Kingston St Mary C of E Primary Learning Overview: Design & Technology

Curriculum Intent

Purpose of study Design and technology is an inspiring, rigorous and practical subject. Using creativity and imagination, pupils design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, they develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation.

KSM DESIGN & TECHNOLOGY KEY AREAS (Kapow Primary)

KEY AREAS			
KEY STAGES 1 & 2			
COOKING & NUTRITION	MECHANISMS & MECHANICAL SYSTEMS	STRUCTURES	TEXTILES
KEY STAGE 2 only			
ELECTRICAL SYSTEMS		DIGITAL WORLD (taught through our computing program)	

KSM DT POJECTS– Kapow Primary

YEARS 1 & 2	YEARS 3 & 4	YEARS 5 & 6
MECHANISMS - Wheels and Axles	**COOKING AND NUTRITION -** Eating Seasonally	**ELECTRICAL SYSTEMS -** Steady Hand Game
COOKING & NUTRITION - Balance Diet (Wraps) and Smoothies	**STRUCTURES -** Helmets	**TEXTILES -** Bags
STRUCTURES - Baby Bear's Chair	**ELECTRICAL SYSTEMS -** Torches	**COOKING & NUTRITION -** Come Dine with Me
TEXTILES - Puppets	**TEXTILES** - Fastenings	**STRUCTURES -** Playgrounds
MECHANISMS - Fairgrounds		

KSM DESIGN & TECHNOLOGY PROJECTS – UNIT AIMS

YEARS 1 & 2

YEAR A

MECHANISMS - Wheels and Axles

- Choose and use the most suitable tool for cutting out different shapes accurately.
- Test and compare wheels of different shapes, thicknesses and smoothness.
- Estimate the middle of a circle.
- Design, draw and label a product that uses a simple mechanism.
- Identify the needs of the user.
- Make and finish a simple pull-along toy.
- Evaluate a product against simple design criteria and provide feedback.

STRUCTURES - Baby Bear's Chair

- 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 appropriate materials and construction techniques.
- Explain how they made their model strong, stiff and stable.

YEAR B

TEXTILES – Puppets

- Join fabrics together using pins, staples or glue.
- Design a puppet and use a template.
- Join their two puppets' faces together as one.
- Decorate a puppet to match their design.

COOKING & NUTRITION - Balance Diet (Wraps) and Smoothies

- Name the main food groups and identify foods that belong to each group.
- Describe the taste, feel and smell of a given food.
- Think of three different wrap or smoothie ideas, considering flavour combinations.
- Construct a wrap or smoothie that meets the design brief and their plan.

MECHANISMS - Fairgrounds

- Describe how axles help wheels move a vehicle and design and label a working fairground wheel.
- Evaluate different designs.
- Describe the properties of different materials and select appropriate materials for the wheel.
- Build a stable structure, test elements of the design and adapt the design as necessary.
- Make the wheel rotate, evaluate a wheel mechanism and adapt it as necessary.
- Recall that a survey is used to find out what people like, tally results and use the results to inform the design.
- Add pods for the correct number of people and ensure that the pods stay upright when rotating around a fixed point.
- Explain the decisions for the pod design.

YEARS 3 & 4

YEAR A

COOKING AND NUTRITION - Eating Seasonally

- Explain that fruits and vegetables grow in different countries based on their climates and identify which grow where.
- Understand that seasonal fruits and vegetables grow in a given season and that eating them in season positively affects the environment.
- Identify which foods grow in which season and find recipes that contain seasonal foods.
- Know that importing food impacts the environment.
- Identify the equipment used to prepare food and explain why food needs to be prepared safely.
- Describe the taste of various fruits and vegetables and identify flavours.
- Design a seasonal dish and describe the ingredients' nutritional benefits.
- Evaluate the dishes and give and receive feedback to identify strengths.

STRUCTURES – Helmets

- Describe what a shell structure is and describe what makes an effective helmet.
- Design a helmet for a specific user by choosing appropriate features.
- Explain layering techniques used to strengthen a helmet.
- Use layering techniques to make a helmet and reflect on the process.
- Evaluate the strengthening required in the helmet and justify appropriate strengthening techniques.
- Follow a design plan and use appropriate techniques to strengthen and stiffen the helmet.
- Communicate with peers when making improvements.
- Analyse helmets' strengths and weaknesses and evaluate how they work for their purpose.

YEAR B

ELECTRICAL SYSTEMS – Torches

- 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.

