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## Static Electricity - Law of Electrical Charge

<b>School</b>	<b>Middle</b>
<b>Year/Class</b>	<b>3</b>
<b>Subject:</b>	<b>Physics</b>
<b>CLIL language</b>	<b>English</b>

<b>Teacher/Teaching team profile</b>	Teacher's role:	Subject taught:
	<b>Main Teacher</b>	<b>Mathematics &amp; Science</b>

<b>Student group profile (general)</b>	CEFR Level: A1 A2
	<ul style="list-style-type: none"> <li>○ No previous CLIL experience</li> <li>○ Mother tongue (Italian): 18</li> <li>○ Migrant background: 2</li> <li>○ Special Educational Needs: 0</li> </ul>

<b>Timetable fit</b>	<b>Lesson n° 3 (2h)</b>	<b>Previous lessons:</b> <ol style="list-style-type: none"> <li>1. The first lesson is mainly focused on "brainstorming" about static electricity with the use of the Padlet website.</li> <li>2. The second lesson is about "the structure of the atom": concepts and terminology. The students are going to work through a matching game, putting together pieces of a simple article describing the atom correctly.</li> </ol>
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		Future lessons: <ol style="list-style-type: none"> <li>4. Grey's Straw experiment,</li> <li>5. Conductors and insulators - Charge and discharge,</li> <li>6. building a "Leyden jar",</li> <li>7. building a "Voltaic pile".</li> </ol>
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<b>Resources and Tools</b>	<p>Online resources (websites)</p> <ul style="list-style-type: none"> <li>- Content information (Italian): <a href="http://www.reinventore.it/">http://www.reinventore.it/</a></li> <li>- Online activity: <a href="https://quizlet.com/class/4465822/">https://quizlet.com/class/4465822/</a></li> <li>- Online activity (simulator): <i>Balloons and Static Electricity</i>  <a href="https://phet.colorado.edu/sims/html/balloons-and-static-electricity/latest/balloons-and-static-electricity_en.html">https://phet.colorado.edu/sims/html/balloons-and-static-electricity/latest/balloons-and-static-electricity_en.html</a></li> <li>- PhET Interactive Simulations, University of Colorado Boulder  <a href="https://phet.colorado.edu">https://phet.colorado.edu</a></li> </ul> <p>Computer (classroom)</p> <p>Material for experiences with static electricity in classroom</p> <p>Tools (realia) for each group:</p> <ul style="list-style-type: none"> <li>✓ A balloon</li> <li>✓ Wool cloth (scarf, pullover ...)</li> <li>✓ Pieces of paper,</li> <li>✓ hair</li> <li>✓ wall</li> <li>✓ soap bubbles</li> <li>✓ a plastic bag shaped like a jellyfish</li> <li>✓ Worksheet with instructions and guided reasoning (see <i>Attachment 1</i> and <i>2</i>)</li> </ul>
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<b>Students' prior knowledge, skills, competencies</b>	<b>Subject</b>	<b>Language</b>
	<p>The students studied this subject in the first year of middle school gaining knowledge about:</p> <ul style="list-style-type: none"> <li>• atomic structure</li> <li>• basic concepts about valence electrons</li> <li>• basic concepts about charges</li> </ul> <p>The students are able to:</p> <ul style="list-style-type: none"> <li>• follow written instructions</li> <li>• work in groups, use basic language to communicate</li> <li>• deal with emotions of groupmates, agree on the</li> </ul>	<p>The students started their study of the English language in the third year of primary school. Some of them took the KET certification in May 2017. According to the school curriculum the students are able to use:</p> <ul style="list-style-type: none"> <li>- simple past forms of regular and irregular verbs</li> <li>- past continuous and present perfect</li> <li>- future forms (<i>will, present continuous, be going to</i>)</li> <li>- personal pronouns used as subject or object (direct or indirect) forms</li> </ul>

