Tarvin Primary School

DT Progression of Knowledge and Skills

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Progression of Knowledge and Skills

How this document works:
This is a whole school overview, demonstrating progression in knowledge and skills.

Page 1: Demonstrates what a typical designer/technologist will look like at the end of each phase, combining the key skills and knowledge they will require.

Page 2 onwards: Demonstrates progression in knowledge and skills objectives for each phase, with key vocabulary, and also 'key indicators' which identify intended learning outcomes.

	Foundation/ EYFS	KS1	LKS2	UKS2
This is what our designers and technologists can do….	**Design, Make and Evaluate.** **Structures:** Children will safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. They will participate in small group, class and one-to-one discussions with both teacher and their peers. Children will work towards simple goals, share their creations, explaining the processes they have used. They will offer explanations for why things might happen, expressing their ideas and feelings using full sentences and recently introduced vocabulary. **Food:** Children will begin to manage their own basic hygiene and personal needs and begin to understand the importance of healthy food choices. They will set and work towards simple goals, learn turn taking and self-control. Children will use a range of small tools, including scissors, paint brushes and cutlery.	**Structures:** Children will plan, create and identify suitable designs to appeal to their client, explaining why they do so. As a class, children will create and follow a design criteria. They will make stable structures, which will eventually support functioning turbines and axles and will say what is good about their structure and what they could do better. **Food:** Children will be describing fruits and vegetables and explaining why they are a fruit or a vegetable. They will be able to name a range of places that fruits and vegetables grow. They will be describing basic characteristics of fruit and vegetables and preparing fruits and vegetables to make a smoothie. Children will learn about different food groups within the food wheel and name foods from each group. They will apply their knowledge to design and make a healthy, balanced wrap including food from each group. The children will assess their wraps and suggest improvements. **Mechanisms:** Children will identify different types of mechanisms and determine what movement they will make. They will clearly label drawings of their design showing directional movement. They will make, and test moving monsters and moving story books and explain how they move. Children will be able to evaluate strengths and weaknesses of their design, use peer assessments and suggest alterations. **Textiles**: Children will prepare and cut fabric to	**Structures:** Children will design a castle with key features to appeal to a specific person/purpose; they will draw and label their design using 2D shapes. Using CAD software, they can design or decorate their castle plan, constructing a range of 3D geometric shapes using nets. They will create special features for individual designs and making facades from a range of recycled materials. Children will evaluate their own work and the work of others based on the aesthetic of the finished product and in comparison, to the original design. They will suggest points for modification of the individual design The children will design a range of free-standing frame structures of different shapes and sizes and then will design a pavilion that is strong, stable and aesthetically pleasing. They will select appropriate materials and construction techniques to create a stable, free-standing frame structure, using appropriate materials and techniques to add cladding to their pavilion. **Food:** The children will explain that fruit and vegetables grow in different countries, based on their climates. They understand that 'seasonal' fruits and vegetables are best grown in a given season. They know that eating seasonal fruit and vegetables has a positive effect on the environment and can give reasons. The children will design their own tart recipe, within a budget, using seasonal ingredients and describe features of a biscuit based on taste, smell, texture and appearance. They can follow a recipe and adapt adding extra ingredients. They understand basic rules of hygiene and safety **Mechanisms/Mechanical Systems:** Children will draw accurate diagrams with correct labels, arrows and explanations and correctly identify definitions for key terms. They will communicate ideas using thumbnail sketches and select appropriate equipment and materials to build a working pneumatic system. They will assemble their pneumatic system within the housing to create the desired motion. Children will work independently to produce an accurate, functioning car chassis, designing a shape that is suitable for the project. They will attempt to reduce air resistance through the design and shape. The children will construct effective car bodies and conduct accurate trials. They will draw conclusions and improvements from the results. **Textiles,** Children will design, cut and shape their template for an	**Structures:** Children will identify stronger and weaker shapes, recognising that supporting shapes can help increase the strength of a bridge, allowing it to hold more weight. They will identify beam, arch and truss bridges and describe their differences. They will cut beams to the correct size, using a cutting mat, smoothing down any rough cut edges with sandpaper. Children will complete a bridge, with varying ranges of accuracy and finish, supported by the teacher. And identify some areas for improvement, reinforcing their bridges as necessary. Children will make several apparatus designs applying their criteria and make changes following peer evaluation. They will make different structures, improving the quality by applying cladding. Children will be able to secure their apparatus to a base making a range of landscape features from a variety of materials. **Food:** Children will be able to contribute ideas as to what a 'healthy meal' is and be aware of the nutritional differences between different products and recipes. They will understand how beef gets from the farm to our plates and present a subject as a poster with clear information in an easy to read format. They will work as a team to amend a bolognese recipe with healthy adaptations and follow this to produce a healthy Bolognese sauce. Children will design packaging that promotes the ingredients of the bolognese. Children will find a suitable recipe for their course, recording the relevant ingredients and equipment needed. They will follow a recipe, including using the correct quantities of each ingredient. Children will then be able to write a recipe, explaining the process taken. They will be able to explain where certain key foods come from before they appear on the supermarket shelf. **Mechanisms/Mechanical Systems:** Children will produce a suitable plan and structure for each page of their book. They will assemble the components necessary for all their structures/mechanisms, hiding the mechanical elements with more layers using spacers where needed. They will use a range of mechanisms and structures to illustrate their story and make it interactive for the users using appropriate materials and captions to illustrate. Children will mark, saw and cut out the components and supports of their toy with a varying degree of accuracy to the intended measurements, following health and safety rules taking care with the equipment. They will use an exploded-diagram and develop a

