



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

Intent

At Higham, Design and Technology aims to inspire pupils through a broad range of practical experiences to design and make innovative products that solve real and relevant problems within a variety of contexts. Pupils are encouraged to become creative, resilient and reflective problem-solvers who work both independently and collaboratively. They develop an understanding of the iterative design process by designing, making, testing, evaluating and refining products to meet the needs of a user or purpose. Throughout the curriculum, pupils investigate and evaluate existing products, develop technical knowledge of materials, mechanisms, structures, electrical systems and food, and apply skills and knowledge from subjects such as mathematics, science, computing and art where appropriate. Through increasingly challenging projects, pupils learn to take informed risks, innovate and make reasoned design decisions.

Implementation

Our Design and Technology curriculum is carefully sequenced to build pupils' knowledge, understanding and practical skills progressively throughout the school. Each unit enables pupils to investigate existing products, develop design criteria, generate ideas, select appropriate materials and components, and apply an increasing range of making techniques. Pupils are taught to test, evaluate and refine their work throughout the design process, recognising that improvements are made through continual reflection and modification. Technical vocabulary is explicitly taught and revisited within every unit to support pupils in explaining their thinking and evaluating products. Food and nutrition education develops pupils' understanding of healthy eating, seasonality, food preparation and cooking skills. Carefully planned, well-resourced lessons enable pupils to understand how design and technology has shaped the modern world while developing the confidence to become innovative designers.

Impact

Pupils leave Higham with the confidence to design, make and evaluate purposeful products using an increasingly sophisticated range of materials, tools and techniques. They demonstrate secure knowledge of the design process, understand how products are developed to meet the needs of users and can explain the reasoning behind their design decisions using accurate technical vocabulary. Pupils show creativity, resilience and independence when solving problems and refining their work. They make meaningful links between Design and Technology and other curriculum subjects, recognising the impact of design on everyday life and the wider world. High-quality outcomes, pupil discussions and ongoing assessment demonstrate clear progression in knowledge, skills and understanding across the curriculum.



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	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Early Learning Goals / National Curriculum	EAD – 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. PD – Fine Motor; - 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.	<i>Pupils should be taught to:</i> <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	<i>Pupils should be taught to:</i> <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				

