Ellwood Community Primary School

Believe, Achieve, Belong

Design and Technology

Designing and creating together to solve problems, building new skills now and for the ever-changing world of technology

Early Years Foundation Stage

Expressive Arts and Design Physical Development		
Prerequisite skills for design technology within the national curriculum		
ELG	**Creating with materials**	**Fine Motor Skills**
	• Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. • Share their creations, explaining the process they have used. • Make use of props and materials when role playing characters in narratives and stories.	• Use a range of small tools, including scissors, paintbrushes and cutlery. • Begin to show accuracy and care when drawing.
Key vocabulary	plan, soft, hard, paper, card, tissue paper,	cut, scissors, paintbrush, cutlery, knife, fork, spoon, pencil, pen, crayon,

Across KS1 pupils should explore:

• what products are

• who products are for

• what products are for

• how products work

• how products are used

• where products might be used

• what materials products are made from

• what they like and dislike about products

Year 1 Skills and Knowledge

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process (one that includes a repeated cycle of operations) of designing and making. They should work in a range of relevant contexts [for example, the home and school, gardens and playgrounds, the local community, industry and the wider environment].

- design purposeful, functional, appealing products for themselves and other users based on design criteria
- generate and communicate their ideas
- use a range of tools and equipment to perform practical tasks
- use a wide range of materials and components, including construction materials, textiles and ingredients
- explore a range of existing products
- build structures, exploring how they can be made stronger, stiffer and more stable
- how to cook and apply the principles of nutrition and healthy eating

Design	Make	Evaluate	Technical knowledge	Cooking and nutrition	Additional
Learn the importance of a clear design criteria Include individual preferences and requirements in a design	• Make stable structures from card, tape and glue	Test a finished product, seeing whether it moves as planned and if not,	• To understand that the shape of materials can be changed to improve the strength and stiffness of structures	• To understand that some foods typically known as vegetables are actually fruits (e.g. cucumber)	To know that a client is the person I am designing for

Explain how to adapt mechanisms Design a moving story book for a given audience Use templates to create a design Design a vehicle that includes wheels, axles and axle holders, which will allow the wheels to move Create clearly labelled drawings which illustrate movement	• Learn how to turn 2D nets into 3D structures • Follow instructions to cut and assemble the supporting of a structure • Make functioning turbines and axles which are assembled into a main supporting structure Follow a design to create moving models that use levers and sliders • Cut fabric neatly with scissors • Use joining methods to decorate • Sequence steps for construction • Adapt mechanisms	explaining why and how it can be fixed Reviewing the success of a product by testing it with its intended audience Reflect on a finished product, explain likes and dislikes • Test mechanisms, identifying what stops wheels from turning, knowing that a wheel needs an axle in order to move	• To understand that cylinders are a strong type of structure (e.g. the main shape used for windmills and lighthouses) • To begin to understand that different structures are used for different purposes •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 'joining technique' means connecting two pieces of material together • To know that drawing a design idea is useful to see how an idea will look • To know that wheels need to be round to rotate and move • To understand that for a wheel to move it must be attached to a rotating axle • To know that an axle moves within an axle holder which is fixed to the vehicle or toy • To know that the frame of a vehicle (chassis) needs to be balanced	• To know that 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 • Chop fruit and vegetables safely to make a smoothie • Learn where and how fruits and vegetables grow • Taste and evaluate different food combinations • Describe appearance, smell and taste • Suggest information to be included on packaging	• 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 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
Key Vocabulary					
planning, investigating design, evaluate, make, user, purpose, ideas, product,	planning, investigating design, evaluate, make, user, purpose, ideas, product,	planning, investigating design, evaluate, make, user, purpose, ideas, product,	cut, fold, join, fix structure, wall, , weak, strong, base, top, underneath, side, edge, surface, thinner, thicker, point, straight, curved, metal, wood, plastic circle, triangle, square,	Blender, carton, fruit, healthy, ingredients, peel, peeler, recipe, slice, smoothie, vegetable, sensory vocabulary e.g. soft, juicy, crunchy, sweet, sticky, smooth, sharp, crisp, sour, hard	

			rectangle, cuboid, cube, cylinder	flesh, skin, seed, pip, core, slicing, peeling, cutting, squeezing, healthy diet, choosing, ingredients,	

Year 2 Skills and Knowledge

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process (one that includes a repeated cycle of operations) of designing and making. They should work in a range of relevant contexts [for example, the home and school, gardens and playgrounds, the local community, industry and the wider environment].

