

Tutshill C of E Primary School

Design Technology

Progression of Skills and Knowledge

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| Structures |
|  | EYFS | 1 | 2 | 3 | 4 | 5 | 6 |
| **Project** | Design a boat | Design a windmill | Design a chair for baby bear | Design a castle | Design a pavilion  |  |  Design playgrounds |
| **Design** | Designing a junk model boat.• Using knowledge from exploration to inform design. | • Learning the importance of a clear design criteria.• Including individual preferences and requirements in a design. | Generating and communicating ideas using sketching and modelling.• Learning about different types of structures, found in the natural world and in everyday objects. | • Designing a castle with key features to appeal to a specific person purpose. | • Designing a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect. • Building frame structures designed to support weight. |  | Designing a playground featuring a variety of different structures, giving carefulconsideration to how the structures will be used, considering effective andineffective designs. |
| **Make** | • Making a boat that floats and is waterproof, considering material choices | • Making stable structures from card, tape and glue .• Learning how to turn 2D nets into 3D structures.• Following instructions to cut and assemble the supporting structure of a windmill.• Making functioning turbines and axles which are assembled into a main supporting structure. | Making a structure according to design criteria.• Creating joints and structures from paper/card and tape.• Building a strong and stiff structure by folding paper. | Constructing a range of 3D geometric shapes using nets. • Creating special features for individual designs. • Making facades from a range of recycled materials. • Creating a range of different shaped frame structures. • Making a variety of free standing frame structures of different shapes and sizes. • Selecting appropriate materials to build a strong structure and cladding. • Reinforcing corners to strengthen a structure. • Creating a design in accordance with a plan. • Learning to create different textural effects with materials. | Creating a range of different shaped frame structures. • Making a variety of free standing frame structures of different shapes and sizes. • Selecting appropriate materials to build a strong structure and cladding. • Reinforcing corners to strengthen a structure. • Creating a design in accordance with a plan. • Learning to create different textural effects with materials |  | Building a range of play apparatus structures drawing upon new and priorknowledge of structures.• Measuring, marking and cutting wood to create a range of structures.• Using a range of materials to reinforce and add decoration to structures. |
| **Evaluate** | • Making predictions about, and evaluating different materials to see if they are waterproof.• Making predictions about, and evaluating existing boats to see which floats best.• Testing their design and reflecting on what could have been done differently.• Investigating the how the shapes and structure of a boat affect the way it moves | Evaluating a windmill according to the design criteria, testing whether thestructure is strong and stable and altering it if it isn’t.• Suggest points for improvements. | • Exploring the features of structures.• Comparing the stability of different shapes.• Testing the strength of own structures.• Identifying the weakest part of a structure.• Evaluating the strength, stiffness and stability of own structure | • Evaluating own work and the work of others based on the aesthetic of the finished product and in comparison to the original design. • Suggesting points for modification of the individual designs. • Evaluating structures made by the class. • Describing what characteristics of a design and construction made it the most effective. • Considering effective and ineffective designs. | • Evaluating structures made by the class. • Describing what characteristics of a design and construction made it the most effective. • Considering effective and ineffective designs |  | • Improving a design plan based on peer evaluation.• Testing and adapting a design to improve it as it is developed.• Identifying what makes a successful structure. |
| **Knowledge** |  |  |  |  |  |  |  |
| **Technical** | To know that ‘waterproof’ materials are those which do not absorb water. | • To understand that the shape of materials can be changed to improve the strength and stiffness of structures.• 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 are used for different purposes.• To know that a structure is something that has been made and put together | To know that shapes and structures with wide, flat bases or legs are the moststable.• To understand that the shape of a structure affects its strength.• To know that materials can be manipulated to improve strength and stiffness.• To know that a structure is something which has been formed or made from parts.• To know that a ‘stable’ structure is one which is firmly fixed and unlikely to changeor move.• To know that a ‘strong’ structure is one which does not break easily.• To know that a ‘stiff’ structure or material is one which does not bend easily | • To understand that wide and flat based objects are more stable. • To understand the importance of strength and stiffness in structures. • To understand what a frame structure is. • To know that a ‘free-standing’ structure is one which can stand on its own.  | 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 structures can be strengthened by manipulating materials andshapes. |
