# Brockwell Junior School Design & Technology Progression Map

## All children to access an engaging design-make-evaluate curriculum within STEM.
## Children to know how to be safe and connected in a digital world.

"Design and Technology should be the subject where mathematical brainboxes
and science whizzkids turn their bright ideas into useful products." James Dyson

**NATIONAL CURRICULUM**
Aims The national curriculum for design and technology aims to ensure that all pupils:
 ♣ develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
 ♣ build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
 ♣ critique, evaluate and test their ideas and products and the work of others ♣ understand and apply the principles of nutrition and learn how to cook. Attainment targets By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

Key stage 2 - Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts.

When designing and making, pupils should be taught to:
<u>Design</u>
 ♣ 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
 <u>Make</u>
 ♣ 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 wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities
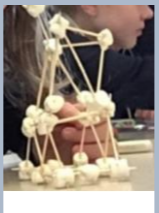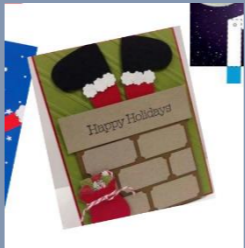 <u>Evaluate</u>
 ♣ investigate and analyse a range of existing products
 ♣ evaluate their ideas and products against their own design criteria and consider the views of others to improve their work
 ♣ understand how key events and individuals in design and technology have helped shape the world Technical knowledge
 ♣ apply their understanding of how to strengthen, stiffen and reinforce more complex structures ♣ understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
 ♣ understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors] ♣ apply their understanding of computing to program, monitor and control their products.

<u>Cooking and nutrition</u>
 As part of their work with food, pupils should be taught how to cook and apply the principles of nutrition and healthy eating. Instilling a love of cooking in pupils will also open a door to one of the great expressions of human creativity. Learning how to cook is a crucial life skill that enables pupils to feed themselves and others affordably and well, now and in later life. Pupils should be taught to:
Key stage 2
 ♣ 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.

| Year Group | Year 3 | | | Year 4 | | | Year 5 | | | Year 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Term** | Sep - Dec | Jan - Apr | May - July | Sep - Dec | Jan - Apr | May - July | Sep - Dec | Jan - Apr | May - July | Sep - Dec | Jan - Apr | May - July |
| **Learning Challenges** | | | | | | | | | | | | |
| | **Textiles:** Cross stitch amd applique (4 lessons)<br><br>**Structures: Constructing a castle** (Lessons 2 -4; omit lesson 1) | **Food: Eating seasonally** (4 Lessons)<br><br>**Optional Electrical systems: Electric Poster** | **Digital world: Electronic charm** (4 lessons)<br><br>**Mechanical system: Pneumatic toys** (Lessons 2-4; omit lesson 1) NB. Watch the tea box in lesson 1, as a physical example. | **Mechanical systems: Making a slingsot car** (4 lessons)<br><br>**Textiles: Fastenings** (Lessons 2-3; omit lesson 1) | **Structures Pavillions** (4 lessons)<br><br>**Optional Digital World: Mindful moments timer.** | **Food: adapting a recipe** (4 lessons)<br><br>**Electrical systems: Torches** (4 lessons) | **Food: What could be healthier?** (4 lessons)<br><br>**Electrical systems: Doodlers** (Lesson 1-3; omit lesson 4) | **Mechanical systems: Making a pop-up book** (Lesson 1-3; omit lesson 4) NB. Use the Jack and Jill book and moving parts template in Lesson 2, to reduce time. **Optional Textiles: Stuffed toys** (4 lessons) | **Digital world: Monitoring devices** (4 lessons)<br><br>**Structures: Bridges** (4 lessons) | **Structures: Playgrounds** (Lesson 1-3; omit lesson 4) NB. Skip the surrounding landscape and complete the playground structures in lesson 3. **Electrical systems: Steady hand game** (Lesson 2-4; omit lesson 1) | **Digital world: Navigating the world** (5 lessons) NB. You can complete lesson 5 as a celebratory event **Optional Textiles: Waistcoats** (4 lessons) | **Mechanical systems: Automata toys** (4 lessons)<br><br>**Food: Come dine with me** (4 lessons) |
| **Example Projects** | | | | | | | | | | | | |

