

# Skills and knowledge progression – Design and technology

## National Curriculum Aims and purpose

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. 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.

### Aims:

- Develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate in an increasingly technological world
- Build and apply a repertoire of knowledge, understanding and skills in order 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 the principles of nutrition and learn to cook.

## School aims - skills, attitudes and knowledge that we would like all children to develop on their journey through the school

At SSPP, we want our children to become confident, independent problem solvers, who view challenges with curiosity and a 'what about trying...' mindset - both at school and in their wider life beyond.

When presented with practical problems, our children will be able to combine their skills and prior knowledge to come up with a range of possible solutions, and then use their experience and understanding to focus in on what they consider to be the best design choice. They will have the practical and technical skills needed to put that idea into practice - and the wherewithal to overcome whatever barriers may present themselves on the way to a completed solution to their initial problem.

To that end, children in every class will be given opportunities to explore new materials, tools, mechanisms and designs, and will be encouraged to explore all of these to find both their potential and their limitations. Each unit of work will have a clear, practical goal as its outcome, accompanied by design criteria against which finished products can be tested and evaluated. Our children will also learn how to use these materials and tools safely and responsibly, and over time will begin to consider the impact that products (and material choices) can have on the wider world.

## Links to learning in EYFS:

### EAD:

- Exploring & using media and materials
- Manipulates materials to achieve a planned effect
- Constructs with a purpose in mind, using a variety of resources
- Selects appropriate resources and adapts work where necessary
- Selects tools and techniques needed to shape, assemble and join materials they are using.
- Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function

## Experiences every child should have:

- Termly visits to Forest school where they will have opportunity to explore open-ended building and making of structures including bridges, rope swings and animal homes.
- Produce something of their own that makes them go, "Wow!"
- Have opportunities to use things they have made - recognising that their work really is purposeful and practical
- Take things to bits to find out how they're held together and how they work
- See something they have constructed move under its own power
- Use saws, hammers, hand drills and other 'grown-up' tools (and know how to use them safely)
- Build something bigger than them
- Learn about design giants that have impacted our lives today

## Knowledge progression

	Structures	mechanisms	Textiles	Food and nutrition	Electrical
EYFS					
Year 1	<ul style="list-style-type: none"> <li>Discuss what makes a building/ home 'strong'</li> <li>Select appropriate materials (which can be cut or shaped, eg. cardboard)</li> <li>Use cutting, gluing, tying, taping to shape and join materials</li> <li>Test models</li> <li>Suggest ways they could be strengthened and improved</li> </ul>	<ul style="list-style-type: none"> <li>Explore and evaluate books and products with moving parts, including those with sliders and levers</li> <li>Develop understanding of the way sliders and levers can create movement</li> <li>Develop &amp; share design ideas</li> <li>Use cutting, gluing &amp; taping to shape and join materials</li> <li>Use art &amp; design techniques to create a finished product</li> </ul>	<ul style="list-style-type: none"> <li>Generate ideas for a product by drawing on their own experiences</li> <li>Say how the product will suit its intended user</li> <li>Cut, shape and join materials to make a product with a particular purpose (eg. a safety jacket or sun hat for a storybook character)</li> <li>Thread a needle</li> <li>Say what they like and dislike about finished products</li> </ul>	<ul style="list-style-type: none"> <li>Know that all food comes from plants or animals</li> <li>Talk about what foods we should eat to stay healthy</li> <li>Prepare fruit and vegetables for eating safely and hygienically (without using a heat source)</li> <li>Compare the taste and texture of different foods</li> <li>Use mixing to make cakes, pastries or crumbles</li> </ul>	
Year 2	<ul style="list-style-type: none"> <li>Explore existing freestanding structures &amp; identify features that make them strong</li> <li>Generate design ideas for a given context (eg. chairs for story characters or pet cages)</li> <li>Agree design criteria</li> <li>Measure, mark-out, cut and shape materials</li> <li>Select tools / methods for cutting, joining and assembling</li> </ul>	<ul style="list-style-type: none"> <li>Explore different vehicles - what is similar and different about them? Identify wheels, axles, chassis etc.</li> <li>Build models from construction kits / materials (eg. Lego, Knex)</li> <li>Explore ways of joining wheels to allow movement</li> <li>Build models and suggest ways they could be tested out</li> </ul>	<ul style="list-style-type: none"> <li>Design a functional, appealing product for a chosen user</li> <li>Use templates to mark-out materials for cutting</li> <li>Choose materials based on their functional and aesthetic properties</li> <li>Join fabrics using a running stitch (eg. to make a pinny)</li> <li>Thread a needle with chosen length of thread</li> <li>Suggest how products could be improved</li> </ul>	<ul style="list-style-type: none"> <li>Know that food can be farmed, grown elsewhere (eg. at home) or caught</li> <li>Name and sort foods into the five groups shown in the Eatwell Guide</li> <li>Use cutting, peeling and grating to prepare ingredients</li> <li>Use ovens to bake cakes etc</li> <li>Evaluate through taste-testing and user feedback</li> <li>Make breads using kneading and baking, and compare different breads</li> </ul>	

