

SLS Design and Technology Progression

Substantive Knowledge Disciplinary Knowledge

Purpose of study

Design and technology is an inspiring, rigorous and practical subject. Using creativity and imagination, pupils design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, they develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation.

Aims

The national curriculum for design and technology aims to ensure that all pupils:

- develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
- build and apply a repertoire of knowledge, understanding and skills to design and make high-quality prototypes and products for a wide range of users
- critique, evaluate and test their ideas and products and the work of others
- understand and apply the principles of nutrition and learn how to cook.

Structures and Frame Structures	EYFS	Year 1/2		Year 3/4		Year 5/6
Product	Boats	Constructing Windmills	Baby Bear's Chair	Constructing a Castle	Pavilions	Playgrounds
Vocabulary	Waterproof Material Absorb Leak Wet Dry Prediction Variable Fair test Experiment Investigation	Client Design Design criteria Evaluation Net Stable Strong Structure Test Weak Windmill Windmill axle Windmill structure Windmill turbine	Function Man-made Mould Natural Stable Stiff Strong Structure Test Weak	2D shapes 3D shapes Castle Design criteria Evaluation Façade Feature Flag Net Recyclable Scoring Stable Strong Structure Tab Weak	Aesthetic Cladding Design criteria Evaluation Frame structure Function Inspiration Pavilion Reinforce Stable Structure Target audience Target customer Texture Theme	Apparatus Bench hook Coping saw Dowel Jelutong Mark out Modify Natural materials Plan view Playground Prototype Reinforce Structure Tenon saw User Vice
Design	To design a junk model boat. To use knowledge from exploration to inform design.	To learn the importance of a clear design criteria. To include individual preferences and requirements in a design.	To generate and communicating ideas using sketching and modelling. Learning about different types of structures, found in the natural world and in everyday objects.	To design a castle with key features to appeal to a specific person/purpose. To draw and label a castle design using 2D shapes. To label the 3D shapes that will create the features - materials needed and colours.	To design a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect. To build a frame structure designed to support weight.	To design a playground featuring a variety of different structures, considering how the structures will be used, considering effective and ineffective designs.

				Designing and/or decorating a castle tower on CAD software.		
Make	To make 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.	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 cladding. Reinforcing corners to strengthen a structure. Creating a design in accordance with a plan. Learning to create different textural effects with materials.	Building a range of play apparatus 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	To make predictions about, and evaluating different materials to see if they are waterproof. To make predictions about, and evaluating existing boats to see which floats best. To test their design and reflecting on what could have been done differently. To investigate how the shapes and structure of a boat affect the way it moves.	Evaluating a windmill according to the design criteria, testing whether the structure is strong and stable and altering it if it isn't. Suggest 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.	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.	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.
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 know that shapes and structures with wide, flat bases or legs are the most stable. To understand that the shape of a structure affects its strength. 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 understand that wide and flat based objects are more stable. To understand the importance of strength and stiffness in structures.	To understand what a frame structure is. To know that a 'free-standing' structure is one which can stand on its own.	To know that structures can be strengthened by manipulating materials and shapes

		<p>To begin to understand that different structures are used for different purposes.</p> <p>To know that a structure is something that has been made and put together.</p>	<p>To know that a 'stable' structure is one which is firmly fixed and unlikely to change or move.</p> <p>To know that a 'strong' structure is one which does not break easily.</p> <p>To know that a 'stiff' structure or material is one which does not bend easily.</p>			
Additional	<p>To know that some objects float, and others sink.</p> <p>To know the different parts of a boat.</p>	<p>To know that a client is the person I am designing for.</p> <p>To know that design criteria is a list of points to ensure the product meets the client's needs and wants.</p> <p>To know that a windmill harnesses the power of wind for a purpose like grinding grain, pumping water or generating electricity.</p> <p>To know that windmill turbines use wind to turn and make the machines inside work.</p> <p>To know that a windmill is a structure with sails that are moved by the wind.</p> <p>To know the three main parts of a windmill are the turbine, axle and structure.</p>	<p>To know that natural structures are those found in nature.</p> <p>To know that man-made structures are those made by people.</p>	<p>To know the following features of a castle: flags, towers, battlements, turrets, curtain walls, moat, drawbridge and gatehouse - and their purpose.</p> <p>To know that a facade is the front of a structure.</p> <p>To understand that a castle needed to be strong and stable to withstand enemy attack.</p> <p>To know that a paper net is a flat 2D shape that can become a 3D shape once assembled.</p> <p>To know that a design specification is a list of success criteria for a product.</p>	<p>To know that a pavilion is a decorative building or structure for leisure activities.</p> <p>To know that cladding can be applied to structures for different effects.</p> <p>To know that aesthetics is how a product looks.</p> <p>To know that a product's function means its purpose.</p> <p>To understand that the target audience means the person or group of people a product is designed for.</p> <p>To know that architects consider light, shadow and patterns when designing.</p>	

