Design Technology

By the end of Year 6 we want our pupils to:

- be inspired to be innovative and creative thinkers who have an appreciation for the product design cycle.
- build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users.
- be empathetic as they critique, evaluate and test their ideas and products and the work of others.
- understand and apply the principles of nutrition and learn how to cook.
- persevere to solve practical problems using their Design Technology skills.
- develop the creative, technical and practical expertise needed to perform everyday tasks confidently to be able to use Design and Technology in their everyday lives.
- be aspirational to go on to have careers within Design and Technology.

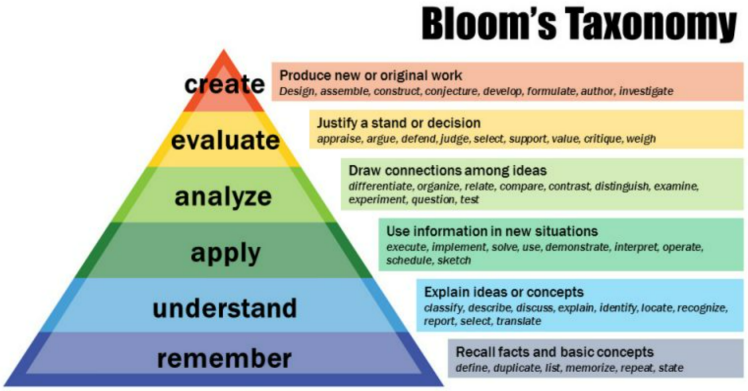
Department for Education

Design and technology programmes of study: key stages 1 and 2

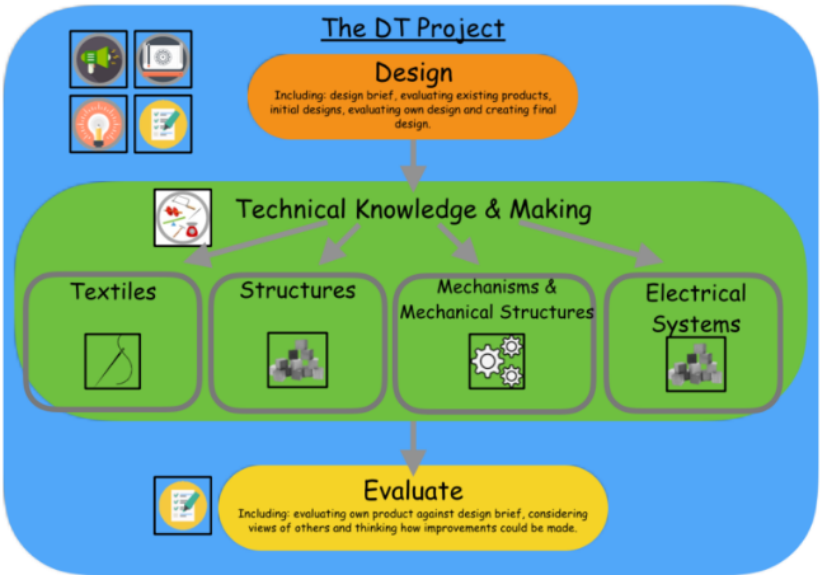
National curriculum in England

Purpose of study

Design and technology is an inspiring, rigorous and practical subject. Using creativity and imagination, pupils design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, they develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation.



Kapow Primary™



Kapow for KS1 and KS2: Curriculum coverage from Preschool to Year 6

Year group	**Structures**	**Textiles**	**Mechanisms**	**Cooking and Nutrition**	**Digital World**	**Electrical systems**
Preschool						
Foundation	Junk modelling Boats	Bookmarks		Soup		
Year 1	Constructing windmills - Designing the structure - Assembling the structure - Assembling the windmill - Testing and evaluating	Puppets - Joining fabrics - Designing my puppet - Making and joining my puppet - Decorating my puppet		Fruit and vegetables - Fruit or vegetable? - Where fruit and vegetables grow - Smoothie ingredients tasting - Making smoothies		
Year 2	Baby Bear's Chair - Exploring stability - Strengthening materials - Making Baby		Fairground wheel - Design a Ferris wheel - Planning the build - Building the			

