Whole-school Curriculum subject plan

Design and Technology

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
YEAR 1	**Mechanisms** Sliders and Levers		**Structures** Free Standing Structures		**Food** Preparing fruit and vegetables	
Component Knowledge	• Generate ideas based on simple design criteria and their own experiences, explaining what they could make. Develop, model and communicate their ideas through drawings and mock-ups with card and paper. • Plan by suggesting what to do next. • Select and use tools, explaining their choices, to cut, shape and join paper and card. • Evaluate their product by discussing how well it works in relation to the purpose and the user and whether it meets design criteria. • Explore and use sliders and levers. • Understand that different mechanisms produce different types of movement. • Know and use technical vocabulary. Pull, push, up, down, straight, curve, forwards, backwards, design, make, evaluate, user, purpose, ideas. • Select new and reclaimed materials and construction kits to build their structures. • Know how to make freestanding structures stronger, stiffer and more stable. • Use vocabulary: structure, wall, tower, framework, weak, strong, base, top, underneath, side, edge, surface. • Use simple utensils and equipment to e.g. peel, cut, slice, squeeze, grate and chop safely. • Select from a range of fruit and vegetables according to their characteristics e.g. colour, texture and taste to create a chosen product. Evaluating • Taste and evaluate a range of fruit and vegetables to determine the intended user's preferences. • Understand where a range of fruit and vegetables come from e.g. farmed or grown at home. • Understand and use basic principles of a healthy and varied diet to prepare dishes, including how fruit and vegetables are part of The eatwell plate. • Know and use technical and sensory vocabulary relevant to the project. Eg, soft, juicy, crunchy, sweet, sticky, smooth, sharp, crisp, sour, hard.					

YEAR 2	**Textiles** Templates and Joining Techniques	**Mechanisms** Sliders and Levers	**Mechanisms** Wheels and Axels
Component Knowledge	• Generate ideas based on simple design criteria and their own experiences, explaining what they could make. Develop, model and communicate their ideas through drawings and mock-ups with card and paper. • Plan by suggesting what to do next. • Select and use tools, explaining their choices, to cut, shape and join paper and card. • Use simple finishing techniques suitable for the product they are creating. • Evaluate their product by discussing how well it works in relation to the purpose and the user and whether it meets design criteria. • Explore and use sliders and levers. • Understand that different mechanisms produce different types of movement. • Know and use technical vocabulary. Pull, push, up, down, straight, curve, forwards, backwards, design, make, evaluate, user, purpose, ideas, design, make, evaluate, user, purpose, ideas, design criteria, product, function, slider, lever, pivot, slot, bridge/guide. • Design a functional and appealing product for a chosen user and purpose based on simple design criteria. • Generate, develop, model and communicate their ideas as appropriate through talking, drawing, templates, mock-ups and information and communication technology. • Select from and use a range of tools and equipment to perform practical tasks such as marking out, cutting, joining and finishing. • Select from and use textiles according to their characteristics. • Explore and evaluate a range of existing textile products relevant to the project being undertaken. • Evaluate their ideas throughout and their final products against original design criteria. • Understand how simple 3-D textile products are made, using a template to create two identical shapes. • Understand how to join fabrics using different techniques e.g. running stitch, glue, over stitch, stapling. • Explore different finishing techniques e.g. using painting, fabric crayons, stitching, sequins, buttons and ribbons. • Know and use technical vocab eg, template, pattern pieces, mark out, join, decorate, finish features, suitable, quality mock-up, design brief, design criteria, make, evaluate, user, purpose, function • Select from and use a range of materials and components such as paper, card, plastic and wood according to their characteristics. • Explore and evaluate a range of products with wheels and axles. • Explore and use wheels, axles and axle holders. • Distinguish between fixed and freely moving axles. • Know and use technical vocabulary eg, vehicle, wheel, axle, axle holder, chassis, body, cab assembling, cutting, joining, shaping, finishing, fixed, free, moving, mechanism		

