Higham Primary School Progression of Knowledge and Skills – Design and Technology

Intent
Design and Technology at Higham aims to inspire children through a broad range of practical experiences to create designs which solve real and relevant problems within a variety of different contexts. Pupils are encouraged to become independent, creative problem-solvers and thinkers as individuals and as part of a team. The iterative design process (design, make, evaluate) is fundamental and runs throughout the teaching in all year groups. This process encourages children to identify real and relevant problems, evaluate existing products and then take risks and innovate when designing and creating solutions using skills from across the curriculum; maths, science, computing and art. As part of the process, time is built in to discuss, evaluate and improve on prototypes using specific design criteria.
Implementation
Our design technology lessons give pupils the skills and knowledge that enable them to think creatively and imaginatively to design, make and evaluate products. Planning and teaching allows for the revision of ideas to become part of good practice and ultimately helps to build a depth to children understanding. Through revisiting and consolidating skills, children build on prior knowledge alongside introducing new skills, deepening their critical thinking and encouraging a greater level of challenge. The revision and introduction of key vocabulary is built into each unit of work. Food technology is implemented across the curriculum with children developing an understanding of where food comes from, the importance of a varied and healthy diet and how to prepare this. Through carefully planned, well-resourced and delivered lessons, we intend to inspire pupils to develop a love of Design and Technology and see how it has helped shaped the ever-evolving technological world they live in.
Impact
Our carefully designed, well-resourced and high quality curriculum, will ensure that design technology is valued and taught consistently across the school, with technical vocabulary displayed, spoken and used by all learners. Teachers will develop strong subject knowledge, feel confident in their teaching and will have a clearer understanding of the progression of skills across the key stages. We want to ensure that Design and Technology is loved by all pupils, therefore encouraging them to want to continue building on their wealth of skills and understanding, now and in the future. Impact can also be measured through key questioning skills built into lessons, child-led assessment such as success criteria.

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Early Years Foundation Stage			
ELG	Expressive Arts and Design	Creating with Materials	• Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. • Share their creations, explaining the process they have used. • Make use of props and materials when role playing characters in narratives and stories.
	Physical Development	Fine Motor Skills	• Hold a pencil effectively in preparation for fluent writing – using the tripod grip in almost all cases. • Use a range of small tools, including scissors, paintbrushes and cutlery. • Begin to show accuracy and care when drawing.