		make a pouch. They will learn to sew a running stitch with regular sized stitches and understand that both ends must be knotted. They will join two pieces of fabric together using running stitches. They will decorate their pouches using a variety of materials, following their design Children will draw around a template and accurately cut out a puppet shape. They will choose which method to use to join their puppet together, explaining their reasons. The children will justify their choice and understand the need for strength and durability.	usekh/wesekh collar, with increasing accuracy. They will decorate their Egyptian collar, using a variety of techniques such as applique, cross – stitch, beads, buttons and pinking. Children will be able to recognise different types and qualities of fabrics and **e**xplain the aesthetic and/or functional properties of some of their material choices. Children will identify the features, benefits and disadvantages of a range of fastening types and write design criteria and design a sleeve that satisfies the criteria. They will make a template for their book sleeve and assemble their case using any stitch they are comfortable with. They will suggest modifications for improvement. **Digital World:** The children will give a brief explanation of the digital revolution and/or remember key examples. They will write a program that initiates a flashing LED panel, or another pattern, on the Micro: bit when a button is pressed and identify errors, if testing is unsuccessful, by comparing their code to a correct example. Children will explain the basic functionality of their finished programme and describe what is meant by 'point of sale' with an example. They will evaluate their design. Children will understand how Micro:bit features could be used in a design idea and write a program using it. They will spot errors, if testing is unsuccessful, by co paring the correct code to their own. The children will understand loops within the program. They will cut out and assemble a box net carefully, fulfilling the design requirements. Children will evaluate the Micro:bit timer and its function and understand which stages were challenging. **Electrical Systems:** Children will explain what 'information design' is and understand its impact, considering what could happen if we had no signage, posters, or written communication in public places of interest. They will research and choose a specific Ancient Roman topic on which to base their initial poster ideas, complete design criteria based on a client's request and develop a design. They will review their initial ideas against the design criteria and peer feedback, developing a final design. Children will be able to assemble an electronic poster, including a functional simple circuit, test it and evaluate in a letter to a client. Children will identify electrical products and explain why they are useful and identify the features of a torch. They will create a functioning torch with a switch according to their design criteria.	design idea with some descriptive notes. They will measure and cut panels that fit with some inaccuracies to conceal the inner workings of the automata an decorate to meet the design criteria and brief. The children will evaluate their finished product, making descriptive and reflective points on function and form **Textiles:** Children will design a stuffed toy, considering the main components of their toy and create an appropriate template for their stuffed toy. They will neatly cut out their fabric and join two pieces of fabric using blanket – stitch. They will use applique to decorate. Children will identify what worked well and areas for improvement. Children will consider a range of factors in their design criteria and use this to create a waistcoat, using a template to mark and cut out a design. They will use a running stitch to join fabric to make a functional waistcoat. Children will be able to attach a secure fastening, as well as decorative objects and evaluate their final product. **Digital World:** Children will describe what is meant by a monitoring device and provide an example. They will explain briefly the development of thermometers from thermoscopes to digital thermometers. They will be able to write programs, identify errors (bugs) in a code and ways to fix (debug) them. Children will state one or two facts about the history and development of plastic, including how it is now affecting planet Earth. They will build a variety of brick models to invent Micro: bit case, housing and stand ideas, evaluating the success of their favourite model. Children will explain key pros and cons of virtual modelling vs physical modelling. They will be able to recall and describe the name and use of key tools used in Tinkercard (CAD) software. Children will key information from a client's design request such as 'multifunctional' and 'compact' in their design brief and write a program that displays an arrow to indicate cardinal compass directions with an 'On start' loading screen. They will identify errors (bugs) in the code and suggest ways to fix (debug) them. They will self and peer evaluate a product concept against a list of design criteria with basic statements and identify key industries that use 3D CAD modelling and why. They will be familiar with Tinkercad (CAD) software and combine more than one object to develop a finished 3D CAD model in Tinkercad.

				Electrical Systems: Children will identify simple circuit components (battery, bulb and switch) with a basic explanation of their function and explain that a series circuit is assembled in a loop to allow the electricity to flow along one path. They will be able to describe a motor as a circuit component that changes electrical energy into movement. Children will be familiar with a Doodler, its function and explain this in an investigation report. They will develop design criteria with consideration for the target user. Children will create a functional Doodler that creates scribbles on paper with or without a switch. They will identify and list each of the required materials, tools and circuit components required to build a Doodler and explain simply the steps to assemble a Doodler as part of a set of instructions (or storyboard). Children will explain simply what is meant by 'form' (the shape of a product) and 'function' (how a product works). They will learn about skills developed through play and apply this knowledge in a survey of one or more children's toys. Children will identify the components of a steady hand game and design a steady hand game of their own according to their design criteria, using four different perspective drawings. They will make and test a functioning circuit and assemble it within a case.