YEAR 3	**Mechanical Systems** Levers and Linkages	**Electrical Systems** Simple Programming and Control	**Structures** Shell Structures-Computer aided	**Food** Healthy and Varied Diet
Component Knowledge	• Generate realistic ideas and their own design criteria through discussion, focusing on the needs of the user. • Use annotated sketches and prototypes to develop, model and communicate ideas. • Order the main stages of making. • Select from and use appropriate tools with some accuracy to cut, shape and join paper and card. • Select from and use finishing techniques suitable for the product they are creating. • Investigate and analyse books and, where available, other products with lever and linkage mechanisms. • Evaluate their own products and ideas against criteria and user needs, as they design and make. • Understand and use lever and linkage mechanisms. • Distinguish between fixed and loose pivots. • Know and use technical vocabulary eg, mechanism, lever, linkage, pivot, slot, bridge, guide system, input, process, output linear, rotary, oscillating, reciprocating user, purpose, function prototype, design criteria, innovative, appealing, design brief. • Develop and use knowledge of nets of cubes and cuboids and, where appropriate, more complex 3D shapes. • Develop and use knowledge of how to construct strong, stiff shell structures. • Investigate and evaluate a range of shell structures including the materials, components and techniques that have been used. • Test and evaluate their own products against design criteria and the intended user and purpose • Select and use appropriate tools and software to measure, mark out, cut, score, shape and assemble with some accuracy. • Explain their choice of materials according to functional properties and aesthetic qualities. • Use computer-generated finishing techniques suitable for the product they are creating. • Know the words: shell structure, three-dimensional (3-D) shape, net, cube, cuboid, prism, vertex, edge, face, length, width, breadth, capacity. • Select from and use tools and equipment to cut, shape, join and finish with some accuracy. • Connect simple electrical components and a battery in a series circuit to achieve a functional outcome. • Program a standalone control box, microcontroller or interface box to enhance the way the product works. • Understand and use computing to program and control products containing electrical systems, such as series circuits incorporating switches, bulbs and buzzers. • Use annotated sketches and appropriate information and communication technology, such as web-based recipes, to develop and communicate ideas. • Plan the main stages of a recipe, listing ingredients, utensils and equipment. • Select and use appropriate utensils and equipment to prepare and combine ingredients. • Select from a range of ingredients to make appropriate food products, thinking about sensory characteristics.			

	• Carry out sensory evaluations of a variety of ingredients and products. Record the evaluations using e.g. tables and simple graphs. • Know how to use appropriate equipment and utensils to prepare and combine food. • Know about a range of fresh and processed ingredients appropriate for their product, and whether they are grown, reared or caught.			
YEAR 4	**Mechanical Systems** Pneumatics	**Textiles** 2D shape to 3D product	**Electrical Systems** Simple Circuits and Switches	**Structures** Shell Structures
Component Knowledge	• Generate realistic ideas through discussion and design criteria for an appealing, functional product fit for purpose and specific user/s. • Produce annotated sketches, prototypes, final product sketches and pattern pieces. • Plan the main stages of making. • Select and use a range of appropriate tools with some accuracy e.g. cutting, joining and finishing. • Select fabrics and fastenings according to their functional characteristics e.g. strength, and aesthetic qualities e.g. pattern. • Test their product against the original design criteria and with the intended user. • Understand how a key event/individual has influenced the development of the chosen product and/or fabric. • Know how to strengthen, stiffen and reinforce existing fabrics. • Understand how to securely join two pieces of fabric together. • Understand the need for patterns and seam allowances. • Know and use technical vocabulary eg, user, purpose, design, model, evaluate, prototype, annotated sketch, functional, innovative, investigate, label, drawing, aesthetics, function, pattern pieces. • Select from and use appropriate tools with some accuracy to cut and join materials and components such as tubing, syringes and balloons. • Understand and use pneumatic mechanisms. • Know the words: pneumatic system, input movement, process, output movement, control, compression, pressure, inflate, deflate, pump, seal, air-tight. • Develop and use knowledge of how to construct strong, stiff shell structures. • Develop and use knowledge of nets of cubes and cuboids and, where appropriate, more complex 3D shapes. • Understand and use electrical systems in their products, such as series circuits incorporating switches, bulbs and buzzers. • Apply their understanding of computing to program and control their products. • Develop design criteria to inform the design of products that are fit for purpose, aimed at particular individuals or groups.			