	<p>final results</p> <ul style="list-style-type: none"> <li>• work through a True/False statements exercise</li> <li>• use an internet browser</li> </ul>	<p>of personal pronouns</p> <ul style="list-style-type: none"> <li>- time and place prepositions</li> <li>- adjectival comparative and superlative forms</li> <li>- modal verbs (<i>can, could, must, should, would</i>)</li> </ul> <p>The students are also able to:</p> <ul style="list-style-type: none"> <li>- describe simple events of the past</li> <li>- name the parts of the day, the months and the seasons of the year</li> <li>- illustrate future plans and intentions</li> <li>- describe the spatial position of objects</li> <li>- compare objects</li> <li>- define rules and prohibitions</li> </ul>
<b>Learning Outcomes expected for this lesson</b>	<p><b>Content</b> Students:</p> <ul style="list-style-type: none"> <li>- understand the concept of static electricity and know how to define it</li> <li>- know the definition of charge (positive- protons, negative – electrons)</li> <li>- understand the concept of “charging by friction” and know the definition</li> <li>- understand the concept of “the Law of Electrical charge” and know how to define it</li> </ul> <p><b>Communication</b> Pupils:</p> <ul style="list-style-type: none"> <li>- are able to describe what are the charges and how they move</li> <li>- are able to use key vocabulary and phrases related to electrostatic: <i>atom, charge, repel, attract, negative, positive, neutral</i>.</li> <li>- are able to use the present simple to describe, define and explain the movements of charges from an object to another</li> <li>- are able to argue and explain their point of view and ask relevant questions about the experiment</li> </ul> <p><b>Cognition</b> The students:</p> <ul style="list-style-type: none"> <li>- are able to summarize new knowledge</li> <li>- are able to write simple sentences in order to explain the most important pieces of information obtained with the experiment</li> <li>- are able to create static electricity and foresee the effects on different objects</li> </ul> <p><b>Culture</b> The students in the group work are aware of their own background and respect that is due to each other.</p>	

<b>Methodology</b>	<p>We start from the review of what has been done in the previous lesson in order to refresh the basic concepts about the atom and its parts.</p> <p>In the first part of the lesson we will introduce the concept of attraction between charges through an experiment titled “<i>Let’s get some attraction</i>” (Experiment 1, see <i>Attachment 1</i>). In this first part of the lesson, the main guidance is a worksheet that includes the method and a list of apparatus used in the experiment, a step-by-step description of the use of a simulator, and any related questions to guide the student in observation as well as related reasoning. There will be a final question asking the whole group to briefly describe what they have learned in the experiment.</p> <p>At the back of the worksheet, the students will find a short glossary with the vocabulary needed to understand the instructions, the questions and the final discussion. The worksheet will be read out loud by the teacher and the students will follow the instructions written on the worksheet. While reading, the teacher will support understanding of the instructions through the use of gestures to overcome the difficulties of the language, particularly for students with dyslexia. In order to help students with special needs, text is always presented in short sentences with high-readability fonts.</p> <p>In the second part of the lesson, we will introduce the concept of repulsion between charges through an experiment titled “Repulsion” (experiment n2, see attachment n2). The main guidance will be a worksheet with the same structure as the worksheet for the first part of the lesson. This will help the students through the reasoning and to understand the instructions.</p> <p>The lesson features mainly groupwork activities, during which they can confer and help one another. Through executing the experiment, each group will answer the given questions and write about what they think they have learned about the experiment. The end of each part of the lesson is followed by a whole class activity where each group will check the given answers.</p> <p>The main activity of the lesson is a hands-on activity in which students will observe the movement of charges that characterizes static electricity.</p>
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Activity	Activity aims	Activity Procedure	Language	Interaction	Materials	Time	Assesment
	<i>What is the purpose of this activity of the lesson</i>	<i>What will happen during this stage of the lesson</i>	<i>Competencies developed</i>				<i>Assessment tools in relation to the learning outcomes of the lesson.</i>
1	Review previous activity about atoms and its parts	The students are going to review the concepts learned in the previous lesson about the atom and its parts through the use of flash cards and other games using a website called quizlet.com	Vocabulary revision	Individual work	<a href="https://quizlet.com/199918171/atom-flash-cards/">https://quizlet.com/199918171/atom-flash-cards/</a>	15'	Informal formative assessment: each student can use it as an indicator of their own knowledge
2	<p>Introduction of the concept of charge, through the experiment of the “rubbed balloon” that is going to reproduce the Benjamin Franklin’s experience. The main concept is:</p> <ul style="list-style-type: none"> <li>- The matter is made off charges + and - .</li> <li>- Opposite charges get attracted”</li> </ul>	<p>The students will complete the experiment (to see the procedure for the experiment see <i>Attachment 1</i>) and they will answer shortly to the questions in the worksheet that will guide them in the reasoning.</p> <p>In the second part of this phase they are guided in the use of a simulator and in the comprehension of the movement and behavior of the charges.</p>	Pupils compare their answers with each other and give a feedback to their peers	Group work	<p>Each group will have the realia necessary for the experience :</p> <ul style="list-style-type: none"> <li>- a ballon a wool cloth (scarf, pullover ...)</li> <li>- pieces of paper,</li> <li>- hair,</li> <li>- wall</li> <li>- soap bubbles</li> <li>- and instruction on how to proceed in the experiment</li> <li>- guided observation</li> <li>- guided reasoning.</li> </ul> <p>The simulator  <a href="https://phet.colorado.edu/sims/html/balloons-and-static-electricity/latest/balloons-and-static-electricity_en.html">https://phet.colorado.edu/sims/html/balloons-and-static-electricity/latest/balloons-and-static-electricity_en.html</a>            PhET Interactive Simulations            University of Colorado            Boulder  <a href="https://phet.colorado.edu">https://phet.colorado.edu</a></p>	20'	Peer to peer assessment, informal and formative

