

1. Year Groups
Year 4

2. Aspect of D&T
Electrical systems
Focus
Simple circuits and switches

4. What could children design, make and evaluate?

siren for a toy vehicle reading light noise-making toy
nightlight illuminated sign torches table lamp
lighting for display hands-free head lamp
buzzer for school office other – specify

5. Intended users

themselves younger children older children
teenagers parents grandparents friends
school general public other – specify

6. Purpose of products

safety and security hobbies and interests
utility pleasure advertising gift
energy saving for sale other – specify

7. Links to topics and themes

Homes Travel and Holidays Cities
Emergency Vehicles School Business
Enterprise Light and Dark other – specify

8. Possible contexts

home school leisure culture
enterprise environment sustainability
local community other – specify

9. Project title

Design, make and evaluate a _____ (product)
for _____ (user) for _____ (purpose)
To be completed by the teacher. Use the project
title to set the scene for children's learning prior
to activities in 10, 12 and 14.

16. Possible resources

handling collection of
battery-powered electrical
products
switches including toggle,
push-to-make and push-
to-break

aluminium foil, paper
fasteners, paper clips,
card, corrugated plastic,
reclaimed materials,
finishing materials and
media

buzzers, bulbs, bulb
holders, zinc carbon or
zinc chloride batteries
batteries, battery holders,
wire, automatic wire
strippers
suitable control program
with interface box or
standalone control box
right/left handed scissors,
PVA glue, cutting mats

17. Key vocabulary

series circuit, fault,
connection, toggle
switch, push-to-make
switch, battery, battery
holder, bulb, bulb
holder, wire, insulator,
conductor, crocodile clip

control, program,
system, input device,
output device

user, purpose, function,
prototype, design criteria,
innovative, appealing,
design brief

3. Key learning in design and technology

Prior learning

- Constructed a simple series electrical circuit in science, using bulbs, switches and buzzers.
- Cut and joined a variety of construction materials, such as wood, card, plastic, reclaimed materials and glue.

Designing

- Gather information about needs and wants, and develop design criteria to inform the design of products that are fit for purpose, aimed at particular individuals or groups.
- Generate, develop, model and communicate realistic ideas through discussion and, as appropriate, annotated sketches, cross-sectional and exploded diagrams.

Making

- Order the main stages of making.
- Select from and use tools and equipment to cut, shape, join and finish with some accuracy.
- Select from and use materials and components, including construction materials and electrical components according to their functional properties and aesthetic qualities.

Evaluating

14. Design, Make and Evaluate Assignment (DMEA)

- Investigate and analyse a range of existing battery-powered products.
- Develop a design brief with the children within a context which is authentic and meaningful.
- Discuss with children the purpose of the battery-powered products that they will be designing and making and who they will be for. Ask the children to generate a range of ideas, encouraging realistic responses. Agree on design criteria that can be used to guide the development and evaluation of the children's products, including safety features.
- Using annotated sketches, cross-sectional and exploded diagrams, as appropriate, ask the children to develop, model and communicate their ideas.
- Understand and use electrical systems in their products.
- Ask the children to consider the main stages in making and testing before assembling high quality products, drawing on the knowledge, understanding and skills learnt through IEAs and FTs.
- Evaluate throughout and the final products against the intended purpose and with the intended user, drawing on the design criteria previously agreed.
- Know and use technical vocabulary relevant to simple circuits and switches.

10. Investigative and Evaluative Activities (IEAs)

- Discuss, investigate and, where practical, disassemble different examples of relevant battery-powered products, including those which are commercially available e.g. *Where and why they are used? How does the product work? What are its key features and components? How does the switch work? Is the product manually controlled or controlled by a computer? What materials have been used and why? How is it suited to its intended user and purpose?*
- Ask children to investigate examples of switches, including those which are commercially available, which work in different ways e.g. push-to-make, push-to-break, toggle switch. Let the children use them in simple circuits e.g. *How might different types of switches be useful in different types of products?*
- Remind children about the dangers of mains electricity.

12. Focused Tasks (FTs)

- Recap with the children how to make manually controlled, simple series circuits with batteries and different types of switches, bulbs and buzzers. Discuss which of the components in the circuit are input devices e.g. switches, and which are output devices e.g. bulbs and buzzers.
- Demonstrate how to find a fault in a simple circuit and correct it, giving pupils opportunities to practise.
- Use a simple computer control program with an interface box or standalone control box to physically control output devices e.g. bulbs and buzzers.
- Ask the children to make a variety of switches by using simple classroom materials e.g. card, corrugated plastic, aluminium foil, paper fasteners and paper clips. Encourage children to make switches that operate in different ways e.g. when you press them, when you turn them, when you push them from side to side. Ask the children to test their switches in a simple series circuit.
- Teach children how to avoid making short circuits.

11. Related learning in other subjects

- **Science** – know how to construct simple series circuits and have a basic understanding of conductors, insulators and open and closed switches.
- **Spoken language** – participate in discussion and evaluation of battery-powered products. Ask relevant questions to extend knowledge and understanding. Build their technical vocabulary.

13. Related learning in other subjects

- **Science** – know how to construct simple series circuits and have a basic understanding of conductors, insulators and open and closed switches.
- **Computing** – design, write and debug programs that accomplish specific goals, including controlling physical systems.
- **Spoken language** – asking questions to check understanding, develop technical vocabulary and build knowledge.

15. Related learning in other subjects

- **Spoken language** – maintain attention and participate actively in collaborative conversations, staying on topic and initiating and responding to comments. Develop understanding through speculating, hypothesising, imagining and exploring ideas.
- **Science** – know how to construct simple series circuits and have a basic understanding of conductors, insulators and open and closed switches.
- **Computing** – design, write and debug programs that accomplish specific goals, including controlling physical systems.
- **Art and design** – using and developing drawing skills.

18. Key competencies

problem-solving teamwork negotiation
consumer awareness organisation motivation
persuasion leadership perseverance
other – specify

19. Health and safety

Pupils should be taught to work safely, using tools, equipment, materials, components and techniques appropriate to the task. Risk assessments should be carried out prior to undertaking this project.

20. Overall potential of project