Year 3	<ul style="list-style-type: none"> <li>Investigate and evaluate shell structures (boxes, packaging, nets of shapes etc)</li> <li>Develop practical ideas to solve a real-world problem (eg. packaging foods / toys)</li> <li>Select materials and tools appropriate to the task</li> <li>Measure, shape, cut and join materials with some accuracy</li> <li>Use art and design skills to finish the product attractively</li> </ul>	<ul style="list-style-type: none"> <li>Investigate the use of levers and linkages to create more complex movement (eg. in pop-up books or greetings cards)</li> <li>Explore the effect of fixed and loose pivots on movement</li> <li>Develop design ideas linked to a specific purpose</li> <li>Measure, shape, cut and join materials with some accuracy</li> <li>Identify strengths and areas for improvement in products</li> </ul>	<ul style="list-style-type: none"> <li>Develop ideas for a real-world design problem (eg. money containers or shopping bags) by gathering information on the wants and needs of users</li> <li>Share and model ideas using sketches and diagrams</li> <li>Justify choice of materials</li> <li>Measure, shape, cut and join materials with some accuracy</li> <li>Sew using running and whip stitching with seam allowance</li> </ul>	<ul style="list-style-type: none"> <li>Use home-grown ingredients in cooking (eg. tomatoes, beans, strawberries)</li> <li>Generate ideas and plan a dish for a specific purpose</li> <li>Know a range of appropriate ingredients, and whether they are grown, reared or caught</li> <li>Understand the idea of seasonality and fairtrade products</li> <li>Understand the main impact of airmiles on freshness</li> </ul>	<p>Know how to use computer aided software (Tinkercad) to plan and design simple 3D structures</p>
Year 4	<ul style="list-style-type: none"> <li>Create models to further understanding in other areas of the curriculum (eg. 3d models of river systems)</li> <li>Use annotated sketches to develop and share ideas</li> <li>Select materials based on their properties and availability</li> <li>Use a wider range of techniques to shape and join materials (eg. saws, glue guns)</li> </ul>	<ul style="list-style-type: none"> <li>Examine and disassemble a simple battery-powered product, identifying key parts of the electrical circuit</li> <li>Explore and make different types of simple switches</li> <li>Know how to use electricity safely</li> <li>Design and make a battery-powered product (eg. a night light or torch)</li> <li>Evaluate using design criteria</li> </ul>	<ul style="list-style-type: none"> <li>Analyse items of clothing linked to another area of the curriculum using annotated sketches</li> <li>Identify design features &amp; develop design criteria</li> <li>Use measurement and pattern pieces to create clothing fitted to a specific user</li> <li>Use equipment independently, choosing the best thread</li> <li>Apply a seam allowance</li> <li>Evaluate finished pieces using agreed design criteria</li> </ul>	<ul style="list-style-type: none"> <li>Know that, to be active and healthy, food and drink are needed to provide energy for the body</li> <li>Prepare savoury dishes using peeling, chopping, slicing and mixing</li> <li>Recognise the steps needed to prepare food safely and hygienically</li> <li>Plan, carry out and record evaluations of food produced</li> </ul>	<ul style="list-style-type: none"> <li>Understand and use electrical systems in their products linked to science coverage.</li> <li>Apply their understanding of computing to program and control their products.</li> <li>Know and use technical vocabulary relevant to the project.</li> </ul>

