

Design and Technology Curriculum

Year A - YEAR 1/2

	Autumn	Spring	Summer
DT focus	Structures	Textiles	Cooking and Nutrition
Key Skills and Techniques	Design Thinking about what others might want from a design. Beginning to recognise how products and designs in the world around us solve certain needs. Considering who they are designing for – identifying the user. Stating what they intend to make and why – identifying the purpose. Talking about ideas, with purpose and user in mind. Talking about existing products when generating ideas. Using basic drawing skills to communicate ideas. Make Choosing between a small number of materials, ingredients or components. Explaining their choices based on personal experiences. Requesting equipment appropriate to the purpose (e.g. scissors for cutting, glue for joining, etc.). Beginning to use objects with a fixed width or length to create even spacing of markings or cuts (e.g. a lolly stick). Refining their grip to cut competently and confidently. Cutting straight and evenly spaced lines. Beginning to cut large shapes and thicker materials like card. Evaluate Discussing existing products, saying what they like about them. Comparing two products and discussing which is better for a specific purpose. Saying what they like about their peers’ designs and products. Accepting feedback and understanding it is meant to improve their work. Technical knowledge Recognising that different structures are used for different purposes. Exploring the features of structures. Describing structures as buildings or freestanding structures. Making stable structures from card. Creating supporting structures to aid stability. Using stable objects like cylinders to create structures.	Designing a pouch. Selecting and cutting fabrics for sewing. Decorating a pouch using fabric glue or running stitch. Threading a needle. Sewing running stitch, with evenly spaced, neat, even stitches to join fabric. Neatly pinning and cutting fabric using a template. Troubleshooting scenarios posed by teacher. Evaluating the quality of the stitching on others’ work. Discussing as a class, the success of their stitching against the success criteria. Identifying aspects of their peers’ work that they particularly like and why.	Designing a healthy wrap based on a food combination which works well together. Slicing food safely using the bridge or claw grip. Constructing a wrap that meets a design brief. Describing the taste, texture and smell of fruit and vegetables. Taste testing food combinations and final products. Describing the information that should be included on a label. Evaluating which grip was most effective.
Key Knowledge	Design To know: The user is the person who will use the product. Different users may want different things from a design. Who they are designing for makes a difference to what they design. The purpose is what something is for. Existing products can help when deciding what to design. Drawings are a way to explain ideas.	To know that sewing is a method of joining fabric. To know that different stitches can be used when sewing. To understand the importance of tying a knot after sewing the final stitch. To know that a thimble can be used to protect my fingers when sewing.	To know that ‘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.

	Make To know: A plan is deciding what to do first and next. Different equipment does different things. Names of common pieces of equipment. Some tools are sharp like scissors and knives. Spacing cuts or marks evenly can be useful. Different glue can be used to join different things. Evaluate To know: Some products will be better than others. Their ideas or products can be made better. Their ideas can make someone else's work better. Other people's ideas can help make their work better. Technical knowledge To know: A structure is something that has been made and put together. Stable structures do not topple. Shapes and structures with wide, flat bases or legs are the most stable. Adding weight to the base of a structure can make it more stable.		To know that nutrients are substances in food that all living things need to make energy, grow and develop. To know that 'ingredients' means the items in a mixture or recipe. To know that I should only have a maximum of five teaspoons of sugar a day to stay healthy. To know that many food and drinks we do not expect to contain sugar do; we call these 'hidden sugars'.
Tasks	KAPOW: Stable Structures(Year 1)	KAPOW: Pouches (Year 2)	KAPOW: A Balanced Diet (Year 2)
Vocabulary	Base Better Compare Design Freestanding Stable Structure Unstable User Worse	decorate fabric fabric glue knot needle needle threader running stitch sew template thread	balanced diet balance carbohydrate dairy fruit ingredients oils sugar protein vegetable design criteria
Outcomes: Knowledge and Assessment	Pupils who are secure will be able to: ● Explain that structures are things that are built and have a purpose. ● Understand that structures with a wider base are more stable than ones with a narrow base. ● Explain that extra weight added to the base of a structure makes it more stable. ● Design a product for a particular user. ● Use a sketch to show ideas. ● Choose the best method for joining the parts of the product. ● Make evenly spaced cuts. ● Use scissors to cut out a shape neatly and accurately. ● Explain what they like and dislike about their final product.	Pupils who are secure will be able to: ● Sew a running stitch with regular-sized stitches and understand that both ends must be knotted. ● Prepare and cut fabric to make a pouch from a template. ● Use a running stitch to join the two pieces of fabric together. ● Decorate their pouch using the materials provided.	Pupils who are secure will be able to: ● Name the main food groups and identify foods that belong to each group. ● Describe the taste, texture and smell of a given food. ● Think of four different wrap ideas, considering flavour combinations. ● Construct a wrap that meets the design brief and their plan.