	Bear's chair - Fixing and testing Baby Bear's chair		frame and wheels - Adding pods and decoration Making a moving monster - Pivots, levers and linkages - Making linkages - Designing my monster - Making my monster			
Year 3	Constructing a castle - Features of a castle - Designing a castle - Nets and structures - Building a castle			Eating seasonally - Where in the World? - British seasonal foods - Rainbow food - Making tarts	Electronic charm - Smart wearables - Programming an eCharm - eCharm pouches - POS displays	
Year 4	Pavilions - exploring frame and structure		Making a slingshot car - chassis and launch			Torches - electrical products - evaluating

	- designing a pavilion - pavilion frame - pavilion cladding		mechanism - designing the car body - making the car body - assembly and testing			torches - torch design - torch assembly
Year 5			Making a pop-up book - pop-up book page design - making my pop-up book - using layers and spacers - writing and illustrating	What could be healthier? - farm to fork - What does healthy look like? - adapting and improving a recipe - Mamma mia! What a tasty, healthy bolognese!		Doodlers - electrical systems and motors - meet the Doodlers - Doodler design and construction - Doodler DIY kits
Year 6	Playgrounds - design a new playground - building structures - perfecting structures - playground landscapes	Waistcoats - waistcoat design - preparing fabric - assembling my waistcoat - decorating my waistcoat			Navigating the world - navigating the world - programming a navigation tool - product concept - 3D CAD models	

Direct links to other curriculum areas within existing year group

SCIENCE

MATHS

RSE

ENGLISH

HISTORY

BRITISH VALUES

GEOGRAPHY

COMPUTING

Progression of vocabulary

	Explanation	*Examples*	*Recommendation for teaching*
Tier 1	**Everyday** words encountered in everyday conversation	dog go happy drink phone play sad	These words do not necessarily need to be explicitly taught, especially in upper grades with native English speakers. *Note: Children with learning difficulties or an English as a Second Language background may still benefit from explicit teaching of some Tier 1 words.*
Tier 2	Words that are needed in an academic context, and provide access to more complex topics and discussions outside of the everyday. Words that are useful across **multiple topic and subject areas**.	relative vary formulate specificity accumulate calibrate itemise falsely description hypothesis misfortune dignified faltered distinctly resolve	**Teachers should explicitly teach these words,** to ensure they can develop their students' understanding and expression of complex ideas. **These words are useful for multiple purposes**, and their use and understanding reflect and mature understanding of academic language. Students should learn to use Tier 2 words in multiple contexts and for multiple purposes.
Tier 3	Words that are **relevant for specific subjects or content-areas**. Words that have distinct meanings and purposes, relevant to a specialised topic or discourse.	lava carburettor legislature circumference aorta polyglot sonata isosceles	**Students should learn these for the particular content-areas**, but should not be preferenced over more useful Tier 2 words. Students should learn to use Tier 3 words in the context of the specific subject matter where they are useful.

TIER 1	**Curriculum area**					
Year group	**Structure**	**Textiles**	**Mechanical Systems**	**Food**	**Digital World**	**Electrical systems**
Preschool	join stick cut bend fix sink float junk	sew sewing needle thread		fruit vegetables chop slice cut		

				mix		
EYFS	join stick cut bend fix sink float junk	sew sewing needle thread		fruit vegetables chop slice cut mix		
Y1	design net t test weak strong	design glue model hand puppet		blender fruit vegetable slice peel		
Y2	strong test weak stable stiff man-made		decorate stable strong test weak			
Y3	2D shapes 3D shapes feature flag net stable strong structure tab weak castle			recipe seasons	badge control develop digital display fasten feature function monitor net product sense stand template test user	
Y4	evaluation function inspiration stable structure stable		function net design			develop investigate motor stable