Year Group	EYFS	KS1	LKS2	UKS2
structures	Junk Modelling	Baby Bear's Chair and Constructing a Windmill	Castles and Pavilions	Bridges and Playgrounds
Knowledge	*To explore and investigate the tools and materials in junk modelling. *To investigate cutting different materials and learn how to plan and select the correct resources needed to make a model. *To verbally plan and create a junk model. *To share finished models and talk about the processes. To explore different ways to temporarily join materials 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	• 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 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 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. • To understand the difference between arch, beam, truss and suspension bridges. • To understand how to carry and use a saw safely. • To know that structures can be strengthened by manipulating materials and shapes. • To understand what a 'footprint plan' is. • To understand that in the real world, design , can impact users in positive and negative ways.

		material is one which does not bend easily • To understand that the shape of materials can be changed to improve the strength and stiffness of structure. • 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 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 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 prototype is a cheap model to test a design idea.
<u>Skills</u>	• Making verbal plans and material choices. • Improving fine motor/scissor skills with a variety of materials . • Joining materials in a variety of ways (temporary and permanent). • Joining different materials together. • Describing their junk model, and how they intend to put it together. • Giving a verbal evaluation of their own and others' junk models with adult support. • Checking to see if their model matches their plan. • Considering what they	• Generating and communicating ideas using sketching and modelling. • Learning about different types of structures, found in the natural world and in everyday objects. • 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. • 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	• 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. • Constructing a range of 3D geometric shapes using nets . • Creating special features for individual designs. •Making facades from a range of recycled materials. • 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. • Designing a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect. • Building frame structures designed to support weight. • 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.	• 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. • electing 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. • Designing a playground featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs. • 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.

	would do differently if they were to do it again . • Describing their favourite and least favourite part of their model.	stability of own structure • Learning the importance of a clear design criteria. • Including individual preferences and requirements in a design. • 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. • 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.	• Reinforcing corners to strengthen a structure. • Creating a design in accordance with a plan. • Learning to create different textural effects with materials. • Evaluating structures made by the class. • Describing what characteristics of a design and construction made it the most effective. • Considering effective and ineffective designs.	• Using a range of materials to reinforce and add decoration to structures. • 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. • Create five apparatus designs, applying the design criteria to their work. • Make suitable changes to their work after peer evaluation. • Make roughly three different structures from their plans using the materials available. • Complete their structures, improving the quality of their rough versions and applying cladding to a few areas. • Secure the apparatus to a base. • Make a range of landscape features using a variety of materials which will enhance their apparatus.
Key vocabulary	Junk, model, materials, cut, scissors, stick, tools, join	design criteria man-made natural properties structure stable shape model test axle bridge design criteria model net packaging structure template unstable stable strong weak sliders mechanism adapt design criteria design input model template assemble test	2D, 3D, castle, key features, scoring, stable, strong, design, net, shape, stiff, structure 3D shapes design criteria natural cladding innovative reinforce structure	beam bridge, truss bridge, technique, lamination, rigid, stability, aesthetics, mark out, softwood, sandpaper/glasspaper, tenon saw/coping, saw, material properties, wood sourcing, quality of finish, arch bridge, strength, corrugation, stiffness, factors, visual appeal, joints, hardwood, wood file/rasp, bench hook/vice, assemble, reinforce, evaluate, accuracy apparatus design criteria equipment playground landscape features cladding
Key indicators	. • Talk about the model and processes used • Show curiosity about the tools and materials. • Name some of them • Use scissors to make cuts or snips. • Use fine motor skills to correctly use scissors. • Talk about the model. • Identify problems and make simple suggestions to solve them. • Decide on suitable materials. • Join materials.	• Identify man-made and natural structures. • Identify stable and unstable structural shapes. • Contribute to discussions. • Identify features that make a chair stable. • Work independently to make a stable structure, following a demonstration. • Explain how their ideas would be suitable for Baby Bear. • Produce a model that supports a teddy, using the materials and construction techniques. • Explain how they made their model strong, stiff and stable.	• Designing a castle with key features to appeal to a specific person/purpose. • Drawing and labelling a castle design using 2D shapes. • Designing and/or decorating a castle tower on CAD software. • Constructing a range of 3D geometric shapes using nets. • Creating special features for individual designs. • Making facades from a range of recycled materials. • 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. • Produce a range of free standing frame structures of different shapes and sizes. • Design a pavilion that is strong, stable and aesthetically pleasing. • Select appropriate materials and construction techniques to create a stable, free standing frame structure. • Select appropriate materials and techniques to add cladding to their pavilion.	• Identify stronger and weaker shapes. • Recognise that supporting shapes can help increase the strength of a bridge, allowing it to hold more weight. • Identify beam, arch and truss bridges and describe their differences. • Use triangles that support simple truss bridges that support a load (weight). • Cut beams to the correct size, using a cutting mat. • Smooth down any rough cut edges with sandpaper. • Follow each stage of the truss bridge creation as instructed by their teacher. • Complete a bridge, with varying ranges of accuracy and finish, supported by the teacher. • Identify some areas for improvement, reinforcing their bridges as necessary. • Create five apparatus designs, applying the design criteria to their work. • Make suitable changes to their work after peer evaluation.

