

Objectives	Construct & Explain Simple Batteries	Extra Information
<p>L.O:</p> <p>To Construct And Explain Simple Batteries.</p>	<p>MAIN TEACHING – Putting Batteries in the Limelight (10 minutes)</p> <p>Ask your pupils if they know how a battery works. Allow any answers that mention storage or electricity. Explain that a battery stores energy, usually with chemicals, to be released when needed, usually via a chemical reaction. Ask the class if they know what a chemical reaction is, if not explain, and ask if they can think of any examples. If the class is having trouble you can help them with a few examples such as rockets, turning food into energy or using hand wash. After a few more examples tell the class that today they will be making their own batteries and watching a chemical reaction take place.</p> <p>MAIN TASK – (25 minutes)</p> <p>Activity Breakdown:</p> <ol style="list-style-type: none"> ➊ Fill your beaker 3/4 with lemonade. ➋ Take your copper strip and scrub it with the steel wool until shiny, then clip one of the wires to one end of it. If you're not using crocodile clip wires, secure a length of copper wire to one end of the copper strip using tape, making sure that the copper wire and copper strip are in contact. ➌ Take your other metal (Zinc, Aluminium or Iron) and repeat the previous step with a new wire. ➍ Take the wire with copper attached and secure its free end to one of the LED wires, either by clipping, or if using a copper wire twist the two wires together and tape them to make them secure. ➎ Take the wire with the other metal and repeat the previous step with the free wire of the LED. ➏ Submerge the copper in the beaker of lemonade. ➐ Repeat the previous step with your other metal. ➑ The LED should come on fairly quickly, if not, switch the wires connected to the LED and try again. If it's still not working check all the connections and clean the metals more thoroughly with the steel wool. 	<p>Materials Required:</p> <ul style="list-style-type: none"> ▶ LEDs (can be purchased for <£5 of salvage from old electronic devices and holiday lights) ▶ Limes/lemons or lemonade ▶ Beaker (if using lemonade) ▶ 5cm copper strips ▶ 5cm Aluminium strips or zinc strips or iron nails ▶ 2 x Crocodile Clip Leads or Copper wires ▶ Tape ▶ Steel Wool <p>Key Words:</p> <ul style="list-style-type: none"> ▶ Electricity ▶ Storage ▶ Chemical reaction ▶ Circuit ▶ Acid ▶ Ion ▶ Positive/negative ▶ Attraction ▶ By-product

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	<p>Mini-Plenary – With the battery made and working, ask your class for observations. Expect initial observations to be just of the light being on but ask the class to look closely at the two metals. They should start to see small bubbles and deposits on the non-copper metal. Explain that the lemonade is acidic and helps break down the other metal and copper into ions (particles with a negative or positive charge). Explain that electricity is the flow of these ions through a circuit and this is the source of energy that devices like lights or phones can make use of to work (you can use the examples of a windmill/windfarm using the flow of air as energy or a watermill using the flow of a river as allegorical representations of this to support learning). Explain that more precisely, some of the ions in the copper are flowing through the acid and are attracted to the other metal which has the opposite charge, that these are the deposits. The charge from the ion then travels through the circuit and is used by the LED to produce light. Explain that the small bubbles being produced are small amounts of Hydrogen (a by-product of this chemical reaction).</p> <p>Tell the class that no battery can run forever and that this reaction is no different. Ask them to think of reasons why that could be. Discuss the lemonade evaporating, or any other reasons they may come up with. Explain that aside from those other valid reasons, as the small bits of copper are attracted to the other metal, over time they build up and cover the other metal and once there is no more space for the copper, the reaction stops and the battery dies.</p> <p>SECONDARY TASK – (15 minutes) Activity Breakdown:</p> <ol style="list-style-type: none"> 1 Take a lime or lemon, roll it firmly between your hands. 2 Using the previous working set up, dispose of the beaker and lemonade, then clean the copper and the other metal with steel wool. 3 Push the copper strip into the lemon/lime, making sure not to pierce all the way through and that the wire is not in contact with the lemon/lime. 4 Repeat the previous step with your other metal. 5 The LED should come on fairly quickly, if not try changing the lemon/lime you are using and rolling it firmer. 	<p>Success Criteria:</p> <ul style="list-style-type: none"> ▶ I can construct a simple battery. ▶ I can construct simple batteries and understand the flow of electricity. ▶ I can construct simple batteries, understand the flow of electricity, and explain the processes involved.

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	<p>Mini-Plenary – Ask the class, if after the previous experiment, they can explain what is happening in this experiment. Encourage any volunteers and lead them to the idea that the same thing is happening.</p> <p>Ask if they know why they had to roll the lemon/lime, explaining that it frees the juice which contains citric acid, (an acid that is found in all citrus fruit) letting the acid flow freely between the two metals. Discuss the advantages and disadvantages of this battery over the last, lead them to the ideas like being easier to carry but harder to refill with acid.</p> <p>PLENARY - SAFETY – (10 minutes)</p> <p>Ask your class about the safety of what they've just done. Ask them if they know of the dangers of electricity and discuss with them the difference between this experiment and other batteries. Explain that this experiment produced very little power, so little that it is of no risk, but the batteries that power phones are many, many thousands of times stronger and the wires that power the devices in their home are many times stronger than that.</p> <p>Tell them that the chemicals in our batteries were all safe as well but that the chemicals used in common batteries are very harmful.</p> <p>Explain that electricity isn't something to be feared, but should always be respected and to never perform an experiment, especially one involving electricity without proper guidance from a trusted adult. If there is time left in the lesson, discuss situations where electricity can be unsafe and how they can avoid these.</p>	