



Solar Toy

Design + Make

Overview

During these sessions pupils will evaluate the design of solar toys, explore how they are made and begin to think about the kind of toy they would like to design themselves. They then design and make a windmill based solar powered toy using junk modelling.

KS2 – Years 3-6
Science, Design and
Technology

Curriculum Links:

Science - Electricity

- identify common appliances that run on electricity.
- recognize that a switch opens and closes a circuit.
- compare and give reasons of the variations in how components function.
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.

Design & Technology

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, such as cutting, shaping, joining and finishing accurately.

Evaluate

- investigate and analyse a range of existing products.
- evaluate their ideas and products against their own design criteria and consider the views of others to improve their work.

Technical Knowledge

- 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 how to strengthen, stiffen and reinforce more complex structures.

Materials & Resources:

Design sheet

A selection of solar powered toys

Pencils and crayons

Junk modeling materials

Scissors

Blu-tac

Double sided sticky tape and pads

Motors

Solar cells

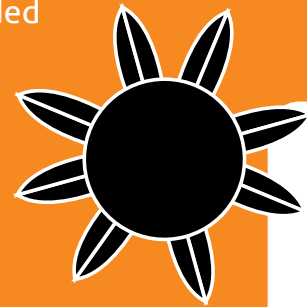
Wires

Plastic propeller blades

Cellotape

Goals

- Revise how solar panels work and how they work in circuits
- Evaluate a solar powered toy
- Apply their knowledge of electrical circuits to both identify how a solar toy works and to design their own solar toy
- Consider the views of other people when evaluating and designing.
- Design a solar powered toy, based on a windmill. Evaluate.
- Make a prototype of the windmill, considering the circuit needed, fixings needed and strength required to make it work.



Intro

What sorts of objects can be powered by solar panels?

Mobile phone chargers/ satellites/ lights/ speed signs/ houses etc.

Why is solar power (& other renewable sources) important?

It's an environmentally friendly way of getting our energy – no CO2 emissions.

Session Activity

- If you have access to one, show a solar powered toy and discuss briefly as a class how it works. If not, watch this video on You Tube. Teacher to make a diagram on the board labeling its features. Discuss – do solar powered toys need a switch? Do they need a battery? How do they work?
- Ask children to choose a toy to evaluate, (see sheet part 1 & 2) looking at fixings, wiring, circuits, mechanisms and materials. If you do not have any solar toys, look at these You Tube videos instead.
 - [Solar Powered Wiggling Cockroach](#)
 - [Lets Repair a Solar Mover](#)
 - [Solar Powered Cars](#)
- Give feedback on what the toy is like to play with.
- Show staged photos of a pre-made windmill toy to model the design process, showing materials used, fixings, circuits, etc.
- Show pupils how to put together the solar circuit (again show photos if necessary) – children to make the circuit work themselves.
- Children to design their own solar powered windmill, using junk modeling materials, considering the following: placing of the solar panel, how to fix it, how to get the wires to it from the motor, placing of the motor and propeller blades, strength of the structure. (part 3 & 4 on sheet)
- Children to work in pairs to make a prototype windmill (may need some adult help with some fixings). Put the toy out in the sunshine.
- Evaluate – did it work? How could you improve it? What would you do different next time? (Part 5 on sheet)
- Using knowledge gained during the design and make process of their junk model solar powered windmill, children then design their 'perfect solar toy'. (final part on sheet)