Mechanisms and Mechanical Systems	EYFS	Year 1/2		Year 3/4	Year 5/6
Product		Fairground Wheel	Making a Moving Monster	Making a Slingshot Car	Making a Pop-up Book
Vocabulary		Axle Decorate Evaluation Ferris wheel Ferris wheel pod Mechanism Stable Strong Test Waterproof Weak	Design criteria Evaluation Input Linkage Mechanical Mechanism Output Pivot Survey	Aesthetic Air resistance Chassis Design Design criteria Function Graphics Kinetic energy Mechanism Net Structure	Aesthetic CAD Caption Design Design brief Design criteria Exploded diagram Function Input Linkage Mechanism Motion Output Pivots Prototype Sliders Structure Template
Design		Selecting a suitable linkage system to produce the desired motion. Designing a wheel.	Creating a class design criterion for a moving monster. Designing a moving monster for a specific audience in accordance with a design criteria.	Designing a shape that reduces air resistance. Drawing a net to create a structure from. Choosing shapes that increase or decrease speed because of air resistance. Personalising a design.	Designing a pop-up book which uses a mixture of structures and mechanisms. Naming each mechanism, input and output accurately. Storyboarding ideas for a book.
Make		Selecting materials according to their characteristics. Following a design brief.	Making linkages using card for levers and split pins for pivots. Experimenting with linkages adjusting the widths, lengths and thicknesses of card used. Cutting and assembling components neatly.	Measuring, marking, cutting and assembling with increasing accuracy. Making a model based on a chosen design.	Following a design brief to make a pop-up book, neatly and with focus on accuracy. Making mechanisms and/or structures using sliders, pivots and folds to produce movement. Using layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result.
Evaluate		Evaluating different designs. Testing and adapting a design.	Evaluating own designs against design criteria. Using peer feedback to modify a final design.	Evaluating the speed of a final product based on the effect of shape on speed and the accuracy of workmanship on performance.	Evaluating the work of others and receiving feedback on own work. Suggesting points for improvement.
Technical		To know that different materials have different properties and are therefore suitable for different uses.	To know that mechanisms are a collection of moving parts that work together as a machine to produce	To understand that all moving things have kinetic energy.	To know that mechanisms control movement.

			<p>movement.</p> <p>To know that there is always an input and output in a mechanism.</p> <p>To know that an input is the energy that is used to start something working.</p> <p>To know that an output is the movement that happens because of the input.</p> <p>To know that a lever is something that turns on a pivot.</p> <p>To know that a linkage mechanism is made up of a series of levers.</p>	<p>To understand that kinetic energy is the energy that something (object/person) has by being in motion.</p> <p>To know that air resistance is the level of drag on an object as it is forced through the air.</p> <p>To understand that the shape of a moving object will affect how it moves due to air resistance.</p>	<p>To understand that mechanisms can be used to change one kind of motion into another.</p> <p>To understand how to use sliders, pivots and folds to create paper-based mechanisms.</p>
Additional		<p>To know the features of a Ferris wheel, include the wheel, frame, pods, a base an axle and an axle holder.</p> <p>To know that it is important to test my design as I go along so that I can solve any problems that may occur.</p>	<p>To know some real-life objects that contain mechanisms.</p>	<p>To understand that products change and evolve over time.</p> <p>To know that aesthetics means how an object or product looks in design and technology.</p> <p>To know that a template is a stencil you can use to help you draw the same shape accurately.</p> <p>To know that a birds-eye view means a view from a high angle (as if a bird in flight).</p> <p>To know that graphics are images which are designed to explain or advertise something.</p> <p>To know that it is important to assess and evaluate design ideas and models against a list of design criteria.</p>	<p>To know that a design brief is a description of what I am going to design and make.</p> <p>To know that designers often want to hide mechanisms to make a product more aesthetically pleasing.</p>