		• Identify some features that would appeal to the client (a mouse) and create a suitable design. • Explain how their design appeals to the mouse. • Make stable structures, which will eventually support the turbine, out of card, tape and glue. • Make functioning turbines and axles that are assembled into the main supporting structure. • Say what is good about their windmill and what they could do better. • Identify whether a mechanism is a side-to-side slider or an up-and-down slider and determine what movement the mechanism will make. • Clearly label drawings to show which parts of their design will move and in which direction. • Make a picture which meets the design criteria, with parts that move purposefully as planned. • Evaluate the main strengths and weaknesses of their design and suggest alterations.		• Make roughly three different structures from their plans using the materials available. • Complete their structures, improving the quality of their rough versions and applying cladding to a few areas. • Secure the apparatus to a base. • Make a range of landscape features using a variety of materials which will enhance their apparatus.
Mechanisms/Mechanical systems		Fairground wheel and Making a Moving Monster and Making a Moving Storybook and Wheels and Axles	Pneumatic toys and Slingshot Toys	Making a pop up book and Automata Toys
<u>Knowledge</u>		• To know that different materials have different properties and are therefore suitable for different uses. • 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 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. • 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	• 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. • 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. • Evaluating the work of others and receiving feedback on own

		• 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 some real-life objects that contain mechanisms. • 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 in Design and technology we call a plan a 'design'. • 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 some real-life items that use wheels such as wheelbarrows, hamster wheels and vehicles.	down on paper quickly. • 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 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.	work. • Suggesting points for improvement. • 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. • 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.
<u>Skills</u>		• Selecting a suitable linkage system to produce the desired motion. • Designing a wheel. • Selecting materials according to their	• 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	• 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.

		characteristics. • Following a design brief. • Evaluating different designs. • Testing and adapting a design. • Creating a class design criteria for a moving monster. • Designing a moving monster for a specific audience in accordance with a design criteria. • 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. • Evaluating own designs against design criteria. • Using peer feedback to modify a final design. • Explaining how to adapt mechanisms, using bridges or guides to control the movement. • Designing a moving story book for a given audience. • Following a design to create moving models that use levers and sliders. • 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 movement. • 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 audience. • Adapting mechanisms, when: ● they do not work as they should. ● to fit their vehicle design. ● to improve how they work after testing their vehicle. • Testing wheel and axle mechanisms, identifying what stops the wheels from turning, and recognising that a wheel needs an axle in order to move.	explain ideas clearly. • 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. • 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. • 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. • Measuring, marking, cutting and assembling with increasing accuracy. • Making a model based on a chosen design. • Evaluating the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance.	• 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. •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. • 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. • 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.

Key vocabulary		• design, wheel, pods, axle holder, design criteria, Ferris wheel, axle, frame, mechanism • axle design criteria input linkage mechanical output pivot wheel • sliders mechanism adapt design criteria design input model template assemble test • axle axle holder chassis diagram dowel equipment mechanism wheel	mechanism, pivot, pneumatic system, output, thumbnail sketch, adapt, reinforce, lever, linkage system, input, component, research, properties, motion chassis energy kinetic mechanism air resistance design structure graphics research model template	design, motion, criteria, reinforce, input, mechanism, research, model accurate assembly-diagram automata axle bench hook cam clamp component cutting list diagram dowel drill bits exploded-diagram finish follower frame function hand drill jelutong linkage mark out measure mechanism model research right-angle set square tenon saw
Key indicators		• Design and label a wheel. • Consider the design of others and make comments about their practicality or appeal. • Consider the materials, shape, construction, and mechanisms of their wheel. • Label their designs. • Build a stable structure with a rotating wheel. • Test and adapt their designs as necessary. • Follow a design plan to make a completed model of the wheel. • Identify the correct terms for levers, linkages and pivots. • Analyse popular toys with correct terminology. • Create functional linkages that produce the desired input and output motions. • Design monsters suitable for children., which satisfy most of the criteria. • Evaluate their two designs against the design criteria, using hthis information and the feedback of their peers to choose their best design. • Select and assemble materials to create their planned monster features. • Assemble the monster to their linkages without affecting their	• Draw accurate diagrams with correct labels, arrows and explanations. • Correctly identify definitions for key terms. • Identify five appropriate design criteria. • Communicate two ideas using thumbnail sketches. • Select appropriate equipment and materials to build a working pneumatic system. • Assemble their pneumatic system within the housing to create the desired motion. • Work independently to produce an accurate, functioning car chassis. • Design a shape that is suitable for the project. • Attempt to reduce air resistance through the design and shape. • Produce panels that will fit the chassis and can be assembled effectively using the tabs they have designed. • Construct car bodies effectivelt. • Conduct a trial accurately and draw conclusions and improvements from the results.	• Produce a suitable plan for each page of their book. • Produce the structure of the book. • Assemble the components necessary for all their structures/mechanisms. • Hide the mechanical elements with more layers using spacers where needed. • Use a range of mechanisms and structures to illustrate their story and make it interactive for the users. • Use appropriate materials and captions to illustrate the story. • Mark, saw and cut out the components and supports of their toy with a varying degree of accuracy to the intended measurements. • Follow health and safety rules taking care with the equipment. • Attempt a partial assembly of their toys using an exploded-diagram following a teacher's demonstration. • Develop a design idea with some descriptive notes. • Explore different cam profiles and choose three for their follower toppers with an explanation of their choices. • Create neat, decorated follower toppers with some accuracy. • Measure and cut panels that fit with some inaccuracies to conceal the inner workings of the automata. • Decorate and finish the automata to meet the design criteria and brief. • Evaluate their finished product, making descriptive and reflective points on function and form.

