



Structures

		<u>Reception</u> Boats	<u>Year 1</u> Windmills	<u>Year 2</u> Baby Bear's Chair	<u>Year 3</u>	<u>Year 4</u> Pavillions	<u>Year 5</u>	<u>Year 6</u> Bridges
Skills	Design	<ul style="list-style-type: none"> • Designing a junk model boat. • Using knowledge from exploration to inform design. 	Learning the importance of a clear design criteria. <ul style="list-style-type: none"> • Including individual preferences and requirements in a design. 	Generating and communicating ideas using sketching and modelling.		Designing a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect. <ul style="list-style-type: none"> • Building frame structures designed to support weight. 		Designing a stable structure that is able to support weight. <ul style="list-style-type: none"> • Creating a frame structure with a focus on triangulation.

Make

- Making a boat that floats and is waterproof, considering material choices.

Making stable structures from card, tape and glue.

- Learning how to turn 2D nets into 3D structures.
- Following instructions to cut and assemble the supporting structure of a windmill.
- Making functioning turbines and axles which are assembled into a main supporting structure.

Making a structure according to design criteria.

- Creating joints and structures from paper/card and tape.
- Building a strong and stiff structure by folding paper.

Creating a range of different shaped frame structures.

- Making a variety of free standing frame structures of different shapes and sizes.
- Selecting appropriate materials to build a strong structure and cladding.
- Reinforcing corners to strengthen a structure.
- Creating a design in accordance with a plan.
- Learning to create different textural effects with materials.

Making a range of different shaped beam bridges.

- Using triangles to create truss bridges that span a given distance and support a load.
- Building a wooden bridge structure.
- Independently measuring and marking wood accurately.
- Selecting appropriate tools and equipment for particular tasks.
- Using the correct techniques to saws safely.
- Identifying where a structure needs reinforcement and using card corners for support.
- Explaining why selecting appropriating materials is an important part of the design process.

								<ul style="list-style-type: none"> • Understanding basic wood functional properties.
	<h1>Evaluate</h1>	<ul style="list-style-type: none"> • Making predictions about, and evaluating different materials to see if they are waterproof. • Making predictions about, and evaluating existing boats to see which floats best. • Testing their design and reflecting on what could have been done differently. • Investigating the how the shapes and structure of a boat affect the way it moves. 		<ul style="list-style-type: none"> • Testing the strength of own structure. • Identifying the weakest part of a structure. • Evaluating the strength, stiffness and stability of own structure. 		<ul style="list-style-type: none"> • Evaluating structures made by the class. • Describing what characteristics of a design and construction made it the most effective. • Considering effective and ineffective designs. 		<ul style="list-style-type: none"> • Adapting and improving own bridge structure by identifying points of weakness and reinforcing them as necessary. • Suggesting points for improvements for own bridges and those designed by others.

Knowledge

Technical

- To know that 'waterproof' materials are those which do not absorb water.

- To understand that the shape of materials can be changed to improve the strength and stiffness of structures.
- To understand that cylinders are a strong type of structure (e.g. the main shape used for windmills and lighthouses).
- To understand that axles are used in structures and mechanisms to make parts turn in a circle.
- To begin to understand that different structures are used for different purposes.
- To know that a structure is something that has been made and put together

To know that materials can be manipulated to improve strength and stiffness.

- To know that a structure is something which has been formed or made from parts.
- To know that a 'stable' structure is one which is firmly fixed and unlikely to change or move.
- To know that a 'strong' structure is one which does not break easily.
- To know that a 'stiff' structure or material is one which does not bend easily.

- To understand what a frame structure is.
- To know that a 'free-standing' structure is one which can stand on its own.

To understand some different ways to reinforce structures.

- To understand how triangles can be used to reinforce bridges.
- To know that properties are words that describe the form and function of materials.
- To understand why material selection is important based on properties.
- To understand the material (functional and aesthetic) properties of wood.

Additional

- To know that some objects float and others sink.
- To know the different parts of a boat.

- To know that a client is the person I am designing for.
- To know that design criteria is a list of points to ensure the product meets the clients needs and wants.
- To know that a windmill harnesses the power of wind for a purpose like grinding grain, pumping water or generating electricity.
- To know that windmill turbines use wind to turn and make the machines inside work.
- To know that a windmill is a structure with sails that are moved by the wind.
- To know the three main parts of a windmill are the turbine, axle and structure

- To know that a pavilion is a a decorative building or structure for leisure activities.
- To know that cladding can be applied to structures for different effects.
- To know that aesthetics are how a product looks.
- To know that a product's function means its purpose.
- To understand that the target audience means the person or group of people a product is designed for.
- To know that architects consider light, shadow and patterns when designing.

To understand the difference between arch, beam, truss and suspension bridges.

- To understand how to carry and use a saw safely.