



Structures - Windmills



Year: 1
Term: Spring

Prior knowledge

Children already know:

How to explain what they have made.

How to talk about how they made it and the different techniques they used.

How to follow instructions accurately including several ideas or actions

How to use a range of small tools e.g. scissors, paint brushes, cutlery

How to discuss problems that they had when making a product or creation and discuss how they overcame it.

How to talk about what they would do differently next time and why.

Key Knowledge (facts and skills) for unit

Pre-design and technical knowledge

Windmill – children to know a windmill is a machine that use the power of the wind. Windmills may be used to grind grain into flour, to pump water, or to produce electricity. A windmill has a number of blades that spin around when wind blows on them. The blades are mounted on a tall tower or building. The main parts of a windmill are: the part that makes it stand up (supporting structure), the pieces that move in the wind (turbine or sails) and the point from which the turbine/sails move (the axle).

2D nets of 3D shapes – children to know that the net of a 3D shape is what it looks like if it is opened out flat. A net can be folded up to make a 3D shape.

Mechanism – children to know that a mechanism is the part that makes movement in a product e.g. slider, wheel, cam, lever, pulley.

Structure and joining – children should know ways of strengthening, stiffening and stabilising their windmill (E.g. Using a strong material, wider base, attaching triangles in the corners, adding supports.) They should know which methods of attaching materials are the strongest to create the structure. (E.g. Using Sellotape instead of a glue stick, folding paper/card around the part it is being attached to.)

Construction materials – children will know the different properties of materials including cardboard, string, plastic and metal and which are most appropriate to select for their design.

Supporting structure – children to know that this is something that has been made and put together. It can usually stand on its own it's the part that makes the windmill stand up.

Turbine or sails – children to know that these are the pieces that move in the wind.

Axle – children to know it is a long straight piece of material which connects to a rotating component (e.g. the wheels of a car) the point from which the turbine/sails move.

Design

- To know how to explore how different types of structures can be made stronger, stiffer and more stable.
- To know how to draw and label a simple sketch to show a design for a windmill
- To know how to create a design based on existing windmills that would be suitable for a mouse.
- To know how to, through discussion, suggest ideas, develop design ideas and explain a plan to make a model, moving windmill
- To know how to design a purposeful, functional model windmill

Make

- To know how to join materials effectively to create strong, structures and moving mechanisms.
- To know how to use a range of tools and equipment to perform practical tasks (e.g. cutting, shaping, joining and finishing).
- To know how to make 2D nets into 3D structures.
- To know how to select construction materials according to their characteristics in order to create stable structures from card, tape and glue
- To know how to follow instructions to cut and assemble the supporting structure of a windmill
- To know how to create functioning turbines and axles which are assembled into a main supporting structure
- To create a windmill fit for a mouse.

Evaluate

- To know how to explore and evaluate existing windmills and how they work.
- To know how to suggest and adapt ways to make a windmill structure stronger, stiffer and more stable and function correctly.
- To know how to test and evaluate the final windmill against set design criteria (a moving windmill for a mouse), explaining strengths and weaknesses.

Key outcomes

Can I research the purpose and structure of windmills?

Children will explore, investigate and research a variety of windmill structures to understand their features and how they work. They will identify the three main parts of a windmill the three main components using the correct vocabulary: the part that makes it stand up (supporting structure), the pieces that move in the wind (turbine or sails), the point from which the turbine/sails move (the axle).

Can I design a windmill fit for a mouse?

Children will know that they will be making a new windmill for the mouse to live in, and look at the design criteria as a class. They will discuss the requirements of the design and decorate the 2D nets templates for the structure according to the design criteria.

How can we ensure the structure is stable and strong?

Children will create their structure nets from the previous session. They will cut and assemble their windmill structures carefully, attaching the base last of all.

Can I assemble and attach my windmill turbine?

Children will attach their turbine to the axle and attach them to the structure of my windmill they will check that the turbine turns in the structure and alter the parts if it doesn't.

Is my windmill successful?

Children will test the windmill (indoors and outdoors) to make sure each of the components work by:-

- Tilting the base slightly in each direction to make sure that it doesn't topple over easily
- Using their finger to move the turbine to make sure that it can turn
- Blowing on the turbine to make sure that this can make the sails rotate

Children will then record their windmill working using a tablet or camera and add a voiceover evaluating the finished product and whether it would be fit for a mouse.

Assessing Pupils' Understanding and Progress

Pupils with secure understanding indicated by: Identifying some features and a design that would appeal to the mouse. Articulating how their design appeals and understanding historical and contemporary uses of windmills. Making stable structures from card, tape and glue, which will support the turbine. Cutting, assembling and making functioning turbines and axle components with accuracy. Being able to say what is good and what they could do better.

Pupils working at greater depth indicated by:

Identifying a greater range of features that would appeal to their mouse - these may go beyond basic aesthetic considerations, such as colour, and focus on functional aspects, such as doors and windows. Creating a suitable design and articulating why it appeals and what they might be able to change/ add to improve it. Extending their structure by making a roof. Cutting and sticking with accuracy to create a strong and stable structure. Explaining the function of windmills in different times and situations. Creating more sophisticated products through greater attention to accuracy and precision during the making process. Evaluating their product by referencing the 'Success and Design Criteria' using appropriate vocabulary.

Key vocabulary

- Turbine
- Turn
- Rotate
- Sail
- Axle
- Tab
- Structure
- Windmill
- Washer

