Ash Grove Academy Design Technology Curriculum

Our Year 1 ***Design Technology curriculum*** *builds directly on the learning undertaken in the* ***EYFS Expressive Arts and Design early learning goal****. During their time in early years, children will have used and explored a variety of materials, tools and techniques which allow them to experiment with design, texture, form and function. They will have engaged with designing, making and evaluating in a way that develops their cutting and joining techniques, as well as their ability to modify and adapt their work. These skills, knowledge and experiences underpin the learning that takes place in Year 1 and across the KS1 and KS2 curriculum.*

	Autumn Term	Spring Term	Summer Term
Year 1	**Textiles – Weaving** *National Curriculum objectives*: *Explore and evaluate a range of existing products* *Design purposeful, functional, appealing products for themselves and other users based on design criteria* *Generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology* *Select from and use a range of tools and equipment to perform practical tasks* *Select from and use a wide range of materials and components according to their characteristics* *Evaluate their ideas and products against design criteria* **Explore** Vocab to introduce and use with the children: *design*, *weave/weaving, evaluate* Children evaluate a range of woven products on the market that have been created using a large weave (eg shopping bag/baskets, place mats, wicker or recycled paper products) Discuss how they have been made – can the children see the 'over/under' pattern? **Develop ideas** - Skills lesson: introduce and practise the technique of 'over/under' weaving.	**Mechanical Systems - Linkages** *National Curriculum objectives*: *Explore and evaluate a range of existing products* *Design purposeful, functional, appealing products for themselves and other users based on design criteria* *Generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology* *Select from and use a range of tools and equipment to perform practical tasks* *Select from and use a wide range of materials and components according to their characteristics* *Evaluate their ideas and products against design criteria* ***Technical knowledge****: explore and use mechanisms in their product* **Explore** Vocab to introduce and use with the children: *mechanism, link/linkage, pivot* Provide children with a range of pre-made linkages that use both fixed and moving pivots. Children investigate the effect of pushing and pulling the linkage and the related output/ movement.	**Food Technology – fruit salad** *National Curriculum objectives*: *Use the basic principles of a healthy and varied diet to prepare dishes* *Understand where food comes from.* *Design appealing food products for themselves and other users based on design criteria* *Generate, develop, model and communicate their ideas through talking and drawing* *Select from and use a range of tools and equipment to perform practical tasks* *Select from and use a range of ingredients according to their characteristics* *Evaluate their ideas and products against design criteria* *** peeling** *** chopping** *** slicing** **Health and Nutrition** Vocab to introduce and use with the children: *fruit, ripe, peel, slice, chop* - Using a selection of food products/pictures, sort into fruit/not fruit - Explore and develop understanding of the 'balanced plate' in terms of food groups and quantities, zooming in on fruit and vegetables - Establish that we should eat 5 portions of fruit and veg every day as part of a healthy and varied diet.

	- Practise weaving using a selection of materials: eg strips of paper, strips of card, strips of fabric, strips of plastic, lengths of wool - Practise cutting, joining, finishing techniques - Take feedback – strengths and drawbacks of each material. **Design** Children design a placemat – Establish design criteria: consider size, shape, material (based on previous exploration), colour choices (aesthetically appealing) Draw and colour their design and label with chosen material. **Make** Make their woven placemat according to their design criteria, selecting appropriate tools, equipment and material. **Evaluate** Evaluate their finished product against their design (criteria and labelled drawing) - consider aesthetics and purpose - size, shape, material, colour choices - consider joining and finishing techniques and the effect on the finished product	Collectively explore ideas for images that could be put on the end (output) of the linkage – eg waving hand, rabbit hopping etc **Develop ideas** - Skills lesson – use strips of paper and split pins to practise creating their own simple linkages that give a range of movement output. - Experiment with a range of materials to explore strength and durability of the link, as well as ways to puncture material to position the split pin. - Take feedback – strengths and drawbacks of each material/method/linkage **Design** Children design a greetings card that incorporates a linkage - Establish a design criteria: consider which linkage will be used, what material will be used (based on previous exploration) and what the image on the end of the linkage will be. Draw, colour and label their design. **Make** Make their greetings card according to their design criteria: Create background without linkage image. Add slit to main image to incorporate linkage. Create linkage with moving image at one end. Add linkage to main image. Add to front of folded card. **Evaluate** Evaluate their greetings card against their design (criteria and labelled drawing) - consider aesthetics (does it look good) and purpose (does the linkage work effectively; if not, why not?)	