		functionality.		
Textiles		Pouches and Puppets	Egyptian collars and Fastenings	Stuffed toys and Waistcoats
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 '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 know that a fastening is something which holds two pieces of material together for example a zipper, toggle, button, press stud and velcro. • To know that different fastening types are useful for different purposes. • To know that creating a mock up (prototype) of their design is useful for checking ideas and proportions.	• 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 that the soft toy is strong and holds the stuffing securely. • 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.
Skills		• Designing a pouch. • 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. • Troubleshooting scenarios posed by the 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 explaining why. • Using a template to create a design for a puppet.	• Designing and making a template from an existing collar and applying individual design criteria • To create an 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 and embellishing the collars based on design ideas. • Evaluating an end product and thinking of other ways in which to create similar ideas. • Writing design criteria for a product, articulating decisions made. • Designing a personalised book sleeve. • Making and testing a paper template with accuracy and in keeping with the design criteria. • Measuring, marking and cutting fabric using a paper template. • Selecting a stitch style to join fabric. • Working neatly by sewing small, straight stitches. • Incorporating a fastening to a design. • Testing and evaluating an end product against the original design criteria.	• Designing a stuffed toy, considering the main component shapes required and creating an appropriate template. • Considering the proportions of individual components. • 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. • Testing and evaluating an end product and giving point for further improvements. • Reflecting on their work continually throughout the design, make and evaluate process. Knowledge Cooking and nutrition • To know that blanket stitch is useful to reinforce the edges of a fabric material or join two pieces of fabric. • Designing a waistcoat in accordance to a specification linked to set of design criteria. • Annotating designs, to explain their decisions. • Using a template when cutting fabric to ensure they achieve the correct shape.

		• Cutting fabric neatly with scissors. • Using joining methods to decorate a puppet. • Sequencing steps for construction. • Reflecting on a finished product, explaining likes and dislikes.	• Deciding how many of the criteria should be met for the product to be considered successful. • Suggesting modifications for improvement. • Articulating the advantages and disadvantages of different fastening types.	• 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. • Reflecting on their work continually throughout the design, make and evaluate process. 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. • To understand that it is important to design clothing with the client.
Key vocabulary		decorate, fabric glue, needle, running stitch, template, fabric, knot, needle threader, sew, thread decorate design fabric glue model hand puppet safety pin staple stencil template	applique, fabric, patch, embellish, cotton, polyester, tear, breathable, shiny, cross – stitch, running stitch, thread, template, silk, wrinkle, water – resistant, matt, biodegrade, pinking criteria fastening mock up fabric fix stitch template	accurate, appendage, design criteria, evaluation, sew, stuffed toy, annotate, blanket – stitch, detail, fabric, shape, stuffing, template annotate decorate design criteria fabric target customer waistcoat waterproof
Key indicators		• Sew a running stitch with regular – sized stitches and understand that both ends must be knotted. • Prepare and cut fabric to make a pouch from a template. • Use a running stitch to join the two pieces of fabric together. • Decorate their pouch using the materials provided. • Join fabrics together using pins, staples or glue. • Design a puppet and use a template. • Join their two puppets' faces together as one.	• Demonstrate their ability to use cross – stitch as a decorative feature or to join pieces of fabric together. • Develop applique designs based on design criteria. • Design, cut and shape their template for an usekh/wesekh collar, with increasing accuracy. • Decorate their Egyptian collar, using a variety of techniques such as applique, cross – stitch, beads, buttons and pinking. • Measure and attach a ribbon with a running stitch. • Recognise different types and qualities of fabrics. • Explain the aesthetic and/or functional properties of some of their material choices. • Identify the features, benefits and disadvantages of a range of fastening types. • Write design criteria and design a sleeve that satisfies the criteria. • Make a template for their book sleeve.	• Design a stuffed toy, considering the main components of their toy. • Create an appropriate template for their stuffed toy. • Join two pieces of fabric using blanket – stitch. • Neatly cut out their fabric. • Use applique of decorative stitching to decorate the front of their stuffed toy. • Use blanket stitch to assemble their stuffed toy, repairing when needed. • Identify what worked well and areas for improvement. • Consider a range of factors in their design criteria and use this to create a waistcoat. • Use a template to mark and cut out a design. • Use a running stitch to join fabric to make a functional waistcoat. • Attach a secure fastening, as well as decorative objects.

