Knowledge Progression

Year 3/4 Design and Technology

	Designing	Making	Evaluating	Technical Knowledge (textiles, structures, mechanical and electrical systems)	Cooking and Nutrition
Key Vocabulary	Design, design-criteria, target audience/user, create, think, research, explain, make, modify, improve, aesthetic, evaluate, analyse, product, strength, weakness, name, describe, use, measure, illustrate, annotate, cross-section, prototype, recognise, explain, tools, equipment, materials, hacksaw, bench hook, hand drill, glue-gun, dowel, structure, join, saw, tape, test, protect, stronger, select, stiffer, moving parts (slider, pivot, hinge levers and linkages), sail, rokkaku (6-sided kite), bridle, kite, line, fly, tow point, diamond, delta, frame, tail.			Textiles, tools, design, explore, aesthetic, tie-dye, annotate, template, join, temporary, fixed, needle, pin, split-pin, thread, running-stitch, cross-stitch, seam, hem, skill, attach, cut, score, product, evaluate, input, output, fixed, pivot, adapt, mechanical system, bulb, battery, mains, electrical system, series circuit, parallel, switch, insulator, conductor, component, circuit, wire, wire-cutters, symbol, stiffen, test, frame structure.	Food, ingredient, recipe, hob, oven, weigh, grams, kilograms, measure, millilitre, litre, technique, chop (bridge and claw) grate and finely grate, peel, snip and tear, spread, juice, zest, mix, pour, stir, drain, cook (boil), garnish, sieve/sift, knead, divide, shape, glaze, bake, hygienic, hygiene, diet, balanced diet, unbalanced diet, food groups, Eatwell Plate, proportions, sweet, savoury, vitamins, minerals, protein, dairy, carbohydrate, vegetable, sensory, taste, texture, appearance, smell, herbs, pesto, yeast, seasonality, grown and captured, caught, reared.
Previous knowledge/ Learning	**IN KS1, OUR CHILDREN WILL HAVE:** *DT1* - Used their imaginations to design a purposeful product (car, moving picture book, tower and t-shirt) whilst planning each step of the production process. *DT2* - Described how their own idea would work and explained why they chose specific textiles/materials and developed their ideas through: talk, drawings, observations, modelling and labelled parts whilst creating plans. *DT3* - Made templates and mock ups of their ideas whilst designing a product (car and picture book) that moves. *DT4* - Explained how their design solved a problem or fit a purpose.	**IN KS1, OUR CHILDREN WILL HAVE:** *DT5* - Create a moving product (car and picture book) and choose appropriate resources and tools to make it (paper, card, wheels and axels, glue, scissors, ruler, split-pins, lollipop sticks, fabrics, felt, ruler, buttons, beads, sequins, braids, ribbons, paints, thread, needles, tape, safety pins, scissors, and staplers). *DT6* - Master more than one joining technique. (e.g. Gluing – PVA, taping, safety pinning, simple flaps, stapling, running stitch and tabs) *DT7* - Measure (in cm) materials and use them in a model, structure or textile piece. *DT8* - Build structures (car and tower), exploring how they can be made stronger, stiffer and more stable whilst choosing appropriate finishing techniques (decoration and colours) – their books and t-shirts. *DT9* - With help, cut and score paper, card and fabrics with accuracy.	**IN KS1, OUR CHILDREN WILL HAVE:** *DT10* - Described how their products (car, moving picture book and tower) worked and explained what went well and not so well with their products (car, moving picture book, tower and t-shirt) and modified any of these if necessary. *DT11* - Evaluated their own product (car, moving picture book, tower and t-shirt) against a simple scale (yes or no) and against existing products.	**IN KS1, OUR CHILDREN WILL HAVE:** **Technical** *DT12* - Made their own model (car and moving picture book) stronger and more stable. *DT13* - Made a product (moving picture book and car) which had two moving mechanisms (levers, sliders, hinges, wheels and axels) *DT14* - Folded, torn and cut paper and card and used a hole punch and inserted paper fasteners for card linkages. *DT15* - Created simple sliders, levers and hinges and investigated joining techniques – temporary, fixed and moving. **Textile:** *DT16* - Created a template and produced a fabric t-shirt. *DT17* - Joined fabrics using running stitch (create a seam), glued, stapled, over sewing and tape (t-shirts). *DT18* - Coloured fabrics using a range of techniques (fabric paints, printing, painting) and decorated fabrics with buttons, beads, sequins, braids and ribbons (t-shirts).	**IN KS1, OUR CHILDREN WILL HAVE:** *DT19* -Explained why a healthy diet is important and sorted foods into the five food groups using the Eatwell plate. *DT20*-Knew to eat at least five portions of fruit and vegetables a day. *DT21*-Began to know the difference between a healthy portion of food and an unhealthy portion of food and applied this in a practical context (pizza toppings) *DT22*-Understood where foods come from – both plant and animal based. *DT23*-Planned and prepared simple dishes (pizzas, dips and dippers and savoury muffins) safely and hygienically without using a heat source. *DT24*-With assistance chopped (bridge and claw), grated, peeled, snipped and tore, spread, scooped, mashed, juiced, zested, poured, mixed, beat and arranged ingredients safely and hygienically. *DT25*-With assistance weighed ingredients using balancing scales and measured ingredients using spoons and cups. *DT26*-Described the ingredients used when making a dish.
N.C. Objectives	1. Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at individuals or groups. 2. Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design.	1. Select from and use a wider-range of tools and equipment to perform practical tasks (for example, cutting, shaping, joining and finishing), accurately select from and use a wide range of materials, textiles and ingredients, according to their functional properties and aesthetic qualities.	1. Investigate and analyse a range of existing products evaluate their ideas and products against their own design criteria and consider the views of others to improve their work. 2. Understand how key events and individuals in design and technology have helped shape the world.	1. Apply their understanding of how to strengthen, stiffen and reinforce more complex structures. 2. Understand and use mechanical systems in their products (for example, gears, pulleys, cams, levers and linkages) 3. Understand and use electrical systems in their products (for example: series circuits incorporating switches, bulbs, buzzers and motors) 4. Apply their understanding of computing to program, monitor and control their products.	1. Understand and apply the principles of a healthy and varied diet. 2. Prepare and cook a variety of predominately savoury dishes using a range of cooking techniques. 3. Understand seasonality and know where and how a variety of ingredients are grown, reared, caught and processed.