# Skills and Key Concepts

## Design

| Design | Design | Design | Design |
|---|---|---|---|
| • Start to order the main stages of making a product.<br>• Identify a purpose and establish criteria for a successful product.<br>• Understand how well products have been designed, made, what materials have been used and the construction technique.<br>• Know to make drawings with labels when designing.<br>• Explain their choice of materials and components including function and aesthetics. | • Start to generate ideas, considering the purposes for which they are designing- Begin to make STEM links.<br>• Confidently make labelled drawings / diagrams from different views showing specific features.<br>• Develop a clear idea of what has to be done, planning how to use materials, equipment and processes, and suggesting alternative methods of making, if the first attempts fail.<br>• Identify the strengths and areas for development in their ideas and products. | • Start to generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces.<br>• With growing confidence apply a range of finishing techniques, including those from art and design.<br>• Draw up a specification for their design- link with STEM.<br>• Use ICT when developing design ideas. Computer Aided Design.<br>• With growing confidence select appropriate materials, tools and techniques.<br>• Start to understand how much products cost to make, how sustainable and innovative they are and the impact products have beyond their intended purpose. | • Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces.<br>• Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose.<br>• Accurately apply a range of finishing techniques, including those from art and design.<br>• Draw up a product specification for their design- link with Mathematics and Science.<br>• Suggest alternative methods of making if the first attempts fail.<br>• Identify the strengths and areas for development in their ideas and products. Know how much products cost to make, how sustainable and innovative they are and the impact products have beyond their intended purpose. |

## Make

| Make | Make | Make | Make |
|---|---|---|---|
| • Select a wider range of tools and techniques for making their product i.e. construction materials and kits, textiles, food ingredients, mechanical components and electrical components.<br>• Explain their choice of tools and equipment in relation to the skills and techniques they will be using.<br>• Start to understand that mechanical systems such as levers and linkages or pneumatic systems create movement.<br>• Start to work safely and accurately with a range of simple tools.<br>• Start to measure, tape or pin, cut and join fabric with some accuracy. | • Select a wider range of tools and techniques for making their product safely.<br>• Start to join and combine materials and components accurately in temporary and permanent ways.<br>• Know how mechanical systems such as cams or pulleys or gears create movement.<br>• Understand how more complex electrical circuits and components can be used to create functional products.<br>• Continue to learn how to program a computer to monitor changes in the environment and control their products.<br>• Now sew using a range of different stitches, to weave and knit.<br>• Begin to use finishing techniques to strengthen and improve the appearance of their product using a range of equipment including ICT. | • Select appropriate materials, tools and techniques e.g. cutting, shaping, joining and finishing, accurately.<br>• Select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities.<br>• Understand how mechanical systems such as cams or pulleys or gears create movement.<br>• Know how more complex electrical circuits and components can be used to create functional products and how to program a computer to monitor changes in the environment and control their products.<br>• Demonstrate how to use skills in using different tools and equipment safely and accurately with growing confidence cut and join with accuracy to ensure a good-quality finish to the product. Weigh and measure accurately (time, dry ingredients, liquids).<br>• Use finishing techniques to strengthen and improve the appearance of their product using a range of equipment including ICT. | • Confidently select appropriate tools, materials, components and techniques and use them.<br>• <br>• Use tools safely and accurately. Assemble components to make working models.<br>• Use software to program a physical system.<br>• Understand that programs have an input and an output.<br>• Aim to make and to achieve a quality product.<br>• With confidence pin, sew and stitch materials together to create a product.<br>• Demonstrate when make modifications as they go along.<br>• Construct products using permanent joining techniques.<br>• Understand how mechanical systems such as cams or pulleys or gears create movement.<br>• Know how more complex electrical circuits and components can be used to create functional products and how to program a computer to monitor changes in the environment and control their products.<br>• Know how to reinforce and strengthen a 3D framework.<br>• Understand that mechanical and electrical systems have an input, process and output. |

| Evaluate | Evaluate | Evaluate | Evaluate |
|---|---|---|---|
| • Start to evaluate their product against original design criteria e.g. how well it meets its intended purpose. | • Evaluate their products carrying out appropriate tests.<br>• Be able to disassemble and evaluate familiar products and consider the views of others to improve them. | • Start to evaluate a product against the original design specification and by carrying out tests.<br>• Evaluate their work both during and at the end of the assignment.<br>• Begin to evaluate it personally and seek evaluation from others.<br>• Evaluate the key designs of individuals in design and technology and understand how this has helped shape the world. | • Evaluate their products, identifying strengths and areas for development, and carrying out appropriate tests.<br>• Evaluate their work both during and at the end of the assignment.<br>• Record their evaluations using drawings with labels.<br>• Evaluate against their original criteria and suggest ways that their product could be improved.<br>• Evaluate the key designs of individuals in design and technology has helped shape the world. |

