF position  the circuit is open/closed. Electricity flows/does not flow.

When the push switch is in ON position  the circuit is open/closed. Electricity flows/does not flow.

When the push switch is in OFF position the buzzer rings/does not ring.

When the push switch is in ON position the buzzer rings/does not ring.

Circuit Diagram

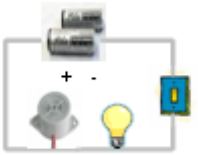
Draw the diagram of the circuit.

EXPERIMENT 2

Material:

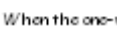
- 1 cell 1,5 V
- 2 wires
- 1 buzzer
- 1 bulb 1,5 V
- 1 one-way switch

Picture



What's happened?

Complete these sentences:

When the one-way switch is in OFF  position the buzzer _____and the bulb_____.

When the one-way switch is in ON position the buzzer _____and the bulb_____.

Circuit Diagram

Draw the diagram of the circuit

Game...

1.- In order to revise what we did last lesson we will play a game.

- You will have some filing cards (pictures, names or symbols).
- Everyone must complete one column (you must fix the filing card).
- One after another must ask another classmate for the filing cards they need to complete the column.
- The questions can be, for example:

Do you have the bulb picture?

Or

Do you have the bulb name?

Or

Do you have the bulb symbol?

- The answers can be:

No, I don't

Or

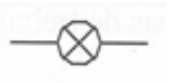
Yes, Ido. Here it is!

Or

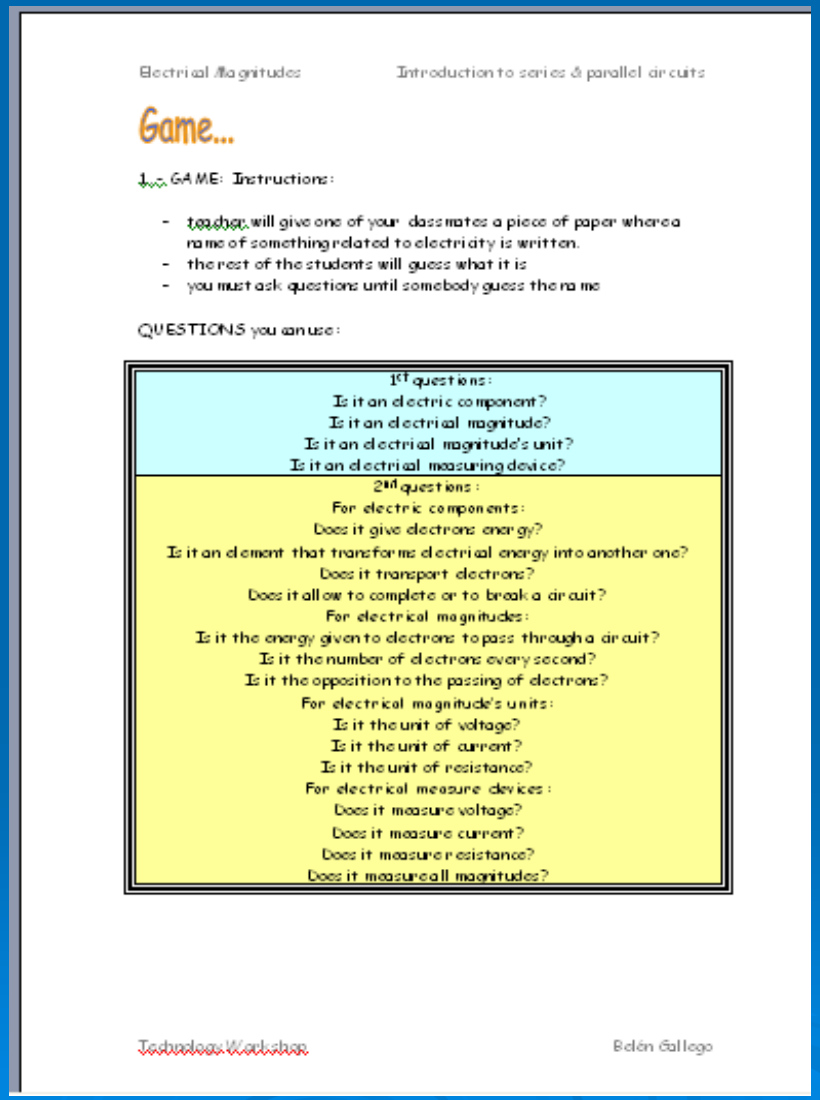
Yes, Ido. Take it!

