

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 careful  consideration to how the structures will be used, considering effective and  ineffective 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 prior  knowledge 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 the  structure 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 most  stable.  • 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 change  or 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 and  shapes. |
| **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 like  grinding grain, pumping water or generating electricity.  • To know that windmill turbines use wind to turn and make the machines  inside 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 and  structure. | 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 and  negative 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 a  specific audience in accordance with a design criteria. ( book illustration) | • Selecting a suitable linkage system to  produce 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 and  mechanisms.  • 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 on  accuracy.  • 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. |  |
| **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 and  the 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 a  collection of moving parts that work  together as a machine to produce  movement.  • To know that there is always an input and  output in a mechanism.  • To know that an input is the energy that  is 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 motion  into another.  • To understand how to use sliders, pivots and folds to create paper-based  mechanisms. |  |
| **Additional** |  |  | To know the features of a ferris wheel  include the wheel, frame, pods, a base an  axle and an axle holder.  • To know that it is important to test my  design as I go along so that I can solve any  problems 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 advertise  something.  •To know that it is important to assess and evaluate design ideas and models against  a list of design criteria. | To know that a design brief is a description of what I am going to design and  make.  • To know that designers often want to hide mechanisms to make a product  more 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 applying  individual design criteria. |  |  | • Designing a waistcoat in accordance to a specification linked to set of design  criteria.  • 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 practise  threading. | 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 to  their design. | Reflecting on a finished product, explaining likes and  dislikes. |  | • Evaluating an end product and thinking of other ways in which to create  similar 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 idea  before we start.  • To know that threading is putting one material  through an object. | • 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 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 |  | 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. |  |  | • To understand that it is important to design clothing with the client/ target  customer in mind.  • To know that using a template (or clothing pattern) helps to accurately mark out a  design 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. |