| **Additional** | To know that some objects float and others sink.• To know the different parts of a boat. | To know that a client is the person I am designing for.• To know that design criteria is a list of points to ensure the product meets the clients needs and wants.• To know that a windmill harnesses the power of wind for a purpose likegrinding grain, pumping water or generating electricity.• To know that windmill turbines use wind to turn and make the machinesinside work.• To know that a windmill is a structure with sails that are moved by the wind.• To know the three main parts of a windmill are the turbine, axle andstructure. | To know that natural structures are those found in nature.• To know that man-made structures are those made by people | • To know the following features of a castle: flags, towers, battlements, turrets, curtain walls, moat, drawbridge and gatehouse - and their purpose. • 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 a pavilion is a a decorative building or structure for leisure activities. • 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 know that a pavilion is a a decorative building or structure for leisure activities. • 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 what a 'footprint plan' is.• To understand that in the real world, design , can impact users in positive andnegative ways.• To know that a prototype is a cheap model to test a design idea. |
| Mechanisms/ Mechanical systems |
|  | EYFS- Year1 | Year2 | Year2 | Year3 | Year4 | Year5 | Year6 |
| **Project** |  | moving monster | fairground |  | sling shot car | designing a pop-up book |  |
| **Design** |  | • Creating a class design criteria for a moving monster.• Designing a moving monster for aspecific audience in accordance with a design criteria. ( book illustration) | • Selecting a suitable linkage system toproduce the desired motion.• Designing a wheel.  |  | • Designing a shape that reduces air resistance. • Drawing a net to create a structure from. • Choosing shapes that increase or decrease speed as a result of air resistance. • Personalising a design | Designing a pop-up book which uses a mixture of structures andmechanisms.• Naming each mechanism, input and output accurately.• Storyboarding ideas for a book. |  |
| **Make** |  | Making linkages using card for levers and split pins for pivots. • Experimenting with linkages adjusting the widths, lengths and thicknesses of card used. • Cutting and assembling components neatly | Selecting materials according to their characteristics. • Following a design brief. |  | Measuring, marking, cutting and assembling with increasing accuracy.• Making a model based on a chosen design. | • Following a design brief to make a pop up book, neatly and with focus onaccuracy.• Making mechanisms and/or structures using sliders, pivots and folds toproduce movement.• Using layers and spacers to hide the workings of mechanical parts for anaesthetically pleasing result.  |  |
| **Evaluate** |  | • Evaluating own designs against design criteria. • Using peer feedback to modify a final design. | Evaluating different designs. • Testing and adapting a design. |  | Evaluating the speed of a final product based on: the effect of shape on speed andthe accuracy of workmanship on performance. | Evaluating the work of others and receiving feedback on own work.• Suggesting points for improvement. |  |
| **Knowledge** |  |  |  |  |  |  |  |
| **Technical** |  | To know that mechanisms are acollection of moving parts that worktogether as a machine to producemovement.• To know that there is always an input andoutput in a mechanism.• To know that an input is the energy thatis used to start something working.• To know that an output is the movement that happens as a result of the input.• To know that a lever is something that turns on a pivot.• To know that a linkage mechanism is made up of a series of levers. | To know that different materials have different properties and are therefore suitable for different uses. |  | 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. • 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 know that mechanisms control movement.• To understand that mechanisms can be used to change one kind of motioninto another.• To understand how to use sliders, pivots and folds to create paper-basedmechanisms. |  |
| **Additional** |  |  | To know the features of a ferris wheelinclude the wheel, frame, pods, a base anaxle and an axle holder.• To know that it is important to test mydesign as I go along so that I can solve anyproblems that may occur. |  | • To understand that products change and evolve over time.• To know that aesthetics means how an object or product looks in design and technology.• To know that a template is a stencil you can use to help you draw the same shape accurately.• To know that a birds-eye view means a view from a high angle (as if a bird in flight).• To know that graphics are images which are designed to explain or advertisesomething.•To know that it is important to assess and evaluate design ideas and models againsta list of design criteria. | To know that a design brief is a description of what I am going to design andmake.• To know that designers often want to hide mechanisms to make a productmore aesthetically pleasing |  |
| Cooking and Nutrition |
|  | EYFS | Year1 | Year2 | Year3 | Year4 | Year5 | Year6 |
| Project | Pumpkin soup | Smoothies | A balanced diet | Eating healthily |  | Developing a recipe |  |
| Design | Designing a soup recipe as a class. • Designing soup packaging. | Designing smoothie carton packaging by-hand. | Designing three wrap ideas based on a food combination which work well together | Designing a recipe for a savoury tart. |  | • Adapting a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients. • Writing an amended method for a recipe to incorporate the relevant changes to ingredients. • Designing appealing packaging to reflect a recipe. • Researching existing recipes to inform ingredient choices. |  |