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Structures	Design - To develop their imagination through building. Make - Make stable structures from a range of materials including blocks and card - Begin to follow picture and verbal instructions to make basic structures Evaluate - Be able to talk through how they made something and the materials they used to do so. - Begin to suggest ways they could improve or adapt their work. - Technical Knowledge - To understand that some materials are better to use than others - To understand how to join materials using glue and tape	Design - Learn the importance of clear design criteria. - Include individual preferences and requirements in a design. Make - Make stable structures from card. - Follow instructions to cut and assemble the supporting structure of a windmill. - Make functioning turbines and axles which are assembled into a main supporting structure. - Find the middle of an object. - Puncture holes. - Add weight to structures. - Create supporting structures. - Cut evenly and carefully. Evaluate - Evaluate 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. Technical Knowledge - 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 begin to understand that different structures	Design - Think about what others might want from a design. - Begin to recognise how products and designs in the world around us solve certain needs. - Consider who they are designing for – identify the user. - State what they intend to make and why – identify the purpose. - Talk about ideas, with purpose and user in mind. - Talk about existing products when generating ideas. - Use basic drawing skills to communicate ideas. Make - Choose between a small number of materials, ingredients or components. - Explain their choices based on personal experiences. - Request equipment appropriate to the purpose. (e.g. scissors for cutting, glue for joining) - Begin to use objects with a fixed width or length to create even spacing of markings or cuts (e.g. a lolly stick). - Refine their grip to cut competently and confidently. - Cut straight lines and evenly spaced lines. - Begin to cut large shapes and thicker materials like card. Evaluate	Design - Design a castle with key features to appeal to a specific person/purpose. - Draw and label a castle design using 2D shapes, labelling the 3D shapes that will create the features, materials needed, and colours. - Design and/or decorate a castle tower on CAD software. Make - Construct a range of 3D geometric shapes using nets. - Create special features for individual designs. - Make facades from a range of recycled materials. Evaluate - Evaluate 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 the individual designs. Technical Knowledge - To understand that wide and flat-based objects are more stable. - To understand the importance of strength and stiffness in structures. - To know the following features of a castle: flags, towers, battlements, turrets, curtain walls, moat, drawbridge and gatehouse - and their purpose.	Design - Design a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect. - Build frame structures designed to support weight. Make - Create a range of different shaped frame structures. - Make a variety of freestanding frame structures of different shapes and sizes. - Select appropriate materials to build a strong structure and cladding. - Reinforce corners to strengthen a structure. - Create a design in accordance with a plan. - 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. Technical Knowledge - 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 a pavilion is a decorative building or structure for leisure activities.	Design - Design a stable structure that is able to support weight. - Create a frame structure with a focus on triangulation. Make - Make a range of different shaped beam bridges. - Use triangles to create truss bridges that span a given distance and support a load. - Build a wooden bridge structure. - Independently measure and mark wood accurately. - Select appropriate tools and equipment for particular tasks. - Use the correct techniques to saws safely. - Identify where a structure needs reinforcement and use card corners for support. - Explain why selecting appropriating materials is an important part of the design process. - Understand basic wood functional properties. Evaluate - Adapt and improve 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. Technical Knowledge	Design - Design a playground featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs. Make - Build a range of play apparatus structures drawing upon new and prior knowledge of structures. - Measure, mark and cut wood to create a range of structures. - Use a range of materials to reinforce and add decoration to structures. Evaluate - Improve a design plan based on peer evaluation. - Test and adapt a design to improve it as it is developed. - Identify what makes a successful structure. Technical Knowledge - To know that structures can be strengthened by manipulating materials and shapes. - To understand what a 'footprint plan' is. - To understand that in the real world, design can impact users in positive and negative ways. - To know that a prototype is a cheap model to test a design idea.



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		are used for different purposes. - To know that a structure is something that has been made and put together. - To know that the sails or blades of a windmill are moved by the wind. - To know that a structure is something built for a reason. - To know that stable structures do not topple. - To know that adding weight to the base of a structure can make it more stable.	- Discuss existing products, saying what they like about them. - Compare two products and discuss which is better for a specific purpose. - Say what they like about their peers' designs and products. - Accept feedback and understanding it is meant to improve their work. Technical Knowledge - To recognise that different structures are used for different purposes. - To explore the features of structures. - To describe structures as buildings or freestanding structures. - To make stable structures from card. - To create supporting structures to aid stability. - To use stable objects like cylinders to create structures.	- To know that a façade is the front of a structure. - To understand that a castle needed to be strong and stable to withstand enemy attack. - To know that a paper net is a flat 2D shape that can become a 3D shape once assembled. - To know that a design specification is a list of success criteria for a product.	- To know that cladding can be applied to structures for different effects. - To know that aesthetics are how a product looks. - To know that a product's function means its purpose. - To understand that the target audience means the person or group of people a product is designed for. - To know that architects consider light, shadow and patterns when designing.	- To understand some different ways to reinforce structures. - To understand how triangles can be used to reinforce bridges. - To know that properties are words that describe the form and function of materials. - To understand why material selection is important based on properties. - To understand the material (functional and aesthetic) properties of wood. - To understand the difference between arch, beam, truss and suspension bridges. - To understand how to carry and use a saw safely.	
Mechanism		Design - Explain how to adapt mechanisms, using bridges or guides to control the movement. - Design a moving storybook for a given audience. Make - Follow a design to create moving models that use levers and sliders. Evaluate - Test a finished product, seeing whether it moves as planned and if not,	Design - Think about what others might want from a design. - Begin to recognise how products and designs in the world around us solve certain needs. - Consider who they are designing for by identifying the user. - State what they intend to make and why by identifying the purpose. - Talk about ideas with purpose and user in mind.	Design - Design a toy which uses a pneumatic system. - Develop design criteria from a design brief. - Generate ideas using thumbnail sketches and exploded diagrams. - Learn that different types of drawings are used in design to explain ideas clearly. Make - Create a pneumatic system to create a desired motion.		Design - Design a shape that reduces air resistance. - Draw a net to create a structure from. - Choose shapes that increase or decrease speed as a result of air resistance. - Personalise a design. - Notice wider-reaching problems or needs in the community. - Identify a wide range of needs and potential barriers through market research.	Design - Notice wider-reaching problems or needs in the community. - Come up with a broader range of ideas and deeper innovation, requiring pupils to think critically about their ideas' practicality and originality. - Begin to use more complex annotated sketches, such as cross-sectional and exploded diagrams and pattern pieces in design.