<p>Year 5</p>	<ul style="list-style-type: none"> <li>Combine solid structures with mechanical systems to create movement (eg. electric cars)</li> <li>Use cross-sectional drawings and exploded diagrams to develop and share ideas</li> <li>Accurately measure, saw and sand wood and plastic for use in construction</li> <li>Test, evaluate and improve prototypes before producing final products</li> </ul>	<ul style="list-style-type: none"> <li>Explore the effect of differently shaped cams on movement (construction kits)</li> <li>Design a product including a cam mechanism (eg. a moving toy), taking into consideration the needs, wants and preferences of users</li> <li>Model ideas using diagrams, sketches and prototypes</li> <li>Accurately apply a range of finishing techniques</li> </ul>	<ul style="list-style-type: none"> <li>Explore the concept of sustainability and the long-term impact of products</li> <li>Carry out research, using surveys, interviews and questionnaires</li> <li>Generate innovate ideas (eg. for creating products from recycled materials)</li> <li>Accurately measure, mark, join and assemble materials</li> <li>Use a range of stitches including blanket, running, whip stitch</li> <li>Justify design decisions</li> </ul>	<ul style="list-style-type: none"> <li>Know that seasons may affect the food that is available</li> <li>Identify the different substances (nutrients, vitamins, fibre, protein etc) that are needed for health</li> <li>Use boiling and simmering to cook food (eg. making soups)</li> <li>Write a step-by-step recipe, including ingredients and equipment needed</li> <li>Decorate and present food</li> </ul>	<p>Know how to use computer aided software (Tinkercad) to plan and design a 3D structure with annotations</p>
<p>Year 6</p>	<ul style="list-style-type: none"> <li>Produce a large-scale construction (eg. bird hide, bomb shelter etc)</li> <li>Investigate and analyse existing / historical products based on sustainability, innovation and cost</li> <li>Generate innovative ideas, based on research</li> <li>Apply skills learnt across keystone to construct, test evaluate and refine product</li> </ul>	<ul style="list-style-type: none"> <li>Develop a design for a functional product that responds automatically to changes in the environment (eg. security alarm or lights)</li> <li>Apply computing skills to program, monitor and control products</li> <li>Test and evaluate the system to demonstrate its effectiveness</li> <li>Learn about famous inventors</li> </ul>	<ul style="list-style-type: none"> <li>Disassemble a real-world textile item (eg. slippers) &amp; use exploded diagrams to identify how it is constructed, materials used etc</li> <li>Separate design criteria into functional and aesthetic</li> <li>Design product for a specific user, considering their needs</li> <li>Apply skills learnt across keystone to construct, test evaluate and refine product</li> </ul>	<ul style="list-style-type: none"> <li>Understand the environmental impact of food decisions (eg. 'air miles' on out of season fruits and vegetables) and international trade</li> <li>Plan a meal for a specific occasion / festival, taking into account the needs and expectations of those who will eat it</li> <li>Prepare this meal using a wide range of skills</li> <li>Present the meal and evaluate</li> </ul>	<ul style="list-style-type: none"> <li>Understand and use electrical systems in their products linked to science coverage.</li> <li>Apply their understanding of computing to program, monitor and control their products.</li> <li>Know and use technical vocabulary relevant to the project</li> <li>Use micro-bits to create a message prompt</li> </ul>

## Skills progression

	Generating ideas	Making	Design and evaluation	Vocabulary
EYFS	<p>I can explain my own knowledge and understanding.</p> <p>I can ask appropriate questions of others.</p> <p>I can use talk to organise, sequence and clarify thinking and ideas.</p> <p>I can link statements and stick to a main theme or intention.</p> <p>I can explain how some technology works by exploring parts by pressing, lifting, twisting to say how it works.</p> <p><i>ELG</i></p> <ul style="list-style-type: none"> <li><i>I can use what I know about media and materials in original ways, thinking about uses and purposes.</i></li> </ul> <p><i>I can represent my own ideas through design technology</i></p>	<p>I can manipulate materials to achieve a planned effect.</p> <p>I can purposely construct something using a variety of resources.</p> <p>I can use simple tools and techniques competently &amp; appropriately.</p> <p>I can select appropriate resources</p> <p>I can hold tools correctly once shown</p> <p>I thread and weave through loops and hoops</p> <p><i>ELG</i></p> <ul style="list-style-type: none"> <li><i>I can use what I know about media and materials in original ways, thinking about uses and purposes.</i></li> </ul>	<ul style="list-style-type: none"> <li><i>*I can adapt my work where necessary.</i></li> <li><i>*I can explain my own knowledge and understanding of what I have made to evaluate it.</i></li> </ul>	<p>Plan, ideas, design, make, build, construct, join, shape, tools, change, like, dislike, different, improve, healthy, unhealthy, fruit, vegetable, clean, safe, ingredients, cut, sew</p>
Year 1	<p>Design appealing products for a particular user based on simple design criteria.</p> <p>Generate initial ideas and design criteria through own experiences.</p> <p>Develop and communicate these ideas through talk and drawings and mock ups where relevant.</p>	<ul style="list-style-type: none"> <li>• Select and use simple utensils, tools and equipment to perform a job e.g. peel, cut, slice, squeeze, grate and chop safely; marking out cutting, joining and finishing; cut, shape and join paper and card.</li> <li>• Select from a range of ingredients and materials according to their characteristics to create a chosen product</li> </ul> <p>thread a needle with large eye and previously cut material</p> <p>select materials from a range given</p>	<ul style="list-style-type: none"> <li>• Taste, explore and evaluate a range of products to determine the intended user's preferences for the product</li> <li>• Evaluate their ideas throughout and finished products against design criteria, including intended user and purpose.</li> </ul>	<p>planning, investigating design, evaluate, make, user, purpose, ideas, product,</p>