Powerful Knowledge
Year 3/4 Design and Technology

Key Knowledge – what do we want our children to know before they leave our phase?

Designing

POWERFUL KNOWLEDGE:

Our pupils will:

DT1 - Use research to design a purposeful, functional and appealing product (mechanical information poster, kite, torch and juggling balls) whilst planning a written step-by-step production plan. They will produce a labelled product design with detailed descriptions about choices around materials, components, functions and aesthetics. E.g. labelling why their material is both suitable and appealing.
DT2 - Develop, model and communicate their ideas through: annotated sketches, cross-sectional diagrams and prototypes, proving that their designs meet a set criterion
DT3 - Draw upon and discuss ideas from the designs of others then persevere whilst refining their designs.

HOW DOES THIS LOOK AT TRANMERE?

Cycle 2 Spring 1: Active Planet (Topic) *Twinkl Unit Included*
-Design a purposeful, functional and appealing mechanical poster to inform children about volcanos.
1) Research, test and understand existing lever, hinges, sliders, pivots and linkage mechanisms.
2) Generate annotated sketches and prototypes, labelling their designs with detailed descriptions about choices around materials, components, functions, equipment and aesthetics (e.g. demonstrate they can choose a material for both its suitability and appearance when making their mechanical poster).
3) Prove that their mechanical poster fits the set criterion whilst engaging in prototype evaluations (self, peer and against existing products) and refine their ideas accordingly before making. *See evaluation column for more detail*

Cycle 1 Spring 2: Gateway to the World (Topic) *Twinkl Unit Included*
-Design a purposeful and functional kite to cross a body of water.
1) Research a purposeful and functional kite, exploring and evaluating Homan Walsh and the story of how he used a kite to help build the Niagara Falls Bridge.
2) Investigate and analyse a range of existing kites, exploring: the parts, the functions and the shapes, exploring how their kite could be made stiffer and stronger.
3) Generate annotated sketches (materials, components, functions, suitability) to show their plans for their kite, creating a plan of the making process – outlining an equipment and materials list, and the different stages / steps.