YEAR 5	**Food** Celebrating Culture and Seasonality	**Structures** Frame Structures	**Textiles** Combining Different Fabric Shapes	**Electrical Systems** More Complex Switches and Circuits
Component Knowledge	• Generate innovative ideas through research and discussion with peers and adults to develop a design brief and criteria for a design specification. • Explore a range of initial ideas, and make design decisions to develop a final product linked to user and purpose. • Use words, annotated sketches and information and communication technology as appropriate to develop and communicate ideas. • Select and use appropriate utensils and equipment accurately to measure and combine appropriate ingredients. • Make, decorate and present the food product appropriately for the intended user and purpose. • Carry out sensory evaluations of a range of relevant products and ingredients. Record the evaluations using e.g. tables/graphs/charts such as star diagrams. • Evaluate the final product with reference back to the design brief and design specification, taking into account the views of others when identifying improvements. • Understand how key chefs have influenced eating habits to promote varied and healthy diets. • Know how to use utensils and equipment including heat sources to prepare and cook food. • Understand about seasonality in relation to food products and the source of different food products. • Know and use relevant technical vocabulary eg, at, sugar, carbohydrate, protein, vitamins, nutrients, nutrition, healthy, varied, gluten, dairy, allergy, intolerance, savoury, source, seasonality. • Generate innovative ideas by carrying out research including surveys, interviews and questionnaires. • Develop, model and communicate ideas through talking, drawing, templates, mock-ups and prototypes and, where appropriate, computer-aided design. • Design purposeful, functional, appealing products for the intended user that are fit for purpose based on a simple design specification. • Produce detailed lists of equipment and fabrics relevant to their tasks. • Formulate step-by-step plans and, if appropriate, allocate tasks within a team. • Select from and use a range of tools and equipment to make products that are accurately assembled and well finished. Work within the constraints of time, resources and cost. • Investigate and analyse textile products linked to their final product. • Compare the final product to the original design specification. • Test products with intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose. • A 3-D textile product can be made from a combination of accurately made pattern pieces, fabric shapes and different fabrics. • Understand how to strengthen, stiffen and reinforce 3-D frameworks.			

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Competently select from and use appropriate tools to accurately measure, mark out, cut, shape and join construction materials to make frameworks.
Communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams.
Understand and use electrical systems in their products.
Apply their understanding of computing to program, monitor and control their products.
Competently select and accurately assemble materials, and securely connect electrical components to produce a reliable, functional product.

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<tr><td>YEAR 6</td><td>Mechanical Systems
Pulleys or Gears</td><td>Textiles
Computer Aided Design</td><td>Electrical Systems
Monitoring and Control</td><td>Mechanical Systems
Cams</td></tr>
<tr><td>Component Knowledge</td><td colspan="4">

Generate innovative ideas by carrying out research using surveys, interviews, questionnaires and web-based resources. Develop a simple design specification to guide their thinking.
Develop and communicate ideas through discussion, annotated drawings, exploded drawings and drawings from different views.
Produce detailed lists of tools, equipment and materials. Formulate step-by-step plans and, if appropriate, allocate tasks within a team.
Select from and use a range of tools and equipment to make products that that are accurately assembled and well finished. Work within the constraints of time, resources and cost.
Compare the final product to the original design specification.
Test products with the intended user, where safe and practical, and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose.
Consider the views of others to improve their work.
Investigate famous manufacturing and engineering companies relevant to the project.
Understand that mechanical systems have an input, process and an output.
Understand how cams can be used to produce different types of movement and change the direction of movement. Know and use technical vocabulary eg, cam, snail cam, off-centre cam, peg cam, pear shaped cam follower, axle, shaft, crank, handle, housing, framework rotation, rotary motion, oscillating motion, reciprocating motion annotated sketches, exploded diagrams mechanical system, input movement, process, output movement.
Understand and use electrical systems in their products.
Understand the use of computer control systems in products.
Apply their understanding of computing to program, monitor and control their products.
Understand that mechanical and electrical systems have an input, process and an output.
Understand how gears and pulleys can be used to speed up, slow down or change the direction of movement.
A 3-D textile product can be made from a combination of accurately made pattern pieces, fabric shapes and different fabrics.

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	• Fabrics can be strengthened, stiffened and reinforced where appropriate. • Formulate step-by-step plans and, if appropriate, allocate tasks within a team. • Test products with intended user, where safe and practical, and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose