



Coleshill Church of England Primary School

Progression of Skills in Design & Technology – Structures

Our curriculum is about **bringing engagement, fun and enthusiasm to learning**. We aspire to provide outstanding educational experiences which will inspire children to develop into lifelong independent learners. **Our high expectations develop character** and pride in our identity as Coleshill Church of England Primary school, preparing every child for their future.

National Curriculum	
KS1	KS2
<p><u>Design</u></p> <ul style="list-style-type: none"> design purposeful, functional, appealing products for themselves and other users based on design criteria generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology <p><u>Make</u></p> <ul style="list-style-type: none"> select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing] select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics <p><u>Evaluate</u></p> <ul style="list-style-type: none"> explore and evaluate a range of existing products evaluate their ideas and products against design criteria <p><u>Technical knowledge</u></p> <ul style="list-style-type: none"> build structures, exploring how they can be made stronger, stiffer and more stable explore and use mechanisms [for example, levers, sliders, wheels and axles], in their products. 	<p><u>Design</u></p> <ul style="list-style-type: none"> 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 <p><u>Make</u></p> <ul style="list-style-type: none"> select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities <p><u>Evaluate</u></p> <ul style="list-style-type: none"> 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 understand how key events and individuals in design and technology have helped shape the world <p><u>Technical knowledge</u></p> <ul style="list-style-type: none"> apply their understanding of how to strengthen, stiffen and reinforce more complex structures 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 computing to program, monitor and control their products.

	Overview	Skills	
Reception	EYFS can readily play with bigger/easy to		
Year 1 – Poles Apart	<u>Windmills</u> Y1 - Through the theme of windmills, pupils design and create their own structure and functioning windmill	Design	Learning the importance of a clear design criteria Including individual preferences and requirements in a design
			Generating and communicating ideas using sketching and modelling Learning about different types of structures, found in the natural world and in everyday objects.
		Make	Making stable structures from card, tape and glue. 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.
			Evaluating a windmill according to the design criteria, testing whether the structure is strong and stable and altering it if it isn't. Suggesting points for improvements
		Technological Knowledge	Exploring the features of structures Comparing the stability of different shapes Testing the strength of own structures Identifying the weakest part of a structure Evaluating the strength, stiffness and stability of own structure
			Describing the purpose of structures, including windmills Learning how to turn 2D nets into 3D structures Learning that the shape of materials can be changed to improve the strength and stiffness of structures Understanding that cylinders are a strong type of structure that are often used for windmills and lighthouses Understanding that windmill turbines use wind to turn and make the machines inside work Understanding that axles are used in structures and mechanisms to make parts turn in a circle Developing awareness of different structures for different purposes
			Identifying natural and man-made structures Identifying when a structure is more or less stable than another Knowing that shapes and structures with wide, flat bases or legs are the most stable Understanding that the shape of a structure affects its strength Using the vocabulary: strength, stiffness and stability Knowing that materials can be manipulated to improve strength and stiffness Building a strong and stiff structure by folding paper
Year 4 – Britain from the	<u>Pavilions</u> Y4 - In an introduction to pavilion architecture, pupils experiment with	Design	Design a pavilion with key features to appeal to a specific person/purpose. Drawing and labelling pavilion

Year 5 – Mexico & the Mayans	frame structures before designing their own landscape and pavilion, using a wider range of materials and construction techniques		Design a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect. Building frame structures designed to support weight.
		Make	Constructing a range of 3D geometric shapes using nets. Creating special features for individual designs. Making facades from a range of recycled materials
			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 for cladding. Reinforcing corners to strengthen a structure. Creating a design in accordance with a plan. Learning to create different textural effects with materials.
		Evaluate	Evaluating own work and the work of others based on the aesthetic of the finished product and in comparison to the original design Suggesting points for modification of the individual designs
			Evaluating structures made by the class Describing what characteristics of a design and construction made it the most effective Considering effective and ineffective designs
		Technological Knowledge	Identifying features Identifying suitable materials to be selected and used for a pavilion, considering weight, compression, tension Extending the knowledge of wide and flat based objects are more stable Understanding the terminology of strut, tie, span, beam Understanding the difference between frame and shell structure
			Learning what pavilions are and their purpose Building on prior knowledge of net structures and broadening knowledge of frame structures Learning that architects consider light, shadow and patterns when designing Implementing frame and shell structure knowledge Considering effective and ineffective designs
	Bridges Y5 - Pupils explore and experiment with a range of different bridge structures, forces and components involved in bridge building, before	Design	Design a stable structure that is able to support weight. Creating frame structure with focus on triangulation

	designing and making their own to test to destruction		Designing a bridge featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs.
		Make	Making a range of different shaped beam bridges Using triangles to create bridges that span a given distance and supports 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 saw safely Identifying where a structure needs reinforcement and using card corners for support
			Building a range of bridge structures drawing upon new and prior knowledge of structures. Measuring, marking and cutting wood to create a range of structures Using a range of materials to reinforce and add decoration to structures
		Evaluate	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
			Improving a design plan based on peer evaluation Testing and adapting a design to improve it as it is developed Identifying what makes a successful structure
		Technological Knowledge	Exploring how to create a strong beam Identifying arch and beam bridges and understanding the terms: compression and tension Identifying stronger and weaker structures Finding different ways to reinforce structures Understanding how triangles can be used to reinforce bridges Articulating the difference between beam, arch, truss and suspension bridges
			Knowing that structures can be strengthened by manipulating materials and shapes Identifying the shell structure in everyday life (cars, aeroplanes, tins, cans) Understanding man-made and natural structures