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
Design • 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 Make • 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 Evaluate • explore and evaluate a range of existing products • evaluate their ideas and products against design criteria Technical Knowledge • 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.	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 [for example, cutting, shaping, joining and finishing], accurately • select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities 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 • understand how key events and individuals in design and technology have helped shape the world Technical Knowledge • 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.

Progression of Skills

Year	Overview	Design	Make	Evaluate / Tech Knowledge
Year 1	Windmills: Through the theme of windmills, pupils design and create their own structure and functioning windmill	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.	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 if it isn't. Suggesting points for improvements 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	Pavilions: In an introduction to pavilion architecture, pupils experiment with frame structures before designing their own landscape and pavilion, using a wider range of materials and construction techniques	Design a pavilion with key features to appeal to a specific person/purpose. Drawing and labelling pavilion Design a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect. Building frame structures designed to support weight.	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 or 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.	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 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 to create different textural effects with materials.	Learning that architects consider light, shadow and patterns when designing Implementing frame and shell structure knowledge Considering effective and ineffective designs
Year 5	Bridges: Pupils explore and experiment with a range of different bridge structures, forces and components involved in bridge building, before designing and making their own to test to destruction	Design a stable structure that is able to support weight. Creating frame structure with focus on triangulation Designing a bridge featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs.	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	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 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