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<table>
<tr><th></th><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Year 6</th></tr>
<tr><td>National Curriculum</td><td colspan="2">Pupils should be taught to:
<u>Design</u>
• 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
<u>Make</u>
• select from and use a range of tools and equipment to perform practical tasks [e.g. 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 characteristic
<u>Evaluate</u>
• explore and evaluate a range of existing products
• evaluate their ideas and products against design criteria
<u>Technical Knowledge</u>
• build structures, exploring how they can be made stronger, stiffer and more stable
• explore and use mechanisms [e.g. levers, sliders, wheels and axles], in their products</td><td colspan="4">Pupils should be taught to:
<u>Design</u>
• 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
<u>Make</u>
• select from and use a wider range of tools and equipment to perform practical tasks [e.g. cutting, shaping, joining and finishing], accurately
• 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
<u>Evaluate</u>
• 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
<u>Technical Knowledge</u>
• 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 [e.g. series circuits incorporating switches, bulbs, buzzers and motors]
• apply their understanding of computing to program, monitor and control their products</td></tr>
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	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Structures	**Design** • Learn the importance of clear design criteria • Include individual preferences and requirements in a design • Talk about my ideas **Make** • Make stable structures from a range of different materials • Follow instructions to assemble a simple structure using appropriate tools and equipment (mini-beast home) **Evaluate** • Evaluate a structure according to the design criteria, testing whether the structure is strong and stable • Suggest points for improvements **Technical Knowledge** • Describe the purpose of structures • Learn that the shape of materials can be changed to improve the strength and stiffness of structures • Develop an awareness of different structures for different purposes	**Design** • Generate and communicate ideas using sketching • Learn about different types of structures, found in the natural world and in everyday objects, using information technology • Use a mock-up to create a design for a structure **Make** • Make a structure according to design criteria • Select from and use a range of tools and equipment • Select materials according to their characteristics • Create joints and structures from a range of materials such as paper, card and tape **Evaluate** • Explore the features of structures • Compare the stability of different shapes • Test the strength of a structure • Identify the weakest part of a structure • Evaluate the strength, stiffness and stability of own structure **Technical Knowledge** • Identify when a structure is more or less stable than another • Understand that the shape of a structure affects its strength • Understand that axles are used in structures and mechanism to make parts turn in a circle • Use the vocabulary: strength, stiffness and stability • Know that materials can be manipulated to improve the strength and stiffness	**Design** • Design a home with key features to appeal to a specific person or purpose • Draw and label a design including materials needed **Make** • Construct a range of 3D geometric shapes using nets • Create a range of different shaped frame structures • Reinforce corners to strengthen a structure • Create a design in accordance with a plan **Evaluate** • Evaluate their own work and the work of others based on the aesthetic of the finished product and in comparison to the original design • Suggest points for modification of an individual design • Understand how key events in DT have helped shape the world (how homes have changed) **Technical Knowledge** • Identify suitable materials to be selected and used • Extend knowledge of wide and flat based objects are more stable • Understand the difference between frame and shell structure	**Design** • Research and design a stable structure that is historically accurate and aesthetically pleasing • select appropriate materials to meet a design brief with a specific set of criteria • build frame structures designed to support weight **Make** • Make a variety of free standing frame structures of different sizes • Select appropriate tools and materials to build a strong structure and for the cladding • Learn to create different textural effects with materials **Evaluate** • Evaluate structures made by the class • Describe what characteristics of a design and construction made it the most effective • Consider effective and ineffective designs • Understand how key events in DT have helped shape the world (how boats have changed) **Technical Knowledge** • Broaden and implement knowledge of frame and shell structures	**Design** • Design a stable structure that is able to support weight • Creating frame structure with focus on triangulation **Make** • Make a range of different shaped beam bridges • Use triangles to create truss bridges that span a given distance and supports a load • Select appropriate tools and equipment for particular tasks • Identify where a structure needs reinforcement **Evaluate** • Investigate and analyse a range of existing products • Adapt and improving own bridge structure by identifying points of weakness and reinforcing them as necessary • Suggest points for improvements for own bridges and those designed by others • Understand how keys events / individuals have helped shape the world (Isambard Kingdom Brunel) **Technical Knowledge** • Explore how to create a strong beam • Identify arch and beam bridges and understanding the terms: compression and tension • Identify stronger and weaker structures • Find different ways to reinforce structures • Understand how triangles can be used to reinforce bridges • Articulate the difference between beam, arch, truss and suspension bridges	**Design** • Design an innovative product for the school community **Make** • Build structures drawing upon new and prior knowledge • Select appropriate tools and equipment for particular tasks • Use the correct techniques to saws safely • Measure, mark and cut wood safely and accurately • Use a range of materials to reinforce and add decoration **Evaluate** • Test and adapt a design to improve it as it is developed • Identify what makes a successful structure **Technical Knowledge** • 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