Electrical Systems	EYFS	Year 1/2	Year 3/4	Year 5/6
Product			Torches	Doodlers
Vocabulary			Battery Bulb Buzzer Cell Conductor Copper Design criteria Electrical item Electricity Insulator Series circuit Switch Test Torch Wire	Circuit Circuit component Configuration Current Develop DIY Investigate Problem-solve Product analysis Stable Target user
Design			Designing a torch, considering the target audience and creating both design and success criteria focusing on features of individual design ideas.	Identifying factors that could be changed on existing products and explaining how these would alter the form and function of the product. Developing design criteria based on findings from investigating existing products. Developing design criteria that clarifies the target user.
Make			Making a torch with a working electrical circuit and switch. Using appropriate equipment to cut and attach materials. Assembling a torch according to the design and success criteria.	Altering a product's form and function by tinkering with its configuration. Making a functional series circuit, incorporating a motor. Constructing a product with consideration for the design criteria. Breaking down the construction process into steps so that others can make the product.
Evaluate			Evaluating electrical products. Testing and evaluating the success of a final product.	Carry out a product analysis to look at the purpose of a product along with its strengths and weaknesses. Determining which parts of a product affect its function and which parts affect its form. Analysing whether changes in configuration positively or negatively affect an existing product. Peer evaluating a set of instructions to build a product.

<p>Technical</p>			<p>To understand that electrical conductors are materials which electricity can pass through.</p> <p>To understand that electrical insulators are materials which electricity cannot pass through.</p> <p>To know that a battery contains stored electricity that can be used to power products.</p> <p>To know that an electrical circuit must be complete for electricity to flow.</p> <p>To know that a switch can be used to complete and break an electrical circuit.</p>	<p>To know that series circuits only have one direction for the electricity to flow.</p> <p>To know when there is a break in a series circuit, all components turn off.</p> <p>To know that an electric motor converts electrical energy into rotational movement, causing the motor's axle to spin.</p> <p>To know a motorised product is one which uses a motor to function.</p>
<p>Additional</p>			<p>To know the features of a torch: case, contacts, batteries, switch, reflector, lamp, lens.</p> <p>To know facts from the history and invention of the electric light bulb(s) - by Sir Joseph Swan and Thomas Edison.</p>	<p>To know that product analysis is critiquing the strengths and weaknesses of a product.</p> <p>To know that 'configuration' means how the parts of a product are arranged.</p>

Cooking and Nutrition	EYFS	Year 1/2	Year 3/4	Year 5/6
Product	Soup	Fruit and Vegetables	Eating Seasonally	What Could be Healthier?
Vocabulary	Seeds Roots Leaves Stem Plant Flower Bud Juicy Sweet Sour Dry Wet Bitter Chewy Watery	Blender Carton Fruit Healthy Ingredients Peel Peeler Recipe Slice Smoothie Stencil Template Vegetable	Climate Dry climate Exported Imported Mediterranean climate Nutrients Polar climate Recipe Seasonal food Seasons Temperate climate Tropical climate	Beef Cross contamination Farm Method Packaging Research Welfare
Design	To design a fruit and vegetable soup recipe. To design food packaging	Designing smoothie carton packaging by-hand or on ICT software.	Creating a healthy and nutritious recipe for a savoury tart using seasonal ingredients, considering the taste, texture, smell and appearance of the dish.	Adapting a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients. Writing an amended method for a recipe to incorporate the relevant changes to ingredients. Designing appealing packaging to reflect a recipe.
Make	To chop plasticine safely. To chop vegetables with support.	Chopping fruit and vegetables safely to make a smoothie. Identifying if a food is a fruit or a vegetable. Learning where and how fruits and vegetables grow.	Knowing how to prepare themselves and a workspace to cook safely in, learning the basic rules to avoid food contamination. Following the instructions within a recipe.	Cutting and preparing vegetables safely. Using equipment safely, including knives, hot pans and hobs. Knowing how to avoid cross-contamination. Following a step by step method carefully to make a recipe.
Evaluate	To taste the soup and give opinions. To describe some of the following when tasting food: look, feel, smell and taste. To choose their favourite packaging design and explaining why.	Tasting and evaluating different food combinations. Describing appearance, smell and taste. Suggesting information to be included on packaging.	Establishing and using design criteria to help test and review dishes. Describing the benefits of seasonal fruits and vegetables and the impact on the environment. Suggesting points for improvement when making a seasonal tart.	Identifying the nutritional differences between different products and recipes. Identifying and describing healthy benefits of food groups.
Cooking and Nutrition Knowledge	To know that soup is ingredients (usually vegetables and liquid) blended. To know that vegetables are grown. To recognise and name some common vegetables. To know that different vegetables taste different.	To understand the difference between fruits and vegetables. To understand that some foods typically known as vegetables are fruits (e.g., cucumber). To know that a blender is a machine which mixes ingredients together into a smooth liquid.	To know that not all fruits and vegetables can be grown in the UK. To know that climate affects food growth. To know that vegetables and fruit grow in certain seasons.	To understand where meat comes from - learning that beef is from cattle and how beef is reared and processed, including key welfare issues. To know that I can adapt a recipe to make it healthier by substituting ingredients.