- Zoom back into fruits – discuss and explore those that grow on trees and those that grow on bushes or runners. Also discuss those that grow in Britain and those that grow abroad, exploring reasons for this (eg temperature, hours of sunshine) **Develop ideas** Provide children with a selection of fruits: - explore using senses - colour, shape, texture, flavour - explore preparation – discuss the need to wash fresh produce, discuss those that need peeling, those that need stems removing etc - practise methods of cutting: slicing, chopping **Design** Children create a list of ingredients for their fruit salad based on their previous exploratory work, justifying their choices in terms of colour and shape (presentation), texture and flavour (taste). Children to draw a labelled exploded diagram of their fruit salad. **Make** Make their fruit salad according to their chosen list of ingredients. **Evaluate** Evaluate their fruit salad against their design - consider presentation (does it look good) and taste (do the flavours and textures work together? Is it sweet/juicy/dry etc?) Include any adaptations ie swapping out one fruit for another to improve presentation or taste.

	Autumn Term	Spring Term	Summer Term
Year 2	**Structures – Marble Run** *National Curriculum objectives*: *Explore and evaluate a range of existing products* *Design purposeful, functional, appealing products for themselves and other users based on design criteria* *Generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology* *Select from and use a range of tools and equipment to perform practical tasks* *Select from and use a wide range of materials and components according to their characteristics* *Evaluate their ideas and products against design criteria* ***Technical knowledge**: build structures, exploring how they can be made stronger, stiffer and more stable* **Explore** Vocab to introduce and use with the children: *structure, chute, stable/stability, prototype* Children build a marble run that is already on the market and evaluate it by exploring and discussing the materials used, the shape of the chutes, the purpose of different components, any extra features etc Encourage children to notice the angle of the run and what happens if it is flat and not tilted. **Develop ideas** - In pairs/small groups, use marbles to explore a range of materials of varying strengths and thicknesses. Can they make a prototype chute that allows their marble to roll?	**Mechanical Systems – Moving Vehicles** *National Curriculum objectives*: *Explore and evaluate a range of existing products* *Design purposeful, functional, appealing products for themselves and other users based on design criteria* *Generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology* *Select from and use a range of tools and equipment to perform practical tasks* *Select from and use a wide range of materials and components according to their characteristics* *Evaluate their ideas and products against design criteria* ***Technical knowledge**: explore and use mechanisms in their product* **Explore** Vocab to introduce and use with the children: *mechanism, axle, chassis* Give children the opportunity to play with a range of toy cars and vehicles. What type of vehicle is it? What features does it have – how is it the same/different to others? Discuss what is making the move forwards and backwards – introduce terminology of wheels and axles. If possible, deconstruct a toy vehicles so that the children can see how the axle is attached to the chassis but is able to spin as the wheel spins. **Develop ideas** - Skills lessons – children explore a range of appropriate materials	**Food Technology – dips and crudites** *National Curriculum objectives*: *Use the basic principles of a healthy and varied diet to prepare dishes* *Understand where food comes from.* *Design appealing food products for themselves and other users based on design criteria* *Generate, develop, model and communicate their ideas through talking and drawing* *Select from and use a range of tools and equipment to perform practical tasks* *Select from and use a range of ingredients according to their characteristics* *Evaluate their ideas and products against design criteria* *** peeling** *** chopping** *** slicing** *** stirring** **Health and Nutrition** Vocab to introduce and use with the children: *vegetable, crudites, dip, recipe, measure, stir* - Using a selection of food products/pictures, sort into vegetables/not vegetables - Revise understanding of the 'balanced plate' in terms of food groups and quantities, zooming in on fruit and vegetables and reminding the children of the need to eat 5 portions of fruit and vegetables every day as part of a healthy and varied diet. - Zoom back into vegetables – discuss and explore those that grow above ground and those that grow underground (root vegetables). Also discuss those that grow in Britain and those that