TEXTILES – Fastenings

- 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.
- Assemble their case using any stitch they are comfortable with.

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YEARS 5 & 6

YEAR A

ELECTRICAL SYSTEMS - Steady Hand Game

- 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.

TEXTILES – Bags

- Explore and compare real textile products, thinking about how they look, how they are used and how they affect the environment.
- Develop and test design ideas by creating pattern pieces and making prototypes to explore how well they work.
- Use labelled drawings and diagrams to show clear design ideas, including how pattern pieces will fit together.
- Use fabrics and materials suitable for the product, thinking about how they look and how well they work.
- Make 3D textile shapes by carefully cutting, folding and joining materials to match the design.
- Join fabrics securely using stitches or knots and add decorative details to improve the appearance.
- Use pins, scissors and other tools carefully to keep fabric flat and measure and cut accurately.
- Evaluate how well the final product meets the design criteria and suggest improvements.

YEAR B

COOKING & NUTRITION - Come Dine with Me

- 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.

STRUCTURES – Playgrounds

- 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 some cladding to a few areas.
- Secure their apparatus to a base.
- Make a range of landscape features using a variety of materials which will enhance their apparatus.

DESIGN & TECHNOLOGY SUBSTANTIVE KNOWLEDGE AND SKILLS (Kapow Primary)

YEARS 1 & 2					
	MECHANISMS - Wheels and Axles	**MECHANISMS - Moving Monsters**	**TEXTILES – Puppets**	**COOKING & NUTRITION - Balance Diet (Wraps) and Smoothies**	**STRUCTURES - Baby Bear's Chair**
DESIGN	• Designing a vehicle that includes wheels, axles and axle holders, that when combined, will allow the wheels to move. • Creating clearly labelled drawings that illustrate movement.	• Creating a class design criteria for a moving monster. • Designing a moving monster for a specific audience in accordance with a design criteria.	• Using a template to create a design for a puppet	• Designing smoothie carton packaging by-hand. • Learning where and how fruits and vegetables grow.	• Generating and communicating ideas using sketching and modelling. • Learning about different types of structures, found in the natural world and in everyday objects.

MAKE	• Adapting mechanisms, when:
	  • they do not work as they should.
	  • to fit their vehicle design.
	• to improve how they work after testing their vehicle
		• 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.
			• Cutting fabric neatly with scissors.
			• Using joining methods to decorate a puppet.
			• Sequencing steps for construction.
				• Chopping fruit and vegetables safely to make a smoothie.
				• Juicing fruits safely to make a smoothie.
				• Identifying if a food is a fruit.
					• Making a structure according to design criteria.
					• Creating joints and structures from paper/card and tape.
					• Building a strong and stiff structure by folding paper.

EVALUATE	• Testing wheel and axle mechanisms, identifying what stops the wheels from turning, and recognising that a wheel needs an axle in order to move.	• Evaluating own designs against design criteria. • Using peer feedback to modify a final design.	• Reflecting on a finished product, explaining likes and dislikes.	• Tasting and evaluating different food combinations. • Describing appearance, smell and taste. • Suggesting information to be included on packaging. • Comparing their own smoothie with someone else's	• Exploring the features of structures. • Comparing the stability of different shapes. • Testing the strength of own structures. • Identifying the weakest part of a structure. • Evaluating the strength, stiffness and stability of own structure
KNOWLEDGE	• 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 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 lever	• 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 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 is any edible part of a plant	• To understand that the shape of a structure affects its strength. • To know that materials can be manipulated to improve strength and stiffness. • To know that a structure is something which has been formed or made from parts. • To know that a 'stable' structure is one which is firmly fixed and unlikely to change or move. • To know that a 'strong' structure is one which does not break easily. • To know that a 'stiff' structure or material is one which does not bend easily.
ADDITIONAL	• To know some real-life items that use wheels such as wheelbarrows, hamster wheels and vehicles.	• To know some real-life objects that contain mechanisms.			• To know that natural structures are those found in nature. • To know that man-made structures are those made by people.