	<p>To know that eating vegetables is good for us.</p> <p>To discuss why different packages might be used for different foods.</p>	<p>To know that a fruit has seeds and a vegetable does not.</p> <p>To know that fruits grow on trees or vines.</p> <p>To know that vegetables can grow either above or below ground.</p> <p>To know that vegetables can come from different parts of the plant (e.g., roots: potatoes, leaves: lettuce, fruit: cucumber).</p>	<p>To know that cooking instructions are known as a 'recipe'.</p> <p>To know that imported food is food which has been brought into the country.</p> <p>To know that exported food is food which has been sent to another country.</p> <p>To understand that imported foods travel from far away and this can negatively impact the environment.</p> <p>To know that each fruit and vegetable gives us nutritional benefits because they contain vitamins, minerals and fibre.</p> <p>To understand that vitamins, minerals and fibre are important for energy, growth and maintaining health.</p> <p>To know safety rules for using, storing and cleaning a knife safely.</p> <p>To know that similar coloured fruits and vegetables often have similar nutritional benefits.</p>	<p>To know that I can use a nutritional calculator to see how healthy a food option is.</p> <p>To understand that 'cross-contamination' means bacteria and germs have been passed onto ready-to-eat foods and it happens when these foods mix with raw meat or unclean objects.</p>
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Textiles	EYFS	Year 1/2	Year 3/4	Year 5/6
Product	Bookmarks	Puppets		Waistcoats
Vocabulary	Thread Weave Pinch Push Pull Through Under Over Up Down Pattern	Decorate Design Fabric Glue Model Hand puppet Safety pin Stencil Technique Template		Adapt Annotate Detail Fabric Fastening Knot Properties Running stitch Seam Shape Target audience Target customer Template Thread Unique Waistcoat Waterproof
Design	To discuss what a good design needs. To design a simple pattern with paper. To design a bookmark. To choose from available materials.	Using a template to create a design for a puppet		Designing a waistcoat in accordance with a specification linked to set of design criteria. Annotating designs, to explain their decisions.
Make	To develop fine motor/cutting skills with scissors. To explore fine motor/threading and weaving (under, over technique) with a variety of materials. To use a prepared needle and wool to practise threading.	Cutting fabric neatly with scissors. Using joining methods to decorate a puppet. Sequencing the steps taken during construction.		Using a template when cutting fabric to ensure they achieve the correct shape. Using pins effectively to secure a template to fabric without creases or bulges. Marking and cutting fabric accurately, in accordance with their design. Sewing a strong running stitch, making small, neat stitches and following the edge. Tying strong knots. Decorating a waistcoat, attaching features (such as appliqué) using thread. Finishing the waistcoat with a secure fastening (such as buttons). Learning different decorative stitches. Sewing accurately with evenly spaced, neat stitches.

