Battery

General informations			
Respective blueprint	**Battery**		
Description	Build a battery and discover the historical background to it's invention.		
Learning objectives	At the end of this session, pupils will be able to : • Differentiate between objects powered by batteries and those powered by mains electricity. • tell the story of the invention of the Volta battery and describe how it works in simple terms		
Related curricular subjects	Sciences – Technology		
Duration	2 hours		
Level of difficulty	Basic ☑	Medium ☑	Advanced ☐
Inclusivity guidelines			
How to integrate students with SLD	• Formulate short, simple instructions that only require one action at a time. For example, cut the cotton discs to the size of the pieces. You have one action and one verb of action. • If you give oral instructions, make sure you keep track of them in the form of pictograms or written on the board. For example, you can place an image of cissors to illustrate the "cut" instruction • When you give instructions (oral or written), make sure to highlight the word of action so pupils know what they are expected to do. • When it's possible, you can show the expected result of the manipulation. • When creating groups, place students who have difficulties with students who are more advanced (in this task) so that they can help each other (for example, a dyspraxic student will have a lot of difficulty with cutting tasks).		
How to integrate students who work faster	• Ask the pupils who finished their tasks earlier to experiment with different techniques with the battery (e.g. removing coins, using something other than lemon juice).		

Step by step description of the lesson

Step 1: Introduction - Electronic objects	**Estimated time: 20 min**

The teacher shows a series of objects torch, washing machine, hoover, small toy, computer (see document page 4), asks students to name them and displays them on the board. The teacher asks how the different objects work.
Three columns are created on the board and the objects are classified according to whether they are battery-operated, mains-operated or hand-operated.
The teacher collects the pupils' initial ideas by asking them where electricity comes from and what it is used for.
You can then realise some exercises where pupils has to identify weather the object works with mains or battery

Step 2: The battery	**Estimated time: 20min**

Ask the pupils if they know of any objects that use batteries. They should be able to name a few, as many toys use batteries.
Ask the students if they know how a battery works and who invented the battery.
The teacher explains that the battery was invented by Volta in Italy in the 1800s. It is important to show the photo of the inventor, locate Italy on the map of Europe and situate his invention on a timeline and place it in the correct historical period (contemporary times). → The sequence can be used as an introduction to the various subjects.

The teacher reads the letter Volta wrote to the President of the Royal Society in 1800 describing how his battery worked (document page 5: Volta's letter). The teacher asks the students to imagine and draw the battery.

The teacher then distributes the short text to all the pupils (document page 5: Volta's letter). The pupils are placed in pairs and asked to share their drawings.

Step 3: Group discussion	**Estimated time: 10min**

The teacher rereads the text, answers the pupils' questions about the different vocabulary words and suggests that the pupils build a pile together. The teacher goes through the necessary elements and finds alternatives with the pupils.
Small copper plates → Coins
Roll of cardboard → Cotton discs
Once you have identified the materials used, you need to understand how they are assembled. If necessary, reread the text to find that the elements need to be stacked and alternate between a coin and a disc of cotton soaked in lemon juice.

Step 4: Creation of the battery	**Estimated time: 30min**

The students are placed in small groups of 3-4 and follow the plan to build the battery.
Once the battery has been built, the students can check the operation of their battery using a voltage tester.

Step 5: Extension	Estimated time: 2 hours+
You can form groups of four or five students, give them a light bulb, some wires and a battery and ask them to make the bulb light up. Let the students work out how to use the Volta battery they made in the first part of the lesson. They can test it with a light bulb and explore the concept of a closed circuit. A sequence on the dangers of electricity can also be envisaged to raise the pupils' awareness. This can be done by showing images of different types of behaviour and dividing them into two columns (dangerous behaviour/safe behaviour). It is important to start a dialogue with the pupils about the behaviours to be avoided.	

Assessment activities

Activity 1: Self-assessment activity

Ask the students to self-assess their performance during the group activity, using the grid on page 6.
Self-assessment encourages learning and improves performance. Self-evaluation is systematically formative. Its aim is to highlight areas for improvement.

Activity 2: End-of-sequence assessment

At the end of the electricity sequences, you can do an evaluation which covers all the concepts addressed.
- Differentiate between a battery-powered object and a mains-powered object;
  → Show pictures of electronic devices and ask the pupils how they work (battery, electric wire).
- Identify dangerous situations;
  → Show images of dangerous and safe situations and ask students to explain why the situations are dangerous or not.
- Name the different parts of a battery/bulb;
  → **Complete** the text with the rights words.

A light bulb is a glass globe containing a filament. At the end of the bulb is a metal part consisting of a screw and a stud. The screw and stud form the socket.
- Draw an electrical circuit;
  → You can ask them to **complete** an electrical circuit so the bulb can light up.
- Conductive and non-conductive materials;
  → **Name** three non-conductive and three conductive materials.

References:

Marie. (2021). Séquence "électricité" CP-CE1. https://www.dansmatrousse.com/sequence-electricite-cp-ce1/

La Fondation La main à la pâte. (s. d.). L'Europe des découvertes scientifiques. Consulté 27 juillet 2023, à l'adresse https://fondation-lamap.org/projet/l-europe-des-decouvertes-scientifiques

Introduction – electronic objects

Figure 1 Canva https://www.canva.com/photos/MAC14QwSllk/

Figure 2 Canva https://www.canva.com/photos/MADer06en5M/

Figure 3 Canva https://www.canva.com/photos/MADQ5FKgeJg/

Figure 4 Canva https://www.canva.com/photos/MAEU4bgMdLo/

Figure 5 Canva https://www.canva.com/photos/MAEEQNF4keY/

Co-funded by the European Union

Volta's letter

"I shall here give a more detailed description of this device and of some others like it, as well as of the most remarkable experiments relating to it. I supplied myself with a few dozen small round plates or discs of copper, brass, or better still silver, an inch in diameter, more or less (for example coins), and an equal number of tin plates, or, what is much better, zinc plates of the same shape and size, more or less - I say more or less, because precision is not required, and in general the size as well as the shape of the metal pieces is arbitrary; We just have to make sure that they can be conveniently arranged one on top of the other in the form of a column. I also prepare a fairly large number of wheels of cardboard, skin or some other spongy material, capable of soaking up and retaining a lot of water or humour, which must be well soaked for the experiments to succeed. These slices or wheels, which I'll call wet discs, I'm making a little smaller than the metal discs or plates, so that when they're placed between them in the way I'll explain shortly, they don't spill over".

Self-assessment grid

Work in group

	☺	😐	☹
I took part in organising and carrying out the task.			
I cooperated actively within the group.			
I respected the other group members at all times.			
I was able to recognise and accept the skills and knowledge of the other members of the group.			
Everyone took part in our group discussions			
We asked the other members of our group for help when we needed it.			
I respected the deadlines			
I've finished my work.			
I've made an effort and I did my best			
I knew how to ask for help when I needed it			
The manipulation helped me understand the concepts			
I'm proud of my work and the result I've achieved			
I enjoyed taking part of this activity !			

☺ = Absolutely / 😐 = Partially / ☹ = Not at all

Teacher's comments :

.....

.....

.....

.....

.....

.....

.....

.....

.....

STEAM IN TIMES

DiSCLAIMER

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Co-funded by the European Union