		• Decorate a puppet to match their design.	• Assemble their case using any stitch they are comfortable with.	• Evaluate their final product.
Food	Soup	A Balanced diet and Fruit and Vegetables	Eating seasonally and Adapting a Recipe	What could be healthier and Come Dine with Me
Knowledge	• 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 'diet' means the food and drink that a person or animal usually eats. • To understand what makes a balanced diet. • To know where to find the nutritional information on packaging. • 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 nutrients are substances in food that all living things need to make energy, grow and develop. • To know that 'ingredients' means the items in a mixture or recipe. • To know that I should only have a maximum of five teaspoons of sugar a day to stay healthy. • To know that many food and drinks we do not expect to contain sugar do; we call these 'hidden sugars'. • Understanding the difference between fruits and vegetables. • To understand that some foods typically known as vegetables are actually fruits (e.g. cucumber). • To know that a blender is a machine which mixes ingredients together into a smooth liquid. • To know that a fruit has seeds and a vegetable does not. • To know that fruits grow on trees or vines. • To know that vegetables can grow either above or below ground. • To know that vegetables can come from different parts of the 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 understand that imported foods travel from far away and this can negatively impact the environment. • To know that each fruit and vegetable gives us nutritional benefits because they contain vitamins, minerals and fibre. • To understand that vitamins, minerals and fibre are important for energy, growth and maintaining health. • To know safety rules for using, storing and cleaning a knife safely. • To know that similar coloured fruits and vegetables often have similar nutritional benefits. • To know that the amount of an ingredient in a recipe is known as the 'quantity.' • To know that it is important to use oven gloves when removing hot food from an oven. • To know the following cooking techniques: sieving, creaming, rubbing method, cooling. •To understand the importance of budgeting while planning ingredients for biscuits.	• To understand where meat comes from - learning that beef is from cattle and how beef is reared and processed, including key welfare issues. • To know that I can adapt a recipe to make it healthier by changing ingredients. • 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 '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).
Skills	• Designing a soup recipe as a class.	• Designing a healthy wrap based on a food combination which works well	• Creating a healthy and nutritious recipe for a savoury tart using seasonal ingredients, considering the taste, texture, smell and	• Adapting a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional

	• Designing soup packaging. • Chopping plasticine safely. • Chopping vegetables with support. • 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.	together. • Slicing food safely using the bridge or claw grip. • Constructing a wrap that meets a design brief. • 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 which grip was most effective. • Designing smoothie carton packaging by-hand or on ICT software. • Chopping fruit and vegetables safely to make a smoothie. • Tasting and evaluating different food combinations. • Describing appearance, smell and taste. • Suggesting information to be included on packaging.	appearance of the dish. • 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. • 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. • Designing a biscuit within a given budget, drawing upon previous taste testing judgements. • 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). • Evaluating a recipe, considering: taste, smell, texture and appearance. • Describing the impact of the budget on the selection of ingredients. • Evaluating and comparing a range of food products. • Suggesting modifications to a recipe (e.g. This biscuit has too many raisins, and it is falling apart, so next time I will use less raisins).	ingredients. • Writing an amended method for a recipe to incorporate the relevant changes to ingredients. • Designing appealing packaging to reflect a recipe. • 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. • Identifying the nutritional differences between different products and recipes. • Identifying and describing healthy benefits of food groups. • Writing a recipe, explaining the key steps, method and ingredients. • Including facts and drawings from research undertaken. • 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. • 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.
Key vocabulary	Fruit, vegetable, look, feel, taste, smell, soup, pumpkin, ingredients, knife, smooth, lumpy, sweet, salty, bitter, creamy, packaging,	• balanced diet, carbohydrate, fruit, oils, protein, balance, dairy, ingredients, sugar, vegetable, design criteria • fruit, vegetable, seed, leaf, root, stem, smoothie ,healthy, carton design, flavour, peel, slice	climate, imported, natural, reared, seasonal, diet, ingredients, processed, recipe, seasons, sugar design criteria research texture innovative aesthetic measure cross contamination diet processed packaging	beef, processed, diet, supermarket, reared, ethical, ingredients, farm, balanced equipment flavours ingredients method research recipe bridge method cookbook cross-contamination farm to fork preparation storyboard.
Key indicators	• Use adjectives to describe fruits and vegetables. • Use senses. • Tell the difference between fruits and vegetables. • Recall events from the story. • Describe a pumpkin using senses. • Plan and design a soup with support. • Contribute to class	• Name the main food groups and identify foods that belong to each group. • Describe the taste, texture and smell of a given food. • Think of four different wrap ideas, considering flavour combinations. • Construct a wrap that meets the design brief and their plan. • Describe fruits and vegetables and explain why they are a fruit or a vegetable.	• Explain that fruit and vegetables grow in different countries based on their climates. • Understand that 'seasonal' fruits and vegetables are those tat grow in a given season and taste best then. • Know tht eating seasonal fruit and vegetables has a positive effect on the environment. • Design their own tart recipe using seasonal ingredients. • Understand the basic rules of food hygiene. • Follow the instructions within a recipe. • Follow a recipe, with some support. • Describe some of the features of a biscuit based on taste, smell, texture and appearance. • Adapt a recipe by adding extra ingredients to it.	• Understand how beef gets from the farm to our plates. • Present a subject as a poster with clear information in an easy to read format. • Contribute ideas as to what a 'healthy meal' means. • Notice the nutritional differences between different products and recipes. • Recognise nutritional differences between two similar recipes and give some justification as to why this is. • Work a s a team to amend a bolognese recipe with healthy adaptations. • Follow a recipe to produce a healthy bolognese sauce. • Design packaging that promotes the ingredients of the bolognese.