Y5			function design input linkage motion output slider structure template	beef diet farm healthy ingredients method nutrients packaging recipe research substitute supermarket	a	develop investigate stable motor
Y6	adapt design evaluation feedback idea landscape mark out measure playground sketch strong structure texture user weak	accurate waterproof design detail fabric fastening knot running-stitch seam sew shape template thread		cookbook equipment farm flavour illustration ingredients method nationality preparation recipe research storyboard top tips	client compass equipment feature function loop materials (wood, metal, plastic etc) program recyclable smart	

TIER 2	Curriculum area					
Year group	**Structure**	**Textiles**	**Mechanical Systems**	**Food**	**Digital World**	**Electrical systems**
Preschool	slot scissors experiment prediction variable	weave pattern		knife blade tool safety edge handle saucepan blender chopping board hob boil blend		
EYFS	slot scissors experiment prediction variable		create, reflect, pinch, evaluate	knife blade tool safety edge handle saucepan blender chopping board hob boil blend		
Y1	evaluation stable	decorate fabric stencil safety pin		carton peeler recipe smoothie ingredients		
Y2	natural structure		axle evaluation waterproof motion			

Y3	facade .			nationality nutrients seasonal food	analogue design requirements digital revolution digital world electronic electronic products initiate key features layers loops point of sale program technology	
Y4	design criteria frame structure target audience target customer texture theme		design criteria graphics mechanism structure			battery bulb buzzer cell component design criteria electrical item electricity electronic item insulator series circuit switch wire
Y5			aesthetic caption design brief	reared vegan vegetarian		circuit component DIY

			design criteria exploded-diagram mechanism pivot prototype			motorised problem solve series circuit target user
Y6	apparatus bench hook cladding coping saw dowel Jelutong modify natural materials plan view prototype reinforce tenon saw vice	adapt annotate design criteria properties target audience target customer unique waistcoat			application Boolean concept convince corrode duplicate finite functional If statement infinite investment lightweight manufacture mouldable navigation non-recycable product lifespan sustainable sustainable design unsustainable design variable workplane	

TIER 3	Curriculum area					
Year group	**Structure**	**Textiles**	**Mechanical Systems**	**Food**	**Digital World**	**Electrical systems**
Preschool	measure materials waterproof absorb investigation	embroider		packaging recyclable metal plastic reusable		
EYFS	measure materials waterproof absorb investigation	embroider evaluate		packaging recyclable metal plastic reusable		

Y1	windmill	staple template		healthy ingredients stencil template.		
Y2	mould function		ferris wheel mechanism survey rotary motion reciprocating motion pivot output oscillating motion mechanical linkage linear motion lever input			

Y3	geometric, frottage, abstract, gestural, expressive			climate dry climate exported imported Mediterranean climate Polar climate temperate climate tropical climate	CAD Micro:bit simulator smart wearables	
Y4	aesthetic cladding pavilion reinforce		aesthetic air resistance chassis kinetic energy			conductor copper
Y5			Computer-aide d design (CAD)	cross-contamina tion ethical issues welfare		configuration current product analysis

Y6					3D CAD biodegradable cardinal compass environmentally friendly GPS tracker	

Progression of Substantive Knowledge in Art from Preschool to Y6

Pre-School Expressive art and design	•					
Foundation Stage Expressive art and design	•					
	Structure	**Textiles**	**Mechanical Systems**	**Food**	**Digital World**	**Electrical systems**
<u>Y1</u> **<u>Topics</u>** Constructing a windmill	To know -that the shape of materials can be changed to improve the strength and stiffness of structures. -that cylinders are a strong type of structure. -that axles	To know -joining technique means connecting two pieces of material together. -there are various temporary methods of joining fabric by using pins, staples or		To know -the difference between fruits and vegetables. -that some foods typically known as vegetables are actually fruits (e.g. cucumber) -a blender		