## VOCABULARY

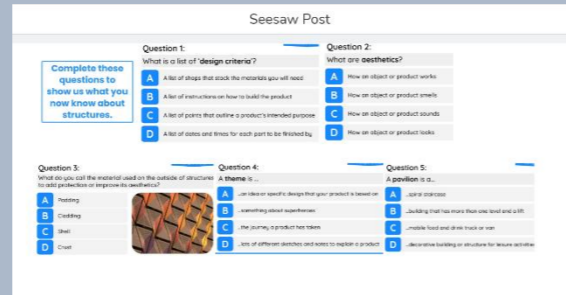| **Food** | **Food** | **Food** | **Food** |
|---|---|---|---|
| ● Climate ● Exported ● Imported ● Mediterranean climate ● Nutrients ● Recipe ● Seasonal food | ● Adapt ● Budget ● Cooling rack ● Creaming ● Method ● Net ● Packaging ● Prototype ● Rubbing ● Sieving ● Utilities | ● Beef ● Cross-contamination ● Diet ● Ethical issues ● Farm ● Healthy ● Ingredients ● Method ● Nutrients ● Packaging ● Reared ● Recipe ● Substitute ● Vegan ● Vegetarian ● Welfare | ●Accompaniment ●Collaboration ●Cookbook ●Cross-contamination ●Flavour ●Imperative-verb ●Method ●Nationality ●Preparation ●Processed ●Reared ●Target audience |
| **Structures** | **Structures** | **Structures** | **Structures** |
| ●2D shapes ● 3D shapes ● Castle ● Facade ● Feature ● Flag ● Net ● Recyclable ● Scoring ● Stable ● Strong ● Structure ● Tab ● Weak | ● Aesthetic ● Cladding ● Frame structure ● Function ● Inspiration ● Pavilion ● Reinforce ● Stable ● Structure ● Texture ● Theme | ● Abutment ● Arched bridge ● Beam bridge ● Coping saw ● File ● Material properties ● Measure ● Predict ● Reinforce ● Sandpaper ● Set square ● Suspension bridge ● Tenon saw ● Test ● Truss bridge ● Wood | ●Apparatus ●Bench hook ●Cladding ●Coping saw ●Dowel ●Jelutong ●Landscape ●Mark out ●Modify ●Natural materials ●Plan view ●Prototype ●Reinforce |
| **Textiles** | **Textiles** | **Textiles** | **Textiles** |
| ● Applique ● Cross-stitch ● Decorate ● Fabric ● Patch ● Running-stitch ● Seam ● Stencil ● Stuffing | ● Aesthetic ● Assemble ● Book sleeve ● Fabric ● Fastening ● Mock-up ● Net ● Running-stitch ● Stencil ● Template | ● Annotate ● Appendage ● Blanket-stitch ● Fabric ● Sew ● Shape ● Stuffed toy ● Stuffing ● Template | ●Annotate ●Fabric ●Fastening ●Knot ●Running-stitch ●Seam ●Sew ● ●Template ●Thread ●Waistcoat |
| **Electrical Systems** | **Electrical Systems** | **Electrical Systems** | **Electrical Systems** |
| ●Battery ● Bulb ● Circuit ● Circuit component ● Crocodile wires ● Electrical product ● Electrical system ● Information design ● Research ● Sketch | ● Battery ● Bulb ● Buzzer ● Cell ● Component ● Conductor ● Copper ● Function ● Insulator ● Series circuit ● Switch ● Test ● Torch ● Wire | ● Circuit component ● Configuration ● Current ● Develop ● DIY ● Motor ● Motorised ● Product analysis ● Series circuit ● Stable | ●Assemble ●Battery ●Benefit ●Bulb ●Bulb holder ●Buzzer ●Circuit ●Circuit symbol ●Component ●Conductor ●Copper ●Fine motor skills ●Form ●Function ●Gross motor skills |
| **Mechanical Systems** | **Mechanical Systems** | **Mechanical Systems** | **Mechanical Systems** |
| ● Exploded-diagram ● Function ● Input ● Lever ● Linkage ● Mechanism ● Motion ● Net ● Output ● Pivot ● Pneumatic system ● Thumbnail sketch | ● Aesthetic ● Air resistance ● Chassis ● Function ● Graphics ● Kinetic energy ● Mechanism ● Net ● Structure | ● Aesthetic ● Computer-aided design (CAD) ● Caption ● Design brief ● Design criteria ● Exploded-diagram ● Function ● Input ● Linkage ● Mechanism ● Motion ● Output ● Pivot ● Prototype ● Slider ● Structure ● Template | ●Assembly-diagram ●Automata ●Axle ●Bench hook ●Cam ●Clamp ●Component ●Cutting list ●Dowel ●Drill bits ●Exploded-diagram ●Finish ●Frame ●Function ●Hand drill ●Jelutong ●Linkage |
| **Digital World** | **Digital World** | **Digital World** | **Digital World** |
| ●Analogue ● Badge ● CAD ● Control ● Design requirements ● Develop ● Digital ● Digital revolution ● Digital world ● Fasten ● Feature ● Function ● Initiate ● Monitor ● Net ● Point of sale ● Product ● Program ● Sense ● Simulator ● Key features ● Layers ● Loops ● Micro: bit | ● 2D ● Advantage ● Assemble ● Block ● Brand identity ● Branding ● Bug ● CAD ● Coding ● Criteria ● Debug ● Develop ● Disadvantage ● Ergonomic ● Instructions ● Join ● Logo ● Loop ● Mindfulness ● Model ● Net ● Pause ● Process ● Program ● Prototype ● Sketchpad ● Template ● Test ● Timer ● User ● Form ● Function ● Variable | ● Alert ● Ambient ● Boolean ● Consumables ● Decompose ● Development ● Device ● Duplicate ● Durable ● Electronic ● Lightweight ● Man-made ● Manipulate ● Manoeuvre ● Microplastics ● Model ● Monitor ● Monitoring device ● Plastic pollution ● Programming comment ● Programming loop ● Reformed ● Replica ● Sensor ● Strong ● Sustainability ● Synthetic ● Thermometer ● Thermoscope ● Value ● Variable ● Versatile ● Water-resistant ● Workplane ● Moulded | ●3D CAD ●Application (apps) ●Biodegradable ●Boolean ●Cardinal compass ●Client ●Compass ●Concept ●Convince ●Corrode ●Duplicate ●Environmentally friendly ●Feature ●Finite ●Function ●Functional ●GPS tracker ●If statement ●Infinite |

