

# DOGSTHORPE ACADEMY - Progression & sequencing within Design Technology

## National Curriculum Programmes of study:

	Design	Make	Evaluate	Technical knowledge	Cooking & nutrition
<b>KS1</b>	<ul style="list-style-type: none"> <li>design purposeful, functional, appealing products for themselves and other users based on design criteria</li> <li>generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology</li> </ul>	<ul style="list-style-type: none"> <li>select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]</li> <li>select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics</li> </ul>	<ul style="list-style-type: none"> <li>explore and evaluate a range of existing products</li> <li>evaluate their ideas and products against design criteria</li> </ul>	<ul style="list-style-type: none"> <li>build structures, exploring how they can be made stronger, stiffer and more stable</li> <li>explore and use mechanisms [for example, levers, sliders, wheels and axles], in their products.</li> </ul>	<ul style="list-style-type: none"> <li>use the basic principles of a healthy and varied diet to prepare dishes</li> <li>understand where food comes from.</li> </ul>
<b>KS2</b>	<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>	<ul style="list-style-type: none"> <li>select from and use a wider range of tools and equipment to perform practical tasks [for example, 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>	<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>	<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 [for example, series circuits incorporating switches, bulbs, buzzers and motors]</li> <li>apply their understanding of computing to program, monitor and control their products</li> </ul>	<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>

The Design and technology national curriculum outlines the three main stages of the **design process**: design, make and evaluate

Year group  
- units of work

Each stage of the design process is underpinned by **technical knowledge** which encompasses the contextual, historical and technical understanding

Key Stage 1 and 2				Key Stage 2 only	
Cooking and nutrition	Mechanisms / Mechanical systems	Structures	Textiles	Electrical systems	Digital world
Where food comes from, balanced diet, preparation and cooking skills. Kitchen hygiene and safety. Following recipes.	Mimic natural movements using mechanisms such as cams, followers, levers and sliders.	Material functional and aesthetic properties, strength and stability, stiffen and reinforce structures.	Fastening, sewing, decorative and functional fabric techniques including cross stitch, blanket stitch and appliqué.	Operational series circuits, circuit components, circuit diagrams and symbols, combined to create various electrical products.	Program products to monitor and control, develop designs and virtual models using 2D and 3D CAD software.

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**Long Term Plan Years 3-6:** Our design technology units are taught in 6 week blocks

	Autumn	Spring	Summer
Year 3	<b>Cooking and nutrition: Eating seasonally (Aut 1)</b> <ul style="list-style-type: none"> <li>discover when and where fruits and vegetables are grown</li> <li>learn about seasonality in the UK and the relationship between the colour of fruits and vegetables and their health benefits by making three dishes</li> </ul>	<b>Digital world: Electronic charm (Spr 1)</b> <ul style="list-style-type: none"> <li>design, code, make and promote a Micro:bit electronic charm to use in low-light conditions</li> <li>develop their understanding of programming to monitor and control their products</li> </ul>	<b>Structures: Construct a castle (Sum 1)</b> <ul style="list-style-type: none"> <li>learn about the features of a castle design and make a model castle</li> <li>use configurations of handmade nets and recycled materials to make towers and turrets and construct a base to secure them</li> </ul>
Year 4	<b>Structures: Pavilions (Aut 2)</b> <ul style="list-style-type: none"> <li>explore pavilion structures and learn about what they are used</li> <li>investigate how to create strong and stable structures</li> <li>design and create their own pavilions, complete with cladding</li> </ul>	<b>Mechanical systems: Make a slingshot car (Spr 2)</b> <ul style="list-style-type: none"> <li>transform lollipop sticks, wheels, dowels and straws into a moving car.</li> <li>make a launch mechanism</li> <li>design and make the body of the vehicle using nets and assembling these to the chassis</li> </ul>	<b>Electrical systems: Torches (Sum 2)</b> <ul style="list-style-type: none"> <li>apply their scientific understanding of electrical circuits</li> <li>create a torch, designing and evaluating their product against set design criteria</li> </ul>
Year 5	<b>Electrical systems: Doodlers (Aut 1)</b> <ul style="list-style-type: none"> <li>explore series circuits further and introduce motors.</li> <li>explore how the design cycle can be approached at a different starting point, by investigating an existing product, which uses a motor</li> <li>problem-solve and work out how the product has been constructed to develop their own</li> </ul>	<b>Mechanical systems: Make a pop-up book (Spr 1)</b> <ul style="list-style-type: none"> <li>create a four-page pop-up storybook design</li> <li>incorporate a range of mechanisms and decorative features, including: structures, levers, sliders, layers and spacers.</li> </ul>	<b>Cooking and nutrition: What could be healthier?</b> <ul style="list-style-type: none"> <li>research and modify a traditional bolognese sauce recipe to make it healthier.</li> <li>cook their healthier versions</li> <li>make appropriate packaging</li> </ul>
Year 6	<b>Textiles: Waistcoats (Aut 2)</b> <ul style="list-style-type: none"> <li>select suitable fabrics, using templates, pinning, decorating and stitching to create a waistcoat for a person or purpose of their choice</li> </ul>	<b>Structures: Playgrounds (Spr 2)</b> <ul style="list-style-type: none"> <li>design and create a model of a new playground featuring five apparatus, made from three different structures.</li> <li>create a footprint as the base to visualise objects in plan, include use of natural features</li> </ul>	<b>Digital world: Navigating the world (Sum 2)</b> <ul style="list-style-type: none"> <li>program a navigation tool to produce a multifunctional device for trekkers</li> <li>combine 3D objects to form a complete product in CAD 3D modelling software</li> <li>present a pitch to 'sell' their product</li> </ul>