Evaluate	To reflect on a finished product and comparing to their design.	Reflecting on a finished product, explaining likes and dislikes.		Reflecting on their work continually throughout the design, make and evaluate process.
Knowledge	<p>To know that a design is a way of planning our idea before we start.</p> <p>To know that threading is putting one material through an object.</p>	<p>To know that 'joining technique' means connecting two pieces of material together.</p> <p>To know that there are various temporary methods of joining fabric by using staples. glue or pins.</p> <p>To understand that different techniques for joining materials can be used for different purposes.</p> <p>To understand that a template (or fabric pattern) is used to cut out the same shape multiple times.</p> <p>To know that drawing a design idea is useful to see how an idea will look.</p>		<p>To understand that it is important to design clothing with the client/ target customer in mind.</p> <p>To know that using a template (or clothing pattern) helps to accurately mark out a design on fabric.</p> <p>To understand the importance of consistently sized stitches.</p>

Digital World	EYFS	Year 1/2	Year 3/4	Year 5/6
Product			Electronic Charm	Navigating the World
Vocabulary			Control Electronic Function Initiate Programming loop Monitor Program Sensor Simulator User	Biodegradable Boolean Environmentally friendly Finite If statement Mouldable Product life cycle Product lifespan Smart Sustainable
Design			<p>Problem solving by suggesting potential features on a Micro: bit and justifying my ideas.</p> <p>Developing design ideas for a technology pouch.</p> <p>Drawing and manipulating 2D shapes, using computer-aided design, to produce a point of sale badge.</p>	<p>Writing a design brief from information submitted by a client.</p> <p>Developing design criteria to fulfil the client's request.</p> <p>Considering and suggesting additional functions for my navigation tool.</p> <p>Developing a product idea through annotated sketches.</p> <p>Placing and manoeuvring 3D objects, using CAD.</p> <p>Changing the properties of, or combine one or more 3D objects, using CAD.</p>
Make			<p>Using a template when cutting and assembling the pouch.</p> <p>Following a list of design requirements.</p> <p>Selecting and using the appropriate tools and equipment for cutting, joining, shaping and decorating a foam pouch.</p> <p>Applying functional features such as using foam to create soft buttons.</p>	<p>Considering materials and their functional properties, especially those that are sustainable and recyclable (for example, cork and bamboo).</p> <p>Explaining material choices and why they were chosen as part of a product concept.</p> <p>Programming an N,E, S,W cardinal compass.</p>
Evaluate			<p>Analysing and evaluating an existing product.</p> <p>Identifying the key features of a pouch.</p>	<p>Explaining how my program fits the design criteria and how it would be useful as part of a navigation tool.</p> <p>Developing an awareness of sustainable design.</p> <p>Identifying key industries that utilise 3D CAD modelling and explain why.</p>

				<p>Describing how the product concept fits the client's request and how it will benefit the customers.</p> <p>Explaining the key functions in my program, including any additions.</p> <p>Explaining how my program fits the design criteria and how it would be useful as part of a navigation tool.</p> <p>Explaining the key functions and features of my navigation tool to the client as part of a product concept pitch.</p> <p>Demonstrating a functional program as part of a product concept.</p>
Technical			<p>To understand that in programming a 'loop' is code that repeats something again and again until stopped.</p> <p>To know that a Micro: bit is a pocket-sized, codable computer.</p> <p>Writing a program to control (button press) and/or monitor (sense light) that will initiate a flashing LED algorithm.</p>	<p>To know that accelerometers can detect movement.</p> <p>To understand that sensors can be useful in products as they mean the product can function without human input.</p>
Additional			<p>To know what the 'Digital Revolution' is and features of some of the products that have evolved as a result.</p> <p>To know that in Design and technology the term 'smart' means a programmed product.</p> <p>To know the difference between analogue and digital technologies.</p> <p>To understand what is meant by 'point of sale display'.</p> <p>To know that CAD stands for Computer-aided design.</p>	<p>To know that designers write design briefs and develop design criteria to enable them to fulfil a client's request.</p> <p>To know that 'multifunctional' means an object or product has more than one function.</p> <p>To know that magnetometers are devices that measure the Earth's magnetic field to determine which direction you are facing.</p>