| Make | Chopping plasticine safely. • Chopping vegetables with support | Chopping fruit and vegetables safely to make a smoothie. • Juicing fruits safely to make a smoothie. | Chopping foods safely to make a wrap. • Constructing a wrap that meets a design brief. • Grating foods to make a wrap. • Snipping smaller foods instead of cutting | • Following the instructions within a recipe. • Tasting seasonal ingredients. • Selecting seasonal ingredients. • Peeling ingredients safely. • Cutting safely with a vegetable knife |  | • Cutting and preparing vegetables safely. • Using equipment safely, including knives, hot pans and hobs. • Knowing how to avoid cross-contamination. • Following a step by step method carefully to make a recipe. |  |
| Evaluate | Tasting the soup and giving opinions. • Describing some of the following when tasting food: look, feel, smell and taste. • Choosing their favourite packaging design and explaining why | Tasting and evaluating different food combinations. • Describing appearance, smell and taste. • Suggesting information to be included on packaging. • Comparing their own smoothie with someone else’s. | Describing the taste, texture and smell of fruit and vegetables. • Taste testing food combinations and final products. • Describing the information that should be included on a label. •Evaluating food by giving a score. | Establishing and using design criteria to help test and review dishes. • Describing the benefits of seasonal fruits and vegetables and the impact on the environment. • Suggesting points for improvement when making a seasonal tart. |  | • Identifying the nutritional differences between different products and recipes. • Identifying and describing healthy benefits of food groups. |  |
| Knowledge |  |  |  |  |  |  |  |
| Technical | To know that soup is ingredients (usually vegetables and liquid) blended together. • To know that vegetables are grown. • To recognise and name some common vegetables. • To know that different vegetables taste different. • To know that eating vegetables is good for us. • To discuss why different packages might be used for different foods | To know that a blender is a machine which mixes ingredients together into a smooth liquid. • To know that a fruit has seeds. • To know that fruits grow on trees or vines. • To know that vegetables can grow either above or below ground. • To know that vegetables is any edible part of a plant (e.g. roots: potatoes, leaves: lettuce, fruit: cucumber) |  know that ‘diet’ means the food and drink that a person or animal usually eats. • To understand what makes a balanced diet. • To know that the five main food groups are: Carbohydrates, fruits and vegetables, protein, dairy and foods high in fat and sugar. • To understand that I should eat a range of different foods from each food group, and roughly how much of each food group. • To know that ‘ingredients’ means the items in a mixture or recipe | To know that not all fruits and vegetables can be grown in the UK. • To know that climate affects food growth. • To know that vegetables and fruit grow in certain seasons. • To know that cooking instructions are known as a ‘recipe’. • To know that imported food is food which has been brought into the country. • To know that exported food is food which has been sent to another country.. • To know that eating seasonal foods can have a positive impact on the environment. • To know that similar coloured fruits and vegetables often have similar nutritional benefits. • To know that the appearance of food is as important as taste. |  | • To understand where meat comes from - learning that beef is from cattle and how beef is reared and processed. • To know that recipes can be adapted to suit nutritional needs and dietary requirements. • To know that I can use a nutritional calculator to see how healthy a food option is. • 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. • To know that coloured chopping boards can prevent cross-contamination. • To know that nutritional information is found on food packaging. • To know that food packaging serves many purposes. |  |
| Textiles |
|  | EYFS | Year 1 | Year 2 | Year3 | Year 4 | Year 5 | Year 6 |
| Project | Design a bookmark | Design a puppet |  | Designing and making a cushion |  |  | Designing and making waistcoats |
| Design | Discussing what a good design needs.• Designing a simple pattern with paper.• Designing a bookmark.• Choosing from available materials. | Using a template to create a design for a puppet |  | • Designing and making a template from an existing cushion and applyingindividual design criteria. |  |  | • Designing a waistcoat in accordance to a specification linked to set of designcriteria.• Annotating designs, to explain their decisions. |
| Make | Developing fine motor/cutting skills with scissors.• Exploring fine motor/threading and weaving (under,over technique) with a variety of materials.• Using a prepared needle and wool to practisethreading.  | Cutting fabric neatly with scissors.• Using joining methods to decorate a puppet.• Sequencing steps for construction.  |  | Following design criteria to create a cushion • Selecting and cutting fabrics with ease using fabric scissors.• Threading needles with greater independence.• Tying knots with greater independence.• Sewing cross stitch to join fabric.• Decorating fabric using appliqué.• Completing design ideas with stuffing and sewing the edges  |  |  | Using a template when cutting fabric to ensure they achieve the correct shape.• Using pins effectively to secure a template to fabric without creases or bulges.• Marking and cutting fabric accurately, in accordance with their design.• Sewing a strong running stitch, making small, neat stitches and following the edge.• Tying strong knots.• Decorating a waistcoat, attaching features (such as appliqué) using thread.• Finishing the waistcoat with a secure fastening (such as buttons).• Learning different decorative stitches.• Sewing accurately with evenly spaced, neat stitches. |