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Mechanism	**Design** • Design a moving picture for a given audience • Create a clearly labelled drawing which illustrates movement • Talk about my ideas • Use a template/mock-up to create a design for a moving picture **Make** • Follow a design to create moving pictures that use levers and sliders • Adapt mechanisms • Use a range of tools and equipment to perform practical tasks e.g. cutting, joining and finishing **Evaluate** • Test a finished product, seeing whether it moves as planned and if not, explaining why and how it can be fixed • Review the success of a product by testing it with its intended audience **Technical Knowledge** • Learn that levers and sliders are mechanisms that can make things move • Identify whether a mechanism is a lever or a slider • Use the vocabulary: up, down, left, right to describe movements	**Design** • Create a class design criteria • Design a moving vehicle for a specific audience in accordance with a design criteria • Select appropriate materials based on their properties **Make** • Use a range of tools and equipment to cut and assemble components neatly • Select materials according to their characteristics • Follow a design brief **Evaluate** • Evaluate own designs against design criteria • Use peer feedback to modify a final design • Test different designs • Test mechanisms identify what stops wheels from turning, knowing that a wheel needs an axle in order to more • Evaluate different designs • Test and adapt a design **Technical Knowledge** • Learn that mechanisms are a collection of moving parts that work together in a machine • Identify mechanism in everyday objects • Explore wheel mechanisms • Learn how axels help wheels to move a vehicle	**Design** • Design a toy which uses a suitable linkage or pneumatic system to produce the desired motions • Generate ideas using thumbnail sketches and exploded diagrams • Learn the different types of drawings are used in design to explain ideas clearly **Make** • Create a pneumatic system to create a desired motion • Use syringes and balloons to create different types of pneumatic systems to make a functional and appealing pneumatic toy • Make linkages using card for levers and split pins for pivots • Experiment with linkages adjusting the widths, lengths and thicknesses of card used **Evaluate** • Investigate and analyse a range of existing products • Use the views of others to improve designs • Test and modify the outcome using suggested improvements **Technical Knowledge** • Learn that a lever is something that turns on a pivot • Learn that a linkage is a system of levers that are connected by pivots • Understand how pneumatics work • Learn that mechanisms are a system of parts that work together to create motion • Understand that pneumatic systems force air over a distance to create movement	**Design** • Design a shaduf which uses levers and counterweights • Generate ideas using annotated sketches and cross-sectional and exploded diagrams **Make** • Measure, mark, cut and assemble with increasing accuracy • Make a model based on a chosen design • Select materials due to their functional and aesthetic characteristics **Evaluate** • Evaluate the strength and functionality of the final product against previously agreed design criteria **Technical Knowledge** • Learn that products change and evolve over time • Learn to use counterweights correctly to create movement	**Design** • After experimenting with a range of cams, create a design for an automata toy based on a choice of cam to create a desired movement **Make** • Measure, mark and check the accuracy of the jelutong and dowel pieces required • Measure, mark and cut components accurately using a ruler and scissors • Assemble components accurately to make a stable frame • Understand that for the frame to function effectively the components must be cut accurately and the joints of the frame secured at right angles • Select appropriate materials based on the materials being joined and the speed at which the glue needs to dry/set **Evaluate** • Evaluate the work of others and receiving feedback on own work • Apply points of improvements • Describe changes they would make/ do if they were to do the project again **Technical Knowledge** • Use a bench hook to saw safely and effectively • Explore cams, learning that different shaped cams produce different follower movements • Explore types of motions and direction of a motion	

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Textiles	**Design** • Use a template to create a design for a puppet • Talk about my ideas **Make** • Select from and use a wide range of textiles • Cut fabric neatly with scissors • Use joining methods to decorate a puppet • Sequence steps for construction • Decorate using fabric glue **Evaluate** • Reflect on a finished product, explaining likes and dislikes **Technical Knowledge** • Learn different ways in which to join fabrics together: pinning, sewing, gluing • Thread a needle with support		**Design** • Design and make a template from an existing product • Write and apply individual design criteria for a product articulating decisions made **Make** • Follow a design criteria to create a product • Make and test a paper template with accuracy and in keeping with the design criteria • Measure, mark and cut fabric using a paper template • Select a simple stitch style to join fabric, working neatly sewing small neat stitches • Decorate fabric using applique **Evaluate** • Investigate and analyse a range of existing products • Evaluate the quality of the stitching in their own work • Discuss as a class, the success of their stitching against the success criteria • Suggest modification for improvement **Technical Knowledge** • Join items using fabric glue or stitching, identifying the benefits of these techniques • Thread a needle and tie a knot with greater independence • Use simple stitches (running and cross stitch); with evenly spaces, neat stitches to join fabric • Neatly pin and but fabric using a template			**Design** • Design a cushion in accordance to a set of design criteria • Annotate designs **Make** • Create a 3D product from a 2D design • Use a template • Measure, mark and cut fabric accurately and independently • Use as sewing machine with support • Use a range of stitches to attach pieces of fabric decoration with increasing neatness • Sew a strong running stitch and blanket stitch, making small, neat stitches and following the edge • Sew a button securely **Evaluate** • Test and evaluate own work continually as it is created considering points for improvement • Decide how many of the criteria should be met for the product to be considered successful • Identify aspects of their peer's work that they like and why • Understand how key events / individuals have helped shape the world **Technical Knowledge** • Understand that there are different types of fastenings and articulate the benefits and disadvantages of these • Learn to sew blanket stitch • Apply blanket and running stitch so the space between the stitches are even and regular • Learn different decorative stitches • Know the basic parts of the sewing machine

