Design and Technology Knowledge and Skills Progression - Alton Park Junior School

Intent:

By the end of Year 6, pupils at Alton Park Junior School will:

Aspiration – have a positive attitude towards design and technology and understand its importance in everyday life;

Learning - have been provided with a range of real and relevant contexts for learning that relate to everyday life. They will know how to use a range of tools, resources and materials to create effectively constructed results;

Tenacity - be creative and resourceful problem solvers, with the knowledge and vocabulary that assists them in the building of confidence, resilience and practical and analytical skills;

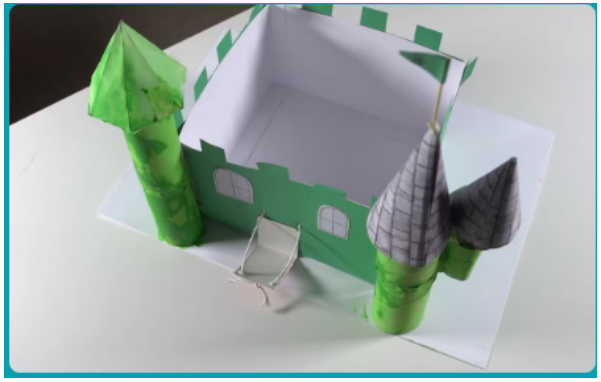
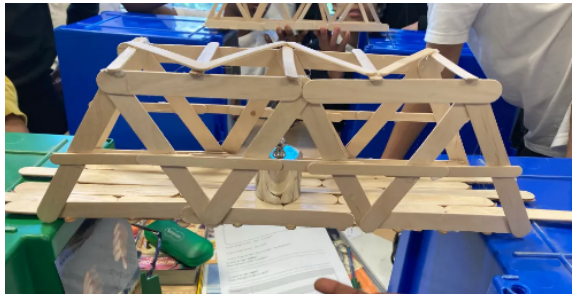
Opportunity - have been inspired by a range of engineers, designers, chefs and architects and recognise potential career paths;

Nurture - succeed and enjoy design and technology and acquire the skills necessary to support their future needs.

Structures

	Year 3	**Year 5**
Context:	**Castles** (Pre teach- Baby Bear's chair)	**Bridges** (pre teach-Pavilions)
Skills: Design	• Designing a castle with key features to appeal to a specific person/purpose. • Drawing and labelling a castle design using 2D shapes, labelling: -the 3D shapes that will create the features - materials needed and colours. • Designing and/or decorating a castle tower on CAD software.	• Designing a stable structure that is able to support weight. • Creating a frame structure with a focus on triangulation.
Skills: Make	• Constructing a range of 3D geometric shapes using nets. • Creating special features for individual designs. • Making facades from a range of recycled materials.	• Making a range of different shaped beam bridges. • Using triangles to create truss bridges that span a given distance and support a load. • Building a wooden bridge structure. • Independently measuring and marking wood accurately. • Selecting appropriate tools and equipment for particular tasks. • Using the correct techniques to saws safely. • Identifying where a structure needs reinforcement and using card corners for support. • Explaining why selecting appropriating materials is an important part of the design process. • Understanding basic wood functional properties.

Skills: Evaluate	• 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.	• Adapting and improving own bridge structure by identifying points of weakness and reinforcing them as necessary. • Suggesting points for improvements for own bridges and those designed by others.
Knowledge: Technical	• To understand that wide and flat based objects are more stable. • To understand the importance of strength and stiffness in structures.	• To understand some different ways to reinforce structures. • To understand how triangles can be used to reinforce bridges. • To know that properties are words that describe the form and function of materials. • To understand why material selection is important based on properties. • To understand the material (functional and aesthetic) properties of wood.
Knowledge: Additional	• To know the following features of a castle: flags, towers, battlements, turrets, curtain walls, moat, drawbridge and gatehouse - and their purpose. • To know that a façade is the front of a structure. • To understand that a castle needed to be strong and stable to withstand enemy attack. • To know that a paper net is a flat 2D shape that can become a 3D shape once assembled. • To know that a design specification is a list of success criteria for a product.	• To understand the difference between arch, beam, truss and suspension bridges. • To understand how to carry and use a saw safely.
Vocabulary	2-D, 3-D, castle, design, key features, net, scoring, shape, stable, stiff, strong, structure, tab	beam bridge, arch bridge, truss bridge, strength, technique, corrugation,

		lamination, stiffness, rigid, factors, stability, visual appeal, aesthetics, joints, mark out, hardwood, softwood, wood file/rasp, sandpaper/glass paper, bench hook/vice, tenon saw/coping saw, assemble, material properties, reinforce, wood sourcing, evaluate, quality of finish, accuracy
Exemplar		

