**Design Technology Progression Document - St. Mary’s R.C Primary School 2024**

**How is the Design and technology scheme of work organised?**

**Make**

Kapow Primary scheme of work

**Mechanisms**

**/ Mechanical**

**systems**

**Textiles**

**Structures**

**Design**

**Evaluate**

**Cooking and**

**nutrition**

Kapow primary key areas - EYFS (Reception), Key stage 1 and 2

**Technical knowledge**

**Electrical**

**systems**

**Digital world**

Key stage 2 only

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|  |  | **Year 1** | **Year 3** | |
| [**Constructing a windmill**](https://www.kapowprimary.com/subjects/design-technology/key-stage-1/year-1/new-structures-constructing-a-windmill/) | [**Constructing a castle**](https://www.kapowprimary.com/subjects/design-technology/lower-key-stage-2/year-3/structures-constructing-a-castle/) | |
| **Skills** | **Design** | * Learning the importance of a clear design criteria. * Including individual preferences and requirements in a design. | * Designing a castle with key features to appeal to a specific person/purpose. * Drawing and labelling a castle design using 2D shapes, labelling: -the 3D shapes that will create the features - materials needed and colours. * Designing and/or decorating a castle tower on CAD software. | |
| **Make** | * Making stable structures from card. * 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. * Finding the middle of an object. * Puncturing holes. * Adding weight to structures. * Creating supporting structures. * Cutting evenly and carefully. | * Constructing a range of 3D geometric shapes using nets. * Creating special features for individual designs. * Making facades from a range of recycled materials. | |
| **Evaluate** | * Begin to be able to say how the structure could be improved. * Adapt and improve the product, with support. | * 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. | |
| **Knowledge** | **Technical** | * 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 the sails or blades of a windmill are moved by the wind. * To know that a structure is something built for a reason. * To know that stable structures do not topple. * To know that adding weight to the base of a structure can make it more stable. | * To understand that wide and flat based objects are more stable. * To understand the importance of strength and stiffness in structures. | |
| **Additional** | * To know that design criteria is a list of points to ensure the product meets the client’s 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 windmills are used to generate power and were used for grinding flour. | * 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. | |
|  |  | **Year 5** | |  |
| **Bridges** | |  |
| **Skills** | **Design** | * Designing a stable structure that is able to support weight. * Creating a frame structure with a focus on triangulation. | | **Knowledge** |
| **Make** | * Making a range of different shaped beam bridges. * Using triangles to create truss bridges that span a given distance and support a load. * Building a wooden bridge structure. * Independently measuring and marking wood accurately. * Selecting appropriate tools and equipment for particular tasks. * Using the correct techniques to saws safely. * Identifying where a structure needs reinforcement and using card corners for support. * Explaining why selecting appropriating materials is an important part of the design process. * Understanding basic wood functional properties. | | **Technical:**   * To understand some different ways to reinforce structures. * To understand how triangles can be used to reinforce bridges. * To know that properties are words that describe the form and function of materials. * To understand why material selection is important based on properties.   To understand the material (functional and aesthetic) properties of wood. |
| **Evaluate** | * Adapting and improving own bridge structure by identifying points of weakness and reinforcing them as necessary. * Suggesting points for improvements for own bridges and those designed by others. | | **Additional:**   * To understand the difference between arch, beam, truss and suspension bridges. * To understand how to carry and use a saw safely. |

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| **Mechanisms** |  |  | |
| Year 1 | Year 2 | | Year 4 |
| **Wheels and axles** | **Making a moving monster** | | **Making a slingshot car** |
| **Skills** | **Design** | * Designing a vehicle that includes wheels, axles and axle holders, that when combined, will allow the wheels to move. * Creating clearly labelled drawings that illustrate movement. | * Creating a class design criterion for a moving monster. * Designing a moving monster for a specific audience in accordance with a design criteria. | | * Designing a shape that reduces air resistance. * Drawing a net to create a structure from. * Choosing shapes that increase or decrease speed because of air resistance. * Personalising a design. |
| **Make** | * Adapting mechanisms, when: * They do not work as they should. * to fit their vehicle design. * To improve how they work after   testing their vehicle. | * 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. | | * Measuring, marking, cutting and assembling with increasing accuracy. * Making a model based on a chosen design. |
| **Evaluate** | * Testing wheel and axle mechanisms, identifying what stops the wheels from turning, and recognising that a wheel needs an axle in order to move. | * Evaluating own designs against design criteria. * Using peer feedback to modify a final design. | | * Evaluating the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance. |
| **Knowledge** | **Technical** | * To know that wheels need to be round to rotate and move. * To understand that for a wheel to move it must be attached to a rotating axle. * To know that an axle moves within an axle holder which is fixed to the vehicle or toy. • To know that the frame of a vehicle (chassis) needs to be balanced. | * 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 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.. |
| **Additional** | * To know some real-life items that use wheels such as wheelbarrows, hamster wheels and vehicles. | * To know some real-life objects that contain mechanisms. | | * 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. |

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|  |  | **Year 4** | **Year 6** |
| **Torches** | **Steady Hand Game** |
| **Skills** | **Design** | * Designing a torch, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas. | * Designing a steady hand game - identifying and naming the components required. * Drawing a design from three different perspectives. * Generating ideas through sketching and discussion. * Modelling ideas through prototypes. |
| **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. | * Constructing a stable base for a game. * Accurately cutting, folding and assembling a net. * Decorating the base of the game to a high quality finish. * Making and testing a circuit. * Incorporating a circuit into a base. |
| **Evaluate** | * Evaluating electrical products. * Testing and evaluating the success of a final product. | * Testing own and others finished games, identifying what went well and making suggestions for improvement. |
| **Knowledge** | **Technical** | * 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 batteries contain acid, which can be dangerous if they leak. * To know the names of the components in a basic series circuit, including a buzzer. |
| **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 understand the diagram perspectives 'top view', 'side view' and 'back'. |