Year B YEAR 1/2

	Autumn	Spring	Summer
DT Focus	Structures	Mechanisms	Textiles
Key Skills and Techniques	Generating and communicating ideas using sketching and modelling. Learning about different types of structures, found in the natural world and in everyday objects. Making a structure according to design criteria. Creating joints and structures from paper/card and tape. Building a strong and stiff structure by folding paper. Exploring the features of structures. Comparing the stability of different shapes. Testing the strength of their own structures. Identifying the weakest part of a structure. Evaluating the strength, stiffness and stability of their own structure.	Creating a design criteria for a moving monster as a class. Designing a moving monster for a specific audience in accordance with a design criteria. Making linkages using card for levers and split pins for pivots. Experimenting with linkages adjusting the widths, lengths and thicknesses of card used. Cutting and assembling components neatly. Evaluating own designs against design criteria. Using peer feedback to modify a final design.	Using a template to create a design for a puppet. Cutting fabric neatly with scissors. Using joining methods to decorate a puppet. Sequencing steps for construction. Reflecting on a finished product, explaining likes and dislikes.
Key Knowledge	To know that shapes and structures with wide, flat bases or legs are the most stable. To understand that the shape of a structure affects its strength. To know that materials can be manipulated to improve strength and stiffness. To know that a structure is something which has been formed or made from parts. To know that a 'stable' structure is one which is firmly fixed and unlikely to change or move. To know that a 'strong' structure is one which does not break easily. To know that a 'stiff' structure or material is one which does not bend easily.	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 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 '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.
Suggested tasks	KAPOW: Build Baby Bear's Chair (Year 2)	KAPOW: Make a Moving Monster (Year 2)	KAPOW: Puppets (Year 1)
Vocabulary	design criteria man-made natural properties structure stable shape model test	axle design criteria input linkage mechanical output pivot wheel	decorate design fabric glue model hand puppet safety pin staple stencil template

Outcomes: Knowledge and Assessment	Pupils who are secure will be able to: - 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.	Pupils who are secure will be able to: - Identify the correct terms for levers, linkages and pivots. - Analyse popular toys with the correct terminology. - Create functional linkages that produce the desired input and output motions. - Design monsters suitable for children, which satisfy most of the design criteria. - Evaluate their two designs against the design criteria, using this information and the feedback of their peers to choose their best design. - Select and assemble materials to create their planned monster features. - Assemble the monster to their linkages without affecting their functionality.	Pupils who are secure will be able to: - 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.
---	--	--	---