Cycle 1 Summer 2: Local History (Topic) *Twinkl Unit included*
-Design functional and appealing juggling balls for Sooty and Sweep.
1) Research and learn about Harry Corbett and Sooty and Sweep's comeback tour discussing that some of his special guests will be doing circus trick (hence juggling balls.)
2) Juggling balls: which colour, shape, size, textiles/materials, decoration. Study Tie-Dye as a decorative technique (dye old white fabric squares or a t-shirt). Then, trial and decide upon juggling ball fillings (dried beans, lentils, rice and sand)
3) Decide upon the best stitch: cross-stitching and running-stitch for creating a seam and hem whilst, generating annotated sketches with detailed descriptions about choices around materials, components, functions and aesthetics (e.g. demonstrate they can choose a material for both its suitability and appearance when making their juggling balls).

Cycle 2 Autumn 1: It's Electric (Science) *Twinkl Unit Included*
- Design a purposeful and functional torch for personal use.
1) Investigate and analyse how series circuits and how switches can be used to make a bulb light.
2) Investigate different designs of torches (shape/handles)
3) Generate annotated sketches and cross-sectional diagrams to show their plans for their torch along with instructions and equipment needed.

Making

POWERFUL KNOWLEDGE:

Our Pupils will:

DT4 - Follow a step-by-step plan for their mechanical information poster, kite, torch and juggling balls, choosing the right equipment and materials for each stage.
DT5 - Know which tools are most appropriate for a task, select these and show knowledge of how to handle it (e.g. scissors vs hacksaw or pritt-stick glue vs hot glue-gun). Furthermore, know which techniques are most appropriate for a task, use these competently (e.g. choosing to join materials by taping, tying, or gluing)
DT6 - Work accurately to measure (cm and mm), mark out, cut, score and make holes in materials needed for their models (with assistance when using hacksaws and hand drills).
DT7 - Work accurately to join and assemble components (with assistance when using the hot glue-gun), paying particular attention to finishing techniques used for aesthetics and detail. Furthermore, they apply their previous learning around stiffening and strengthening to build and join strong frame structures and bodies in their kites.

HOW DOES THIS LOOK AT TRANMERE?

Cycle 2 Spring 1: Active Planet (Topic) *Twinkl Unit Included*
1) Follow their design selecting the right tools (scissors, glue, tape, rulers, pens and pencils) and materials (split pins, lollipop sticks, paper and card).
2) Demonstrate that they know and understand how to handle the tools (e.g. handling and using scissors and split pins correctly)
3) Accurately measure (cm and mm) the card/ paper pieces and independently, mark out, cut and score, with accuracy, their card/paper templates to make their poster.
4) Independently make holes, join and assemble (with accuracy) the levers and linkages for their poster.
5) At each stage, consider aesthetics and detail with a particular focus on their audience and their design.

Cycle 1 Spring 2: Gateway to the World (Topic) *Twinkl Unit Included*
1) Follow their design, selecting the right tools (pencils, rulers, scissors, glue, hot glue-gun, stapler, hacksaws, bench hooks and sandpaper)
and materials (tape, elastic bands, string, stapler, plastic bags, newspaper, tissue paper, card, dowels, decorative materials), demonstrating that they can handle the tools (e.g. handling and using a hacksaw correctly).
2) Accurately measure (cm and mm) the Kite's body & structure dowels and independently, mark out and score it and with support, use hacksaws and bench hooks to saw their dowel frames to the correct length, sanding if necessary.
3) Join the kite structure and body together using appropriate joining techniques (masking tape, string, elastic bands, holes/slots or plastic tubing), focusing on structure strength.

Cycle 1 Summer 2: Local History (Topic) *Twinkl Unit included*
1) Follow their design selecting the right tools (needle, thread, pins) and materials for each stage. Demonstrating that they know how to handle the tools (e.g. sewing needle and thread) then accurately measure (cm and mm) the felt/fabric.
2) Independently, mark out and cut (with accuracy) their felt/fabric templates and use a running- stitch or cross-stitch to create a hem to join their juggling balls together.
3) Use a range of media and materials (fabrics, fabric pens, paints and brushed, dyes, pipettes/squirting bottles) to decorate their JBs focusing on the aesthetics to ensure their product fits the criterion

Cycle 2 Autumn 1: It's Electric (Science) *Twinkl Unit Included*
1) Follow their design, selecting the right tools (scissors, hot glue-gun, rulers, pencils, hacksaws and bench hooks and wire cutters) and materials (bulbs, bulb holders, batteries, wire with crocodile clips, split pins, paper-clips, cardboard, masking tape and plastic bottles)
2) Accurately and independently measure (cm and mm) and mark out the amount of bottle needed for the reflection spout and hole for the switch. Then, with support, use hacksaws to cut the reflection spout and switch hole
3) Create the circuit to create a working electrical system (torch)
4) Use appropriate joining techniques (e.g. Gluing – PVA, supervised glue gun, taping, safety pinning/brass fasteners)
to fix the circuit in place.