- design purposeful, functional, appealing products for themselves and other users based on design criteria
- generate and communicate their ideas
- use a range of tools and equipment to perform practical tasks
- use a wide range of materials and components, including construction materials, textiles and ingredients
- explore a range of existing products
- build structures, exploring how they can be made stronger, stiffer and more stable
- how to cook and apply the principles of nutrition and healthy eating

Design	Make	Evaluate	Technical knowledge	Cooking and nutrition	Additional
• Learning the importance of a clear design criteria • Including individual preferences and requirements in a design • Create a class design criteria • Design a for a specific audience in accordance with a design criteria Designing a healthy foods based on a food combination which work well together	• Make stable structures from card, tape and glue • Learning how to turn 2D nets into 3D structures • Follow instructions to cut and assemble that supports a structure • Make linkages using card for levers and split pins for pivots • Experiment with linkages adjusting the widths, lengths and thicknesses of card used • Cut and assemble components neatly • Select and cut fabrics for sewing • Decorate using fabric glue or running stitch • Thread a needle • Sew running stitch, with evenly spaced, neat, even stitches to join fabric	• Evaluate own designs against design criteria • Use peer feedback to modify a final design • Evaluate which grip was most effective • Troubleshoot scenarios posed by teacher • Evaluate the quality of the stitching on others' work • Discus as a class, the success of their stitching against the success criteria • Identify aspects of their peers' work that they particularly like and why	• To understand that the shape of materials can be changed to improve the strength and stiffness of structures • To understand that cylinders are a strong type of structure (e.g. the main shape used for windmills and lighthouses) • To understand that axles are used in structures and mechanisms to make parts turn in a circle • To begin to understand that different structures are used for different purposes • To know that a structure is something that has been made and put together • To know that 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 '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	• To know that a client is the person I am designing for • To know that design criteria's are a list of points to ensure the product meets the client's needs and wants • To know some real-life objects that contain mechanisms

	• Neatly pin and cut fabric using a template		• To know that an input is the energy that is used to start something working • To know that an output is the movement that happens as a result of the input • To know that a lever is something that turns on a pivot • To know that a linkage mechanism is made up of a series of levers To know that 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	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• Describe the taste, texture and smell of fruit and vegetables • To know that many food and drinks we do not expect to contain sugar do; we call these 'hidden sugars' • Construct food that meets a design Slice food safely using the bridge or claw grip brief Taste testing food combinations and final products • Describe the information that should be included on a label	
Key Vocabulary					
Plan/design investigating, planning, design, make, evaluate, user, purpose, ideas, design criteria, product, function	joining and finishing techniques, tools, fabrics and components, template, pattern pieces, mark out, join, decorate, finish stable, stiff, strong, test, weak	planning, investigating design, evaluate, make, user, purpose, ideas, product,	cut, fold, join, fix, structure, wall, tower, framework, weak, strong, base, top, underneath, side, edge, surface, thinner, thicker, corner, point, straight, curved, metal, wood, plastic circle, triangle, square, rectangle, cuboid, cube, cylinder, lever, mechanical, mechanism, motion, pivot, axel vehicle, wheel, axle, axle holder, chassis, body, cab assembling, cutting, joining, shaping, finishing, fixed, free, moving, mechanism names of tools, equipment and materials used	Diet, balanced diet, expensive, healthy, ingredients, nutrients, packaging, refrigerator, sugar, substitute	

In early KS2 pupils should also investigate and analyse:

• who designed and made the products

• where products were designed and made

• when products were designed and made

• whether products can be recycled or reused

Year 3 Skills and Knowledge

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process (one that includes a repeated cycle of operations) of designing and making. They should work in a range of relevant contexts [for example, the home, school, leisure, culture, enterprise, industry and the wider environment].