Year A - YEAR 3/4

	Autumn	Spring	Summer
DT focus	Structures	Cooking and Nutrition	Textiles
Key Skills and Techniques	Designing a castle with key features to appeal to a specific person/purpose. Drawing and labelling a castle design using 2D shapes. Designing and/or decorating a castle tower on CAD software. Constructing a range of 3D geometric shapes using nets. Creating special features for individual designs. Making facades from a range of recycled materials. Evaluating own work and the work of others based on the aesthetic of the finished product and in comparison to the original design. Suggesting points for modification of the individual designs.	Creating a healthy and nutritious recipe for a savoury tart 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 to help test and review dishes. Describing the benefits of seasonal fruits and vegetables and the impact on the environment. Suggesting points for improvement when making a seasonal tart.	Writing design criteria for a product, articulating decisions made. Designing a personalised book sleeve. Making and testing a paper template with accuracy and in keeping with the design criteria. Measuring, marking and cutting fabric using a paper template. Selecting a stitch style to join fabric. Sewing neatly using small regular stitches. Incorporating a fastening to a design. Testing and evaluating an end product against the original design criteria.
Key Knowledge	To understand that wide and flat based objects are more stable. To understand the importance of strength and stiffness in structures. To know the following features of a castle: flags, towers, battlements, turrets, curtain walls, moat, drawbridge and gatehouse – and their purpose. To know that a façade is the front of a structure. To understand that a castle needed to be strong and stable to withstand enemy attack.	To know that not all fruits and vegetables can be grown in the UK. To know that climate affects food growth. To know that vegetables and fruit grow in certain seasons. To know that cooking instructions are known as a 'recipe'. To know that imported food is food that has been brought into the country.	To know that a fastening is something that holds two pieces of material together. 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.
Suggested tasks	KAPOW: Constructing a Castle (Year 3)	KAPOW: Eating Seasonally (Year 3)	KAPOW: Fastenings (Year 4)
Vocabulary	2D 3D castle design key features net	climate diet imported ingredients natural processed	Criteria Fabric Fastening Fix Mock-up Stitch

	scoring shape stable stiff strong structure tab	reared recipe seasonal seasons sugar	Template
Outcomes: Knowledge and Assessment	Pupils who are secure will be able to: • Draw and label a simple castle that includes the most common features. • Recognise that a castle is made up of multiple 3D shapes. • Design a castle with key features which satisfy a given purpose. • Score or cut along lines on the net of a 2D shape. • Use glue to securely assemble geometric shapes. • Utilise skills to build a complex structure from simple geometric shapes. • Evaluate their work by answering simple questions.	Pupils who are secure will be able to: • Explain that fruits and vegetables grow in different countries based on their climates. • Understand that 'seasonal' fruits and vegetables are those that grow in a given season and taste best then. • Know that eating seasonal fruit and vegetables has a positive effect on the environment. • Design their own tart recipe using seasonal ingredients. • Understand the basic rules of food hygiene and safety. • Follow the instructions within a recipe.	Pupils who are secure will be able to: • 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.

Year B - YEAR 3/4

	Autumn	Spring	Summer
DT focus	Digital World	Electrical Systems	Mechanical Systems
Key Skills and Techniques	Problem solving by suggesting potential features on a Micro:bit and justifying my ideas. Developing design ideas for a technology pouch. Drawing and manipulating 2D shapes, using computer-aided design, to produce a point of sale badge.	Designing a torch, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas. Making a torch with a working electrical circuit and switch. Using appropriate equipment to cut and attach materials.	<u>Design</u> Taking part in structured idea generation sessions. Developing drawing and sketching skills with a focus on clarity and simplicity.

