

# Oak Meadow Skills Progression

## Upper Key Stage 2

### Subject Area: Design Technology



<b>National Curriculum Objectives</b>	<p><b><u>Pupils will be taught to:</u></b></p> <p><b><u>Design:</u></b></p> <ul style="list-style-type: none"><li>• 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</li><li>• generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design</li></ul> <p><b><u>Make</u></b></p> <ul style="list-style-type: none"><li>• select from and use a wider range of tools and equipment to perform practical tasks [e.g. cutting, shaping, joining and finishing], accurately</li><li>• 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</li></ul> <p><b><u>Evaluate</u></b></p> <ul style="list-style-type: none"><li>• investigate and analyse a range of existing products</li><li>• evaluate their ideas and products against their own design criteria and consider the views of others to improve their work</li><li>• understand how key events and individuals in design and technology have helped shape the world</li></ul> <p><b><u>Technical knowledge</u></b></p> <ul style="list-style-type: none"><li>• apply their understanding of how to strengthen, stiffen and reinforce more complex structures</li><li>• understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]</li><li>• understand and use electrical systems in their products [e.g. series circuits incorporating switches, bulbs, buzzers and motors]</li><li>• apply their understanding of computing to program, monitor and control their products</li></ul> <p><b><u>Cooking and Nutrition</u></b></p> <ul style="list-style-type: none"><li>• understand and apply the principles of a healthy and varied diet</li><li>• prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques</li><li>• understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed</li></ul>
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<b>Skills and Techniques</b>	<b>Design</b>	<ul style="list-style-type: none"> <li>• Describe in detail the purpose of their products.</li> <li>• Indicate design features of their products that will appeal to intended users.</li> <li>• Gather information about the needs and wants of individuals or groups.</li> <li>• Develop their own design criteria and use this to inform their ideas.</li> <li>• Carry out research. E.g. surveys and interviews to identify users' needs, wants and preferences.</li> <li>• Develop a simple design specification to guide their thinking.</li> <li>• Share and clarify ideas confidently through discussion</li> <li>• Link discussions about ideas, plans and designs to the investigation, disassembly and evaluation of a range of products describing in detail their parts and their function.</li> <li>• Produce detailed designs and plans using prototypes, commentary and diagrams that include accurate measurements.</li> <li>• Use annotated sketches, cross-sectional drawings, exploded diagrams to develop and communicate ideas.</li> <li>• Generate plans and designs based on research and ideas that take account of the users' views and the intended purpose.</li> <li>• Make design decisions that take account of the availability of resources.</li> <li>• Generate innovative ideas from prior research.</li> <li>• Make design decisions based on time, cost and resource constraints.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe in detail the purpose of their products.</li> <li>• Indicate design features of their products that will appeal to intended users.</li> <li>• Gather information about the needs and wants of individuals or groups.</li> <li>• Develop their own design criteria and use this to inform their ideas.</li> <li>• Carry out research. E.g. surveys, interviews, questionnaires to identify users' needs, wants and preferences.</li> <li>• Develop detailed design specifications to guide their thinking and planning.</li> <li>• Share and clarify ideas confidently through discussion</li> <li>• Clarify and justify plans, designs and ideas by drawing upon and using a range of relevant sources of information.</li> <li>• Produce detailed designs and plans drawn to scale from a range of viewpoints.</li> <li>• Use annotated sketches, cross-sectional drawings, exploded diagrams to develop and communicate ideas.</li> <li>• Discuss ways in which ideas, plans and designs are formed and modify to ensure that the design criteria are met effectively.</li> <li>• Generate realistic ideas focusing on the needs of the user.</li> <li>• Make design decisions that take account of the availability of resources.</li> <li>• Generate innovative ideas drawing on research.</li> <li>• Make informed decisions based on time, cost and resource constraints.</li> </ul>
	<b>Make</b>	<ul style="list-style-type: none"> <li>• Select from and use an extensive range of materials and components according to both functional and aesthetic qualities. E.g. textiles, mechanical, construction kits, electrical and food ingredients.</li> <li>• Select materials and components suitable to the task.</li> <li>• Confidently select tools and equipment suitable to the task. Explain their choices.</li> </ul>	<ul style="list-style-type: none"> <li>• Select from and use an extensive range of materials and components according to both functional and aesthetic qualities. E.g. textiles, mechanical, construction kits, electrical and food ingredients.</li> <li>• Select materials and components suitable to the task.</li> <li>• Confidently select tools and equipment suitable to the task. Explain their choices, giving evidence.</li> </ul>