	- Practise cutting, joining, finishing techniques to extend their prototype chutes, making the marble roll for longer, or allowing it to change direction. - Take feedback – strengths and drawbacks of each material they have tested, drawing conclusions about which will be best to use for their final product and why. **Design** Use their observations and comments about the original marble run, as well as their work with prototypes, to establish a design criteria that will allow a marble to roll along its length - consider material that will be used (based on strength, shape (eg curved or flat), durability), as well as effective joining techniques. Children design a section of marble run by drawing, colouring and labelling it with their chosen material and method of joining. **Make** Make their section of marble run according to their design criteria, selecting appropriate tools, equipment and materials. **Evaluate** Test their section of marble run against their design criteria: Does it allow a marble to roll along its length? Is the material used stable and durable? Are the joining techniques effective? Evaluate their finished product against their design (criteria and labelled drawing), suggesting improvements and adaptations with support. *Consider joining multiple sections together to create a whole-class marble run. How long can they keep the marble rolling?*	– push wheels onto dowel, ensuring diameter of dowel matches diameter of hole in wheel (and what happens if these don't match); - measure length of dowel, mark accurately - use bench hook and hacksaw to cut dowel to correct length - explore ways to puncture a hole in card for dowel (axle) to go through, including using a hole punch. **Design** In groups, children design a moving vehicle - Establish a design criteria: consider which type of vehicle they will make, how many wheels/axles they will need, what material will be used for the axle and chassis. Draw, colour and label their design. **Make** In groups, make their chosen vehicle: - Create chassis and add details – these could be created using computing skills (WordArt, images on Clipart, 3D modelling program etc) - Use accurate measuring and appropriate tools/equipment to make axles and wheels. **Evaluate** Evaluate their vehicle against their design (criteria and labelled drawing) - consider aesthetics (does it look good) and purpose (do the wheels turn/do the axles work effectively; are they attached securely to the chassis; if not, why not?)	grow abroad, exploring reasons for this (eg temperature and weather conditions) - introduce the idea of dips and crudites **Develop ideas** - explore vegetables using senses - colour, shape, texture – to decide whether they would make suitable crudites - practise methods of preparation, including food hygiene and the need to wash fresh produce: peeling, slicing, chopping - taste test a selection of dips and evaluate **Design** Children vote as a class to decide on the preferred dip that will be made. Children write a list of ingredients for their chosen dip, as well as adding their preferred vegetable(s) for their crudites using their previous exploratory work to inform their choices. Children to draw a labelled exploded diagram of their dip with accompanying crudites. **Make** Follow a simple recipe to make their class dip, measuring out and preparing ingredients, before stirring together. Prepare their crudites by peeling and slicing their chosen vegetable(s). **Evaluate** Evaluate their dip and crudites against their design - consider presentation (does it look good) and taste (do the flavours and textures work together?) - Include any adaptations ie adding something to the dip to improve taste, or changing their choice of crudites

	Autumn Term	Spring Term	Summer Term
Year 3	**Textiles – Christmas tree decoration** *National Curriculum objectives*: *Investigate and analyse a range of existing products* *Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups* *Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Select from and use a wider range of materials and components according to their functional properties and aesthetic qualities* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *Understand how key events and individuals in design and technology have helped shape the world* **Explore** Vocab to introduce and use with the children: *textiles, thread, aesthetics* Children evaluate a range of Christmas textile tree decorations on the market. Discuss how they have been made – can the children see stitches? Do they notice how they've been embellished to make them more appealing? **Develop ideas** Skills lessons - sewing - Practise threading a needle and tying a knot - Practise sewing a simple running stitch using Binca - Apply a running stitch to swatches of different fabric. - Take feedback – strengths and drawbacks of each fabric. **Design** Children design a Christmas tree decoration –	**Mechanical Systems - Catapults** *National Curriculum objectives*: *Investigate and analyse a range of existing products* *Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups* *Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Select