

Year 6 – Summer 1 – ‘Electricity’

NC Science – Electricity

Pupils should be taught to:

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
- Use recognised symbols when representing a simple circuit in a diagram.



I can create a success criteria based on a design brief

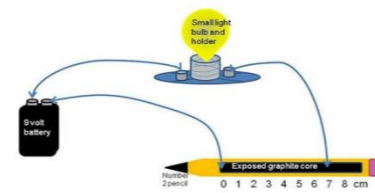
Note – will need some teacher (SLT) volunteers to be the ‘dragons’. They will need to be present for the final lesson too. Introduce the ‘dragons’ to the class. Explain that the ‘dragons’ are there to set a brief for a prototype that the chn will need to complete by the final lesson of this term. Teacher to be the ‘Chief Dragon’ – you will be the chn’s coach and mentor throughout. You and the other dragons to share the brief. Explain health and safety. Share the clips. <http://www.bbc.co.uk/programmes/p0118bzv> – The Dangers of Electricity; <http://www.bbc.co.uk/programmes/p0119815> – Electrical Circuits; <http://www.switchedonkids.org.uk> – Using electricity safely. Explain that we will be making battery-powered circuits. TTYP – why is this different to mains electricity? Lower voltage. Check that chn understand how mains and battery power is created (talk about energy sources vs chemical reactions) and establish that scientists call ‘single’ batteries ‘cells’. The chn to complete a series of electrical challenges. We will be looking for understanding of how electric circuits work and how they respond to enquiry questions scientifically. Give out the challenge cards in groups. Use the laminated Ps and post-its to be used throughout the investigations. Once completed, explain to the chn that they now need to create their own success criteria. Encourage chn to highlight. Begin as a class. In groups chn to finish. They will need this before starting their planning process by looking at existing products during the next session.

I can investigate electrical components and circuits

Pose a series of ‘What if?’ questions like ‘What happens to the brightness of a bulb if I increase or decrease the number of bulbs in a circuit?’ Discuss. Today’s learning will be exploring and investigating the ‘What if?’ questions. Chn need to make correlations (vocab check) that they notice between the number of components, the batteries, sound, movement or brightness this creates through their **published** conclusions. Draw two axes on the board, one labelled ‘number of bulbs in circuit’, and the other ‘brightness of bulbs’. What graph type they think might reflect this ‘What if?’ challenge. This could be a way of **presenting** findings. Remind chn of circuit diagrams, symbols. Whilst the chn investigate, ask questions like ‘how can you check which voltage of battery or cell needed?’ ‘What do you think will happen if they increase the voltage/number of batteries instead of bulbs?’ Chn to complete investigations of 1-2 ‘What if?’ using the ps. These will be short, however highlight the importance of presentation particularly in the **planning** stage (circuit diagram) and **presenting** of results. Ideally, the chn will have explored a ‘What if?’ with a bulb, buzzer and motor. Explain that this is research for their design and the ‘dragons’ will want to know the testing that has been carried out! Chn to research for their own projects. Create an ideas board.

I can improve and design an electrical circuit

Share <https://www.bbc.co.uk/bitesize/topics/zq9q9f/articles/z18vg82>. Chn have been set a circuits challenge by the Dragons to complete in their teams. They only have 3mins to complete! In that time, they need to ‘repair’ the non-working circuits! After, discuss the circuits challenge. Explain that the ideas boards and investigations from last week impressed the Dragons. Now, it is getting more technical! They will be exploring *how* the components work! How does a bulb work? Share <http://www.bbc.co.uk/education/clips/zk4st9q> (from 2mins-end). Explain the tungsten in the bulb adds ‘resistance’ to the flow of the electric current as well as being long (coiled) and thin – this is what causes it to glow. Give chn the circuit diagram symbols and challenge them to create a circuit diagram as a ‘blue print’ for their design. Remind chn to refer back to success criteria. Chn to complete online research to embed scientific explanations for resistance within the components they are using. The chn’s circuit diagram will have a summary of the relevant brightness, volume and speed of components within it. It will be annotated, with explanations of resistance. Come back together and lay all current designs out around the classroom. Get chn (and yourself as chief dragon) to feedback (see forms) on the designs. Design now needs to be finalised!



I can investigate and make a dimmer switch

The ‘dragons’ have requested a design tweak – the lights and buzzers must now have a dimmer switch! TTYP – ‘what is a regular switch?’ ‘What do you think a dimmer switch is?’ What they think you need to do to the electricity in a dimmer switch to reduce the brightness in a bulb. What happens to the electricity when it goes into a component (it is resisted). We need to find a way of reducing and increasing the flow of electricity to create a dimmer switch. Now show the chn the adapted pencil. In groups, to investigate how it can be used to as a dimmer switch. Give the chn the equipment. Remind them to use their knowledge of resistance in materials that conduct electricity. 15-20mins to try out their ideas. Come back together and discuss. Demonstrate how the crocodile clip is used as connection and is moved up and down the pencil, where it will become dimmer/brighter. In their groups, chn will incorporate this into their design. Chn will draw the circuit and include and explanation. Complete their equipment request form so that their design is organised.



I can create a working prototype

Today, chn are going to manufacture their design prototype. They must follow their design but to be confident to tweak it where necessary and to ensure that their components are at the correct powered level for their design by choosing the correct batteries. They also need to develop their presentation for the dragons As they are building their prototype, they can explain how they have met the design brief (get chn to refer to their success criteria). In their presentation, they need to include an explanation of how each component works and why they have used the voltage selected for what effect. Give the chn presentation prompts to support – what needs to be included. In addition to this, they need to cost out how much their design would cost to make (based on the given costing resource) and come to a decision about how much they would market their product at (there needs to be a profit of 20% on the sale price). They will be asked questions on their product by the dragons, so ALL chn need to be clear on how their prototype works.



NC Working Scientifically (UKS2)

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations

Identifying scientific evidence that has been used to support or refute ideas or arguments

I can present and evaluate a working prototype

The ‘dragons’ will be invited back in (halfway through the session). They will ask the chn questions as the groups present their prototypes ‘in the den’. To begin, the chn will evaluate their prototype and make any last minute improvements before putting together their final presentation. They need to present their design in relation to the design brief- use the examples. They need a technical aspect, drawing on their findings from the investigations they completed earlier (explaining components etc.). Chn can discuss their roles – are they going to be sharing a particular part? Within their presentations they need to include prototype, diagrams, graphs, costing, safety guidance, marketing introduction (about the product, target buyer, USP etc.), development of product. Presentations used to assess understanding of electrical content as well as noting how well chn can present their findings from investigation. **Evaluate the procedure** – reflect on both the aesthetics of their design and whether they are happy with their electrical decisions as well.



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