| Evaluate | • Reflecting on a finished product and comparing totheir design. | Reflecting on a finished product, explaining likes anddislikes. |  | • Evaluating an end product and thinking of other ways in which to createsimilar items. |  |  | Reflecting on their work continually throughout the design, make and evaluate process. |
| Knowledge |  |  |  |  |  |  |  |
| Technical | • To know that a design is a way of planning our ideabefore we start.• To know that threading is putting one materialthrough an object. | • To know that ‘joining technique’ means connecting twopieces of material together.• To know that there are various temporary methods ofjoining fabric by using staples. glue or pins.• To understand that different techniques for joiningmaterials can be used for different purposes.• To understand that a template (or fabric pattern) is usedto cut out the same shape multiple times.• To know that drawing a design idea is useful to see howan idea will look |  | To know that applique is a way of mending or decorating a textile by applyingsmaller pieces of fabric to larger pieces.•To know that when two edges of fabric have been joined together it is called aseam.•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 thestitching is hidden. |  |  | • To understand that it is important to design clothing with the client/ targetcustomer in mind.• To know that using a template (or clothing pattern) helps to accurately mark out adesign on fabric.• To understand the importance of consistently sized stitches |
| Electrical Systems KS2 only |
|  | EYFS | Year1 | Year2 | Year3 | Year4 | Year5 | Year6 |
| Project |  |  |  |  | Torches | Doodlers |  |
| Design |  |  |  |  | Designing a torch, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas. | • Identifying factors that could be changed on existing products and explaining how these would alter the form and function of the product. • Developing design criteria based on findings from investigating existing products. • Developing design criteria that clarifies the target user. |  |
| Make |  |  |  |  | Making a torch with a working electrical circuit and switch. • Using appropriate equipment to cut and attach materials. • Assembling a torch according to the design and success criteria. | Altering a product’s form and function by tinkering with its configuration. • Making a functional series circuit, incorporating a motor. • Constructing a product with consideration for the design criteria. • Breaking down the construction process into steps so that others can make the product. |  |
| Evaluate |  |  |  |  | Evaluating electrical products. • Testing and evaluating the success of a final product. | Carry out a product analysis to look at the purpose of a product along with its strengths and weaknesses. • Determining which parts of a product affect its function and which parts affect its form. • Analysing whether changes in configuration positively or negatively affect an existing product. • Peer evaluating a set of instructions to build a product |  |
| Knowledge |  |  |  |  |  |  |  |
| Technical |  |  |  |  | To understand that electrical conductors are materials which electricity can pass through. • 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. | To know that series circuits only have one direction for the electricity to flow. • To know when there is a break in a series circuit, all components turn off. • To know that an electric motor converts electrical energy into rotational movement, causing the motor’s axle to spin. • To know a motorised product is one which uses a motor to function. |  |
| Additional |  |  |  |  | To know the features of a torch: case, contacts, batteries, switch, reflector, lamp, lens. • To know facts from the history and invention of the electric light bulb(s) - by Sir Joseph Swan and Thomas Edison. | To know that product analysis is critiquing the strengths and weaknesses of a product. • To know that ‘configuration’ means how the parts of a product are arranged. |  |
| Digital World as part of digital world enrichment sessions KS2 only |
| Project |  |  |  | Wearable technology | Mindful moments | Monitoring Devices |  |
| Design |  |  |  | Problem solving by suggesting which features on a Micro:bit might be useful and justifying my ideas. • Drawing and manipulating 2D shapes, using computer-aided design, to produce a point of sale badge. • Developing design ideas through annotated sketches to create a product concept. • Developing design criteria to respond to a design brief. | Writing design criteria for a programmed timer (Micro:bit). • Exploring different mindfulness strategies. • Applying the results of my research to further inform my design criteria. • Developing a prototype case for my mindful moment timer. • Using and manipulating shapes and clipart by using computer-aided design (CAD), to produce a logo. • Following a list of design requirements | • Researching (books, internet) for a particular (user’s) animal’s needs. • Developing design criteria based on research. • Generating multiple housing ideas using building bricks. • Understanding what a virtual model is and the pros and cons of traditional and CAD modelling. • Placing and manoeuvring 3D objects, using CAD. • Changing the properties of, or combining one or more 3D objects, using CAD | Writing a design brief from information submitted by a client. • Developing design criteria to fulfil the client’s request. • Considering and suggesting additional functions for my navigation tool. • Developing a product idea through annotated sketches. • Placing and manoeuvring 3D objects, using CAD. • Changing the properties of, or combining one or more 3D objects, using CAD. |