	are used in structures and mechanisms to make parts turn in a circle. -that different structures are used for different purposes. - that a structure is something that has been made and put together.	glue. -the different techniques for jing materials that can be used for different purposes. -that a template is used to cut the same shape multiple times. -that drawing a design is useful to see how an idea will work.		is a machine which mixes ingredients together into a smooth liquid. - a fruit has seeds and a vegetable does not. -vegetables can grow either above or below the ground. - vegetables can come from different parts of the plant.		
Y2	To know. -that shapes and structures		To know -different materials			

	with wide, flat bases or legs are the most stable. -that the shape of a structure affects its strength. -materials can be manipulated to improve strength and stiffness. -a structure is something which has been formed or made from parts. -that a strong structure is one which is firmly fixed and unlikely to change or move. - that "a strong"		have different properties and are therefore suitable for different uses. - the features of a ferris wheel include the wheel, frame, pods, a base, an axle and an axle holder. - mechanisms are a collection of moving parts that work together as a machine to produce movement. -there is			

	structure is one which does not break easily. -that a "stiff" structure or material is one which does not bend easily.		always an input and output to a mechanism. -an input is energy that is used to start something working. -an output is the movement that happens as a result of the input. - a lever is something that turns on a pivot. - a linkage mechanism is made up of a series of levers.			
Y3	To know -that wide and flat based objects are			To know -that not all fruits and	To know -in programming a lupus code	

	more stable. -the importance of strength and stiffness in structures. - the facade is the front of the castle. - a paper net is a flat 2D shape that can become a 3D shape. - a design specification is a list of success criteria for a product.			vegetables can be grown in the UK. - that climate affects food growth. -that vegetables and fruits are grown in certain seasons. -cooking instructions are known as a recipe. -imported food is food which has been brought into the country. -exported food is food which has been sent to	that repeats something again and again until stopped. -a Micro:bit is a pocket-sized codeable computer.	

				another country. -imported foods can travel from far away and this can negatively impact the environmen t. -each fruit and vegetable gives us nutritional benefits because they contain vitamins, minerals and fibre. -vitamins, minerals and fibre are important for energy, growth and		

				maintaining health. -safety rules for storing and cleaning a knife safely. -similar coloured fruits and vegetables often have similar nutritional benefits.		
Y4	To know -what a frame structure is. -that a "free-standing" structure is one that can stand on its own. - a pavilion is a decorative building or structure		To know -all moving things have kinetic energy. -that kinetic energy is the energy that something has by being in motion.			To know -electrical conductors are materials which electricity can pass through. -understand that electrical insulators are materials which electricity cannot pass

	for leisure activities. - cladding can be applied to structures for different effects. -aesthetics are how a product looks.		- that air resistance is the level of drag on an object that is forced through the air. - the shape of a moving object will affect how it moves due to air resistance.			through. - a battery contains stored electricity that can be used to power products. -an electrical circuit must be complete for electricity to flow. -a switch can be used to complete and break a circuit.
Y5	.	.	To know -that mechanisms control movement. -that mechanisms can be used to change one kind of motion into another.	To know -where meat comes from- learning that beef is from cattle and how it is reared and processed including		To know -series circuits only have one direction for the electricity to flow. -when there is a break in a series circuit, all components turn off.

			-how to use sliders, pivots and folds to create paper-based mechanisms.	key welfare issues. - I can make a recipe healthier by substituting ingredients. -I can use a nutritional calculator to see how healthy a food option is. -cross-contamination means bacteria and germs have been passed onto ready-to-eat foods and it happens when these foods mix with raw		-an electric motor converts electrical energy into rotational movement, causing the motor's axle to spin. - a motorised product is one which uses a motor to function.

				meat or unclean objects.		
Y6	To know -structures can be strengthened by manipulating materials and shapes. - what a "Footprint plan" is. -that a prototype is a cheap model to test a design idea.	To know -understand that it is important to design clothing with the client/target customer in mind. -using a template helps to accurately mark out a design on fabric. -the importance of consistently sized stitches.			To know -accelerometers can detect movement. -sensors can be useful in products as they mean the product can function without human input.	