	Using a template when cutting and assembling the pouch. Following a list of design requirements. Selecting and using the appropriate tools and equipment for cutting, joining, shaping and decorating a foam pouch. Applying functional features such as using foam to create soft buttons. Analysing and evaluating an existing product. Identifying the key features of a pouch.	Assembling a torch according to the design and success criteria. Evaluating electrical products. Testing and evaluating the success of a final product.	Beginning to recognise the benefit of a range of diagram types or prototypes to communicate ideas. (e.g. sketches, cross-sectional diagrams, thumbnail sketches and exploded diagrams). Creating prototypes using materials with similar properties to their final design. Creating simple design criteria that outline basic functionality and appeal to individual users or target audiences. Developing designs by adding details and justifications about materials, tools and methods. <u>Make</u> Following detailed safety instructions. Using a ruler as a measuring tool with increasing accuracy by creating spaced marks using millimetres and measuring lengths of objects. Handle different sizes and types of scissors with confidence. With close supervision, using a hot glue gun to join wooden materials (e.g. lolly sticks). Selecting equipment required for a series of tasks based on the plan and explaining why each piece is suitable for each stage. <u>Evaluate</u> Explaining why they think certain aspects of a peer's design are effective or why they suggested specific improvements. Reflecting on feedback to decide if and how it could be used to improve future iterations. Investigating and analysing a range of existing products by looking at their functionality and appeal. Analysing why specific products, designers or inventors are successful. Evaluating their designs by comparing them against design criteria and considering feedback from peers to suggest improvements. Evaluating how effective their chosen materials and tools were in fulfilling the design brief.
Key Knowledge	To understand that in programming a 'loop' is code that repeats something again and again until stopped. To know that a Micro:bit is a pocket-sized, codeable computer. Writing a program to control (button press) and/or monitor (sense light) that will initiate a flashing LED algorithm.	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.	<u>Design</u> To know: Extra information on drawings or diagrams can help the user understand a design or idea. An exploded diagram shows how the parts of a product fit together. A prototype is a detailed model that helps users understand how a product will work. A problem or need is something that a designer can help to solve. A target audience is a group of people that might like the idea. <u>Make</u> To know: Different tools and equipment have different dangers. A ruler can be used to measure length. Scissors are useful for cutting out complex shapes. A hot glue gun can be used to join materials. Different pieces of equipment will be used at different stages in a plan. <u>Evaluate</u> To know: The better the suggestions, the better the feedback. They can choose to use feedback or not.

			Some products are more successful than others because of their function. Designers and inventors create products. Choices of materials and equipment can affect the final product. Feedback is ideas and suggestions from other people that can help improve their work. Technical To know: A mechanical system can allow us to move something more easily. Mechanical systems have more than one mechanism that moves to make them work. Mechanical systems are often hidden in products to make them look more appealing.
Suggested tasks	KAPOW: Electronic Charms (Year 3)	KAPOW: Torches (Year 4)	KAPOW: Mechanical Cars (Year 4)
Vocabulary	smart wearables product design digital revolution technology analogue digital feature function digital world Micro:bit electronic products program loops initiate simulator control monitor sense template develop fasten test user CAD (computer-aided design) point of sale display badge stand net design requirements layers	battery bulb buzzer conductor circuit circuit diagram electricity insulator series circuit switch component design design criteria diagram evaluation LED model shape target audience input recyclable theme aesthetics assemble equipment ingredients packaging properties sketch test	Chassis Bearing Force Machine Mechanism air resistance Prototype Target Audience

Outcomes: Knowledge and Assessment	Pupils who are secure will be able to: • Give a brief explanation of the digital revolution and/or remember key examples. • Suggest a feature from the Micro:bit that is suitable for an eCharm. • Write a program that initiates a flashing LED panel, or another pattern, on the Micro:bit when a button is pressed. • Identify errors, if testing is unsuccessful, by comparing their code to a correct example. • Explain the basic functionality of their finished program. • Suggest key features for a pouch, with some consideration for the overall theme and the user. • Use a template when cutting and assembling a pouch, with some support. • Describe what is meant by 'point of sale display' with an example. • Follow basic design requirements using computer-aided design, drawing at least one shape with a text box and bright colours, following a demonstration. • Evaluate their design.	Pupils who are secure will be able to: • 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.	Pupils who are secure will be able to: • Describe key design improvements in the history of the automobile. • Measure and compare the distance travelled by different mechanical cars. • Choose and use appropriate tools and materials to make mechanical cars. • Draw exploded diagrams and annotated sketches of my different mechanical cars. • Use a problem statement to identify the design criteria. • Assess the product against the design criteria. • Conduct market research into existing products. • Provide specific feedback and adjust my design to incorporate customer feedback.
---	---	--	---

Year A - YEAR 5/6

	Autumn	Spring	Summer
DT focus	Cooking and Nutrition	Textiles	Digital World
Key Skills and Techniques	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.	<u>Design</u> Developing annotated sketches to communicate design ideas. Creating pattern pieces to use in design. <u>Make</u> Using a ruler to accurately measure and draw lines and marks. Using nets to create 3D objects.	Writing a design brief from information submitted by a client. Developing design criteria to fulfil the client's request. Developing a product idea through annotated sketches. Placing and manoeuvring 3D objects, using CAD.