<p>Year 2</p>	<p>Generate ideas based on simple design criteria and their own experiences, explaining what they could make.</p> <p>Develop, model and communicate their ideas through talking, mock-ups and drawings.</p>	<p>Plan by suggesting what to do next.</p> <ul style="list-style-type: none"> <li>• Select and use tools, equipment, skills and techniques to perform practical tasks, explaining their choices.</li> <li>• Select new and materials, components, reclaimed materials and construction kits to build and create their products.</li> <li>• Use simple finishing techniques suitable for the products they are creating</li> </ul> <p>thread needle with chosen allowance of thread.</p>	<ul style="list-style-type: none"> <li>• Explore a range of existing products related to their design criteria.</li> <li>• Evaluate their product by discussing how well it works in relation to the purpose, the user and whether it meets the original design criteria.</li> </ul>	<p>investigating, planning, design, make, evaluate, user, purpose, ideas, design criteria, product, function</p>
<p>Year 3</p>	<ul style="list-style-type: none"> <li>• Generate realistic ideas through discussion and design criteria for an appealing, functional product fit for purpose and specific user/s.</li> <li>• Use annotated sketches, prototypes, final product sketches and pattern pieces; communication technology, such as web-based recipes, to develop and communicate ideas</li> </ul>	<ul style="list-style-type: none"> <li>• Plan the main stages of making.</li> <li>• Select from and use a range of appropriate utensils, tools and equipment with some accuracy related to their product.</li> <li>• Select from and use finishing techniques suitable for the product they are creating. Choose own quality and quantity of thread suitable for the product</li> </ul> <p>Thread own needle and select the thread allowance so that it doesn't run out</p>	<ul style="list-style-type: none"> <li>• Investigate a range of 3-D textile products, ingredients and lever and linkage products relevant to their project.</li> <li>• Test their product against the original design criteria and with the intended user.</li> <li>• Evaluate the ongoing work and the final product with reference to the design criteria and the views of others.</li> </ul> <p>Evaluate product success through questionnaires/ consumer feedback</p>	<p>user, purpose, design, model, evaluate, prototype, annotated sketch, functional, innovative, investigate, label, drawing, function, planning, design criteria, annotated sketch, appealing, prototype, consumer</p>
<p>Year 4</p>	<ul style="list-style-type: none"> <li>• Generate and clarify ideas through discussion with peers to develop design criteria to inform the design of products that are fit for purpose, aimed at particular individuals or groups.</li> <li>• Use annotated sketches and appropriate information and communication technology, such as web-</li> </ul>	<p>Order the main stages of making.</p> <ul style="list-style-type: none"> <li>• Select and use appropriate tools to measure, mark out, cut, score, shape and combine with some accuracy related to their products.</li> <li>• Explain their choice of materials according to functional properties and aesthetic qualities.</li> </ul>	<ul style="list-style-type: none"> <li>• Investigate and evaluate a range of products including the ingredients, materials, components and techniques that are used.</li> <li>• Test and evaluate their own products against design criteria and the intended user and purpose.</li> </ul>	<p>evaluating, design brief design criteria, innovative, prototype, user, purpose, function, prototype, design criteria, innovative, appealing, design brief, planning, annotated sketch, sensory evaluations, consumer</p>

