**Design and Technology Skills and Knowledge Progression**

**Make**

Forest Primary scheme of work

**Mechanisms**

**/ Mechanical**

**systems**

**Textiles**

**Structures**

**Design**

**Evaluate**

**Cooking and**

**nutrition**

Forest primary key areas - Key stage 1 and 2

**Technical knowledge**

**Electrical**

**systems**

**Digital world**

Key stage 2 only

3

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **By the End of Key Stage 1** | **By the End of Key Stage 1** |
| **Constructing a windmill** | **Baby bear’s chair** |
| **Skills** | **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. |
| **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.
 | * 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.
 |
| **Evaluate** |  | * Testing the strength of own structure.
* Identifying the weakest part of a structure.
* Evaluating the strength, stiffness and stability of own structure.
 |
| **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 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.
 |
| **Additional** | * 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 windmills are used to generate power and were used for grinding flour.
 | N/A |

|  |  |  |
| --- | --- | --- |
|  |  | **By the End of Lower Key Stage Two** |
| **Pavilions** |
| **Skills** | **Design** | * Designing a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect.
* Building frame structures designed to support weight.
 |
| **Make** | * 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.
 |
| **Evaluate** | * Evaluating structures made by the class.
* Describing what characteristics of a design and construction made it the most effective.
* Considering effective and ineffective designs.
 |
| **Knowledge** | **Technical** | * To understand what a frame structure is.
* To know that a ‘free-standing’ structure is one which can stand on its own.
 |
| **Additional** | * 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.
 |

|  |  |  |
| --- | --- | --- |
|  |  | **By the end of Key Stage 2** |
| **Bridges** |
| **Skills** | **Design** | * Designing a stable structure that is able to support weight.
* Creating a frame structure with a focus on triangulation.
 |
| **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.
 |
| **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.
 |
| **Knowledge** | **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.
 |
| **Additional** | * To understand the difference between arch, beam, truss and suspension bridges.
* To understand how to carry and use a saw safely.
 |

|  |  |  |
| --- | --- | --- |
|  |  | **By the End of Key Stage One** |
| Making a moving storybook | Wheels and axles |
| **Skills** | **Design** | * Explaining how to adapt mechanisms, using bridges or guides to control the movement.
* Designing a moving story book for a given audience.
 | • 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. |
| **Make** | • Following a design to create moving models that use levers and sliders. | • Adapting mechanisms, when:* they do not work as they should.
* to fit their vehicle design.
* to improve how they work after

testing their vehicle.  |
| **Evaluate** | * Testing a finished product, seeing whether it moves as planned and if not, explaining why and how it can be fixed.
* Reviewing the success of a product by testing it with its intended audience.
 | • Testing wheel and axle mechanisms, identifying what stops the wheels from turning, and recognising that a wheel needs an axle in order to move.  |
| **Knowledge** | **Technical** | * To know that a mechanism is the parts of an object that move together.

•To know that a slider mechanism moves an object from side to side.* To know that a slider mechanism has a slider, slots , guides and an object.
* To know that bridges and guides are bits of card that purposefully restrict the movement of the slider.
 | * 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.
 |
| **Additional** | • To know that in Design and technology we call a plan a ‘design’. | • To know some real-life items that use wheels such as wheelbarrows, hamster wheels and vehicles. |

|  |  |  |
| --- | --- | --- |
|  |  | **By the End of Lower Key Stage Two** |
| **Making a slingshot car** |
| **Skills** | **Design** | * 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.
 |
| **Make** | * Measuring, marking, cutting and assembling with increasing accuracy.
* Making a model based on a chosen design.
 |
| **Evaluate** | • 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 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 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. |