Progression of Disciplinary Knowledge in Design and Technology from Preschool through to Year 6

Do children have opportunities to…

Year Group	**Design**			
Pre-school				
Foundation				
	Structure	**Textiles**	**Mechanical Systems**	**Food**
Year 1	How to: -learn the importance of a clear design criteria. -include individual preferences and requirements in a design	How to: -use a template to create a design for a puppet		How to: -design a smoothie carton packaging by hand or on ICT software
Year 2	How to: -generate and communicate ideas using sketching and modelling. -learn about different types of structures, found in the natural world and in everyday objects.		How to: -select a suitable linkage system to produce the desired motion -design a wheel -create a class design criteria for a moving monster -design a moving monster for a specific audience in accordance with a design criteria	

Year Group	**Make**			
Pre-school				
Foundation				

	Structure	Textiles	Mechanical Systems	Food
Year 1	How to: -make stable structures from card, tape and glue. -learn how to turn 2D nets into 3D structures. -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.	How to: -cut fabric neatly with scissors -use joining methods to decorate a puppet -sequence steps for construction		How to: -chop fruit and vegetables safely to make a smoothie -identify if a food is a fruit or vegetable -learn where and how fruits and vegetables grow
Year 2	How to: -make a structure according to design criteria -create joints and structures from paper/card and tape -build a strong and stiff structure by folding paper		How to: -select materials according to their characteristics -follow a design brief -make linkages using card for levers and split pins for pivots -experiment with linkages adjusting the widths, lengths and thicknesses of card used -cut and assemble the components neatly.	

Year Group	**Evaluate**			
Pre-school				
Foundation				
	Structure	**Textiles**	**Mechanical Systems**	**Food**
Year 1	How to:	How to:		How to:

	-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 improvement	reflect on a finished product, explaining likes and dislikes		-taste and evaluate different food combinations -describe appearance, smell and taste -suggest information to be included on packaging
Year 2	How to: -explore the features of structures. -comparing the sustainability of different shapes -test the strength of won structures -identify the weakest part of the structure -evaluate the strength, stiffness and stability of their own structure.		How to: -evaluate different designs -test and adapt a design -evaluate own designs against design criteria -use peer feedback to modify a final design	

	Design					
	Structure	**Textiles**	**Mechanical Systems**	**Food**	**Digital World**	**Electrical systems**
Year 3	How to: -design a castle with key features to appeal to a specific person/purpose. -draw and label a castle design using 2D shapes, labelling: the			How to: -create a healthy and nutritious recipe for a savoury tart using seasonal ingredients, considering the taste, texture, smell and appearance of the	How to: -problem solving by suggesting potential features on a Micro:bit and justifying my ideas. -DEveloping design ideas for a	

	3D shapes that will create the features-materials needed and colours. -design and/or decorate a castle tower on CAD software			dish	technology pouch. -Drawing and manipulating 2D shape, using computer-aided design to produce a point of sale badge.	
Year 4	How to: -design a stable pavilion structure that is aesthetically pleasing and select materials to create a desired effect. -building frame structures designed to support weight.		How to: -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			How to: -design a torch, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas
Year 5			How to: -design a pop-up book which uses a mixture of structures and mechanisms -name each mechanism, input and output accurately -storyboard ideas for a book	How to: -adapt a traditional recipe, understanding that the nutritional value of a recipe alters if you remove or add additional ingredients -write an amended method for a recipe to incorporate the relevant changes to the ingredient -design appealing packaging to reflect a recipe		How to: -identify factors that could be changed on existing products and explaining how these would alter the form and function of the product -develop design criteria based on findings from investigating existing products -develop design criteria that clarifies the target user

Year 6	How to: -design a playground featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs.	How to -Design a waistcoat in accordance with a specification linked to a set of design criteria. -Annotate designs to explain their decisions.:			How to -write a design brief from information submitted by the client. -develop design criteria to fulfil the client's request .-Consider and suggest additional functions for my navigation tool. -develop a product idea through annotated sketches. -place and manoeuvring objects using CAD. -change the properties of, or combine one or more 3D objects using CAD.	