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		explaining why and how it can be fixed. - Review the success of a product by testing it with its intended audience. Technical Knowledge - To know that a mechanism is the parts of an object that move together. - To know that a slider mechanism moves an object from side to side. - To know that a slider mechanism has a slider, slots, guides and an object. - To know that bridges and guides are bits of card that purposefully restrict the movement of the slider.	- Talk about existing products when generating ideas. - Use basic drawing skills to communicate ideas. Make - Plan more than one step ahead. - Choose between a small number of materials, ingredients or components. - Explain their choices based on personal experiences. - Request equipment appropriate to the purpose (e.g. scissors for cutting and glue for joining). - Explain in simple terms why certain tools must be handled carefully. - Follow and recall simple safety instructions. - Find the middle of an object. - Refine their grip to cut competently and confidently. - Cut straight lines and evenly spaced lines. - Begin to cut large shapes and thicker materials like card. - Puncture holes. - Recognise the edges of paper and card need to be stuck firmly using a glue stick. - Use tools, like scissors, to create shapes. - Begin to cut large shapes and thicker materials like card. - Begin to use controlled painting or colouring	- Build secure housing for a pneumatic system. - Use syringes and balloons to create different types of pneumatic systems to make a functional and appealing pneumatic toy. - Select materials due to their functional and aesthetic characteristics. - Manipulate materials to create different effects by cutting, creasing, folding and weaving. Evaluate - Use the views of others to improve designs. - Test and modify the outcome, suggesting improvements. - Understand the purpose of exploded-diagrams through the eyes of a designer and their client. Technical Knowledge - To understand how pneumatic systems work. - To understand that pneumatic systems can be used as part of a mechanism. - To know that pneumatic systems operate by drawing in, releasing and compressing air.		- Write more complex problem statements that consider multiple factors and constraints. - Create more complex design criteria that require considering detailed user needs, environmental impact, materials and cost. - Come up with a broader range of ideas and deeper innovation, requiring pupils to think critically about their ideas' practicality and originality. - Begin to use more complex annotated sketches, such as cross-sectional and exploded diagrams and pattern pieces in design. - Use a series of prototypes to refine and improve their designs. Make - Measure, mark, cut and assemble with increasing accuracy. - Make a model based on a chosen design. - Consistently apply safety instructions. - Select appropriate scissors to handle delicate cutting tasks and challenging materials. - Cut patterns and drawings accurately. - In supervised groups, use hot glue guns safely. - Recognise that hot glue is useful for joining materials that need a strong bond that sets quickly.	Make - Produce lists of equipment, materials and tools that they need for a task. - Select materials, components or ingredients based on research or user needs. - Explain their choices, referring to their research. - Consider which equipment will work well together. - Choose from the known range of equipment available to them with little guidance. - Assess risks associated with different tools and equipment. - Understand and explain the importance of each safety rule. - Consistently apply safety instructions. - Cut jelutong or other harder wood with a coping saw or a tenon saw in small groups. - Cut in a back-and-forth sawing motion where appropriate. - In supervised groups, use hot glue guns safely. - Recognise that hot glue is useful for joining materials that need a strong bond that sets quickly. Evaluate - Assess their designs against a more complex set of design criteria that includes functionality, aesthetics, user