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Cooking and nutrition		Year 3	Year 5
		Eating seasonally	What could be healthier
Skills	Design	<ul style="list-style-type: none"> <li>• Creating a healthy and nutritious recipe for a savoury tart using seasonal ingredients, considering the taste, texture, smell and appearance of the dish.</li> </ul>	<ul style="list-style-type: none"> <li>• Adapting a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients.</li> <li>• Writing an amended method for a recipe to incorporate the relevant changes to ingredients.</li> <li>• Designing appealing packaging to reflect a recipe.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>• Knowing how to prepare themselves and a work space to cook safely in, learning the basic rules to avoid food contamination.</li> <li>• Following the instructions within a recipe.</li> </ul>	<ul style="list-style-type: none"> <li>• Cutting and preparing vegetables safely</li> <li>• Using equipment safely, including knives, hot pans and hobs.</li> <li>• Knowing how to avoid cross-contamination.</li> <li>• Following a step by step method carefully to make a recipe.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Establishing and using design criteria to help test and review dishes.</li> <li>• Describing the benefits of seasonal fruits and vegetables and the impact on the environment.</li> <li>• Suggesting points for improvement when making a seasonal tart.</li> </ul>	<ul style="list-style-type: none"> <li>• Identifying the nutritional differences between different products and recipes</li> <li>• Identifying and describing healthy benefits of food groups.</li> </ul>
Knowledge	Cooking & nutrition	<ul style="list-style-type: none"> <li>• To know that not all fruits and vegetables can be grown in the UK.</li> <li>• To know that climate affects food growth.</li> <li>• To know that vegetables and fruit grow in certain seasons.</li> <li>• To know that cooking instructions are known as a 'recipe'.</li> <li>• To know that imported food is food which has been brought into the country.</li> <li>• To know that exported food is food which has been sent to another country.</li> <li>• To understand that imported foods travel from far away and this can negatively impact the environment.</li> <li>• To know that each fruit and vegetable gives us nutritional benefits because they contain vitamins, minerals and fibre.</li> <li>• To understand that vitamins, minerals and fibre are important for energy, growth and maintaining health.</li> </ul>	<ul style="list-style-type: none"> <li>• To understand where meat comes from - learning that beef is from cattle and how beef is reared and processed, including key welfare issues.</li> <li>• To know that I can adapt a recipe to make it healthier by substituting ingredients.</li> <li>• To know that I can use a nutritional calculator to see how healthy a food option is.</li> <li>• To understand that 'cross-contamination' means bacteria and germs have been passed onto ready-to-eat foods and it happens when these foods mix with raw meat or unclean objects.</li> </ul>

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Mechanisms		Year 4	Year 5
		Slingshot car	Pop up book
Skills	Design	<ul style="list-style-type: none"> <li>• Designing a shape that reduces air resistance.</li> <li>• Drawing a net to create a structure from.</li> <li>• Choosing shapes that increase or decrease speed as a result of air resistance.</li> <li>• Personalising a design.</li> </ul>	<ul style="list-style-type: none"> <li>• Designing a pop-up book which uses a mixture of structures and mechanisms.</li> <li>• Naming each mechanism, input and output accurately.</li> <li>• Storyboarding ideas for a book.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>• Measuring, marking, cutting and assembling with increasing accuracy.</li> <li>• Making a model based on a chosen design.</li> </ul>	<ul style="list-style-type: none"> <li>• Following a design brief to make a pop up book, neatly and with focus on accuracy.</li> <li>• Making mechanisms and/or structures using sliders, pivots and folds to produce movement. • Using layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Evaluating the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance.</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluating the work of others and receiving feedback on own work.</li> <li>• Suggesting points for improvement.</li> </ul>
Knowledge	Technical	<ul style="list-style-type: none"> <li>• To understand that all moving things have kinetic energy.</li> <li>• To understand that kinetic energy is the energy that something (object/person) has by being in motion.</li> <li>• To know that air resistance is the level of drag on an object as it is forced through the air.</li> <li>• To understand that the shape of a moving object will affect how it moves due to air resistance.</li> </ul>	<ul style="list-style-type: none"> <li>• To know that mechanisms control movement.</li> <li>• To understand that mechanisms can be used to change one kind of motion into another.</li> <li>• To understand how to use sliders, pivots and folds to create paper-based mechanisms.</li> </ul>

