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Year Group	Food and Nutrition	Mechanisms/ Mechanical Structures	Structures	Textiles	Electrical Systems	Digital World

EYFS	**The children in EYFS work towards the following outcomes:** <u>Communication and Language ELG</u> (*Christmas, Junk Model Rockets, Pirate Boats: Floating or Sinking*?) - Articulate their ideas and thoughts in well-formed sentences. - Connect one idea or action to another using a range of connectives. - Use talk to help work out problems and organise thinking and activities, and to explain how things work and why they might happen. **ELG: Speaking** - Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary. - Offer explanations for why things might happen. <u>Personal, Social and Emotional Development ELG</u> *(Happy, Healthy Me, Mr Wolf's Pancakes, Chinese New Year)* - Know and talk about the different factors that support their overall health and wellbeing: healthy eating **ELG: Managing Self** Manage their own basic hygiene and personal needs, including… understanding the importance of healthy food choices <u>Understanding the World ELG</u> (*Christmas, Junk Model Rockets, Pirate Boats: Floating or Sinking*?) - Explore the natural world around them **ELG: The Natural World** - Explore the natural world around them, making observations and drawing pictures <u>Expressive Arts and Design ELG</u> (*Christmas, Junk Model Rockets, Pirate Boats: Floating or Sinking*?) Explore, use and refine a variety of artistic effects to express their ideas and feelings

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	ELG: Creating with Materials - 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. **<u>Characteristics of effective learning</u>** - Playing and exploring - Active Learning - Creating and thinking critically					
Year 1 Knowledge	To know and understand the difference between fruits and vegetables. To know and understand that some foods which are typically known as vegetables are actually fruits (e.g. a cucumber).	TBC (add in Summer when Emily has decided on her 3rd unit)	To know that the shape of materials can be changed to improve the strength and stiffness of structures. To know that cylinders are a strong type of structure (and therefore, they are the main shape used for windmills and lighthouses).	TBC (add in Summer when Emily has decided on her 3rd unit) **Through 'Mother's Day' project:** To know that 'joining technique' means connecting two pieces of material together. To know that there are various temporary methods		

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	To know that fruits have seeds and a vegetable does not. To know that fruits grow on trees and vines. To know that vegetables can grow either above or below ground. To know that vegetables can come from different parts from a plant.		To know that axels are used in structures and mechanisms to make parts turn in a circle. To begin to know and understand that different structures are used for different purposes. To know that a structure is something that has been made and put together.	of joining fabrics using staples, glue or pins. To know and understand that different techniques for joining materials can be used for different purposes. To know and 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.		

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Year Group	Food and Nutrition	Mechanisms/ Mechanical Structures	Structures	Textiles	Electrical Systems	Digital World
Year 1 Skills	Designing packaging for their product by hand. Chopping fruit and vegetables safely. Identifying if a food is a fruit or a vegetable. Learning where and how fruits and vegetables grow. Tasting and evaluating different foods and combinations.		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 a supporting structure (e.g. a windmill). Making a functioning turbine	**Through 'Mother's Day' project:** Using a template to create a design. Cutting fabric nearly with scissors. Using joining methods to decorate. Sequencing steps for construction. Reflecting on a finished product, explaining likes and dislikes.		

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			with an axel which is assembled into a main supporting structure.			
Year 2 Knowledge	To know that cooking instructions are known as a 'recipe'. To know 'ingredients' means the items in a mixture or recipe. To know that the amount of an ingredient in a recipe is known as the 'quantity'. To know what the five main food groups are and where cake	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 an 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	To know that shapes and structures with wide, flat bases or legs are the most stable. To know and 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	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.		

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	ingredients come into this. To know that the cake contributes to the five teaspoons of sugar a day to stay healthy. To know that many foods and drinks contain hidden sugars. To know and understand the importance of budgeting when fundraising for a charity. To know it is important to use oven gloves when	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	has been formed or made from parts. To know that a 'stable' structure is one which is firmly fixed and unlikely to change or move. To know that a 'strong' structure is one which does not break easily. To know that a 'stiff' structure or material is one which does not easily bend.			