- Who completes their column first wins the game.

EXAMPLE:

Picture	Name	Symbol
	Bulb	

Practical: Lesson 8



Electrical Magnitudes Introduction to series & parallel circuits

Game...

1.- GAME: Instructions:

- teacher will give one of your classmates a piece of paper where a name of something related to electricity is written.
- the rest of the students will guess what it is
- you must ask questions until somebody guess the name

QUESTIONS you can use:

1st questions:
Is it an electric component?
Is it an electrical magnitude?
Is it an electrical magnitude's unit?
Is it an electrical measuring device?
2nd questions:
For electric components:
Does it give electrons energy?
Is it an element that transforms electrical energy into another one?
Does it transport electrons?
Does it allow to complete or to break a circuit?
For electrical magnitudes:
Is it the energy given to electrons to pass through a circuit?
Is it the number of electrons every second?
Is it the opposition to the passing of electrons?
For electrical magnitude's units:
Is it the unit of voltage?
Is it the unit of current?
Is it the unit of resistance?
For electrical measure devices:
Does it measure voltage?
Does it measure current?
Does it measure resistance?
Does it measure all magnitudes?

Technology Workshop Belén Gallego

DOING EXPERIMENTS

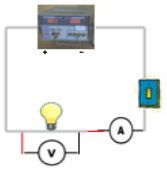
EXPERIMENT 1

FIRST PART

Material:

- 1 power source 
- 2 multimeters
- 1 bulb 6V
- 1 one-way switch

Picture



Instructions:

- Adjust the power source at 6V
- Put the multimeter 1 in the voltage positionas in the picture
- Select DC
- Select 20 V in the scale
- Put the multimeter 2 in the current positionas in the picture
- Select DC
- Select 20 A in the scale

Questions:

Volts multimeter 1	Volts power source	Amperes multimeter 2

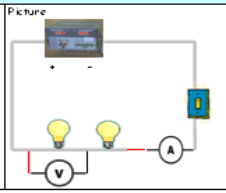
Circuit Diagram

SECOND PART

Material:

- All components of the first part
- 1 bulb 6 V

Picture



Instructions:

- Adjust the power source at 12V
- Put the multimeter 1 in the voltage positionas in the picture
- Select DC
- Select 20 V in the scale
- Put the multimeter 2 in the current positionas in the picture
- Select DC
- Select 20 A in the scale

Questions:

Volts multimeter 1 for every bulb	Volts power source	Amperes multimeter 2
Bulb 1: Bulb 2:		

- Is the mark of the multimeter 1 the double (x 2) or the half (: 2) of the mark of the power source?
- What happens when youadjust the power sourceat 6V? Underline the most suitable option:

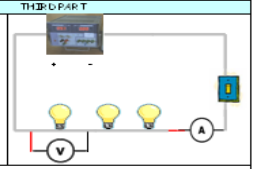
Bulbs have more/less light

Circuit Diagram

THIRD PART

Material:

- All components of the second part
- 1 bulb 6 V



Instructions:

- Adjust the power source at 18V
- Put the multimeter 1 in the voltage positionas in the picture
- Select DC
- Select 20 V in the scale
- Put the multimeter 2 in the current positionas in the picture
- Select DC
- Select 20 A in the scale

Questions:

Volts multimeter 1 for every bulb	Volts power source	Amperes multimeter 2
Bulb 1: Bulb 2: Bulb 3:		