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Structures		Year 3	Year 4	Year 6
		Construct a castle	Pavilions	Playgrounds
Skills	Design	<ul style="list-style-type: none"> <li>• Designing a castle with key features to appeal to a specific person/purpose.</li> <li>• Drawing and labelling a castle design using 2D shapes, labelling: -the 3D shapes that will create the features - materials needed and colours.</li> </ul>	<ul style="list-style-type: none"> <li>• Designing a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect.</li> <li>• Building frame structures designed to support weight</li> </ul>	<ul style="list-style-type: none"> <li>• Designing a playground featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>• Constructing a range of 3D geometric shapes using nets.</li> <li>• Creating special features for individual designs.</li> <li>• Making facades from a range of recycled materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Creating a range of different shaped frame structures.</li> <li>• Making a variety of free standing frame structures of different shapes and sizes.</li> <li>• Selecting appropriate materials to build a strong structure and cladding.</li> <li>• Reinforcing corners to strengthen a structure.</li> <li>• Creating a design in accordance with a plan.</li> <li>• Learning to create different textural effects with materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Building a range of play apparatus structures drawing upon new and prior knowledge of structures.</li> <li>• Measuring, marking and cutting wood to create a range of structures.</li> <li>• Using a range of materials to reinforce and add decoration to structures.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Evaluating own work and the work of others based on the aesthetic of the finished product and in comparison to the original design.</li> <li>• Suggesting points for modification of the individual designs</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluating structures made by the class.</li> <li>• Describing what characteristics of a design and construction made it the most effective.</li> <li>• Considering effective and ineffective designs.</li> </ul>	<ul style="list-style-type: none"> <li>• Improving a design plan based on peer evaluation.</li> <li>• Testing and adapting a design to improve it as it is developed.</li> <li>• Identifying what makes a successful structure.</li> </ul>
Knowledge	Technical	<ul style="list-style-type: none"> <li>• To understand that wide and flat based objects are more stable.</li> <li>• To understand the importance of strength and stiffness in structures.</li> </ul>	<ul style="list-style-type: none"> <li>• To understand what a frame structure is.</li> <li>• To know that a 'free-standing' structure is one which can stand on its own</li> </ul>	<ul style="list-style-type: none"> <li>• To know that structures can be strengthened by manipulating materials and shapes.</li> </ul>

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Textiles		Year 6
		Waistcoats
Skills	Design	<ul style="list-style-type: none"> <li>• Designing a waistcoat in accordance to a specification linked to set of design criteria.</li> <li>• Annotating designs, to explain their decisions.</li> </ul>
	Make	<p>Using a template when cutting fabric to ensure they achieve the correct shape.</p> <ul style="list-style-type: none"> <li>• Using pins effectively to secure a template to fabric without creases or bulges.</li> <li>• Marking and cutting fabric accurately, in accordance with their design.</li> <li>• Sewing a strong running stitch, making small, neat stitches and following the edge.</li> <li>• Tying strong knots.</li> <li>• Decorating a waistcoat, attaching features (such as appliqué) using thread.</li> <li>• Finishing the waistcoat with a secure fastening (such as buttons).</li> <li>• Learning different decorative stitches.</li> <li>• Sewing accurately with evenly spaced, neat stitches.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Reflecting on their work continually throughout the design, make and evaluate process.</li> </ul>
Knowledge	Technical	<ul style="list-style-type: none"> <li>• To understand that it is important to design clothing with the client/ target customer in mind.</li> <li>• To know that using a template (or clothing pattern) helps to accurately mark out a design on fabric.</li> <li>• To understand the importance of consistently sized stitches.</li> </ul>