	Cutting and preparing recipes safely. Using equipment safely, including knives, hot pans and hobs. Knowing how to avoid cross-contamination. Following a step-by-step method carefully to make a recipe. Identifying the nutritional differences between different products and recipes. Identifying and describing healthy benefits of food groups.	<u>Evaluate</u> Reflecting on the functionality and aesthetics of products. Discussing reasons for design choices. <u>Technical knowledge</u> 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.	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 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. 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.
Key Knowledge	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 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.	<u>Design:</u> To know: How designers use pattern pieces when creating textile products. Pattern pieces are like nets/templates. <u>Make</u> To know: Nets can be folded to create 3D shapes. Products are sometimes made in parts that are sewn together. Safety pins can hold fabric in place before sewing. <u>Evaluate</u> To know: Consistently sized stitches improve the aesthetic of a product. The shape of an object can affect both its aesthetics and function. <u>Technical knowledge</u> To know: There are different types of stitches. What a running stitch is. Aesthetics is how something looks.	To know that accelerometers can detect movement. To understand that sensors can be useful in products as they mean the product can function without human input. To know that designers write design briefs and develop design criteria to enable them to fulfil a client’s request. To know that ‘multifunctional’ means an object or product has more than one function. To know that magnetometers are devices that measure the Earth’s magnetic field to determine which direction you are facing.
Suggested tasks	KAPOW: What could be healthier? (Year 5)	KAPOW: Bags (Year 6)	KAPOW: Navigating the World (Year 6)
Vocabulary	beef reared processed ethical diet ingredients supermarket farm balanced	Innovate Pattern piece Seam allowance	smart smartphone equipment navigation cardinal compass application (apps) pedometer GPS tracker design brief design criteria client function program duplicate replica loop variable

			value if statement boolean corrode mouldable lightweight sustainable design environmentally friendly biodegradable recyclable product lifecycle product lifespan
Outcomes: DT and Design Knowledge and Assessment	Pupils who are secure will be able to: - Understand how beef gets from the farm to our plates. - Present a subject as a poster with clear information in an easy to read format. - Contribute ideas as to what a ‘healthy meal’ means. - Notice the nutritional differences between different products and recipes. - Recognise nutritional differences between two similar recipes and give some justification as to why this is. - Work as a team to amend a bolognese recipe with healthy adaptations. - Follow a recipe to produce a healthy bolognese sauce. - Design packaging that promotes the ingredients of the bolognese.	Pupils who are secure will be able to: - 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.	Pupils who are secure will be able to: - Incorporate key information from a client’s design request such as ‘multifunctional’ and ‘compact’ in their design brief. - Write a program that displays an arrow to indicate cardinal compass directions with an ‘On start’ loading screen. - Identify errors (bugs) in the code and suggest ways to fix (debug) them. - Self and peer evaluate a product concept against a list of design criteria with basic statements. - Identify key industries that use 3D CAD modelling and why. - Recall and describe the name and use of key tools used in Tinkercad (CAD) software. - Combine more than one object to develop a finished 3D CAD model in Tinkercad. - Complete a product pitch plan that includes key information.