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	removing hot food from an oven. To understand the difference between 'raw' and 'cooked' ingredients (e.g. egg).					
Year 2 Skills	Designing cakes within a given budget. Following a baking recipe. Cooking safely, following basic hygiene rules. Describing the taste, texture and smell of ingredients and the baking process.	Creating design criterion for a moving monster as a class. Designing a moving monster for a specific audience in accordance with design criterion. Making linkages using card for levers and split pins for pivots.	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.	Designing a product. Selecting and cutting fabrics for sewing. Decorating a product using fabric glue or running stitch. Threading a needle. Sewing running stitch, with evenly spaces, neat, even		

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	Taste testing and evaluating final products. Describing the information that should be included on a label (ingredient packaging and final products e.g. to include allergens for specific children in the school).	Experimenting with linkages and adjusting the widths, lengths and thickness of card used. Cutting and assembling components neatly. Evaluating own designs against criteria. Using peer feedback to modify a final design.	Creating joins 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 strengths of their own structures. Identifying the weakest part of a structure.	stitches to join fabric. Neatly pinning and cutting fabric using a template. Troubleshooting scenarios posed by teacher. Evaluating the quality of the stitching on others' work. Discussing as a class, the success of their stitching against the success criteria. Identifying aspects of their peers' work that they		

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			Evaluating the strength, stiffness and stability of their own structure.	particularly like and why.		
Year 3 Knowledge	To know that not all fruits an vegetables can be grown in the UK. To know that climate effects food growth. To know that vegetables and fruit grow in certain seasons. To know that imported food has been brought into the country.	To know and understand how pneumatic systems work. To know and 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 know that applique is a way of mending or decorating a textile by applying smaller pieces of fabric. To know and understand that a product's function relies on material choices. To know how to identify materials by explaining their aesthetic and/or functional properties.		

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Year Group	Food and Nutrition	Mechanisms/ Mechanical Structures	Structures	Textiles	Electrical Systems	Digital World
Year 3 Skills	Creating a healthy and nutritious recipe for a savoury product using seasonal ingredients, considering the taste, texture, smell and appearance of the dish. Knowing how to prepare themselves and a workspace to cook safely in, learning the basic rules to avoid food contamination. Following the instructions within a recipe. Establishing and using design criteria	Designing a toy that uses a pneumatic system. Developing design criteria from a design brief. Generating ideas using thumbnail sketches and exploded diagrams. Learning that different types of drawings are used in design to explain ideas clearly. Creating a pneumatic system to create a desired motion.			Designing and making a template. Applying individual design criteria. Following design criteria to create a product. Selecting and cutting fabrics with ease using fabric scissors. Threading needles with greater independence. Tying knots with greater independence.		

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	to help test and review dishes. Describing the benefits of seasonal fruits and vegetables and their impact on the environment. Suggesting points for improvement when making a product.	Building a 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.		Sewing cross-stitch to decorate or join fabric. Decorating fabric using applique, beads or other embellishments. Incorporating a fastening into a design *(see Year 4 textiles unit on Kapow for examples).* Evaluating an end product.		

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		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.				
Year 4 Knowledge		To know that all moving things have kinetic energy. To know and understand that kinetic energy is the	To understand what a frame structure is. To know that a 'free-standing' structure is one that	**Through Mother's Day project:** To know that a fastening is something that holds two pieces of material together.	To know and understand that an electrical system is a group of parts (components) that work together to	

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		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 know that the shape of a moving object will affect how it moves due to air resistance.	can stand up on its own. To know that cladding can be applied to structures for different effects. To know that aesthetics is how a product looks. To know and understand that wide and flat based objects are more stable (including the importance of strength and stiffness in structures). To know the features of a historical structure	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 proportions and ideas.	transport electricity around a circuit. To know the common features of an electric product (switch, battery, plug, dials etc). To know the name and appearance of a bulb, battery, battery holder and crocodile wire to build simple circuits. To know and understand that electrical conductors are materials which electricity can pass through. To know and understand that	

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			and their purpose to include within own designs (e.g. features and stability to withstand enemy attack). To know that a façade is the front of a structure.		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 and electrical circuit.	
Year 4 Skills		Designing a shape that reduces air resistance.	Designing a stable structure/building with key features to	Designing a personalised	Designing a product, giving considering to the	

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		Drawing a net to create a structure form. Choosing shapes that increase or decrease speed as a result of air resistance. Personalising a design. Measuring, making, cutting and assembling with increasing accuracy. Making a model based on a chosen design. Evaluating the speed of the final	appeal to a specific person/audience and materials to create a desired effect. Drawing and labelling a design using 2D and 3D shapes. Making a variety of freestanding frame structures of different shapes and sizes (including a 3D geometric shapes using nets). Selecting appropriate materials to build a strong structure and for the cladding.	product (e.g. purse or book sleeve). Making and testing with a paper template. Measuring, marking and cutting fabric using a paper template. Selecting a stitch style to join fabric (cross stitch or running stitch). Sewing neatly using small, regular stitches. Incorporating a fastening into a design.	target audience and creating both design and success criteria focusing on the features of individual designs. Making a product with a working electrical circuit using a switch. Using appropriate equipment to cut and attach materials. Fitting an electrical component (bulb). Learning ways to give a finished product a higher quality finish.	