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Electrical systems		Year 4	Year 5
		Torches	Doodlers
Skills	Design	<ul style="list-style-type: none"> <li>• Designing a torch, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas.</li> </ul>	<ul style="list-style-type: none"> <li>• Identifying factors that could be changed on existing products and explaining how these would alter the form and function of the product.</li> <li>• Developing design criteria based on findings from investigating existing products.</li> <li>• Developing design criteria that clarifies the target user.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>• Making a torch with a working electrical circuit and switch.</li> <li>• Using appropriate equipment to cut and attach materials.</li> <li>• Assembling a torch according to the design and success criteria.</li> </ul>	<ul style="list-style-type: none"> <li>• Altering a product's form and function by tinkering with its configuration.</li> <li>• Making a functional series circuit, incorporating a motor.</li> <li>• Constructing a product with consideration for the design criteria.</li> <li>• Breaking down the construction process into steps so that others can make the product.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Evaluating electrical products.</li> <li>• Testing and evaluating the success of a final product.</li> </ul>	<ul style="list-style-type: none"> <li>• Carry out a product analysis to look at the purpose of a product along with its strengths and weaknesses.</li> <li>• Determining which parts of a product affect its function and which parts affect its form.</li> <li>• Analysing whether changes in configuration positively or negatively affect an existing product.</li> <li>• Peer evaluating a set of instructions to build a product.</li> </ul>
Knowledge	Technical	<ul style="list-style-type: none"> <li>• To understand that electrical conductors are materials which electricity can pass through.</li> <li>• To understand that electrical insulators are materials which electricity cannot pass through.</li> <li>• To know that a battery contains stored electricity that can be used to power products.               <ul style="list-style-type: none"> <li>• To know that an electrical circuit must be complete for electricity to flow.</li> </ul> </li> <li>• To know that a switch can be used to complete and break an electrical circuit.</li> </ul>	<ul style="list-style-type: none"> <li>• To know that series circuits only have one direction for the electricity to flow.</li> <li>• To know when there is a break in a series circuit, all components turn off.</li> <li>• To know that an electric motor converts electrical energy into rotational movement, causing the motor's axle to spin.</li> <li>• To know a motorised product is one which uses a motor to function.</li> </ul>

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Digital world		Year 3	Year 6
		Electronic charm	Navigating the world
Skills	Design	<ul style="list-style-type: none"> <li>• Problem solving by suggesting potential features on a Micro: bit and justifying my ideas.</li> <li>• Developing design ideas for a technology pouch.</li> <li>• Drawing and manipulating 2D shapes, using computer-aided design, to produce a point of sale badge.</li> </ul>	<ul style="list-style-type: none"> <li>• Writing a design brief from information submitted by a client.</li> <li>• Developing design criteria to fulfil the client's request.</li> <li>• Considering and suggesting additional functions for my navigation tool.</li> <li>• Developing a product idea through annotated sketches.</li> <li>• Placing and manoeuvring 3D objects, using CAD.</li> <li>• Changing the properties of, or combining one or more 3D objects, using CAD.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>• Using a template when cutting and assembling the pouch.</li> <li>• Following a list of design requirements.</li> <li>• Selecting and using the appropriate tools and equipment for cutting, joining, shaping and decorating a foam pouch.</li> <li>• Applying functional features such as using foam to create soft buttons.</li> <li>• Writing a program to control (button press) and/or monitor (sense light) that will initiate a flashing LED algorithm.</li> </ul>	<ul style="list-style-type: none"> <li>• Considering materials and their functional properties, especially those that are sustainable and recyclable (for example, cork and bamboo).</li> <li>• Explaining material choices and why they were chosen as part of a product concept.</li> <li>• Programming an N,E, S, W cardinal compass.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Analysing and evaluating an existing product.</li> <li>• Identifying the key features of a pouch.</li> </ul>	<ul style="list-style-type: none"> <li>• Explaining how my program fits the design criteria and how it would be useful as part of a navigation tool.</li> <li>• Developing an awareness of sustainable design.</li> <li>• Identifying key industries that utilise 3D CAD modelling and explaining why.</li> <li>• Describing how the product concept fits the client's request and how it will benefit the customers.</li> <li>• Explaining the key functions in my program, including any additions.</li> <li>• Explaining how my program fits the design criteria and how it would be useful as part of a navigation tool.</li> <li>• Explaining the key functions and features of my navigation tool to the client as part of a product concept pitch.</li> <li>• Demonstrating a functional program as part of a product concept pitch.</li> </ul>
Knowledge	Technical	<ul style="list-style-type: none"> <li>• To understand that, in programming, a 'loop' is code that repeats something again and again until stopped.</li> <li>• To know that a Micro:bit is a pocket-sized, codeable computer.</li> </ul>	<ul style="list-style-type: none"> <li>• To know that accelerometers can detect movement.</li> <li>• To understand that sensors can be useful in products as they mean the product can function without human input.</li> </ul>