from and use a wider range of materials and components according to their functional properties and aesthetic qualities* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *Understand how key events and individuals in design and technology have helped shape the world* ***Technical knowledge**: understand and use mechanical systems in their products - **levers*** **Explore** Vocab to introduce and use with the children: *mechanism, base, lever, fulcrum* Children experience throwing a ball, exploring the difference between throwing underarm and overarm. Discuss the force of a push moving the ball forward. Explain the lever system in their arm – Elbow = fulcrum Ball = load Bicep = effort/force Forearm = lever How can the children throw the ball further? (Increase the force/effort)	**Food Technology - vegetable soup** *National Curriculum objectives:* *Understand and apply the principles of a healthy and varied diet* *Prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques* *Understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.* *Generate, develop, model and communicate their ideas through discussion, annotated sketches and cross-sectional and exploded diagrams* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Select from and use a wider range ingredients according to their characteristics and aesthetic qualities* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *** peeling** *** chopping** *** slicing** *** heat source** **Health and Nutrition** Vocab to introduce and use with the children: *seasonal, savoury, recipe, measure, heat source* - Using a selection of products already on the market, look closely at the packaging/ingredients listed on a range of vegetable soups. - Place the main ingredients on the 'balanced plate' and, alongside the traffic light system, evaluate the health and nutrition offered by these soups. - Also discuss research where the main vegetables are grown in the world and what this

	Establish design criteria: consider materials (fabric and thread), colour choices and embellishments to make their product aesthetically appealing. Design their Christmas tree decoration by creating a labelled exploded diagram. **Make** Make their Christmas decoration, guided by their design criteria. **Evaluate** Evaluate their finished product against their design (criteria and exploded diagram) - consider aesthetics and effectiveness of their material and colour choices - consider joining and finishing techniques and the overall effect of these on the finished product	Explain that a lever is a mechanism that has a balance point – when a force is applied at one end, it cause the load at the other end to move. Show examples of everyday levers – seesaw, scissors; nutcracker, wheelbarrow. Show toy catapults and give children opportunity to use and test them. Can they identify the fulcrum, the load, the lever and the effort/force? **Develop ideas** - Skills lesson – use models and images to explore and investigate a range of ways to join materials (dowel, lollipop sticks, rolled up paper), creating a stable base and a lever with a fulcrum. - Investigate an elastic band in terms of potential energy, and explore ways of incorporating elastic bands into their catapult. **Design** In groups, children design a catapult - Establish a design criteria: consider the materials that will be used (based on previous exploration) and label the key components of their mechanism – base, fulcrum, lever, load **Make** In groups, make their catapult according to their design criteria. **Evaluate** Test their catapult against others in the class: Is it stable? Are the joining techniques effective? Does it propel the load forward? Measure the distance accurately. Evaluate their finished product against their design (criteria and labelled drawing), suggesting improvements and adaptations with support.	means in terms of cost, air miles, impact on the environment etc. - introduce the terms 'savoury' and 'seasonal'. Sort some of the identified ingredients into those that are seasonal and those that aren't and what this may mean in terms of forced food production/mass farming etc **Develop ideas** Taste test a range of vegetable soups that are already on the market. Evaluate in terms of presentation and taste. Create a survey based on what they find out from their taste-test. Ask staff at school and people at home to complete the survey as part of their market research. Complete further research into which vegetables are seasonal at this time of year. **Design** Write a list of ingredients that are 'non-negotiable' in their vegetable soup based on their market research and on their knowledge of seasonal vegetables. Research a recipe that meets most/all of these criteria. **Make** Follow food hygiene procedures and a simple vegetable soup recipe to prepare their ingredients, peeling and slicing their chosen vegetables, weighing and measuring as necessary. Under adult supervision, use a heat source to cook their soup. **Evaluate** Taste-test their soup, considering presentation and taste. Create an evaluation sheet that will allow some of those who completed the survey to also give feedback. - suggest adaptations to improve taste or presentation.