- use design criteria to inform the design of innovative, functional, appealing products that are fit for purpose
- generate, model and communicate their ideas through discussion and annotated sketches
- select from and use a wider range of tools and equipment to perform practical tasks
- select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties
- investigate a range of existing products
- evaluate their ideas and products against their own design criteria to improve their work
- apply their understanding of how to strengthen more complex structures
- understand and use mechanical systems in their products
- understand and apply the principles of a healthy and varied diet

Design	Make	Evaluate	Technical knowledge	Cooking and nutrition	Additional
• Problem solving by suggesting potential features on a Micro: bit and justifying my ideas • Drawing and manipulating 2D shapes, using computer-aided design • Developing design criteria from a design brief • Learning that different types of drawings are used in design to explain ideas clearly. • To know that exploded-diagrams are used to show how different parts of a product fit together.	• Construct a range of 3D geometric shapes using nets • Create special features for individual designs • Make products from a range of recycled materials • Create a pneumatic system to create a desired motion • Select materials due to their functional and aesthetic characteristics • Manipulate materials to create different effects by cutting, creasing, folding, weaving • Following design criteria to create a product	• Use the views of others to improve designs • Test and modify the outcome, suggesting improvements • Understand the purpose of exploded-diagrams through the eyes of a designer and their client • Evaluate an end product and thinking of other ways in which to create similar items Analyse and evaluate an existing product	• To understand that wide and flat based objects are more stable • To understand the importance of strength and stiffness in structures 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	• Follow the instructions within a recipe Know how to prepare themselves and a work space to cook safely in, learning the basic rules to avoid food contamination Describe the benefits of seasonal fruits and vegetables and the impact on the environment • Suggest points for improvement when making a food • 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 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 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 •To know that applique is a way of mending or decorating a textile by applying

	• Select and cut fabrics with ease using fabric scissors • Thread needles with greater independence • Tie knots with greater independence • Sew cross stitch to join fabric • Decorate fabric using appliqué • Complete design ideas with stuffing and sewing the edges Using a template when cutting and assembling the product • Follow a list of design requirements • Select and using the appropriate tools and equipment for cutting, joining, shaping and decorating a product • Apply functional features such as using foam to create soft buttons		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, codable computer • Writing a program to control (button press) and/or monitor (sense light) that will initiate a flashing LED algorithm	• 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 Establish and use design criteria to help test and review dishes	smaller pieces of fabric •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 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 o sale display' • To know that CAD stands for Computer-aided design
Key Vocabulary					
user, purpose, design, model, evaluate, prototype, annotated sketch, functional, innovative, investigate, label, drawing, function, planning, design criteria, annotated sketch, appealing	joining and finishing techniques, tools, fabrics and components, template, pattern pieces, mark out, join, decorate, finish	user, purpose, design, model, evaluate, prototype, annotated sketch, functional, innovative, investigate, label, drawing, function, planning, design criteria, annotated sketch, appealing	shell structure, three-dimensional (3-D) shape, net, cube, cuboid, prism, vertex, edge, face, length, width, breadth, capacity, marking out, scoring, shaping, tabs, adhesives, joining, assemble, accuracy, material, stiff, strong, reduce, reuse, recycle, corrugating, ribbing, laminating, font,	name of products, names of equipment, utensils, techniques and ingredients, taste, sweet, sour, hot, smell, greasy, cook, fresh, hygienic, grown, frozen, tinned, processed, harvested healthy/varied diet	

			lettering, text, graphics, decision,	

Year 4 Skills and Knowledge

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process (one that includes a repeated cycle of operations) of designing and making. They should work in a range of relevant contexts [for example, the home, school, leisure, culture, enterprise, industry and the wider environment].