- Is the mark of the multimeter 1 the triple (x 3) or the third part (: 3) of the mark of the power source?
- What happens when you unscrew one of the bulbs?
  - All bulbs do not light up
  - All bulbs light up
  - Multimeter 2 marks 0.25 A
  - Multimeter 2 marks 0 A

Circuit Diagram

Theoretical: Lesson 9

CONNECTIONS OF CIRCUITS

When you connect bulbs in this way

it is a SERIES CIRCUIT

Characteristics
Remember the experiments you did in the workshop. Work in groups. Choose the most suitable option: - Current through a receiver is the same in every one - Current through a receiver is half, third ...than voltage of every receiver - The voltage crossing every receiver is the same as the voltage at the power source - The voltage crossing every receiver is half, third ...than voltage of every receiver - If a bulb is disconnected the other ones do not light up - If a bulb is disconnected the other ones light up - The total voltage of the circuit is the sum (+) of the voltage crossing every receiver - The total voltage of the circuit is the same as the voltage crossing every receiver

- The total current of the circuit is the sum of the current through every receiver
- The total current of the circuit is the same as the current through every receiver

Write correct sentences:

More things....

Batteries	CONTROLLERS
	
The total voltage is the SUM of voltage of every cell. It is useful if we want to increase the TOTAL voltage of a circuit.	A circuit is complete when ALL controllers are in ON position.

Theoretical: Lesson 7

Ohm's Law

In an electric circuit VOLTAGE, CURRENT and RESISTANCE are closely related with each other.

This relationship is known as OHM'S LAW:

Voltage = Current × Resistance

You need a new lamp for you bicycle so you buy one. The filament of the bulb has 4 Ω resistance and it takes a current of 0,8 A. The shop assistant did not give you a battery so now you must buy one. What voltage must battery have?

To resolve this problem it is helpful to use this triangle.

Resistance = 4 Ω

Current = 0,8 A

Voltage = ?

Answer

(you must cover with your finger the magnitude you are looking for. Operation: multiplication)

V = 0,8 A x 4 Ω V = 3,2 volts (V)

you must buy a 3,2 v battery.

Some Exercises

1.- What operation do must you do in every case?

(I don't know ...)

- the current I must _____ (multiply / divide) _____ (voltage / current / resistance) by _____ (voltage / current / resistance)
- the voltage I must _____ (multiply / divide) _____ (voltage / current / resistance) by _____ (voltage / current / resistance)
- the resistance I must _____ (multiply / divide) _____ (voltage / current / resistance) by _____ (voltage / current / resistance)

Now practise this new concept:

2.- The circuit of a little torch  has 3 Ω of resistance. It has inside a 4,5 v battery. What is the current through the circuit?

Voltage =

Resistance =

Current =

Answer =

3.- One of your friend has given you a lamp  that has 62,5 Ω and the current flowing through it is 0,2 A. What is the voltage?

Voltage =

Resistance =

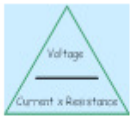
Current =

Answer =

4.- Your stereo player  needs four 4,5 v cells to work and pass through the circuit a 2..A current. Do you know what the resistance of the circuit is?

	Voltage = Resistance = Current = Answer =

5.- The battery of your mobile  is 3,7 v and has a 5 Ω of resistance. What is the current through the battery if the switch is opened?

	Voltage = Resistance = Current = Answer =

6.- Do you remember these pictures? Work in pairs.

- How can you increase the current (number of cars per minute) without modifying the engine of the cars? Choose the most suitable answer:
  - making the road broader
  - making the road narrower

  So, in the case of an electric circuit we must:
  - use a _____(thicker/thinner) wire.
  - _____(increase/decrease) the resistance.
- How can you decrease the current without modifying the engine of the cars? Choose the most suitable answer:
  - making the road broader
  - making the road narrower

  So, in the case of an electric circuit we must:
  - use a _____(thicker/thinner) wire.
  - _____(increase/decrease) the resistance.
- How can you increase the current without modifying size of the road?
  - making an engine that gives more energy
  - making an engine that gives less energy

  So, in the case of an electric circuit we must:
  - use a generator with _____(more/less) voltage
  - _____(increase/decrease) the voltage.
- How can you decrease the current without modifying size of the road?
  - making an engine that gives more energy
  - making an engine that gives less energy

So, in the case of an electric circuit we must:

- use a generator with _____(more/less) voltage
- _____(increase/decrease) the voltage.