	Autumn Term	Spring Term	Summer Term
Year 4	**Structures – Packaging** *National Curriculum objectives*: *Investigate and analyse a range of existing products* *Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups* *Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Select from and use a wider range of materials and components according to their functional properties and aesthetic qualities* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *Understand how key events and individuals in design and technology have helped shape the world* ***Technical knowledge**: apply their understanding of how to strengthen, stiffen and reinforce more complex structures* (See also STEM unit on Packaging) **Explore** Vocab to introduce and use with the children: *packaging, net, tab, fold, score, reinforce* Before the first lesson, invite children to bring in an example of packaging that they like. Take feedback from their (and other) examples about why they like it (eg shape, colours, characters used, special offers, information given etc) Tune the children into specific points shown by the packaging eg one that has instructions, a product description, a cut-out to see the product through etc. Use egg boxes to focus the children in on the purpose of packaging (to promote and sell the product, to protect the product in transit/on the shelf) Discuss the materials used in the packaging explored, and consider why this may be (purpose and environmental impact) **Develop ideas** - Deconstruct some of the packaging explored and introduce the term 'net', evaluating the effectiveness of how they are constructed. Identify the tabs and discuss what these are for.	**Electrical Systems** *National Curriculum objectives*: *Investigate and analyse a range of existing products* *Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups* *Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Select from and use a wider range of materials and components according to their functional properties and aesthetic qualities* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *Understand how key events and individuals in design and technology have helped shape the world* ***Technical knowledge**: understand and use electrical systems in their products* **Explore** Vocab to introduce and use with the children: *mechanism, electrical system, circuit, motor* Children explore a range of fairground rides, discussing key aspects such as where the passengers sit, what kind of motion is involved, how are the parts connected. Label images of various fairground rides according to this criteria. **Develop ideas** - Skills lesson - build simple circuits that incorporate a motor - attach various items to the motor to explore output (the movement)	**Food Technology - cupcakes** *National Curriculum objectives:* *Understand and apply the principles of a healthy and varied diet* *Prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques* *Understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.* *Generate, develop, model and communicate their ideas through discussion, annotated sketches and cross-sectional and exploded diagrams* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Select from and use a wider range ingredients according to their characteristics and aesthetic qualities* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *** weighing** *** mixing** *** heat source** **Health and Nutrition** Vocab to introduce and use with the children: *weigh, mix, sweet treat, heat source* - Using a selection of products already on the market, look closely at the packaging/ingredients listed on a range of cakes/cupcakes. - Place the main ingredients on the 'balanced plate' and, alongside the traffic light system, evaluate the health and nutrition offered by these cakes. On this basis, establish that cakes/cupcakes are 'sweet treats' rather than food that we should be eating every day. **Develop ideas**

	- Discuss the 2D shapes that are the components of the finished 3D product. - Discuss aspects of design, including effective joining techniques and areas where the packaging has been reinforced. - Explore a prototype net of a cuboid without tabs – can it be built effectively? Why not? Give net with no tabs and discuss where would/could the tabs go, and where they would be redundant (eg doubled-up). Cut out and test. - Explore joining techniques (glue, various tapes, staples, paperclips etc) for their effectiveness, durability and aesthetics. - Practise cutting out, folding, scoring and joining a cuboid net. - Take feedback on accuracy of cutting, folding, scoring and joining a cuboid net, drawing conclusions about what they will need to do when making their final product. **Design** Explain that they will be designing and making some packaging for sweets. Use their observations and comments about the original packaging, as well as their work with prototypes, to establish a design criteria - consider purpose of packaging, where and how it might be reinforced, what material and joining technique they will use, how they will decorate the outside – what information they will include, font, colour scheme, aesthetic appeal. Children draw and label their packaging – net, with tabs and joining techniques identified, as well as external information and decoration. **Make** Make their sweet packaging according to their design criteria, selecting appropriate tools, equipment and materials (eg choosing to hand draw their graphic designs or use a computer program to create lettering/clip art pics). **Evaluate** Evaluate their finished product against their design (criteria and labelled diagram), suggesting improvements and adaptations with support. Consider in terms of construction (are there gaps along the edges, is the joining technique appropriate and tidy) as well as graphic design (font, illustrations, colour scheme, information).	