	Make					
	Structure	**Textiles**	**Mechanical Systems**	**Food**	**Digital World**	**Electrical systems**
Year 3	How to: -construct a range of 3D geometric shapes using nets. -create special features for individual			How to: -know how to prepare themselves and a work space to cook safely in, learning the basic	How to: -Use a template when cutting and assembling a pouch. -follow a list of design requirements.	

	designs -make facades from a range of recycled materials			rules to avoid food contamination. - follow the instructions within a recipe	-select and use the appropriate tools and equipment for cutting, joining, shaping and decorating a foam pouch. -apply functional features such as using foam to create soft buttons. -write a program to control(button press) and/or monitor (sense light) that will initiate a flashing LED algorithm.	
Year 4	How to: -create a range of different shaped frame structures -make a variety of free standing 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		How to: -measure, mark, cut and assemble with increasing accuracy -make a model based on chosen design			How to: -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

	-learn to create different textural effects with materials.					
Year 5			How to: -follow a design brief to make a pop-up book, neatly and with focus on accuracy -make mechanisms and /or structures using sliders, pivots and folds to produce movement -use layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result	How to: -cut and prepare vegetables safely -use equipment safely, including knives, hot-pans and hobs - know how to avoid cross-contamination -follow a step by step method carefully to make a recipe		How to: -alter a products form and function by tinkering with its configuration -make a functional series circuit, incorporating a motor -construct a product with consideration for the design criteria -break down the construction process into steps so that others can make the product
Year 6	How to: - build a range of play apparatus 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	How to: -use a template when cutting fabric to ensure they achieve the correct shape. -use pins effectively to secure fabric without creases or bulges. -mark and cut fabric accurately, in accordance with their design. -sew a strong running			How to -consider materials and their functional properties, especially those that are sustainable or recyclable. -explain material choices and why they were chosen as part of a product concept. -program an N,E,S,W cardinal compass.	

		stitch, making small, neat stitches and following the edge. -tie small knots -decorate a waistcoat, attaching features (such as applique) using thread. -finish the waistcoat with a secure fastening (such as buttons) -learning different decorative stitches. -sew accurately with evenly spaced, neat stitches.				

	Evaluate					
	Structure	**Textiles**	**Mechanical Systems**	**Food**	**Digital World**	**Electrical systems**
Year 3	How to: -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			How to: -establish and use design criteria to help test and review dishes -describe the benefits of seasonal fruits and vegetables and the impact on the environment -suggest points for	How to: -analyse and evaluate an existing product. -identify key features of a pouch.	

				improvement when making a seasonal tart		
Year 4	How to: -evaluate structures made by the class -describe what characteristics of a design and construction made it the most effective -consider effective and ineffective designs		How to: -evaluate the speed of a final product based on: the effect of shape on speed and accuracy of workmanship on performance			How to: -evaluate electrical products -test and evaluate the success of a final product
Year 5			How to: -evaluate the work of others and receive feedback on own work suggest points for improvement	How to: -identify the nutritional differences between different products and recipes -identify and describe healthy benefits of food groups		How to: -carry out a product analysis to look at the purpose of a product along with its strengths and weaknesses -determine which parts of a product affect its function and which parts affect its form -analyse whether changes in configuration positively or negatively affect an existing product -peer evaluate a set of instructions to

						build a product
ear 6	How to: -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	How to: -reflect on their work continually throughout the design, make and evaluate process.			How to: -explain how my program fits the design criteria and how it would be useful as part of a navigation tool. -develop an awareness of sustainable design. -identify key industries that utilise 3D CAD modelling and explain why. -Describe how the product concept fits the client's request and how it would be useful as part of a navigation tool. -explain the key functions in my program, including any additions. -explain key functions and features of my navigation tool to the client as part of a product concept pitch. -demonstrate a functional program as part of a product concept pitch.	