DESIGN & TECHNOLOGY SUBSTANTIVE KNOWLEDGE AND SKILLS (Kapow Primary)

YEARS 3 & 4				
	COOKING AND NUTRITION - Eating Seasonally	**STRUCTURES** - Helmets	**ELECTRICAL SYSTEMS** - Torches	**TEXTILES** – Fastenings
DESIGN	• Describing how climate affects where foods grow.	• Creating simple design criteria that outline basic functionality and appeal to individual users or target audiences. • Noticing simple problems or needs in everyday life. • Developing drawing and sketching skills with a focus on clarity and simplicity.	• Designing a torch, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas.	• Writing design criteria for a product, articulating decisions made. • Designing a personalised book sleeve.
MAKE	• Identifying seasonal ingredients from the UK. • Following the instructions within a recipe. • Tasting seasonal ingredients. • Peeling foods by hand or with a peeler. • Cutting ingredients safely. • Choosing ingredients based on a design brief.	• Selecting materials, components or ingredients based on their form as well as their functional properties. • Explaining choices with regard to function and form. • Choosing shapes to suit the function of a product.	• Making a torch with a working electrical circuit and switch. • Using appropriate equipment to cut and attach materials. • Assembling a torch according to the design and success criteria.	• 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.
EVALUATE	• Describing the texture and flavour of ingredients. • Describing the benefits of seasonal fruits and vegetables and the impact on the environment.	• Evaluating designs by comparing them against design criteria. • Considering feedback from peers to suggest improvements. • Evaluating how effective the chosen materials were in fulfilling the design brief.	• Evaluating electrical products. • Testing and evaluating the success of a final product.	• Testing and evaluating an end product against the original design criteria. • 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.
KNOWLEDGE	• To know that seasonal means foods that grow in a given season in a given country. • To know some seasonal foods that grow in the UK and what season they grow in. • To know that eating seasonal foods can have a positive impact on the environment. • To know how to describe the flavour and texture of foods. • To know how to cut a peel safely. • To know that the appearance of food is as important as taste. • To know that similar coloured fruits and vegetables often have similar nutritional benefits.	• Strengthening structures by layering materials (lamination). • Strengthening structures by ribbing. • To know how some different structures are built. • To know that structures can be strengthened by manipulating materials and shapes. • To know a shell structure is a hollow shape with a thin outer layer.	• 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 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.
ADDITIONAL KNOWLEDGE		• To know form is the look and shape of something. • To know function is what something does and how it works. • To know that creating accurate shapes improves how they look and sometimes their function. • To know choices of materials and equipment can affect the final product.	• 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.	

DESIGN & TECHNOLOGY SUBSTANTIVE KNOWLEDGE AND SKILLS (Kapow Primary)

YEARS 5 & 6				
	ELECTRICAL SYSTEMS - Steady Hand Game	**TEXTILES -** Bags	**COOKING & NUTRITION -** Come Dine with Me	**STRUCTURES -** Playgrounds
DESIGN	• Designing a steady hand game - identifying and naming the components required. • Drawing a design from three different perspectives. • Generating ideas through sketching and discussion. • Modelling ideas through prototypes. • Understanding the purpose of products (toys), including what is meant by 'fit for purpose' and 'form over function'.	• Developing annotated sketches to communicate design ideas. • Creating pattern pieces to use in design.	• Writing a recipe, explaining the key steps, method and ingredients. • Including facts and drawings from research undertaken.	• Designing a playground featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs.
MAKE	• Constructing a 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.	• Using a ruler to accurately measure and draw lines and marks. • Using nets to create 3D objects	• 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.	• Building a range of play apparatus structures drawing upon new and prior knowledge of structures. • Measuring, marking and cutting wood to create a range of structures. • Using a range of materials to reinforce and add decoration to structures.
EVALUATE	• 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.	• Reflecting on the functionality and aesthetics of products. • Discussing reasons for design choices.	• 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 in productions. • Evaluating health and safety in production to minimise cross contamination.	• Improving a design plan based on peer evaluation. • Testing and adapting a design to improve it as it is developed. • Identifying what makes a successful structure.
KNOWLEDGE	• 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	• Using pins effectively to secure a template to fabric without creases or bulges. • Threading needles independently. • Tying knots at the end of thread to secure it. • Selecting textiles and buttons to improve aesthetics and function. • Attaching objects like buttons using thread.	• 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).	• To know that structures can be strengthened by manipulating materials and shapes.
ADDITIONAL KNOWLEDGE	• 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'.	• To know that nets can be folded to create 3D shapes. • To know that pattern pieces are like nets/templates. • To know how designers use pattern pieces when creating textiles products. • To know that products are sometimes made in parts that are sewn together. • To know that safety pins can hold fabric in place before sewing. • To know that there are different types of stitches. • To know what a running stitch is. • To know that aesthetics is how something looks. • To know that consistently sized stitches improve the aesthetic of a product. • To know that the shape of an object can affect both its aesthetics and function.		• 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.