- use a range of materials (card, paper, wire, Lego etc) to create prototypes of fairground rides that could be attached to the motor, using images for inspiration and considering how parts will be connected and where passengers will sit. **Design** In groups, children design a fairground ride - Establish a design criteria: consider the materials that will be used and how they will be connected (based on previous exploration), as well as the electrical system that will be incorporated into their design. Create an exploded diagram of their design, including a circuit diagram, and label materials and movement. **Make** In groups, make their fairground ride according to their design criteria. **Evaluate** Test their fairground ride: Is it stable? Are the joining techniques effective? Does it turn on and off? Does it rotate/move as planned? Evaluate their finished product against their design (criteria and exploded diagram), suggesting improvements and adaptations.	Taste test a range of cupcakes that are already on the market. Evaluate in terms of presentation and taste. Create a survey based on what they find out from their taste-test. Ask staff at school and people at home to complete the survey as part of their market research. Make sure to include questions about the decoration as well as the cake itself. **Design** Research a recipe for simple cupcakes that meet most/all of the criteria established by the market research. Write a list of ingredients. Draw a labelled exploded diagram of their cupcake plus decorations. **Make** Follow food hygiene procedures to prepare their recipe, weighing, measuring and mixing to the correct consistency. Under adult supervision, bake the cupcakes in the school oven. Once cool, decorate according to their design criteria. **Evaluate** Taste-test their cupcakes, considering presentation and taste. Create an evaluation sheet that will allow some of those who completed the survey to also give feedback. Suggest adaptations to improve taste or presentation.

	Autumn Term	Spring Term	Summer Term
Year 5	**Textiles – Money container** *National Curriculum objectives*: *Investigate and analyse a range of existing products* *Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups* *Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Select from and use a wider range of materials and components according to their functional properties and aesthetic qualities* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *Understand how key events and individuals in design and technology have helped shape the world* **Explore** Vocab to introduce and use with the children: *seam, backstitch, embellish(ment)* Children evaluate a range of fabric money containers on the market. Discuss how they have been made – do the children notice that they cannot see the stitches? Turn inside out if possible and explore/explain the purpose of a hem. Discuss the range of embellishments and fastenings, and why these are necessary. **Develop ideas** Skills lessons - sewing - Revise threading a needle and tying a knot - Practise sewing a backstitch using Binca - Practise sewing together two swatches of fabric using backstitch – look at reverse side to see smoother seam. - Apply to a range of fabrics.	**Mechanical Systems – Cams** *National Curriculum objectives*: *Investigate and analyse a range of existing products* *Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups* *Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Select from and use a wider range of materials and components according to their functional properties and aesthetic qualities* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *Understand how key events and individuals in design and technology have helped shape the world* ***Technical knowledge**: understand and use mechanical systems in their products – **cams*** **Explore** Vocab to introduce and use with the children: *mechanism/mechanical system, cam, rotary, linear* Explain that a cam is a device in a mechanism that turns rotary motion into linear motion. Show examples of everyday cams – gears in engines, hand drill, old-fashioned moving toys. Share examples of pre-built cams and give children opportunity to use and test them. Can they identify the frame, the axle, the crank handle, the cam and the follower? Show some of Peter Markey's automata as inspiration for their own designs. **Develop ideas**	**Food Technology - pizzas** *National Curriculum objectives:* *Understand and apply the principles of a healthy and varied diet* *Prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques* *Understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.* *Generate, develop, model and communicate their ideas through discussion, annotated sketches and cross-sectional and exploded diagrams* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Select from and use a wider range ingredients according to their characteristics and aesthetic qualities* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *** weigh** *** mix** *** knead** *** roll** **Health and Nutrition** Vocab to introduce and use with the children: *savoury, dough, knead, roll, yeast* - Using children's background knowledge of pizza – base/dough, toppings – place the main ingredients of their favourite pizza on the 'balanced plate' and evaluate the health and nutrition offered by pizza in terms of a healthy and varied diet. - Also research where and how some key ingredients are grown, reared, caught and processed.

