

Our Intent is: To support our pupils in answering the question, "How do we design, make and evaluate solutions to real and relevant problems?" Using creativity and innovation, we inspire pupils to develop skills which impact on daily life.



Forton Primary School
Design and Technology

Pendle Class
Summer 2
Year B

N.C. LINKS: Design and Technology

When designing and making, pupils should be taught to:

Design

- use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups
- generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design

Make

- select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately
- select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities

Evaluate

- investigate and analyse a range of existing products

Key Concept: Electrical systems

Focus : More complex switches and circuits

Key Question: How can I include multiple switches in my circuit?

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	<ul style="list-style-type: none">• evaluate their ideas and products against their own design criteria and consider the views of others to improve their work• understand how key events and individuals in design and technology have helped shape the world• Technical knowledge• apply their understanding of how to strengthen, stiffen and reinforce more complex structures• understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]• understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]• apply their understanding of computing to program, monitor and control their products
<p>Unit Overview: to design and create a system that needs multiple switches and bulbs/buzzers.</p>	<p>Vocabulary:</p> <p>series circuit, parallel circuit, names of switches and components, input device, output device, system, monitor, control, program, flowchart</p>
<p>Possible Outcome:</p> <p>vehicle alarm security lighting system alarm for valuable artefact automatic nightlight electrical board game alarm for school shed</p>	<p>function, innovative, design specification, design brief, user, purpose</p>

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Intended User:

vehicle owner themselves
school community school administrator younger children
siblings parents
museum curator

Building on Prior learning when B follows A:

- Understanding of the essential characteristics of a series circuit and experience of creating a battery-powered, functional, electrical product.
 - Initial experience of using computer control software and an interface box or a standalone box, e.g. writing and modifying a program to make a light flash on and off.

Key Skills (Disciplinary)

Designing

- Use research to develop a design specification for a functional product that responds automatically to changes in the environment. Take account of constraints including time, resources and cost.
- Generate and develop innovative ideas and share and clarify these through discussion.
- Communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams.

Making

- Formulate a step-by-step plan to guide making, listing tools, equipment, materials and components.

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- Competently select and accurately assemble materials, and securely connect electrical components to produce a reliable, functional product.
- Create and modify a computer control program to enable an electrical product to work automatically in response to changes in the environment.

Evaluating

- Continually evaluate and modify the working features of the product to match the initial design specification.
- Test the system to demonstrate its effectiveness for the intended user and purpose.
- Investigate famous inventors who developed ground-breaking electrical systems and components.

Technical knowledge and understanding

- Understand and use electrical systems in their products.
- Apply their understanding of computing to program, monitor and control their products.
- Know and use technical vocabulary relevant to the project.

Sequence of Lessons:

1. Investigative and Evaluative Activities (IEAs)

- Using research, discuss a range of relevant products that respond to changes in the environment using a computer control program such as automatic nightlights, alarm systems, security lighting e.g. *Who have the products been designed for and for what purpose? How and why is a computer control program used to operate the products? What input devices, e.g. switches, and output devices, e.g. bulbs, have been used?*
- Investigate electrical sensors such as light dependent resistors (LDRs) and a range of switches such as push-to-make switches, push-to-break switches, toggle switches, micro switches and reed switches. To gain an understanding of how they are operated by the user and how they work, ask the children to use each component to control a bulb in a simple circuit. Remind children about the dangers of mains electricity.
- Children could research famous inventors related to the project e.g. Thomas Edison – light bulb.

2. Focused Tasks

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- Through teacher demonstration and explanation, recap measuring, marking out, cutting and joining skills with construction materials that children will need to create their electrical products.
- Demonstrate and enable children to practise methods for making secure electrical connections e.g. using automatic wire strippers, twist and tape electrical connections, screw connections and connecting blocks.
- Drawing on science understanding, ask the children to explore a range of electrical systems that could be used to control their products, including a simple series circuit where a single output device is controlled, a series circuit where two output devices are controlled by one switch and, where appropriate, parallel circuits where two output devices are controlled independently by two separate switches.
- Drawing on related computing activities, ensure that children can write computer control programs that include inputs, outputs and decision making. Test out the programs using electrical components connected to interface boxes or standalone boxes.
- Teach children how to avoid making short circuits.

3. Design, Make and Evaluate Assignment

- Develop an authentic and meaningful design brief with the children.
- Ask the children generate innovative ideas by drawing on research and develop a design specification for their product, carefully considering the purpose and needs of the intended user.
- Communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams. Drawings should indicate the design decisions made, including the location of the electrical components and how they work as a system with an input, process and output.
- Produce detailed step-by-step plans and lists of tools, equipment and materials needed. If appropriate, allocate tasks within a team.
- Make high quality products, applying knowledge, understanding and skills from IEAs and FTs. Create and modify a computer control program to enable the product to work automatically in response to changes in the environment.
- Critically evaluate throughout and the final product, comparing it to the original design specification. Test the system to demonstrate its effectiveness for the intended user and purpose.

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Enhancements: N/A

End of Unit Outcome: Working circuit