**Electrical systems (KS2 only)**

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|  | | **Year 1** | **Year 2** |
| **Smoothies** | **Balanced diet** |
| **Skills** | **Design** | • Designing smoothie carton packaging by-hand or on ICT software. | • Designing a healthy wrap based on a food combination which works well together. |
| **Make** | * Chopping fruit and vegetables safely to make a smoothie. * Identifying if a food is a fruit or a vegetable. * Learning where and how fruits and vegetables grow. | * Slicing food safely using the bridge or claw grip. * Constructing a wrap that meets a design brief. |
| **Evaluate** | • Suggesting information to be included on packaging. | * Taste testing food combinations and final products. * Describing the information that should be included on a label. * Evaluating which grip was most effective. |
| **Knowledge**  **Cooking and nutrition** | | * 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). | * To 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. |

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|  | | **Year 3** | **Year 4** |
| **Eating seasonally** | **Adapting a recipe** |
| **Skills** | **Design** | • Creating a healthy and nutritious recipe for a savoury tart using seasonal ingredients, considering the taste, texture, smell and appearance of the dish. | • Designing a biscuit within a given budget, drawing upon previous taste testing judgements. |
| **Make** | * Knowing how to prepare themselves and a work space to cook safely in, learning the basic rules to avoid food contamination. * Following the instructions within a recipe. | * Following a baking recipe, from start to finish, including the preparation of ingredients. * Cooking safely, following basic hygiene rules. * Adapting a recipe to improve it or change it to meet new criteria (e.g. from savoury to sweet). |
| **Evaluate** | * 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. | * Describing the impact of the budget on the selection of ingredients. * Evaluating and comparing a range of food products. |
| **Knowledge**  **Cooking and nutrition** | | * 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 know that the amount of an ingredient in a recipe is known as the ‘quantity.’ * To know that safety and hygiene are important when cooking. * To know the following cooking techniques: sieving, measuring, stirring, cutting out and shaping.   •To understand the importance of budgeting while planning ingredients for biscuits.   * To know that products often have a target audience. |

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|  | | **Year 5** | **Year 6** |
| **Developing a recipe** | **Come dine with me** |
| **Skills** | **Design** | * 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. | * Writing a recipe, explaining the key steps, method and ingredients. * Including facts and drawings from research undertaken. |
| **Make** | * 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. | * Following a recipe, including using the correct quantities of each ingredient. * Adapting a recipe based on research. * Working to a given timescale. * Working safely and hygienically with independence. |
| **Evaluate** | * Identifying the nutritional differences between different products and recipes. * Identifying and describing healthy benefits of food groups. | * Evaluating a recipe, considering: taste, smell, texture and origin of the food group. * Taste testing and scoring final products. * Suggesting and writing up points of improvements when scoring others’ dishes, and when evaluating their own throughout the planning, preparation and cooking process. * Evaluating health and safety in production to minimise cross contamination. |
| **Knowledge**  **Cooking and nutrition** | | * 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 ‘flavour’ is how a food or drink tastes. * To know that many countries have ‘national dishes’ which are recipes associated with that country. * To know that ‘processed food’ means food that has been put through multiple changes in a factory. * To understand that it is important to wash fruit and vegetables before eating to remove any dirt and insecticides. * To understand what happens to a certain food before it appears on the supermarket shelf (Farm to Fork). |

**Textiles**

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|  | | **Year 2** | **Year 5** |
| **Pouches** | **Stuffed toys** |
| **Skills** | **Design** | * Designing a stuffed toy, considering the main component shapes required and creating an appropriate template.   Considering the proportions of individual components. | • Designing a pouch. |
| **Make** | * Creating a 3D stuffed toy from a 2D design. * Measuring, marking and cutting fabric accurately and independently . * Creating strong and secure blanket stitches when joining fabric. * Threading needles independently. * Using appliqué to attach pieces of fabric decoration. * Sewing blanket stitch to join fabric. * Applying blanket stitch so the spaces between the stitches are even and regular. | * Selecting and cutting fabrics for sewing. * Decorating a pouch using fabric glue or running stitch. * Threading a needle. * Sewing running stitch, with evenly spaced, neat, even stitches to join fabric. * Neatly pinning and cutting fabric using a template. |
| **Evaluate** | • Testing and evaluating an end product and giving point for further improvements. | * Troubleshooting scenarios posed by teacher. * Evaluating the quality of the stitching on others’ work. * Discussing as a class, the success of their stitching against the success criteria. * Identifying aspects of their peers’ work that they particularly like and why. |
| **Knowledge** | | * To know that sewing is a method of joining fabric. * To know that different stitches can be used when sewing. * To understand the importance of tying a knot after sewing the final stitch. * To know that a thimble can be used to protect my fingers when sewing. | * To know that blanket stitch is useful to reinforce the edges of a fabric material or join two pieces of fabric. * To understand that it is easier to finish simpler designs to a high standard. * To know that soft toys are often made by creating appendages separately and then attaching them to the main body.   To know that small, neat stitches which are pulled taut are important to ensure that the soft toy is strong and holds the stuffing securely. |

**Textiles**

**Digital world (KS2 only)**

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|  |  | **Year 3** | **Year 6** |
| **Wearable technology** | **Navigating the world** |
| **Skills** | **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 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. | * 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** | * Evaluating an end product and thinking of other ways in which to create   similar items. | * 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 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 understand what is meant by ‘point of sale display.’ * To know that CAD stands for ‘Computer-aided design’. | * 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. |