3	Checking group work	Each group is going to read aloud the chosen answers	Reading aloud	Whole class		10'	This is an informal formative assessment: each student can use it as an indicator of their own knowledge
4	<p>Maintaining the structure of the previous experiment, we are going to carry out a second experiment about: Repulsion of the charges, The main concept is:</p> <ul style="list-style-type: none"> <li>- Equal charges get repulsed</li> <li>- Different charges attract each other</li> </ul>	<p>The students will complete the experiment (to see the procedure for the experiment see <i>Attachment 2</i>) and they will shortly answer to the questions in the worksheet that will lead them in the reasoning. Like in the previous experiment the pupils are guided in the use of a simulator and in the comprehension of the movement and behavior of the charges.</p> <p>In this phase the use of the simulator will see the use of 2 balloons without the wall.</p>	<p>Pupils compare their answers and give feedback to their peers</p> <p>Vocabulary</p>	Group work	<p>Each group will have the realia necessary for the experience:</p> <ul style="list-style-type: none"> <li>- a balloon</li> <li>- a wool cloth (scarf, pullover ...),</li> <li>- a plastic bag shaped like a jellyfish</li> <li>- instruction on how to proceed in the experiment</li> <li>- guided observation</li> <li>- guided reasoning</li> </ul>	20'	Peer to peer assessment: Informal and formative:
5	Checking work group	Each group is going to read aloud the chosen answers	Reading aloud	Whole class		10'	This is an informal formative assessment: each student can use it as an indicator of their own knowledge

6	Final revision	The revision of the concept learned Is realized through the use of a ppt presentation. In the ppt the students review the experiments and the connected concepts	Listening	Whole class	See <i>Attachment 3</i> Final revision PPT	15'	
7	Homework	At hom, the students are going to review the concepts learned through the use of flash cards and other games on quizlet.com	Revision of language used and vocabulary	Individual work	<a href="https://quizlet.com/205817694/static-electricity-flash-cards/">https://quizlet.com/205817694/static-electricity-flash-cards/</a>		