Evaluating

POWERFUL KNOWLEDGE:

Our pupils will:

DT8 - Present their products (mechanical information poster, kite, torch and juggling balls), giving a demonstration and description of how their products work.
DT9 - In the design stage, engage in self, peer and against existing-product evaluations, using simple scales (yes or no) with extended explanations to give reasons as to why conclusions were made. Explain how to improve their designs and/or prototypes and if necessary, modify.
DT10 - Complete finished product evaluations to show an awareness of whether their design brief has been met, knowing how and why their model did or did not meet it. Explain how to improve their finished products and if necessary, modify.
DT11 - Research and explain how Homan Walsh used a kite to help build the Niagara Falls Bridge and how kites have been used to influence to design of aeroplanes.
DT12 - Research and explain the developments of 'light' throughout history, in particular how Thomas Edison created the light bulb.

HOW DOES THIS LOOK AT TRANMERE?

Cycle 2 Spring 1: Active Planet (Topic) *Twinkl Unit Included*
-Within the design stage and at the post make stage, use a simple scale (yes or no) with extended explanations to evaluate their mechanical poster prototype against existing products, individual-self and peer opinions to judge against the **criteria below:**

Cycle 1 Spring 2: Gateway to the World (Topic) *Twinkl Unit Included*
-Learn about the story of Homan Walsh and how he used a kite to help build the Niagara Falls bridge (Canada). Further investigate through self-led research how the design of kites influenced the design of aeroplanes.
-Within the design stage and at the post make stage, use a simple scale (yes or no) with extended explanations (why yes or no) to evaluate their kite design against existing products, individual-self and peer opinions to judge against the **criteria below:**

Cycle 1 Summer 2: Local History (Topic) *Twinkl Unit*
-Within the design stage and at the post make stage, use a simple scale (yes or no) with extended explanations (why yes or no) to evaluate their juggling ball design against existing products, individual-self and peer opinions to judge against the **criteria below:**

Cycle 2 Autumn 1: It's Electric (Science) *Twinkl Unit Included*
-Research the key changes overtime around lighting and lighting a home, particularly focusing on key figures (Thomas Edison). Also, consider the future of lighting.
-Within the design stage and at the post make stage, use a simple scale (yes or no) with extended explanations (why yes or no) to evaluate their torch design against existing products, individual-self and peer opinions to judge against the **criteria below:**

Within the design phase considerations:
-Has their product been successful? Does it appeal to its audience? Is it fit for purpose? If so, why? If not, why?
- Can you explain why your product will or will not be successful, and develop improvements which should be made to specifically target these areas? Look here specifically at the design criteria to recognise where their prototype does or does not fit the bill then modify.

Post make phase considerations:
- Can you describe your work and the process involved in creating it justifying your choices?
- Were the materials used appropriate? Were they functional/aesthetically pleasing?
- Can you explain how you developed your finished product based upon feedback from the design phase?

Technical Knowledge

POWERFUL KNOWLEDGE:

Our Pupils will:

Technical

DT13 - Know how to strengthen their kite by stiffening a given part or reinforce a part of the structure.
DT14 - Create a prototype of their mechanical information poster.
DT15 - Cut slots and internal shapes in their mechanical information posters. Use lolly sticks, card and split pins to make levers and linkages when making their mechanical information posters. Further to this, create neat, functional links and hinges.
DT16 - Link scientific knowledge by using lights and switches to make their torch using series and parallel circuits, diagnosing faults when necessary.

Textile

DT17 - Can use textiles to create simple patterns on their juggling balls (applique: glued or simple stitches.) whilst measuring (using cm and mm), mark and cut fabric/felt materials accurately.
DT18 - Join fabrics using running-stitch or cross-stitch when making their juggling ball and understand seam allowance and create a hem using a running stitch or cross stitch when joining their juggling balls together.

HOW DOES THIS LOOK AT TRANMERE?

Cycle 2 Spring 1: Active Planet (Topic) *Twinkl Unit Included*
1) Measure (cm and mm) mark and cut their poster pieces accurately.
2) Use lolly sticks/card and split pins to make levers and linkages. Further to this, create neat, functional links, hinges, sliders and pivots.
3) Create prototypes of their posters.