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			techniques to finish a product. - Add texture to create visual interest. Evaluate - Discuss existing products, saying what they like about them. - Compare two products and discuss which is better for a specific purpose. - Discuss how their products could be improved based on personal preferences. - Compare their finished products with their original designs. - Say what they like about their peers' designs and products. - Accept feedback and understanding it is meant to improve their work. Technical Knowledge - To recognise and explore everyday objects that have mechanisms. - To recognise many things that move have parts inside to help them work. - To recognise that mechanisms usually limit unwanted movement. - To recognise that an axle allows the wheel to turn without falling off.			- Choose PVA glue over hot glue for its safety when joining materials in less intensive projects. Evaluate - Evaluate the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance. - Reflect on the usability, aesthetics, innovation and sustainability of products and discussing how design choices impact these aspects. - Assess their designs against a more complex set of design criteria that includes functionality, aesthetics, user experience, sustainability and cost. - Consider alternative materials, tools or techniques that could enhance the product. - Provide feedback that is helpful, specific, and encouraging. - Incorporate feedback from peers or users to improve their product further, explaining the changes they made and the impact they had. Technical Knowledge - To understand that all moving things have kinetic energy. - To understand that kinetic energy is the energy that something (object/person) has by being in motion.	experience, sustainability and cost. - Provide feedback that is helpful, specific and encouraging. - Incorporate feedback from peers or users to improve their product further, explaining the changes they made and the impact they had. Technical Knowledge - To know that the mechanism in an automata uses a system of cams, axles and followers. - To know that different shaped cams produce different outputs. - To know which mechanisms are working together to make a mechanical system. - To know that there are different directions of movement. - To know that mechanisms can change one type of movement to another.



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						• To know that air resistance is the level of drag on an object as it is forced through the air. • To understand that the shape of a moving object will affect how it moves due to air resistance. • To understand that mechanical systems that use gears in everyday objects (eg bicycle, clock). • To understand that gears and pulleys allow us to transfer movement and force from one part of a mechanical system to another. • To understand that gears allow us to increase the output of a mechanism.	
Textiles		Design • Use a template to create a design for a puppet. Make • Cut fabric neatly with scissors. • Use joining methods to decorate a puppet. • Sequence steps for construction. Evaluate • Reflect on a finished product, explaining likes and dislikes. Technical Knowledge • To know that 'joining technique' means connecting two pieces of material together. • To know that there are various temporary methods of joining fabric by using staples, glue or pins. • To understand that different techniques for			Design • Design and make a template and applying individual design criteria. Make • Follow design criteria to create an Egyptian collar. • Select and cut fabrics with ease using fabric scissors. • Thread needles with greater independence. • Tie knots with greater independence. • Sew cross-stitch to join fabric. • Decorate fabric using appliqué. • Complete design ideas embellishing the collars based on design ideas (Egyptian collars). Evaluate • Evaluate an end product and thinking of other ways in which to create similar items.		