Year B - YEAR 5/6

	Autumn	Spring	Summer
DT focus	Mechanical Systems	Structures	Electrical Systems
Key Skills and Techniques	<u>Design</u> Noticing wider-reaching problems or needs in the community. Identifying a wide range of needs and potential barriers through market research. Writing more complex problem statements that consider multiple factors and constraints. Creating more complex design criteria that require considering detailed user needs, environmental impact, materials and cost. Coming up with a broader range of ideas and deeper innovation, requiring pupils to think critically about their ideas’ practicality and originality.	Designing a playground featuring a variety of different structures, giving consideration to how the structures will be used. Considering effective and ineffective designs. Building a range of play apparatus structures drawing upon new and prior knowledge of structures. Measuring, marking and cutting wood to create a range of structures. Using a range of materials to reinforce and add decoration to structures. Improving a design plan based on peer evaluation. Testing and adapting a design to improve it as it is developed. Identifying what makes a successful structure.	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’. Constructing a stable base for a game. Accurately cutting, folding and assembling a net. Decorating the base of the game to a high-quality finish. Making and testing a circuit. Incorporating a circuit into a base. Testing their own and others’ finished games, identifying what went well and making suggestions for improvement.

	Beginning to use more complex annotated sketches, such as cross-sectional and exploded diagrams and pattern pieces in design. Using a series of prototypes to refine and improve their designs. <u>Make</u> Consistently apply safety instructions. Select appropriate scissors to handle delicate cutting tasks and challenging materials. Cutting patterns and drawings accurately. In supervised groups, using hot glue guns safely. Recognising that hot glue is useful for joining materials that need a strong bond that sets quickly. Choosing PVA glue over hot glue for its safety when joining materials in less intensive projects. <u>Evaluate</u> Reflecting on the usability, aesthetics, innovation and sustainability of products and discussing how design choices impact these aspects. Assessing their designs against a more complex set of design criteria that includes functionality, aesthetics, user experience, sustainability and cost. Considering alternative materials, tools or techniques that could enhance the product. Providing feedback that is helpful, specific, and encouraging. Incorporating feedback from peers or users to improve their product further, explaining the changes they made and the impact they had.		Gathering images and information about existing children's toys. Analysing a selection of existing children's toys.
Key Knowledge	To know: Mechanical systems that use gears in everyday objects (e.g. bicycle, clock, etc.). Gears and pulleys allow us to transfer movement and force from one part of a mechanical system to another. Gears allow us to increase the output of a mechanism. Market research is a way of collecting information about problems or needs. Constraints are things that might stop our ideas from being successful. Original and innovative ideas are different from what has been made before. Annotations are detailed labels and comments on diagrams. Risks are things that might happen. Hot glue creates a strong bond quickly. It is often better to choose safer equipment. Sustainability means thinking about the materials that were used to make a product and how the product was made. Their final product can still be improved by different materials or techniques. Evaluating their designs in detail will help them understand their successful and less successful parts. Feedback should be positive, helpful and specific.	To know that structures can be strengthened by manipulating materials and shapes. To understand what a 'footprint plan' is. To understand that in the real world, design can impact users in positive and negative ways. To know that a prototype is a cheap model to test a design idea.	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'.

	That explaining how they used feedback to improve their design can help them create better products in the future.		
Suggested tasks	KAPOW: Gears and Pulleys (Year 5)	KAPOW: Playgrounds (Year 6)	KAPOW: Steady Hand Game (Year 6)
Vocabulary	Annotate Axle Force Gear Gear system Input Machine Market research Mechanism Output Problem statement Pulley Pulley system Renewable energy Research Sustainability Teeth	apparatus design criteria equipment playground landscape features cladding	assemble battery battery pack benefit bulb bulb holder buzzer circuit circuit symbol component conductor copper design design criteria evaluation fine motor skills fit for purpose form function gross motor skills insulator LED user
Outcomes: Knowledge and Assessment	Pupils who are secure will be able to: ● Give examples of machines that use gears and/or pulleys. ● Describe how gears and pulleys work and their purpose. ● Design and make a gear and pulley system. ● Write a problem statement. ● Write questions for market research, provide feedback and research market competitors. ● Write and use a design brief to guide design. ● Evaluate a product against a set of design criteria, provide useful feedback and incorporate changes. ● Draw and annotate an eco-gadget bike design.	Pupils who are secure will be able to: ● 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.	Pupils who are secure will be able to: ● 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.