	<p>based recipes, to develop and communicate ideas.</p> <ul style="list-style-type: none"> <li>• Generate, develop, model and communicate realistic ideas through discussion and, as appropriate, annotated sketches, cross-sectional and exploded diagrams.</li> </ul>	<ul style="list-style-type: none"> <li>• Select from and use materials and components, including ingredients, construction and electrical components according to their function and properties</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluate their ideas and products against their own design criteria and identify the strengths and areas for improvement in their work</li> </ul> <p>Evaluate product and suggest improvements/ design adjustments.</p> <p>Produce consumer feedback evaluations</p>	
Year 5	<ul style="list-style-type: none"> <li>• Generate innovative ideas through research including surveys, interviews and Questionnaires and discussion with peers to develop a design brief and criteria for a design specification.</li> <li>• Design purposeful, functional, appealing products for the intended user that are fit for purpose based on a simple design specification.</li> <li>• Develop and communicate ideas through discussion, annotated drawings, exploded drawings and drawings from different views. and, where appropriate, computer-aided design</li> </ul>	<p>Produce detailed lists of equipment and fabrics relevant to their tasks</p> <ul style="list-style-type: none"> <li>• Write a step-by-step plan, including a list of resources required.</li> <li>• Select from and use, a range of appropriate utensils, tools and equipment accurately to measure and combine appropriate ingredients, materials and resources.</li> </ul>	<ul style="list-style-type: none"> <li>• Investigate and analyse products linked to their final product.</li> <li>• Compare the final product to the original design specification and record the evaluations.</li> <li>• Test products with intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose.</li> <li>• Consider the views of others to improve their work</li> </ul>	<p>design decisions, functionality, authentic, user, purpose, design specification, design brief, innovative, research, evaluate, design criteria, annotate, evaluate, mock-up, prototype</p>
Year 6	<ul style="list-style-type: none"> <li>• Use research using surveys, interviews, questionnaires and web-based resources. To develop a design specification for a range of functional products.</li> <li>• Develop a simple design specification to guide the development of their ideas and products, taking account of constraints including time, resources and cost.</li> <li>• Generate and develop innovative ideas and share and clarify these through discussion.</li> <li>• Communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams</li> </ul>	<p>Formulate a step-by-step plan to guide making, listing tools, equipment, materials and components</p> <ul style="list-style-type: none"> <li>• Competently select from and use appropriate tools to accurately measure, mark, cut and assemble materials, and securely connect electrical components to produce reliable, functional products.</li> <li>• Use finishing and decorative techniques suitable for the product they are designing and making.</li> </ul>	<p>Continually evaluate and modify the working features of the product to match the initial design specification.</p> <ul style="list-style-type: none"> <li>• Critically evaluate their products against their design specification, intended user and purpose, identifying strengths and areas for development, and carrying out appropriate tests.</li> <li>• Test the system to demonstrate its effectiveness for the intended user and purpose.</li> </ul>	<p>function, innovative, design specification, design brief, user, purpose prototype, annotated sketch, purpose, user, innovation, research, functional, mock-up,</p>

## Product/ design long term overview

Key stage 1				
Year 1	Textiles - Make your own thaumatrope	Structures - Make a boat that can travel across the lake (linked to Christopher Columbus) Design, make and adapt rockets to make them fly further	Mechanisms- Design and make a moveable prototype of play equipment for the park	Food and nutrition-Design and make ice-cream sundaes for the summer
	Structures/ open-ended design and making - Forest school			
Year 2	Textiles - make a pinny that is useful for a nurse	Mechanisms - levers and pulleys	structures - Build a bridge that can carry the weight of....	Food and nutrition - Compare different breads from around the world/ make a flat bread
	Structures/ open-ended design and making - Forest school			
Key Stage 2				
Year 3	Textiles- Make a stone age garment fit for Ug	Mechanisms - make a shaduf that can transport water to a different place	Electrical: CAD design linked to Computing unit	Food and nutrition Seasonal produce- superfood smoothies
	Structures - Forest school			
Year 4	Textiles - Textiles: Make a shoe fit for a soldier walking the A5/ Make mittens suitable for an Arctic expedition	Electrical: Simple circuits Create a shell for packaging a Victorian sponge using computer aided software	Mechanisms- design and make a catapult that will launch successfully	Food and nutrition - prepare and cook from a recipe for a Spanish Cafe
	Structures - Forest school			
Year 5	Structures/ computer-aided - create a computer-aided structure of a Mayan Temple	Textiles: Make a pillow for a workhouse child with left over fabric...	Mechanisms and electrical: Design, make a space buggy (Space station trip workshop)	Food and nutrition - Bake a Christmas cake
	Electrical - Tinkercad (Computing)			
Year 6	Electrical - make a prototype of an electrically-powered car	Mechanism: Pullies and gears	Textiles: Make do and mend - make a _____ fit for _____	Food and nutrition- research, plan and cook a Spanish tapas meal from adapted recipes
	Structures - Forest school			