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		joining materials can be used for different purposes. - To understand that a template (or fabric pattern) is used to cut out the same shape multiple times. - To know that drawing a design idea is useful to see how an idea will look.			Technical Knowledge - To know that applique is a way of mending or decorating a textile by applying smaller pieces of fabric to larger pieces. - To know that when two edges of fabric have been joined together it is called a seam. - To know that it is important to leave space on the fabric for the seam. - To understand that some products are turned inside out after sewing so the stitching is hidden.		
Electrical Systems					Design - Design a torch, giving consideration to the target audience, and create both design and success criteria focusing on features of individual design ideas. Make - Make a torch with a working electrical circuit and switch. - Use appropriate equipment to cut and attach materials. - Assemble a torch according to the design and success criteria. Evaluate - Evaluate electrical products. - Test and evaluate the success of a final product. Technical Knowledge - To understand that electrical conductors are materials which electricity can pass through		Design - Design a steady hand game - identifying and naming the components required. - Draw a design from three different perspectives. - Generate ideas through sketching and discussion. - Model ideas through prototypes. - Understand the purpose of products (toys), including what is meant by 'fit for purpose' and 'form over function'. Make - Construct a stable base for a game. - Accurately cut, fold and assemble a net. - Decorate the base of the game to a high quality finish. - Make and test a circuit. - Incorporate a circuit into a base. Evaluate



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					• To understand that electrical insulators are materials which electricity cannot pass through • To know that a battery contains stored electricity that can be used to power products. • To know that an electrical circuit must be complete for electricity to flow. • To know that a switch can be used to complete and break an electrical circuit.		• Test own and others finished games, identifying what went well and making suggestions for improvement. • Gather images and information about existing children's toys. • Analyse a selection of existing children's toys. Technical Knowledge • To know that batteries contain acid, which can be dangerous if they leak. • To know the names of the components in a basic series circuit, including a buzzer. • To know that 'form' means the shape and appearance of an object. • To know the difference between 'form' and 'function'. • To understand that 'fit for purpose' means that a product works how it should and is easy to use. • To know that form over purpose means that a product looks good but does not work very well. • To know the importance of 'form follows function' when designing: the product must be designed primarily with the function in mind. • To understand the diagram perspectives 'top view', 'side view' and 'back'.



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Early Learning Goals /National Curriculum	PSED – Managing Self; - Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices. PD – Fine Motor; - Use a range of small tools, including scissors, paintbrushes and cutlery.	<i>Pupils should be taught to:</i> - use the basic principles of a healthy and varied diet to prepare dishes - understand where food comes from		<i>Pupils should be taught to:</i> - 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	- Peel and chop vegetables safely to make a soup. - Taste and discuss what we like / don't like about our soup - To know that we follow a recipe to make a meal / cake etc - To be able to spread butter / jam on bread to make a sandwich - To have an understanding that some foods are healthy and some are unhealthy and to name some of those foods.		Design - Design smoothie carton packaging by-hand. - Learn where and how fruits and vegetables grow. Make - Chop fruit and vegetables safely to make a smoothie. - Juice fruits safely to make a smoothie. - Identify if a food is a fruit. Evaluate - Taste and evaluate different food combinations. - Describe appearance, smell and taste. - Suggest information to be included on packaging. - Compare their own smoothie with someone else's. Technical Knowledge - To know that a blender is a machine which mixes ingredients together into a smooth liquid. - To know that a fruit has seeds and a vegetable does not. - To know that fruits grow on trees or vines.	Design - Describe how climate affects where foods grow. Make - Identify seasonal ingredients from the UK. - Follow the instructions within a recipe. - Taste seasonal ingredients. - Peel foods by hand or with a peeler. - Cut ingredients safely. - Choose ingredients based on a design brief. Evaluate - Describe the texture and flavour of ingredients. - Describe the benefits of seasonal fruits and vegetables and the impact on the environment. Technical Knowledge - To know that seasonal means foods that grow in a given season in a given country. - To know some seasonal foods that grow in the UK and what season they grow in. - To know that eating seasonal foods can have a		- 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	



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			• To know that vegetables can grow either above or below ground. • To know that vegetables is any edible part of a plant.	positive impact on the environment. • To know how to describe the flavour and texture of foods. • To know how to cut a peel safely. • To know that the appearance of food is as important as taste. • To know that similar coloured fruits and vegetables often have similar nutritional benefits.		• Evaluate a recipe, considering taste, smell, texture, and appearance, and suggest points for improvement	