	discussion. • Follow knife safety rules. • Attempt to chop playdough/softened fruit/vegetables with a knife. • Describe their soup using adjectives. • Talk about it's success. • Plan packaging.	• Name a range of places that fruits and vegetables grow. • Describe basic characteristics of fruit and vegetables. • Prepare fruits and vegetables to make a smoothie.	• Plan a biscuit recipe within a budget.	• Find a suitable recipe for their course. • Record the relevant ingredients and equipment needed. • Follow a recipe, including using the correct quantities of each ingredient. • Write a recipe, explaining the process taken. • Explain where certain key foods come from before they appear on the supermarket shelf.
Digital world			Making an electronic charm and Mindful Moments	Monitoring Devices and Navigating the World
<u>Knowledge</u>			• 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 what the 'Digital Revolution' is and features of some of the products that have evolved as a result. •To know that in Design and technology the term 'smart' means a programmed product. •To know the difference between analogue and digital technologies. • To understand what is meant by 'point of sale display.' • To know that CAD stands for 'Computer-aided design. • 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 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 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 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 accelerometers can detect movement. • To understand that sensors can be useful in products as they mean the product can function without human input. • 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.
<u>Skills</u>		•	• Problem solving by suggesting potential features on a Micro: bit and justifying my ideas. • Developing design ideas for a technology pouch. • Drawing and manipulating 2D shapes, using computer-aided design, to produce a point of sale badge. • Using a template when cutting and assembling the pouch. • Following a list of design requirements. • Selecting and using the appropriate tools and equipment for cutting,	• 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

			joining, shaping and decorating a foam pouch. • Applying functional features such as using foam to create soft buttons. • Writing a program to control (button press) and/or monitor (sense light) that will initiate a flashing LED algorithm. • Analysing and evaluating an existing product. • Identifying the key features of a pouch. • 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 requirement. • Developing a prototype case for my mindful moment timer. • Creating a 3D structure using a net. • Programming a micro:bit in the Microsoft micro:bit editor, to time a set number of seconds/minutes upon button press. • 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.	objects, using CAD. • 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. • 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. • 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. • 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. • 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
<u>Key vocabulary</u>		•	Smart wearables, technology, feature, Micro: bit, loops, control, template, test, point of sale, product design, analogue, function, electronic products, initiate, monitor, develop, user, display, digital revolution, digital, digital world, program, simulator, sense, fasten, CAD (computer aided design) research advantage disadvantage criteria design ergonomic timer program loop coding block variable pause bug debug net template	Monitoring device, sensor, thermometer, design brief, development, vivarium, programming, comment, ambient, duplicate, value, model, electronic, thermoscope, research, design criteria, inventor, programming loop, alert, boolean, copy, variable, sustainability smartphone equipment navigation cardinal compass application (apps) pedometer GPS tracker design brief design criteria client