	- Take feedback – strengths and drawbacks of each fabric. - Practise sewing a button onto their swatch. **Design** Establish design criteria: consider materials (fabric and thread), size, method of fastening, colour choices and embellishments to make their product aesthetically appealing. Design their money container by creating a labelled exploded diagram. **Make** Make their money container, guided by their design criteria. **Evaluate** Test their finished product by placing coins in their money container. Evaluate against their design (criteria and exploded diagram) - consider aesthetics and effectiveness of their material, method of fastening and colour choices - consider joining technique (seam) and embellishments, and the overall effect of these on the finished product.	- Skills lesson – build a mechanism that incorporates a cam – accurately measure, mark and cut dowel - accurately measure, mark and cut frame - use appropriate joining techniques for frame - explore best methods for creating holes for axle **Design** In groups, children design a cam automata - Establish a design criteria: consider the materials that will be used and how they will be constructed (based on previous exploration), as well as the type of cam that will be incorporated into their design. Create an cross-section diagram of their design, labelling materials and movement. **Make** In groups, make their cam automata according to their design criteria. **Evaluate** Test their cam automata: Is it stable? Are the joining techniques effective? Does it move as planned (turning rotary motion into linear motion)? Evaluate their finished product against their design (criteria and cross-section diagram), suggesting improvements and adaptations.	- sort some of the identified ingredients into those that are local to Britain and those that are often/usually shipped into the country, and discuss what this may mean in terms of air miles/cost etc **Develop ideas** Discuss variations of pizza base eg thick/thin/stuffed crust, the Pizza Express 'leggera' pizza, tomato sauce or white sauce, preferences for maximum number of toppings and the pros/cons of this. Research pizza dough – what it is, how it is made, why it needs yeast, why is has to be kneaded and left to rise etc **Design** Draw and label an exploded diagram of their pizza design based on the outcomes of their previous discussions and research, and their personal preferences for flavours. Research a recipe for quick and easy pizza dough with limited resting time and discuss why this is necessary. Write a list of ingredients for their pizza. **Make** In pairs/groups, follow food hygiene procedures and a quick and easy pizza recipe – weigh/ measure ingredients; mix, knead, roll, stretch and press their dough; peel, chop, slice their toppings. Under adult supervision, cook in school oven (**CAUTION** oven must be VERY HOT**) **Evaluate** Taste-test their pizza, considering presentation as well as taste – is the base crisp or soggy, is the crust as they wanted it, do the combined flavours of the toppings work together etc Suggest adaptations to improve taste or presentation.

	Autumn Term	Spring Term	Summer Term
Year 6	**Structures – Bridge Bonanza** *National Curriculum objectives*: *Investigate and analyse a range of existing products* *Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups* *Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Select from and use a wider range of materials and components according to their functional properties and aesthetic qualities* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *Understand how key events and individuals in design and technology have helped shape the world* ***Technical knowledge**: apply their understanding of how to strengthen, stiffen and reinforce more complex structures* (See also STEM unit on Bridges) **Explore** Vocab to introduce and use with the children: *engineer, strut, load, symmetry* Show images of a range of bridges from around the world, including a truss bridge, a beam bridge, a cantilever bridge, and a suspension bridge. Discuss in terms of purpose and design – what is each bridge made of, what is its load, the thing it is transporting (people, traffic, cargo), what elements of the design are making it strong enough to do this? List features identified – polygons evident in the design (eg triangles), arches, symmetry, trusses and struts. Introduce important civil engineers through history, including Isambard Kingdom Brunel, Thomas Telford, Gustave Eiffel, Joseph Strauss **Develop ideas**	**Computing Systems** *National Curriculum objectives*: *Investigate and analyse a range of existing products* *Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups* *Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *Understand how key events and individuals in design and technology have helped shape the world* ***Technical knowledge**: apply their understanding of computing to program, monitor and control their products* **Explore and develop ideas** Vocab to introduce and use with the children: *robotics engineer, program/monitor/control* - Expose children to a range of products that use computing to program, monitor and control them eg anything with a sensor (light, temperature, sound), anything which responds to a button press, anything 'smart'/voice activated. - introduce and explain the role of robotic engineering - ask key question: *What do scientists and engineers do when they cannot access places that they want to explore?* - Take feedback on the sorts of places this might mean (volcanoes, deep sea, space) - *What might they want to do in these places?* (eg take samples of rock, plants; log discoveries of new species; map landscape) Discuss solutions to this problem.	**Food Technology – shortcrust pastry (savoury tarts)** *National Curriculum objectives:* *Understand and apply the principles of a healthy and varied diet* *Prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques* *Understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.* *Generate, develop, model and communicate their ideas through discussion, annotated sketches and cross-sectional and exploded diagrams* *Select from and use a wider range of tools and equipment to perform practical tasks accurately* *Select from and use a wider range ingredients according to their characteristics and aesthetic qualities* *Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work* *** weigh** *** sift** *** rub** *** roll** **Health and Nutrition** Vocab to introduce and use with the children: *savoury, pastry, sift, rub* - Using a selection of products already on the market, look closely at the packaging/ingredients listed on a range of savoury tarts. - Place the main ingredients on the 'balanced plate' and, alongside the traffic light system, evaluate the health and nutrition offered by these tarts. - Also research where and how some ingredients are grown, reared, caught and processed.