Textiles

	Year 3	**Year 5**
Context:	Make a cushion (pre teach- pouches)	To make a stuffed toy (pre teach- textiles fastenings)
Skills: Design	• Designing and making a template from an existing cushion and applying individual design criteria.	• Designing a stuffed toy, considering the main component shapes required and creating an appropriate template. • Considering the proportions of individual components.
Skills: Make	• Following design criteria to create a cushion or Egyptian collar. • Selecting and cutting fabrics with ease using fabric scissors. • Threading needles with greater independence. • Tying knots with greater independence. • Sewing cross stitch to join fabric. • Decorating fabric using appliqué. • Completing design ideas with stuffing and sewing the edges (Cushions)	• Using a template when cutting fabric to ensure they achieve the correct shape. • Using pins effectively to secure a template to fabric without creases or bulges. • Marking and cutting fabric accurately, in accordance with their design. • Sewing a strong running stitch, making small, neat stitches and following the edge. • Tying strong knots. • Decorating a waistcoat, attaching features (such as appliqué) using thread. • Finishing the waistcoat with a secure fastening (such as buttons). • Learning different decorative stitches. • Sewing accurately with evenly spaced, neat stitches.
Skills: Evaluate	• Evaluating an end product and thinking of other ways in which to create similar items.	• Reflecting on their work continually throughout the design, make and evaluate process

Knowledge: Additional	•To know that applique is a way of mending or decorating a textile by applying smaller pieces of fabric to larger pieces. •To know that when two edges of fabric have been joined together it is called a seam. •To know that it is important to leave space on the fabric for the seam. •To understand that some products are turned inside out after sewing so the stitching is hidden.	• To 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.
Vocabulary	Applique, cross-stitch, design, equipment, fabric, patch, running stitch, thread, seam, texture, knot	Accurate, annotate, appendage, blanket-stitch, design criteria, detail, evaluation, fabric, sew, shape, stuffed toy, stuffing, template
Exemplar		

Electrical

	Year 4	**Year 6**
Context:	Torches (pre teach- electrical poster)	Electrical handheld game (pre teach- doodlers)
Skills: Design	• Designing a torch, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas.	• 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'.
Skills: Make	• 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.	• 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.
Skills: Evaluate	• Evaluating electrical products. • Testing and evaluating the success of a final product.	• 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.
Knowledge: Technical	• To understand that electrical conductors are	• To know that batteries contain acid, which can

	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 ci	be dangerous if they leak. • To know the names of the components in a basic series circuit, including a buzzer.
<u>Knowledge: Additional</u>	• To know the features of a torch: case, contacts, batteries, switch, reflector, lamp, lens. • To know facts from the history and invention of the electric light bulb(s) - by Sir Joseph Swan and Thomas Edison.	•To know that ‘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'.

Vocabulary	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	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
Exemplar		

Mechanical

	Year 4	**Year 6**
Context:	Sling shot chariot (pre teach- Pneumatic toys	Automata toy (pre teach- pop up book)
Skills: Design	• Designing a shape that reduces air resistance. • Drawing a net to create a structure from. • Choosing shapes that increase or decrease speed as a result of air resistance. • Personalising a design.	•Experimenting with a range of cams, creating a design for an automata toy based on a choice of cam to create a desired movement. • Understanding how linkages change the direction of a force. • Making things move at the same time. • Understanding and drawing cross-sectional diagrams to show the inner-workings of my design.
Skills: Make	• Measuring, marking, cutting and assembling with increasing accuracy. • Making a model based on a chosen design.	• Measuring, marking and checking the accuracy of the jelutong and dowel pieces required. • Measuring, marking and cutting components accurately using a ruler and scissors. • Assembling components accurately to make a stable frame. • Understanding that for the frame to function effectively the components must be cut accurately and the joints of the frame secured at right angles. • Selecting appropriate materials based on the materials being joined and the speed at which the glue needs to dry/set.
Skills: Evaluate	• Evaluating the speed of a final product based	• Evaluating the work of others and receiving

	on: the effect of shape on speed and the accuracy of workmanship on performance.	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.
Knowledge: Technical	• To understand that all moving things have kinetic energy. • To understand that kinetic energy is the energy that something (object/person) has by being in motion. • To know that air resistance is the level of drag on an object as it is forced through the air. • To understand that the shape of a moving object will affect how it moves due to air resistance.	• To understand that the mechanism in an automata uses a system of cams, axles and followers. • To understand that different shaped cams produce different output
Knowledge: Additional	• To understand that products change and evolve over time. • To know that aesthetics means how an object or product looks in design and technology. • To know that a template is a stencil you can use to help you draw the same shape accurately. • To know that a birds-eye view means a view from a high angle (as if a bird in flight). • To know that graphics are images which are designed to explain or advertise something. •To know that it is important to assess and evaluate design ideas and models against a list of design criteria.	• 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.

