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|  | **DESIGN TECHNOLOGY - PROGRESSION OF SKILLS & KNOWLEDGE** |  |
| **Introduction**  An overview of the skills and knowledge covered in each year group and strand and how these are developed through our  Design Technology scheme of work. | | |
| **Design Concepts:**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Cooking & Nutrition** | **Mechanisms & Mechanical Systems** | **Electrical Systems** | **Textiles** | **Structures** | |  |  |  |  |  | | Where food comes from,  balanced diet, preparation  and cooking skills. Kitchen  hygiene and safety. Following  recipes | Mimic natural movements  using mechanisms such as  cams, followers, levers and  sliders | Operational series circuits,  circuit components, circuit  diagrams and symbols,  combined to create various  electrical products. | Fastening, sewing, decorative  and functional fabric  techniques including  cross stitch, blanket  stitch and appliqué | Material functional and  aesthetic properties,  strength and stability,  stiffen and reinforce  structures. | | | |

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|  | **Cooking & Nutrition** | | | |
| **Year 1/2**  **Smoothies** | | **Year3/4**  **Seasonal Food** | **Year 5/6**  **Developing a Recipe** |
| **Skills** | **Design** | • Designing smoothie carton packaging by-hand. | • 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 fruit and vegetables safely to make a  smoothie.  • Juicing fruits safely to make a smoothie. | 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 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. | • 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 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 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. |
| **Additional** |  |  |  |

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|  | **Mechanisms & Mechanical Systems** | | |
| **Year 1/2**  **Making a Moving Picture Book** | | **Year 1/2**  **Wheels & 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. |
|  | **Mechanisms & Mechanical Systems** | | |
| **Year 3/4**  **Pneumatic Toy** | | **Year 5/6**  **Gears & Pulleys** |
| **Skills** | **Design** | • Designing a toy which uses a pneumatic system.  • Developing design criteria from a design brief.  • Generating ideas using thumbnail sketches and exploded diagrams.  • Learning that different types of drawings are used in design to explain ideas clearly. | ● Noticing wider-reaching problems or needs in the community.  ● Identifying a wide range of needs and potential barriers through market research.  ● Writing more complex problem statements that consider multiple factors and constraints.  ● Creating more complex design criteria that require considering detailed user needs, environmental impact, materials and cost.  ● Coming up with a broader range of ideas and deeper innovation, requiring pupils to think critically about their ideas' practicality and originality.  ● Beginning to use more complex annotated sketches, such as cross-sectional and exploded diagrams and pattern pieces in design.  ● Using a series of prototypes to refine and improve their designs. |
| **Make** | • Creating a pneumatic system to create a desired motion.  • Building secure housing for a pneumatic system.  • Using syringes and balloons to create different types of pneumatic systems to make a functional and appealing pneumatic toy.  • Selecting materials due to their functional and aesthetic characteristics.  • Manipulating materials to create different effects by cutting, creasing, folding and weaving. | ● Consistently apply safety instructions.  ● Select appropriate scissors to handle delicate cutting tasks and challenging materials.  ● Cutting patterns and drawings accurately.  ● In supervised groups, using hot glue guns safely.  ● Recognising that hot glue is useful for joining materials that need a strong bond that sets quickly.  ● Choosing PVA glue over hot glue for its safety when joining materials in less intensive projects. |
| **Evaluate** | • Using the views of others to improve designs.  • Testing and modifying the outcome, suggesting improvements.  • Understanding the purpose of exploded-diagrams through the eyes of a designer and their client. | ● Reflecting on the usability, aesthetics, innovation and sustainability of products and discussing how design choices impact these aspects.  ● Assessing their designs against a more complex set of design criteria that includes functionality, aesthetics, user experience, sustainability and cost.  ● Considering alternative materials, tools or techniques that could enhance the product.  ● Providing feedback that is helpful, specific, and encouraging.  ● Incorporating feedback from peers or users improve their product further, explaining the changes they made and the impact they had. |
| **Knowledge** | **Technical** | • To understand how pneumatic systems work.  • To understand that pneumatic systems can be used as part of a mechanism.  • To know that pneumatic systems operate by drawing in, releasing and compressing air. | ● That mechanical systems that use gears in everyday objects (eg bicycle, clock).  ● That gears and pulleys allow us to transfer movement and force from one part of a mechanical system to another.  ● That gears allow us to increase the output of a mechanism. |
| **Additional** | • To understand how sketches, drawings and diagrams can be used to communicate design ideas.  • To know that exploded-diagrams are used to show how different parts of a product fit together.  • To know that thumbnail sketches are small drawings to get ideas down on paper quickly | ● That market research is a way of collecting information about problems or needs.  ● That constraints are things that might stop our ideas being successful.  ● That original and innovative ideas are different from what has been made before.  ● That annotations are detailed labels and comments on diagrams.  ● That risks are things that might happen.  ● That hot glue creates a strong bond quickly.  ● That is often better to choose safer equipment.  ● That sustainability means thinking about the materials that were used to make a product and how the product was made.  ● That their final product can still be improved by different materials or techniques.  ● That evaluating their designs in detail will help them understand its successful and less successful parts.  ● That feedback should be positive, helpful and specific.  ● That explaining how they used feedback to improve their design can help them create better products in the future |