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		product based on: the effect of shape on speed and the accuracy of workmanship on performance.	Reinforcing corners to strengthen a structure. Creating special features for individual designs. Creating a design with accordance to a plan. Evaluating own work and the work of others based on the aesthetic of the finished product and in comparison, to the original design.		Evaluating electrical products and comparing this when testing and evaluating own final products.	
Year 5 Knowledge	To know where meat comes from- including how it is reared and welfare issues.	To know that mechanisms control movement.		To know that a blanket stitch is useful to reinforce the edges of a fabric material or		

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Year Group	Food and Nutrition	Mechanisms/ Mechanical Structures	Structures	Textiles	Electrical Systems	Digital World
	To know to adapt a recipe to make it easier by substituting ingredients. To know that a nutritional calculate can be used to see how healthy a food option is. To understand 'cross contamination' means that bacteria and germs have been passed onto read-to-eat foods and it happens when these foods mix with raw meat or unclean objects.	To know that mechanism 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.		join two pieces of fabric. To know that it is easier to finish simpler designs to a high standard. To know that stuffed products (e.g. soft toys) are often made by creating appendages separately and attaching them to the main body. To know that small, near stitches which are pulled taut are important to ensure that the stuffed		

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				product can hold in its stuffing.		
Year 5 Skills	Adapting a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients. Writing an amended method for a recipe to incorporate the relevant changes to ingredients. Designing appealing packaging to reflect a recipe.	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. Following a design brief to make a popup book, neatly and with focus on accuracy.		Designing a stuffed product considering the main component shapes required and creating and appropriate template. Considering the proportions of individual components. Creating a 3D stuffed product from a 2D design. Measuring, marking and cutting fabric accurately and independently.		

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	Cutting and preparing recipes safely. Using equipment safely, including knives, hot pans, ovens 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.	Making mechanisms and/or structures using sliders, pivots and folds to produce movement. Using layers and spaces to hide the workings of mechanical parts for an aesthetically pleasing result. Evaluating the work of others and receiving feedback on own work. Suggesting points for improvements.		Creating strong and secure blanket stitches when joining that are even and regular. Threading needles independently. Using applique to attach pieces of fabric decoration. Testing and evaluating an end product and giving points for further improvements.		

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	Identifying and describing healthy benefits of food groups.					
Year 6 Knowledge		To know that the mechanism in an automaton uses a system of cams, axles and followers. To know that different shaped cams produce different outputs. To know that an automaton is a hand powered mechanical product (e.g., a toy). To know that a cross-sectional diagram shows the			To know that 'form' means the shape and appearance of an object. To know the difference between 'form' and 'function'. To know and 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	To know that accelerometers can detect movement. To know and 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.

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		inner workings of a product.			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 know and understand the diagram perspectives 'top view', 'side view' and 'back'.	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.
Year 6 Skills		Experimenting with a range of cams, creating a design for an automata product based on a choice of cam to			Designing an electrical game (e.g. a steady hand game) identifying and naming the components required.	Writing a design brief from information submitted by a client.

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		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			Drawing a design from three different perspectives. Generating ideas through sketching and discussion. Modelling ideas through prototypes. Understanding the purpose of products (toys), including what is meant by 'fit for purpose' and 'form over function'. Constructing a stable base for a game.	Developing design criteria to fulfil the client's request. Developing a product idea through annotated sketches. Placing and manoeuvring 3D objects, using CAD. Changing the properties of, or combine one or more 3D objects, using CAD. Considering materials and their functional properties, especially those that are sustainable and

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Year Group	Food and Nutrition	Mechanisms/ Mechanical Structures	Structures	Textiles	Electrical Systems	Digital World
		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			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 their own and others' finished games, identifying what went well and making suggestions for improvement. Gathering images and information	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.

The below skills and knowledge have been collated from the Kapow units of work and split into individual year groups and by the design and technology lead from Castor CE Primary School. Skills and knowledge were generalised so in the long term, they could tie into changing design briefs to fit the current cohort's needs and interests and changing topics. Design briefs can be adapted by the class teachers to fit in with achieving these key skills and knowledge. Where one unit is taught every 2 years within year group partners, the design and technology lead has combined and adapted the skills and knowledge required in *both* year groups to ensure thorough coverage.

Year Group	Food and Nutrition	Mechanisms/ Mechanical Structures	Structures	Textiles	Electrical Systems	Digital World
		glue needs to dry/set. Evaluating the work of others and receiving feedback on own work. Applying points of improvement to a product. Describing changes they would make/do if they were to do the project again.			about existing children's toys. Analysing a selection of existing children's toys.	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.