- develop design criteria to inform the design of functional, appealing products that are fit for purpose
- generate, develop, model and communicate their ideas through discussion, annotated sketches and prototypes and computer-aided design
- select from and use a wider range of tools and equipment to perform practical tasks
- select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties
- investigate and analyse a range of existing products
- apply their understanding of how to strengthen, stiffen and reinforce more complex structures
- understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
- understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]

understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed

Design	Make	Evaluate	Technical knowledge	Cooking and nutrition	Additional
• Designing a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect • Building frame structures designed to support weight • Draw a net to create a structure from • Choose shapes that increase or decrease speed as a result of air resistance • Personalise a design • Give consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas	• Create a range of different shaped frame structures • Make a variety of free standing frame structures of different shapes and sizes • Select appropriate materials to build a strong structure • Reinforce corners to strengthen a structure • Create a design in accordance with a plan • Learn to create different textural effects with materials • Measure, marking, cutting and assemble with increasing accuracy	• Evaluate structures made by the class • Describe what characteristics of a design and construction made it the most effective • Consider effective and ineffective designs • Evaluate the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance • Evaluate electrical products • Test and evaluate the success of a final product and taking inspiration • Evaluate and comparing a range of products	• To understand what a frame structure is • To know that a 'free-standing' structure is one which can stand on its own • 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 understand that the shape of a moving object will affect how it moves due to air resistance .• To understand that electrical conductors are materials which electricity can pass through To understand that electrical insulators are materials which electricity cannot pass through	• Follow a baking recipe • Cook safely, following basic hygiene rules • Adapt a recipe Follow a list of design requirements Design food within a given budget, drawing upon previous taste testing • Evaluate a recipe, considering: taste, smell, texture and appearance • Describe the impact of the budget on the selection of ingredients • 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	• To know that a pavilions is a decorative building or structure for leisure activities • To know that cladding can be applied to structures for different effects. • To know that aesthetics are how a product looks • To know that a product's function means its purpose • To understand that the target audience means the person or group of people a product is designed for • To know that architects consider light, shadow and patterns when designing • To understand 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)

Write design criteria for a product, articulating decisions made Apply the results of my research to further inform my design criteria • Develop a prototype case for product • Use and manipulate shapes and clipart, using computer-aided design (CAD), to produce a logo	• Make a model based on a chosen design • Making a working electrical circuit and switch • Use appropriate equipment to cut and attach materials • Assemble products according to the design and success criteria • Make and test a paper template with accuracy and in keeping with the design criteria Measure, mark and cut fabric using a paper template • Select a stitch style to join fabric, working neatly sewing small neat stitches • Incorporate fastening to a design • Develop a prototype • Create a 3D structure using a net • Program a micro:bit in the Microsoft micro:bit editor, to time a set number of seconds/minutes upon button press	• Suggest modifications • Test and evaluate an end product against the original design criteria • Decide how many of the criteria should be met for the product to be considered successful • Suggest modifications for improvement • Articulate the advantages and disadvantages of different fastening types • Evaluate my micro:bit program against points on my design criteria and amending them to include any changes I made • Document and evaluate my project • Understand what a logo is and why they are important in the world of design and business • Test my program for bugs (errors in the code) • Find and fix the bugs (debug) in my code	• To know that a battery contains stored electricity that can be used to power products • To know that an electrical circuit must be complete for electricity to flow • To know that a switch can be used to complete and break an electrical circuit • To know that 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 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	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 food	• To know that graphics are images which are designed to explain or advertise something •To know that it is important to assess and evaluate design ideas and models against a list of design criteria • To know facts from the history and invention of the electric light bulb(s) - by Sir Joseph Swan and Thomas Edison •Understand the terms 'ergonomic' and 'aesthetic' •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
Key Vocabulary					
evaluating, design brief design criteria, innovative, prototype, user, purpose, function, prototype, design criteria, innovative, appealing, design brief, planning, annotated sketch, sensory evaluations	fabric, names of fabrics, fastening, compartment, zip, button, structure, finishing technique, strength, weakness, stiffening, templates, stitch, seam, seam allowance	evaluating, design brief design criteria, innovative, prototype, user, purpose, function, prototype, design criteria, innovative, appealing, design brief, planning, annotated sketch, sensory evaluations	shell structure, three-dimensional (3-D) shape, net, cube, cuboid, prism, vertex, edge, face, length, width, breadth, capacity, marking out, scoring, shaping, tabs, adhesives, joining, assemble, accuracy, material, stiff, strong, reduce, reuse, recycle, corrugating, ribbing, laminating, font, lettering, text, graphics, decision,	name of products, names of equipment, utensils, techniques and ingredients texture, taste, sweet, sour, hot, spicy, appearance, smell, preference, greasy, moist, cook, fresh, savoury, hygienic, edible, grown, reared, caught, frozen, tinned, processed, seasonal, harvested healthy/varied diet	