			develop join assemble test form function prototype process cheap user	function program duplicate replica loop variable value if statement Boolean corrode moudable lightweight sustainable design environmentally friendly biodegradable recyclable product lifecycle
Key indicators		•	• Give a brief explanation of the digital revolution and/or remember key examples. • Suggest a feature from the Micro: bit that is suitable for an eCharm. • Write a program that initiates a flashing LED panel, or another pattern, on the Micro: bit when a button is pressed. • Identify errors, if testing is unsuccessful, by comparing their code to a correct example. • Explain the basic functionality of their finished programme. • Suggest key features for a pouch, with some consideration for the overall theme and the user. • Use a template when cutting and assembling a pouch, with some support. • Describe what is meant by 'point of sale' with an example. • Follow basic design requirements using computer – aided design, drawing at least one shape with a text box and bright colours following a demonstration. • Evaluate their design. • State and/or describe the advantages and disadvantages of existing products (timers). • Understand hoe Micro:bit features could be used as part of a design idea. • Write a program that displays a timer on the Micro:bit based on their chosen seconds/minutes. • Suggest where the errors are, if testing is unsuccessful, by comparing the code to their own. • State key functions in the program editor (eg loops). • Cut out a net box carefully, assembling it securely into a box using tape or glue and tabs and ensuring it has a slot for the Micro:bit display. • Evaluate the immediate appeal of the Micro:bit timer and how it might function. • Express which stages of the project they enjoyed or found more challenging. • Explain the need for a company to stand out against competition and/or state the importance of logos in business. • Recall and describe the name and use of key tools used in Sketchup (CAD) software. • Fulfil the design requirements of the logo.	• Describe what is meant by a monitoring device and provide an example. • Explain briefly the development of thermometers from thermoscopes to digital thermometers. • Research a chosen animal's key information to develop a list of design criteria for an animal's monitoring device. • Write a program that monitors the ambient temperature and alerts someone when the temperature moves from a specified range. • Identify errors (bugs) in the code and ways to fix (debug) them. • State on or two facts about the history and development of plastic, including how it is now affecting planet Earth. • Build a variety of brick models to invent Micro: bit case, housing and stand ideas, evaluating the success of their favourite model. • Explain key pros and cons of virtual modelling vs physical modelling. • Recall and describe the name and use of key tools used in Tinkercard (CAD) software. • Incorporate key information from a client's design request such as 'multifunctional' and 'compact' in their design brief. • Write a program that displays an arrow to indicate cardinal compass directions with an 'On start' loading screen. • Identify errors (bugs) in the code and suggest ways to fix (debug) them. • Self and peer evaluate a product concept against a list of design criteria with basic statements. • Identify key industries that use 3D CAD modelling and why. • Recall and describe the name and use of key tools used in Tinkercad (CAD) software. • Combine more than one object to develop a finished 3D CAD model in Tinkercad. • Complete a product pitch plan that includes key information.
Electrical systems			An electric poster and Torches	Doodlers and Steady Hand Game

<u>Knowledge</u>		•	• 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 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 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 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 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. • 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. • 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. •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'
<u>Skills</u>		•	• 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. • 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). • 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. • Designing a torch, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas. • Making a torch with a working electrical circuit and switch.	• 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. • 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. • 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. • Designing a steady hand game - identifying and naming the components required. • Drawing a design from three different perspectives.

			• Using appropriate equipment to cut and attach materials. • Assembling a torch according to the design and success criteria. • Evaluating electrical products. • Testing and evaluating the success of a final product.	• 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' • 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. • 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.
Key vocabulary			information design, public, research, sketch, self assessment, feedback, final design, electric product, circuit component, battery, design, design criteria, initial ideas, bulb, peer assessment, develop, electric system, circuit, crocodile wires	circuit component, current, DIY, motor, problem solve, series circuit, configuration, develop, investigate, motorised, product analysis, stable, target user assemble battery battery pack benefit bulb bulb holder buzzer circuit circuit symbol component conductor copper design design criteria evaluation fine motor skills fit for purpose form function gross motor skills insulator LED user
Key indicators			• Explain what 'information design' is and understand its impact, considering what could happen if we had no signage, posters, or written communication in public places of interest. • Research and choose a specific Ancient Roman topic on which to base their initial poster ideas. • Complete design criteria based on a client's request. • Roughly sketch four initial poster, indicating where a bulb will be located for each. • Review their initial ideas against the design criteria and peer feedback, developing a final design. • Assemble an electronic poster, including a functional simple circuit following a demonstration. • Acknowledge, with a brief explanation, the need to mount the poster using corrugated card. • Test that the simple circuit works by adding a battery. • Evaluate their electric posters in a letter to a client. • Identify electrical products and explain why they are useful. • Help to make a working switch. • Identify the features of a torch and how it works. • Describe what makes a torch successful. • Create suitable designs that fit the success criteria and their own design criteria. • Create a functioning torch with a switch according to their design criteria.	• Identify simple circuit components (battery, bulb and switch) with a basic explanation of their function. • Explain that a series circuit is assembled in a loop to allow the electricity to flow along one path. • Describe a motor as a circuit component that changes electrical energy into movement. • Provide examples of motorised products that use movement to rotate or spin different parts. • Remove and replace different parts of a Doodler, as part of a team. • Suggest ways to switch the configuration to amend the form or function of the Doodler. • Explain, in an investigation report, each of the changes they made and the effect this had on the Doodler's ability to draw scribbles (function) and appearance (form). • Develop design criteria with consideration for the target user, the purpose of their Doodler, a key function and the Doodler's form and final appearance (e.g. fun, bright, soft). • Explain simply why their Doodler has a certain configuration based on the findings of their investigation (e.g. I used four pens because the Doodler would fall over with two). • Create a functional Doodler that creates scribbles on paper with or without a switch. • Identify and list each of the required materials, tools and circuit components required to build a Doodler. • Explain simply the steps to assemble a Doodler as part of a set of instructions (or storyboard). • Explain simply what is meant by 'form' (the shape of a

				product) and 'function' (how a product works). • State what they like or dislike about an existing children's toy and why. • Learn about skills developed through play and apply this knowledge in a survey of one or more children's toys. • Identify the components of a steady hand game. • Design a steady hand game of their own according to their design criteria, using four different perspective drawings. • Create a secure base for their game, with neat edges, that relates to their design. • Make and test a functioning circuit and assemble it within a case.