	<ul style="list-style-type: none"> <li>• Produce appropriate list of tools, equipment and materials that they will need.</li> <li>• Order the stages of the making process in logical steps.</li> <li>• Formulate step-by-step plans as a guide to making.</li> <li>• Measures, marks out, cuts and shapes materials and components with accuracy.</li> <li>• Accurately assembles, joins and combines most materials.</li> <li>• Accurately applies the most effective finish to enhance the appearance of a product using a range of finishing techniques, including those from art and design sessions.</li> <li>• Use techniques that involve a number of steps.</li> <li>• Use resourcefulness when tackling practical problems.</li> <li>• Follow procedures for safety and hygiene.</li> </ul>	<ul style="list-style-type: none"> <li>• Produce appropriate list of tools, equipment and materials that they will need.</li> <li>• Order the stages of the making process in logical steps.</li> <li>• Formulate step-by-step plans as a guide to making.</li> <li>• Measures, marks out, cuts and shapes materials and components with accuracy and precision.</li> <li>• Accurately assembles, joins and combines a range of materials and components using the most effective permanent and temporary way.</li> <li>• Accurately applies the most effective finish to to ensure a high quality end product using a range of finishing techniques, including those from art and design sessions.</li> <li>• Use techniques that involve a number of steps.</li> <li>• Use resourcefulness, resilience and innovation when tackling practical problems.</li> <li>• Explains next steps in learning drawing from prior experience.</li> <li>• Follow procedures for safety and hygiene.</li> </ul>
<p style="text-align: center;"><b>Evaluate</b></p>	<ul style="list-style-type: none"> <li>• Investigate and use analysis of existing products to inform own work.</li> <li>• Identify from a range the key features and functions needed to create an effective and efficient working product.</li> <li>• Identify the strengths and areas for development in their ideas and products.</li> <li>• Consider the views of others, including intended users, to improve their work.</li> <li>• Use their design criteria to evaluate and improve their completed products.</li> <li>• Critically evaluate the quality of the design, manufacture and fitness for purpose of their products.</li> <li>• Evaluate their ideas and products against their original design specification giving reasons, supported by factual evidence for the success of aspects of a product.</li> <li>• Investigate and analyse how well products have been designed and made; why materials have been chosen and</li> </ul>	<ul style="list-style-type: none"> <li>• Use analysis of existing products supported by accurate factual information to inform own work.</li> <li>• Test and evaluate products to identify the variants which may affect the function of a product.</li> <li>• Identify the strengths and areas for development in their ideas and products.</li> <li>• Consider the views of others, including intended users, to improve their work.</li> <li>• Use their design criteria to evaluate and improve their completed products.</li> <li>• Critically evaluate the quality of the design, manufacture and fitness for purpose of their products.</li> <li>• Evaluate their ideas and products against their original design specification giving reasons, supported by factual evidence for the success of aspects of a product and provide considered solutions to resolve those parts that could be improved.</li> <li>• Investigate and analyse how well products have been designed and made; why materials have been chosen and what methods</li> </ul>

	<p>what methods of construction were used; how well the products worked; whether they achieved their purpose and the needs/ wants of the users.</p> <ul style="list-style-type: none"> <li>• Investigate and analyse: who designed the products, where products were designed and made; when products were designed and made; whether products can be recycled or re-used.</li> <li>• Consider cost and sustainability.</li> <li>• Consider the impact and innovative qualities of their products.</li> <li>• Recognise several inventors, designers, chefs, manufacturers and engineers, who have been influential in the design and technology industries.</li> </ul>	<p>of construction were used; how well the products worked; whether they achieved their purpose and the needs/ wants of the users.</p> <ul style="list-style-type: none"> <li>• Investigate and analyse: who designed the products, where products were designed and made; when products were designed and made; whether products can be recycled or re-used.</li> <li>• Investigate and analyse how much products cost to make, how innovative products are, how sustainable the materials in the prodsts are, what impact products have beyond tehr inteneded purpose.</li> <li>• Recognise several inventors, designers, chefs, manufacturers and engineers, who have been influential in the design and technology industries.</li> </ul>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Technical knowledge</p>	<ul style="list-style-type: none"> <li>• Describe in detail the way in which an axle and chassis help a vehicle to move.</li> <li>• Use a range of different ways to attach an axle to a chassis, <b>e.g. card triangles, drilled holes, cable clips and clothes pegs.</b></li> <li>• Identify, describe and evaluate products that contain pulleys and drive belts.</li> <li>• Create pulleys and drive systems.</li> <li>• Explore and describe how electrical circuits can be created and controlled.</li> <li>• Discuss in depth the hazards and safety issues associated with electricity.</li> <li>• Explore and explain how the direction and speed of an electrical motor can be controlled.</li> <li>• Explore and program a simple control device.</li> <li>• Create a range of sliders and levers to produce horizontal and vertical movement.</li> <li>• Combine sliders and levers to produce a range of movements.</li> <li>• Generate questions to investigate and compare the efficiency of pneumatic systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Design and build a working model where the direction of movement can be controlled, <b>e.g. with a chassis with a pivoting axle.</b></li> <li>• Explain how a belt and pulley system can be used to reverse the direction of rotation, and alter the plane of rotation by 90 degrees.</li> <li>• Explain how the number of teeth of a gear affects the speed of rotation.</li> <li>• Explore and describe how switches can be used in a range of circuits to control components, <b>e.g. lights in a lighthouse, a movement sensor in a burglar alarm.</b></li> <li>• Apply appropriate safety measures when constructing circuits.</li> <li>• Explore and discuss ways in which electricity can be used to control movement.</li> <li>• Explore and use an increasing range of complex control system, <b>e.g., a light sensor.</b></li> <li>• Use a range of technical vocabulary to describe the properties and functions of mechanisms.</li> <li>• Choose and use a range of sliders and levers accurately to create a range of effects.</li> <li>• Analyse and evaluate the efficiency of pneumatic systems.</li> </ul>