|  |  |  |
| --- | --- | --- |
|  |  | **By the End of Key Stage 2** |
| **Automata toys** |
| **Skills** | **Design** | •Experimenting with a range of cams, creating a design for an automata toy based on a choice of cam to create a desired movement. * Understanding how linkages change the direction of a force.
* Making things move at the same time.
* Understanding and drawing cross-sectional diagrams to show the inner-workings of my design.
 |
| **Make** | * Measuring, marking and checking the accuracy of the jelutong and dowel pieces required.
* Measuring, marking and cutting components accurately using a ruler and scissors.
* Assembling components accurately to make a stable frame.
* Understanding that for the frame to function effectively the components must be cut accurately and the joints of the frame secured at right angles.
* Selecting appropriate materials based on the materials being joined and the speed at which the glue needs to dry/set.
 |
| **Evaluate** | * Evaluating the work of others and receiving feedback on own work.
* Applying points of improvement to their toys.
* Describing changes they would make/do if they were to do the project again.
 |
| **Knowledge** | **Technical** | * To understand that the mechanism in an automata uses a system of cams, axles and followers.
* To understand that different shaped cams produce different outputs.
 |
| **Additional** | * To know that an automata is a hand powered mechanical toy.
* To know that a cross-sectional diagram shows the inner workings of a product.
* To understand how to use a bench hook and saw safely.
* To know that a set square can be used to help mark 90° angles.
 |

**Electrical systems (KS2 only)**

|  |  |  |
| --- | --- | --- |
|  |  | **By the End of Lower Key Stage Two** |
| **Torches** |
| **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. |
| **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.
 |
| **Evaluate** | * Evaluating electrical products.
* Testing and evaluating the success of a final product.
 |
| **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.
 |
| **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.
 |

**Electrical systems (KS2 only)**

|  |  |  |
| --- | --- | --- |
|  |  | **By the End of Key Stage 2** |
| **Steady hand game** |
| **Skills** | **Design** | * 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** | * 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** | • Testing own and others finished games, identifying what went well and making suggestions for improvement.  |
| **Knowledge** | **Technical** | * 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 understand the diagram perspectives 'top view', 'side view' and 'back'. |

|  |  |
| --- | --- |
|  | **By the End of Key Stage 1** |
| **Balanced diet** |
| **Skills** | **Design** | • Designing a healthy wrap based on a food combination which works well together. |
| **Make** | * Slicing food safely using the bridge or claw grip.
* Constructing a wrap that meets a design brief.
 |
| **Evaluate** | * 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 ‘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.
 |

|  |  |
| --- | --- |
|  | **By the End of Lower Key Stage 2** |
| **Adapting a recipe** |
| **Skills** | **Design** | • Designing a biscuit within a given budget, drawing upon previous taste testing judgements. |
| **Make** | * 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** | * 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 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.
 |

|  |  |
| --- | --- |
|  | **By the End of Key Stage 2** |
| **Come dine with me** |
| **Skills** | **Design** | * Writing a recipe, explaining the key steps, method and ingredients.
* Including facts and drawings from research undertaken.
 |
| **Make** | * 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** | * 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 ‘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**

|  |  |
| --- | --- |
|  | **By the End of Key Stage 1** |
| **Pouches** |
| **Skills** | **Design** | • Designing a pouch. |
| **Make** | * 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** | * 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.
 |

**Textiles**

|  |  |
| --- | --- |
|  | **By the End of Lower Key Stage 2**  |
| **Cross-stitch and appliqué****Cushions** or **Egyptian collars** |
| **Skills** | **Design** | • Designing and making a template from an existing cushion and applying individual design criteria. |
| **Make** | * Following design criteria to create a cushion or Egyptian collar.
* 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 (Cushions) ***or*** embellishing the collars based on design ideas (Egyptian collars).
 |
| **Evaluate** | • Evaluating an end product and thinking of other ways in which to create similar items. |
| **Knowledge** | •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. |

|  |  |
| --- | --- |
|  | **By the End of Key Stage 2** |
| **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.
 |
| **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.
 |
| **Evaluate** | • Testing and evaluating an end product and giving point for further improvements.  |
| **Knowledge** | * 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.
 |

**Digital**

**orld (KS2 only)**

|  |  |  |
| --- | --- | --- |
|  |  |  **By the End of Lower Key Stage 2** |
| **Wearable technology** |
| **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.
 |
| **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.
 |
| **Evaluate** |  |
| **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.
 |
| **Additional** | * To understand what is meant by ‘point of sale display.’
* To know that CAD stands for ‘Computer-aided design’.
 |

**Digital world (KS2 only)**

|  |  |  |
| --- | --- | --- |
|  |  | **By the End of Key Stage 2** |
| **Monitoring devices** |
| **Skills** | **Design** | * 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.
 |
| **Make** | * 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.
 |
| **Evaluate** | * 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.
 |
| **Knowledge** | **Technical** | * 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.
 |
| **Additional** | * 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.
 |