Year 5 Skills and Knowledge

In late KS2 pupils should also investigate and analyse:

• how much products cost to make

• how innovative products are

• how sustainable the materials in products are

• what impact products have beyond their intended purpose

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process (one that includes a repeated cycle of operations) of designing and making. They should work in a range of relevant contexts [for example, the home, school, leisure, culture, enterprise, industry and the wider environment].

- use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose
- generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes and computer-aided design
- select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately
- select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities
- evaluate their ideas and products against their own design criteria and consider the views of others to improve their work
- understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]
- apply their understanding of how to strengthen, stiffen and reinforce more complex structures
- prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques

Design	Make	Evaluate	Technical knowledge	Cooking and nutrition	Additional
• Design a stable structure that is able to support weight • Create frame structure with focus on triangulation • Design a pop-up book which uses a mixture of structures and mechanisms	• Independently measuring and marking wood accurately • Select appropriate tools and equipment for particular tasks • Use the correct techniques to saws safely • Identify where a structure needs reinforcement and using card corners for support	• Adapt and improve own structures by identifying points of weakness and reinforcing them as necessary • Suggest points for improvements for own products and those designed by others	• To understand some different ways to reinforce structures • To understand how triangles can be used to reinforce products • To know that properties are words that describe the form and function of materials • To understand why material selection is important based on their properties	• 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 substituting ingredients	To understand how to carry and saw safely • To know that a design brief is description of what I am going t design and make • To know that designers often want to hide mechanisms to make a product aesthetically pleasing

	• Name each mechanism, input and output accurately • Storyboard ideas for a book • Design an electronic greetings card with a copper track circuit and components • Create a labelled circuit diagram showing positive and negative parts in relation to the LED and the battery • Write a design criteria for an electronic greeting card • Adapt a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients • Write an amended method for a recipe to incorporate the relevant changes to ingredients • Design appealing packaging to reflect a recipe • Research (books, internet) for a particular (user's) animal's needs • Develop design criteria based on research • Understand what a virtual model is and the pros and cons of traditional and CAD modelling • Place and manoeuvre 3D objects, using CAD • Change the properties of, or combine one or more 3D objects, using CAD	• Explain why selecting appropriating materials is an important part of the design process • Understand basic wood functional properties • Follow a design brief to make a pop up book, neatly and with focus on accuracy • Make mechanisms and/or structures using sliders, pivots and folds to produce movement • Use layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result • Make a functional series circuit • Create an electronics greeting card, referring to a design criteria • Map out where different components of the circuit will go • Create a 3D stuffed toy from a 2D design • Measure, mark and cut fabric accurately and independently • Create strong and secure blanket stitches when joining fabric • Thread needles independently • Use applique to attach pieces of fabric decoration • Sew blanket stitch to join fabric • Apply blanket stitch so the space between the stitches are even and regular • Understand the functional and aesthetic properties of plastics	• Evaluate the work of others and receiving feedback on own work • Suggest points for improvement • Evaluate a peer's product against design criteria and suggesting modifications that could be made to improve the reliability or aesthetics of it or to incorporate another type of circuit component • State what Sir Rowland Hill invented and why it was important for greeting cards • Analyse and evaluate a range of existing greeting cards • Test and evaluate an end product and giving point for further improvements • State an event or fact from the last 100 years of plastic history • Know how plastic is affecting planet Earth and suggesting ways to make more sustainable choices • Explain key functions in my program (audible alert, visuals) • Explain how my product would be useful for an animal carer including programmed features	• To understand the material (functional and aesthetic) properties of wood • To know that mechanisms control movement • To understand that mechanisms that 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 the key components used to create a functioning circuit • To know that copper is a conductor and can be used as part of a circuit • To understand that breaks in a circuit will stop it from working • To understand that a series circuit only has one path for the electrical current to flow from positive to negative • To know that we use symbols to represent components in a circuit diagram • To know the names of the components in a basic series circuit: crocodile wires, LED (light-emitting diode), battery holder, battery, cell • To know that blanket stitch is useful to reinforce the edges of a fabric material or join two pieces of fabric 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 know that a 'device' means equipment created for a certain purpose or job and that monitoring devices observe and record	• To know that I can use a nutritional calculator to see how healthy a food option is • To understand that 'cross-contamination' means that bacteria and germs have been passed onto ready-to-eat foods and it happens when these foods mix with raw meat or unclean objects • Identify the nutritional differences between different products and recipes • Identify and describe healthy benefits of food groups • Cut and prepare vegetables safely • Use equipment safely, including knives, hot pans and hobs • Know how to avoid cross-contamination • Follow a step by step method carefully to make a recipe	• To know that product an lysis critiquing the strengths an weaknesses of a product • To know that 'mass prod ction when a product is made in large quantities by a machine, usuall factory •To know that one-off prod uctio when only one of a produc is m by hand • To know that 'bespoke' m eans product was made for a pa rticul reason or person • To understand the devel opmen personal message exchang thro the invention of the Penny Black stamp, and exchanging of greeti cards • To understand key develo omen thermometer history • To know events or facts t at to place over the last 100 yea rs in history of plastic, and how this changing our outlook on t e fut • To know the 6Rs of susta inabi • To understand what a vi tual is and the pros and cons o trad vs CAD modelling • To know that a 'device' m eans equipment created for a ce tain purpose or job and that monitoring devices ob serve record. • To know that a sensor is a too device that is designed to m onit detect and respond to changes for a p rpos