	<ul style="list-style-type: none"> <li>• Describe the way in which a cam changes rotary motion into linear motion.</li> <li>• Create nets of increasingly complex 3D shapes which include the addition of gluing tabs.</li> <li>• Reinforce and strengthen 3D framework using the concept of <b>'triangulation'</b>.</li> <li>• Explain in detail why some structures fail.</li> <li>• Use a range of materials to make joints <b>e.g., card strips, elastic bands, thread and ties, and plastic tubing.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Discuss the relationship between a cam and follower, an off-centre cam, a peg cam, a pear-shaped cam and a snail cam.</li> <li>• Create nets and templates accurately in a range of sizes.</li> <li>• Use a range of increasing methods to strengthen 3D structures and frames.</li> <li>• Investigate measure and record the load tolerance of different structures and find ways of improving a structures load-bearing capacity.</li> <li>• Build a range of structures using a wide range of effective materials.</li> </ul>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Cooking and Nutrition</b></p>	<ul style="list-style-type: none"> <li>• Know that food is farmed, reared, grown, imported or caught locally, regionally and internationally.</li> <li>• Begin to know that seasons and weather affect food availability.</li> <li>• Begin to know how food is processed into ingredients that can be eaten or used in cooking.</li> <li>• Know how to prepare and cook a variety of savoury and some sweet dishes safely and hygienically, including the use of a heat source. Talk in scientific terms about the physical and chemical changes that take place when food is cooked, <b>e.g. heated and cooled</b></li> <li>• Know how to use a wide range of techniques such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking.</li> <li>• Know that a healthy diet is made up of a variety and balance of different foods and drinks as depicted on 'The Eatwell Plate'.</li> <li>• Know that to be active and healthy, food is needed to provide energy for the body.</li> <li>• Talk about the impact of changing proportions within a recipe and use knowledge of food and cooking to generate own recipes.</li> <li>• Know that recipes can be adjusted to change the taste, texture, aroma and appearance.</li> </ul>	<ul style="list-style-type: none"> <li>• Know that food is farmed, reared, grown, imported or caught locally, regionally and internationally.</li> <li>• Begin to know that seasons and weather affect food availability.</li> <li>• Begin to know how food is processed into ingredients that can be eaten or used in cooking.</li> <li>• Know how to prepare and cook a variety of savoury and some sweet dishes safely and hygienically, including the use of a heat source.</li> <li>• Talk in scientific terms about the physical and chemical changes that take place when food is cooked, <b>e.g. heated and cooled</b></li> <li>• Know how to use a wide range of techniques such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking.</li> <li>• Select the appropriate methods and equipment for measuring, <b>e.g. time, dry goods, liquids etc.</b></li> <li>• Compare commercial and domestic processes for producing food, <b>e.g. bread.</b></li> <li>• Know that a healthy diet is made up of a variety and balance of different foods and drinks as depicted on 'The Eatwell Plate'.</li> <li>• Know that to be active and healthy, food is needed to provide energy for the body.</li> </ul>

	<ul style="list-style-type: none"><li>• Know that different foods contain substances that are needed for health. E.g. water, fibre, vitamins and nutrients.</li><li>• Talk about and give reasons for the need to work safely and hygienically.</li></ul>	<ul style="list-style-type: none"><li>• Talk about the impact of changing proportions within a recipe and use knowledge of food and cooking to generate own recipes.</li><li>• Know that recipes can be adjusted to change the taste, texture, aroma and appearance.</li><li>• Know that different foods contain substances that are needed for health. E.g. water, fibre, vitamins and nutrients.</li><li>• Know and understand the practice needed in terms of food hygiene and kitchen safety.</li></ul>
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