Write 4 conclusions:

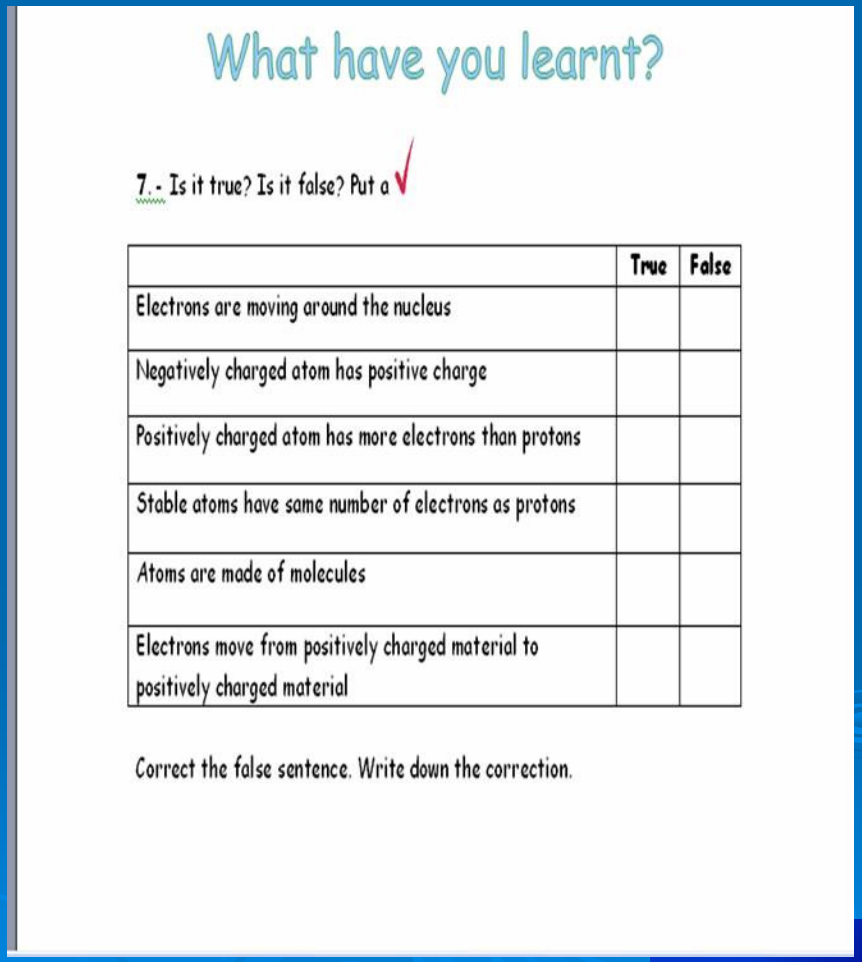
If we want to	increase	the current, we must	increase	the voltage
	decrease		decrease	the resistance

Assessment

- Theoretical Lesson:
  - Individual work
  - Work in pairs
  - What have I learnt?

In a plenary

- Practical Lesson:
  - At the end of every unit students give the teacher the workshop worksheets



What have you learnt?

7.- Is it true? Is it false? Put a √

	True	False
Electrons are moving around the nucleus		
Negatively charged atom has positive charge		
Positively charged atom has more electrons than protons		
Stable atoms have same number of electrons as protons		
Atoms are made of molecules		
Electrons move from positively charged material to positively charged material		

Correct the false sentence. Write down the correction.