Vocabulary	chassis, energy, kinetic, mechanism, air resistance, design, structure, graphics, research, model, template	Accurate, assembly-diagram, automata, Axle, bench hook, cam, clamp,component, cutting list, diagram, dowel, drill bits, exploded-diagram, finish, follower, frame, function hand drill, jelutong, linkage, mark out, measure, mechanism, model, research, right-angle, set square, tenon saw
Exemplar	**Picture to follow** 	

Cooking and Nutrition

	Year 3	**Year 4**	**Year 5**	**Year 6**
Context:	Eating seasonally (Pre teach- balanced diet)	Adapting a recipe (pre teach- recap eating seasonally)	What could be healthier (Pre teach- adapting a recipe)	Rationing recipe related WW2 topic (pre teach- what makes a good recipe)
Skills: Design	• Creating a healthy and nutritious recipe for a savoury tart using seasonal ingredients, considering the taste, texture, smell and appearance of the dish.	• Designing a biscuit within a given budget, drawing upon previous taste testing judgements.	• 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.	• Writing a recipe, explaining the key steps, method and ingredients. • Including facts and drawings from research undertaken.
Skills: Make	• Knowing how to prepare themselves and a work space to cook safely in, learning the basic rules to avoid food contamination. • Following the instructions within a recipe.	• Following a baking recipe, from start to finish, including the preparation of ingredients. • Cooking safely, following basic hygiene rules. • Adapting a recipe to improve it or change it to meet new criteria (e.g. from savoury to sweet).	Cutting and preparing vegetables safely. • Using equipment safely, including knives, hot pans and hobs. • Knowing how to avoid cross-contamination. • Following a step by step method carefully to make a recipe.	• 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.

Skills: Evaluate	• 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.	• Evaluating a recipe, considering: taste, smell, texture and appearance. • Describing the impact of the budget on the selection of ingredients. • Evaluating and comparing a range of food products. • Suggesting modifications to a recipe (e.g. This biscuit has too many raisins, and it is falling apart, so next time I will use less raisins).	• Identifying the nutritional differences between different products and recipes. • Identifying and describing healthy benefits of food groups.	• Evaluating a recipe, considering: taste, smell, texture and origin of the food group. • Taste testing and scoring final products. • Suggesting and writing up points of improvements when scoring others' dishes, and when evaluating their own throughout the planning, preparation and cooking process. • Evaluating health and safety in production to minimise cross contamination.
Knowledge: Additional	• To know that not all fruits and vegetables can be grown in the UK. • To know that climate affects food growth. • To know that vegetables and fruit grow in certain seasons. • To know that cooking instructions are known as a 'recipe'. • To know that imported food is food which has been brought into the country. • To know that exported food is food which has been sent to another country.. • To understand that imported foods travel from far away and this can	• To know that the amount of an ingredient in a recipe is known as the 'quantity.' • To know that it is important to use oven gloves when removing hot food from an oven. • To know the following cooking techniques: sieving, creaming, rubbing method, cooling. •To understand the importance of budgeting while planning ingredients for biscuits.	• To understand where meat comes from - learning that beef is from cattle and how beef is reared and processed, including key welfare issues. • To know that I can adapt a recipe to make it healthier by 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 bacteria and germs have been passed onto ready-to-eat foods and it	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).

	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.		happens when these foods mix with raw meat or unclean objects.	
<u>Vocabulary</u>	Appearance, arid, climate, complementary, country, cut, design, evaluate, export, fruit, grate, import, ingredients, Mediterranean, mock-up, mountain, peel, polar, seasonal, seasons, snip, taste temperate, texture, tropical, vegetable, weather	Adapt, addition, appearance, budget, buttery, combine, comment, compare, construct, cream, crunchy, cuboid, cut, design, evaluate, fold, hygiene, ingredients, layout, market research, modify, multiplication, opinion, pounds, sieve, sift, targe audience, taste, texture, unique, wooden spoon	Abattoir, adaptation, balanced beef, brand, cook, cross-contamination, cut, design, enhance, equipment, evaluate, far, grate, hygiene, ingredients, label, measure, nutrient, nutrition, nutritional value, preference, press, process, recipe, safety, theme	Bitter, cookbook, cross-contamination, equipment, farm to fork, flavours, ingredients method, research, recipe, preparation, salty, sour, sweet

Exemplar