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Electrical Systems					<u>Design</u> • Identify a design criteria and a target audience • Generate ideas through sketching and discussion <u>Make</u> • Use a range of materials and equipment safely • Make a working model using Lego WeDo <u>Evaluate</u> • Test the success of a product against the original design criteria and justifying opinions • Evaluate the success of a final product and take inspiration from the work of peers <u>Technical Knowledge</u> • Use coding to design, write and debug programs which accomplish specific goals	<u>Design</u> • Create a labelled design showing positive and negative parts in relation to the motor and the battery • Draw a design from three different perspectives • Generate ideas through sketching and discussion • Model ideas through prototypes <u>Make</u> • Use a wider range of materials and equipment safely • Use appropriate equipment to cut, fold and attach materials accurately • Make and test a circuit • Map out where different components of the circuit will go • Finish a product to a high standard <u>Evaluate</u> • Evaluate a completed product against the original design sheet and look at modifications that could be made to improve the reliability or aesthetics of it or to incorporate another type of electronic device, eg: buzzer, bulbs • Test own and others finished products, identify what worked well and make suggestions for improvement <u>Technical Knowledge</u> • Learn the key components used to create a functioning series circuit incorporating switches, motors, buzzers and bulbs • Understand that breaks in a circuit will stop it from working • Know what electrical conductors and insulators are

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NC	*Pupils should be taught to:* • use the basic principles of a healthy and varied diet to prepare dishes • understand where food comes from		*Pupils should be taught to:* • understand and apply the principles of a healthy and varied diet • prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques • understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed			
Cooking and Nutrition		• Design a healthy snack based on a food combination which work well together • Chop fruit and vegetables safely • Slice food safely using the bridge or claw grip • Identify if a food is a fruit of a vegetable • Learn where and how fruits and vegetables grow • Describe the taste, texture and smell of fruit and vegetables • Taste test food combinations and final products • Evaluate which grip was most effective • Understand the difference between fruits and vegetables • Describe and group fruits by texture and taste • Understand what makes a balanced diet		• Know that food is grown (such as tomatoes, wheat and potatoes), reared (such as pigs, chickens and cattle) and caught (such as fish) in the UK, Europe and the wider world • Learn that vegetables and fruit grow in certain seasons • Prepare/cook a variety of predominantly savoury dishes safely and hygienically • With support, use a range of techniques such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking • Understand and apply the knowledge that a healthy diet is made up from a variety and balance of different food and drink, as depicted in "The Eatwell plate" • Use food ingredients that are fresh, pre-cooked and processed • Combine food ingredients according to their sensory characteristics. • Know how to prepare themselves and a work space to cook safely and hygienically in, learning the basic rules to avoid food contamination • Follow instructions within a recipe • Evaluate a recipe, considering taste, smell, texture, and appearance	• Understand that seasons may affect the food available • Know how food is processed into ingredients that can be eaten or used in cooking • Adapt recipes to change the appearance, taste, texture, aroma and to make it healthier • Explore and discuss that a recipe can be adapted by adding or substituting one or more ingredients • Use a range of techniques safely such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking • Use equipment safely including hot pans and hobs to boil and simmer • Learn and apply basic food safety rules to avoid cross- contamination • Follow a recipe including measuring and using the correct quantities of each ingredient • Working safely and hygienically with independence • Evaluate a recipe, considering taste, smell, texture, and appearance, and suggest points for improvement	