



Knowledge and Skills Mind Map (DT)

Year 4 Spring Term

Knowledge - 
Skill - 

 High
Performance
Learning
World Class School

Prior Learning:

- ****Note for teachers:** very little prior knowledge about electrical systems. Circuits are also covered in Science this term in Year 4**
- Children have previously cut and joined a variety of construction materials, such as wood, card, plastic, reclaimed materials and glue (Year 2)

1. Can I explore and evaluate existing electrical products?

- **Vocab:** electrical product, circuit, battery, switch, light, input, output, purpose, user
- Know that an electrical product uses a power source (battery) to make something work.
- Know that a simple electrical system includes parts such as a battery, wires, a switch and a light.
- Know that a switch turns a circuit on and off, allowing electricity to flow.
- Know that electrical products are designed for a user and a purpose (e.g. to provide light or communicate a message).

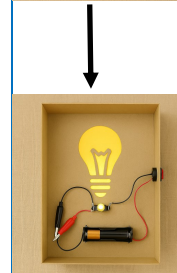
Task: Show a simple working circuit (battery, wires, switch and bulb/LED) and model how it works (switch on/off), then provide a range of simple electrical products or images (e.g. torch, light-up toy, illuminated sign) and identify the key parts (battery, switch, light) and what they do. Children explore how products work and what they are used for. In books, children draw and label a simple electrical system (battery, switch, light) and write a short explanation e.g. "The switch turns the light on because..."

- **Investigating and Evaluating:** Investigate and analyse a range of existing battery-powered products, considering how they work and their purpose.
- **Technical Knowledge and Understanding:** Know and use technical vocabulary relevant to electrical systems (e.g. battery, switch, circuit, light).

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Electrical Systems

Simple Programming and Control:
'Can I design, make and evaluate an illuminated sign for a specific user and purpose?'



3. Can I design an illuminated sign for a specific user and purpose?

- **Vocab:** design, user, purpose, criteria, circuit, switch, light, annotated
- Know that we must design a product for a **specific user and purpose** (e.g. a sign to help younger children follow rules or keep safe).
- Know that design criteria help us decide what our product should include (e.g. clear message, bright light, easy to use switch).
- Know that electrical components need to be planned in the design (e.g. where the light and switch will go).
- Know that we can communicate our ideas through **annotated drawings**, showing materials, components and key features.

Task: Discuss possible purposes for illuminated signs (e.g. safety message, classroom reminder) and model how to create simple design criteria (e.g. must clearly show a message, must include a light, must have a switch that is easy to use), then children design their own illuminated sign by drawing and labelling the key features including where the circuit components will go. In books, children create an annotated design showing the structure, message, light and switch, and include a short explanation e.g. "My sign is for... I chose this design because..."

Designing:

- information about users' needs and develop design criteria for a product that is fit for purpose.
- Generate, develop and communicate ideas through annotated sketches.

Technical Knowledge and Understanding: Know and use technical vocabulary relevant to electrical systems and design (e.g. switch, circuit, light, user, purpose).

2. Can I investigate and select an appropriate switch?

- **Vocab:** switch, push-to-make, push-to-break, toggle, circuit, open, closed
- Know that a switch is an **input device** that controls whether a circuit is on or off.
- Know that when a circuit is **closed**, electricity flows and the output (e.g. light) works, and when it is **open**, it does not.
- Know that different switches work in different ways, such as:
 - **push-to-make** (press to turn on)
 - **push-to-break** (press to turn off)
 - **toggle** (flip on/off)
- Know that different switches are suited to different purposes (e.g. a push switch for quick use, a toggle switch for keeping something on).

Task: Model how to use different switches in a simple circuit (battery, wires, bulb/LED), showing how each one turns the circuit on and off, then children test a range of switches (or simple home-made versions using card/foil if resources are limited) and observe how they work. In books, children draw and label two different types of switches and write a short explanation e.g. "This switch works by... I would use this switch because..."

- **Investigating and Evaluating:** Investigate examples of switches and how they work in different products.
- **Technical Knowledge and Understanding:** Understand how switches act as input devices to control circuits and outputs such as bulbs or LEDs.



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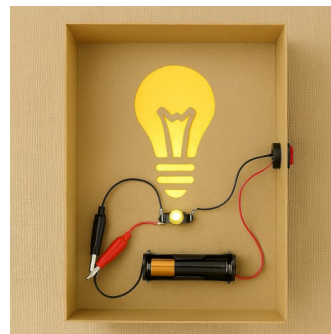
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Electrical Systems

Simple Programming and Control:

'Can I design, make and evaluate an illuminated sign for a specific user and purpose?'



4. Can I make an illuminated sign using a simple circuit?

- **Vocab:** circuit, battery, wire, bulb/LED, switch, connection, assemble, structure
- Know that a simple series circuit includes a battery, wires, a switch and an output (e.g. bulb or LED).
- Know that the circuit must form a complete loop (closed circuit) for the light to work.
- Know that loose or incorrect connections can cause a fault, so components must be joined securely.
- Know that we must work safely (e.g. not connecting wires directly across the battery, keeping equipment organised, handling tools carefully).

Task: Model how to build a simple series circuit (battery, wires, switch and bulb/LED) and test it before adding it to a structure, then demonstrate how to attach the circuit to a basic sign (e.g. card frame or box with a message on the front), ensuring the light is visible and the switch is accessible. Children follow their design to build their illuminated sign, testing as they go to ensure the circuit works. In books, children annotate their design to show how the circuit was assembled, including any changes made during making.

Making:

- Order the main stages of making.
- Select and use tools and equipment to cut, shape, join and assemble with some accuracy.
- Connect simple electrical components in a series circuit to achieve a functional outcome.

Technical Knowledge and Understanding: Understand how to construct a simple series circuit and use it within a product.

5. Can I evaluate my illuminated sign?

- **Vocab:** evaluate, criteria, purpose, user, function, improve, fault
- Know that we can evaluate our product by comparing it to our design criteria (e.g. does it work, is it bright enough, is the message clear).
- Know that we must check if the circuit works correctly (e.g. the light turns on/off using the switch and there are no loose connections).
- Know that we can identify faults in a circuit (e.g. loose wires, incomplete circuit) and suggest ways to fix them.
- Know that we can suggest improvements based on how well the product meets the user's needs and purpose.

Task: Model how to test an illuminated sign (checking the circuit works, the switch functions correctly and the light is clearly visible), then children test their own sign and compare it to their design criteria. In books, children write a short evaluation including what worked well, whether the product met its purpose and one improvement using a sentence starter such as "My illuminated sign was successful because... Next time I would...".

- **Evaluating:** Evaluate their ideas and products against their own design criteria and identify strengths and areas for improvement.
- **Technical Knowledge and Understanding:** Understand how electrical systems function and how faults can be identified and corrected.