	- Use lolly sticks and a range of joining techniques (eg glue, various tapes, pegs, clips) to practise making straight joints, angled joints and trusses. - Practise making a beam and extending the length, strengthening and reinforcing the length with struts and trusses. How far can their beam reach? Share images of 'proof of concept' for strength of a triangle, as well as examples of bridge design that incorporate beams, struts and trusses. **Design** Use their observations and comments about known bridges, as well as their work with prototypes on structural features, to establish a design criteria - consider bridge type, distance to be spanned (will this be the same for each group?), where and how it might be reinforced, what materials and joining technique they will use. In groups, children draw and label their bridge design. **Make** In groups, build their bridge according to their design criteria, selecting appropriate tools, equipment and materials **Evaluate** Test their bridge against their design criteria: Does it span the agreed distance? Is it stable? Has it been reinforced using known structural design elements? Are the joining techniques effective? Place increasing weights (the load) on their bridge – is it strong enough to support each one? Take photos/video to evidence this. Evaluate their bridge against their design (criteria and labelled drawing), suggesting improvements and adaptations based on evident weaknesses in their structures.	- Zoom in on space and share information on the ExoMars Program and the Rosalind Franklin ExoMars rover. Identify key features of the design of the rover and why these were necessary. Make clear links between digital technology, robotic engineering and space exploration. - Introduce key figures within the world of computer programming and technological advancements, eg - Yoky Matsuoka (CTO of Google Nest and cofounder of Google X) - Abbie Hutty (lead structures engineer – Mars Rovers) **Design** - Using what they know, establish design criteria for a Mars rover, considering which factors to prioritise, eg durability, environmental conditions, applications (purpose), appearance. - Use their design criteria to create a detailed labelled diagram of their Mars rover. **Make** In groups, use Crumble kits to develop their ideas for product design based on their design criteria. - use coding software to programme, monitor and control their Mars rover - debug algorithms as necessary to improve outcomes - record the code they create. **Evaluate** Test their product – Does the code work? Is their rover responsive? Which aspects of the design criteria have been met and which have not? Record using photo/video evidence. Evaluate their finished product, explaining how their Mars rover could contribute to space exploration and suggesting improvements and adaptations.	- Evaluate the pros and cons of shop-bought and home-made produce. **Develop ideas** Taste test a range of savoury tarts that are already on the market. Evaluate in terms of presentation and taste. Research shortcrust pastry – what it is, how it is made, what it means to rub and sift, and why it is important to not over-work the dough. **Design** Consider their research into savoury tarts and the possible ingredients for the fillings. Research a recipe for their preferred tart that meet most/all of the criteria established by their discussion. Write a list of ingredients. Draw a labelled cross-section diagram of their savoury tart. **Make** In pairs/groups, follow food hygiene procedures and use their savoury tart recipe to weigh/ measure ingredients; sift, rub, knead, roll their dough; stir, peel, chop, slice their filling. Under adult supervision, cook in school oven **Evaluate** Taste-test their savoury tart, considering presentation as well as taste – is the pastry crisp and golden brown, do the combined flavours of the fillings work together, is the filling firm or soggy etc Suggest adaptations to improve taste or presentation.