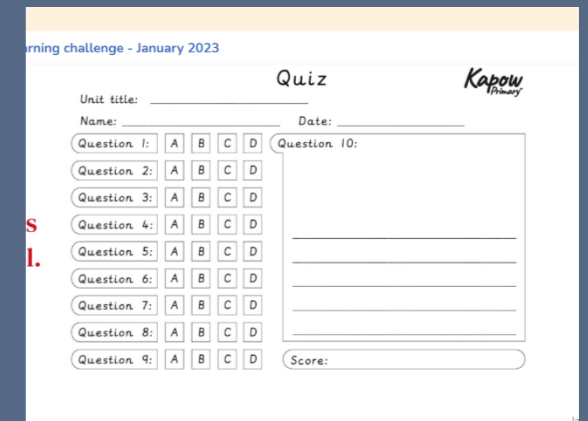| Y3 | Y4 | Y5 | Y6 |
|---|---|---|---|
| **Seesaw Library** | Re-visit previous Year's units. **Food, Structures, Textiles, Electrical systems, Mechanical systems, Digital world** | Re-visit previous Year's units. **Food, Structures, Textiles, Electrical systems, Mechanical systems, Digital world** | Re-visit previous Year's units. **Food, Structures, Textiles, Electrical systems, Mechanical systems, Digital world** |
|  |  |  |  |

**Cultural Capital / Enrichment**

| KNEX | KNEX | KNEX BAKE OFF POP UP CHRISTMAS CARDS | KNEX GREAT EXHIBITION COME DINE WITH ME |
|---|---|---|---|

**KNOWLEDGE ORGANISERS**

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## What are the end points, goals for this phase?

- Children have developed creative skills through planning, designing and making things.
- Teamworking skills through joint project work with other pupils is developed further.
- Technical / craft skills further developed by carefully working with a range of tools and materials.
- Links with computing skills are routine.