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|  | **Electrical Systems** | | | |
| **Year 3/4**  **Torch** | | **Year3/4**  **Electric Poster** | **Year 5/6**  **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. | • Carry out research based on a given topic (e.g. The Romans) to develop a  range of initial ideas.  • Generate a final design for the electric poster with consideration to the  client’s needs and design criteria.  • Design an electric poster that fits the requirements of a given brief.  • Plan the positioning of the bulb (circuit component) and its purpose | • 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.  • Understanding the purpose of products (toys), including what is meant by ‘fit for purpose’ and ‘form over function’. |
| **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. | • Create a final design for the electric poster.  • Mount the poster onto corrugated card to improve its strength and allow it  to withstand the weight of the circuit on the rear.  • Measure and mark materials out using a template or ruler.  • Fit an electrical component (bulb).  • Learn ways to give the final product a higher quality finish (e.g. framing to  conceal a roughly cut edge). | • 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. | • Learning to give and accept constructive criticism on own work and the work of others.  • Testing the success of initial ideas against the design criteria and justifying  opinions.  • Revisiting the requirements of the client to review developing design ideas  and check that they fulfil their needs. | • Testing own and others finished games, identifying what went well and making  suggestions for improvement.  • Gathering images and information about existing children’s toys.  • Analysing a selection of existing children’s toys. |
| **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 understand that an electrical system is a group of parts (components) that  work together to transport electricity around a circuit.  • To understand common features of an electric product (switch, battery or  plug, dials, buttons etc.).  • To list examples of common electric products (kettle, remote control etc.).  • To understand that an electric product uses an electrical system to work  (function).  • To know the name and appearance of a bulb, battery, battery holder and  crocodile wire to build simple circuits. | • 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 Ediso | • To understand the importance and purpose of information design.  • To understand how material choices (such as mounting paper to corrugated  card) can improve a product to serve its purpose (remain rigid without bending  when the electrical circuit is attached). | •To know that ‘form’ means the shape and appearance of an object.  •To know the difference between 'form' and 'function'.  •To understand that 'fit for purpose' means that a product works how it should and is easy to use.  • To know that form over purpose means that a product looks good but does not work very well.  • To know the importance of ‘form follows function’ when designing: the product must be designed primarily with the function in mind.  • To understand the diagram perspectives 'top view', 'side view' and 'back'. |

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|  | **Textiles** | | |
| **Year 1/2**  **Puppets** | | **Year 3/4**  **Cross Stitch & Applique** |
| **Skills** | **Design** | • Using a template to create a design for a puppet | • Designing and making a template from an existing cushion and applying  individual design criteria. |
| **Make** | • Cutting fabric neatly with scissors.  • Using joining methods to decorate a puppet.  • Sequencing steps for construction. | • 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** | • Reflecting on a finished product, explaining likes and dislike | • Evaluating an end product and thinking of other ways in which to create  similar items. |
| **Knowledge** | **Technical** | • 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. |
| **Additional** |  |  |
|  | **Textiles** | | |
| **Year 5/6**  **Waistcoats** | | **Year 5/6**  **Toys** |
| **Skills** | **Design** | • Designing a waistcoat in accordance to a specification linked to set of design criteria.  • Annotating designs, to explain their decisions. | • Designing a stuffed toy, considering the main component shapes required  and creating an appropriate template.  • Considering the proportions of individual components. |
| **Make** | • 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. | • 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** | • Reflecting on their work continually throughout the design, make and evaluate process. | • Testing and evaluating an end product and giving point for further  improvements. |
| **Knowledge** | **Technical** | • 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. | • 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. |
| **Additional** |  |  |

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|  | **Structures** | | |
| **Year 1/2**  **Constructing a Windmill** | | **Year 1/2**  **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.  • Learning about different types of structures, found in the natural world  and in everyday objects. |
| **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** | • 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. |
| **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 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 |
| **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. | • To know that natural structures are those found in nature.  • To know that man-made structures are those made by people. |
|  | **Structures** | | |
| **Year 3/4**  **Construction Castle** | | **Year 5/6**  **Playgrounds** |
| **Skills** | **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. | • 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** | • Constructing a range of 3D geometric shapes using nets.  • Creating special features for individual designs.  • Making facades from a range of recycled 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** | • 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. | • 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 understand that wide and flat based objects are more stable.  • To understand the importance of strength and stiffness in structures. | • To know that structures can be strengthened by manipulating materials and  shapes. |
| **Additional** | • 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 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. |