Key Vocabulary				
design decisions, functionality, authentic, user, purpose, design specification, design brief, innovative, research, evaluate, design criteria, annotate, evaluate, mock-up, prototype	fabric, names of fabrics, fastening, compartment, zip, button, structure, finishing technique, strength, weakness, stiffening, templates, stitch, seam, seam allowance	design decisions, functionality, authentic, user, purpose, design specification, design brief, innovative, research, evaluate, design criteria, annotate, evaluate, mock-up, prototype	frame structure, stiffen, strengthen, reinforce, triangulation, stability, shape, join, temporary, permanent	ingredients, yeast, dough, bran, flour, wholemeal, baking soda, spice, herbs fat, sugar, carbohydrate, protein, vitamins, nutrients, healthy, varied, gluten, dairy, allergy, intolerance, savoury, utensils, fold, knead, stir, pour, mix, rubbing in, whisk, beat, roll out, shape, sprinkle, crumble

Year 6 Skills and Knowledge

In late KS2 pupils should also investigate and analyse:

• how much products cost to make

• how innovative products are

• how sustainable the materials in products are

• what impact products have beyond their intended purpose

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process (one that includes a repeated cycle of operations) of designing and making. They should work in a range of relevant contexts [for example, the home, school, leisure, culture, enterprise, industry and the wider environment].

- use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups
- generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design
- select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately
- select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities
- evaluate their ideas and products against their own design criteria and consider the views of others to improve their work
- understand how key events and individuals in design and technology have helped shape the world
- understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
- understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]
- apply their understanding of computing to program, monitor and control their products
- understand and apply the principles of a healthy and varied diet
- prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques

Design	Make	Evaluate	Technical knowledge	Cooking and nutrition	Additional
• Design a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs •Experiment with a range of cams • Understand how linkages change the direction of a force • Draw a design from three different perspectives • Generate ideas through sketching and discussion • Model ideas through prototypes • Understand the purpose of products (toys), including what is meant by 'fit for purpose' and 'form over function' • Write a recipe, explaining the key steps, method and ingredients • Include facts and drawings from research undertaken • Annotate designs • Write a design brief from information submitted by a client • Develop design criteria to fulfil the client's request • Develop a product idea through annotated sketches • Place and manoeuvre 3D objects, using CAD • Change the properties of, or combine one or more 3D objects, using •Experimenting with a range of cams, creating a	• Measure, mark and cut wood to create a range of structures • Use a range of materials to reinforce and add decoration to structure • Measure, mark and cut components accurately using a ruler and scissors • Assemble components accurately to make a stable frame • Understand that for the frame to function effectively the components must be cut accurately and the joints of the frame secured at right angles • Select appropriate materials based on the materials being joined and the speed at which the glue needs to dry/set • Accurately cut, fold and assemble a net • Make and test a circuit incorporating a circuit into a base • Use a template when pinning panels onto fabric • Mark and cut fabric accurately, in accordance with a design • Sew a strong running stitch, making small, neat stitches and following the edge • Tie strong knots • Decorate a waistcoat -attaching objects using thread and adding a secure fastening • Learn different decorative stitches • Sew accurately with even regularity of stitches • Consider materials and their functional properties, especially those that are sustainable and recyclable (for example, cork and bamboo)	• Improve a design plan based on peer evaluation • Test and adapt a design to improve it as it is developed • Identify what makes a successful structure • Evaluate the work of others and receive feedback on own work • Apply points of improvements • Describe changes they would make • Identify what went well and making suggestions for improvement • Gathering images and information about existing products • Analyse a selection of existing products • Evaluate a recipe, considering: taste, smell, texture and origin of the food group • Taste testing and scoring final products • Suggest and write up points of improvements in productions • Evaluate work continually as it is created • Explain how my program fits the design criteria and how it would be useful as part of a navigation tool • Develop an awareness of sustainable design • Identify key industries that utilise 3D CAD modelling and explain why • Describe how the product concept fits the client's request and how it will benefit the customers • Explain the key functions in my program, including any additions • Explain how my program fits the design criteria and how it would be useful as part of a navigation tool • Evaluating the work of others and receiving feedback on own work.	• To know that structures can be strengthened by manipulating materials and shapes • To understand that the mechanism in automata uses a system of cams, axles and followers • To understand that different shaped cams produce different outputs • 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 • 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 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 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 • 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• Follow a recipe, including using the correct quantities of each ingredient • Adapt a recipe based on research • Work to a given timescale • Work safely and hygienically with independence • To understand what happens to a certain food before it appears on the supermarket shelf (Farm to Fork) • Evaluate health and safety in production to minimise cross contamination I can list the ingredients I need for my chosen recipe. I can read the method and make a list of all of the	• 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 •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 • 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 • 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.

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.	• Explain material choices and why they were chosen as part of a product concept • 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	• Applying points of improvement to their toys. • Describing changes they would make/do if they were to do the project again		equipment I need for my chosen recipe. To prepare a meal using a recipe. To understand where their food comes from. To write up a recipe. Prepare ingredients and follow a recipe safely and sensibly.	
Key Vocabulary					
function, innovative, design specification, design brief, user, purpose design brief, design specification, prototype, annotated sketch, purpose, user, innovation, research, functional, mock-up, prototype	seam, seam allowance, wadding, reinforce, right side, wrong side, hem, template, pattern pieces, name of textiles and fastenings used, pins, needles, thread, pinking shears, fastenings,	function, innovative, design specification, design brief, user, purpose design brief, design specification, prototype, annotated sketch, purpose, user, innovation, research, functional, mock-up, prototype	frame structure, stiffen, strengthen, reinforce, triangulation, stability, shape, join, temporary, permanent	ingredients, yeast, dough, bran, flour, wholemeal, unleavened, baking soda, spice, herbs fat, sugar, carbohydrate, protein, vitamins, nutrients, nutrition, healthy, varied, gluten, dairy, allergy, intolerance, savoury, source, seasonality utensils, combine, fold, knead, stir, pour, mix, rubbing in, whisk, beat, roll out, shape, sprinkle, crumble, nutrients, fibre, appearance, texture, aroma, savoury dishes,	