Cycle 1 Spring 2: Gateway to the World (Topic) *Twinkl Unit Included*
1) Know how to strengthen their kite by stiffening a given part or reinforcing.
2) Cut slots and internal shapes to connect the kite structure together.
3) Measure, mark and cut the materials needed to make their kite accurately to 1mm.

Cycle 1 Summer 2: Local History (Topic) *Twinkl Unit included*
1) Measure, mark and cut the materials needed to make their juggling balls accurately to 1mm
2) Use textiles and tie-dye to create patterns (applique- glued or simple stitches).
3)Understand seam allowance and create a hem using a running stitch.
4) Join fabrics using running stitch or cross-stitch, stating why they chose one over the other.

Cycle 2 Autumn 1: It's Electric (Science)
1) Link scientific knowledge by using bulbs, wires and home-made switches
2) Use series circuits to create a torch, diagnosing faults when necessary.

Cooking and Nutrition

POWERFUL KNOWLEDGE:

Our pupils will:

DT19 - Know the correct proportions for a balanced diet and understand that when we don't eat a balanced meal, knowing the characteristics of a poor diet, this can contribute to an unhealthy lifestyle.
DT20 - Know the difference between sweet and savoury foods.
DT21 - Know when a food is ready for harvesting (seasonality) and where and how ingredients are grown and captured, explaining how a variety of ingredients are reared and caught.
DT22 - Follow a recipe to plan, prepare and make simple dishes (tomato pesto pasta and bread) safely and hygienically, being assisted when using a heat source (oven and hob).
DT23 - With supervision, chop (bridge and claw) grate and finely grate, peel, snip and tear, spread, juice, zest, mix, pour, stir, drain, cook (boil), garnish, sieve/sift, knead, divide, shape, glaze and bake safely and hygienically.
DT24 - With supervision, weigh ingredients (g) using digital and spring balance scales and measure ingredients using spoons, cups and jugs (ml).
DT25 - Explain why you might use a cooking technique (microwave vs hob, grater vs peeler).

HOW DOES THIS LOOK AT TRANMERE?

Cycle 1 Autumn 1: Rainforest; including chocolate (Topic) *Twinkl Unit Included*
1) Research the bread (sweet and savoury) and plan to create a new bread product which contains chocolate (from the rainforest) and other ingredients (e.g., raisins, mixed dried fruit, cinnamon, banana, carrot, chilli, apple, honey, orange, lemon, lime, ginger, cheese etc).
2)Focusing on the key practical skills (supervised) – weighing, measuring, chopping (bridge and claw), grating and finely grating, peeling, spreading, juicing, zesting, mixing, pouring, sieving/sifting, kneading, dividing, shaping and glazing, prepare and make a new bread product.
3) Whilst mixing, choose and justify techniques for adding ingredients (e.g., grating the chocolate to make fine sprinkles to avoid dense chunks.)
4) With assistance, use the oven to bake the bread, focusing on safety procedures and controlling temperature.

Cycle 2 Summer 1: What's on the Menu (Topic) *Twinkl Unit Included*
1) Research and present about correct proportions for a balanced diet using the Eatwell plate.
2) Research how ingredients can be used to make both sweet and savoury dishes by investigating eggs.
3) Research into the different types of farming in the UK (arable and pastoral) and discuss the origins of food from the farm to school.
4) Research into locally grown seasonal food (summer) and collectively grow some tomatoes and basil together then use these to plan a balance main meal (pesto and tomato pasta bake)
5) Focusing on the key skills (supervised) measuring, weighing, chopping (bridge and claw), grating and fine grating, peeling, snipping and tearing, stirring, draining and garnishing, prepare and make their dish.
6) With assistance, cook (boil) and bake using the hob and oven, focusing on safety procedures and controlling temperature.
7) Explain why certain techniques were chosen (e.g., grating cheese finely or using an oven to bake the pasta).

PSHE (Y3 and 4): Physical Health and Wellbeing
Pupils will evaluate unhealthy choices and explore why they are made and the consequences. They will learn about moral reasoning and seasonality (alongside other factors such as religion and health reasons) that influence peoples food choices.

Science Cycle 1 Summer 2: Animals Including Humans, Keeping Healthy (Y3)
Pupils will develop their understanding of the nutritional properties of the 5 food groups and plan balanced diets based on statistical analysis.