| Make |  |  |  | Following a list of design requirements. • Writing a program to control (button press) and/or monitor (sense light) that will initiate a flashing LED algorithm. | Developing a prototype case for my mindful moment timer. • Creating 3D structures using modelling materials. • Programming a micro:bit in the Microsoft micro:bit editor, to time a set number of seconds/minutes upon button press. | • Understanding the functional and aesthetic properties of plastics. • Programming to monitor the ambient temperature and coding an (audible or visual) alert when the temperature rises above or falls below a specified range. | Considering materials and their functional properties, especially those that are sustainable and recyclable (for example, cork and bamboo). • Explaining material choices and why they were chosen as part of a product concept. • Programming an N,E, S, W cardinal compass |
| Evaluate |  |  |  | Analysing and evaluating wearable technology. • Using feedback from peers to improve design. | Investigating and analysing a range of timers by identifying and comparing their advantages and disadvantages. • Evaluating my Micro:bit program against points on my design criteria and amending them to include any changes I made. • Documenting and evaluating my project. • Understanding what a logo is and why they are important in the world of design and business. • Testing my program for bugs (errors in the code). • Finding and fixing the bugs (debug) in my code. • Using an exhibition to gather feedback. • Gathering feedback from the user to make suggested improvements to a product | • Stating an event or fact from the last 100 years of plastic history. • Explaining how plastic is affecting planet Earth and suggesting ways to make more sustainable choices. • Explaining key functions in my program (audible alert, visuals). • Explaining how my product would be useful for an animal carer including programmed features. | Explaining how my program fits the design criteria and how it would be useful as part of a navigation tool. • Developing an awareness of sustainable design. • Identifying key industries that utilise 3D CAD modelling and explaining why. • Describing how the product concept fits the client’s request and how it will benefit the customers. • Explaining the key functions in my program, including any additions. • Explaining how my program fits the design criteria and how it would be useful as part of a navigation tool. • Explaining the key functions and features of my navigation tool to the client as part of a product concept pitch. • Demonstrating a functional program as part of a product concept pitch. |
| Knowledge |  |  |  |  |  |  |  |
| Technical |  |  |  | To understand that, in programming, a ‘loop’ is code that repeats something again and again until stopped. • To know that a Micro:bit is a pocket-sized, codeable computer. • To know that a simulator is able to replicate the functions of an existing piece of technology. | To understand what variables are in programming. • To know some of the features of a Micro:bit. • To know that an algorithm is a set of instructions to be followed by the computer. • To know that it is important to check my code for errors (bugs). • To know that a simulator can be used as a way of checking your code works before installing it onto an electronic device. | • To know that a ‘device’ means equipment created for a certain purpose or job and that monitoring devices observe and record. • To know that a sensor is a tool or device that is designed to monitor, detect and respond to changes for a purpose. • To understand that conditional statements (and, or, if booleans) in programming are a set of rules which are followed if certain conditions are met. | To know that accelerometers can detect movement. • To understand that sensors can be useful in products as they mean the product can function without human input. |
| Additional |  |  |  | To know what the ‘Digital Revolution’ is and features of some of the products that have evolved as a result. • To understand what is meant by ‘point of sale display.’ • To know that CAD stands for ‘Computer-aided design’. • To know what a focus group is by taking part in one. | •To understand the terms 'ergonomic' and 'aesthetic'. •To know that a prototype is a 3D model made out of cheap materials, that allows us to test design ideas and make better decisions about size, shape and materials. • To know that an exhibition is a way for companies to showcase products, meet potential new customers and gather feedback from users | To understand key developments in thermometer history. • To know events or facts that took place over the last 100 years in the history of plastic, and how this is changing our outlook on the future. • To know the 6Rs of sustainability. • To understand what a virtual model is and the pros and cons of traditional vs CAD modelling. | To know that designers write design briefs and develop design criteria to enable them to fulfil a client’s request. • To know that ‘multifunctional’ means an object or product has more than one function. • To know that magnetometers are devices that measure the Earth’s magnetic field to determine which direction you are facing. |