Design and Technology Curriculum – Year 5 and 6 – Cycle B

Please refer to Previous Years' Geography assessment documents linked to hierarchies

Link to DT Association guidance – Link to Projects on a Page Documents

Non-Negotiables	Developing Planning and Communicating Ideas	Evaluating Processes and Products	Knowledge and Understanding of Materials and Components
Year 5	Apply their understanding of how to strengthen, stiffen and reinforce more complex structures	• 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	• 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
Year 6	• 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.	• 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	• 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
Term	**Autumn**	**Spring**	**Summer**
Topic	Programming Pioneers	Make do and mend - **How did WWII change people's lives?**	Building bridges - **What makes bridges so strong?**
Resources	***Due to the specialised nature of the mechanisms in the unit of work, learning intentions and outcomes are very similar.*** Sratch/Raspberry Pi, 3D CAD software,	***Due to the specialised nature of the mechanisms in the unit of work, learning intentions and outcomes are very similar.*** collection of slippers or pictures of slippers for different people, from different cultures and for different purposes, selection of fabrics and materials *eg felt, dipryl (used for making disposable clothes), baize, hessian, calico, corduroy, wadding, bubble wrap, foam,* fabric paints, sequins, embroidery threads, needles, pins, threads, fabric scissors, paper/grid paper	***Due to the specialised nature of the mechanisms in the unit of work, learning intentions and outcomes are very similar.*** Resources available on the shared drive. Variety of wood, saws, card triangles, metal rulers, glue guns, glue, card, lolly pop sticks,
Vocabulary	Knowledge and understanding - Computer system, programming, embedded, debugging, software, hardware, micro-controllers, LED, algorithms,	designing *eg specification, flow chart, mock-up, accurate, users, fabric swatches, working drawing* making *eg pattern/template, working properties* knowledge and understanding *eg seam, seam allowance, insulation, sole, upper, inner, reinforce, right side/wrong side, stitch, stitching, tacking, wadding, sewing machine, hem*	making - proto-type, design criteria, knowledge and understanding - pillars, span, gaps, suspension, arch, beams, trusses, load, tension, support,
Lesson 1	**Year 5:** To explain how computers and computer programs are used in products. **Year 6:** To explain how computers and computer programs are used in a variety of products. **Activities:** Children will learn that many more complex electrical products are controlled using embedded computer systems, often with microcontrollers with specially written programs on them. They will begin to explain, in human language, the algorithms that monitor and control these systems. **Outcomes:** **Year 5 -** Children communicate and develop their ideas by discussing, annotating diagrams and writing instructions • Children begin to explain how embedded systems monitor and control products **Year 6 -** Children communicate and develop their ideas by discussing, annotating diagrams and writing instructions • Children begin to explain how embedded systems monitor and control products • Some children can explain how computer scientists have helped shape the world	**Year 5:** To investigate a range of slippers. **Year 6:** To investigate and compare a range of slippers. **Activities:** Children will explore, discuss and compare a variety of slippers, thinking about the materials used, their function and who they are designed for **Outcomes:** **Year 5 -** Children distinguish between functional and decorative items • Children compare a variety of products based on materials, function, cost and safety • Children identify the different materials that have been used **Year 6 -** Children distinguish between functional and decorative items • Children compare a variety of products based on materials, function, cost and safety • Children identify the different materials that have been used and explain why they were chosen	**Year 5:** To explore ways in which pillars and beams are used to span gaps. **Year 6:** To explore ways in which pillars and beams are used to span gaps. **Activities:** Children will learn about how simple bridges are constructed using beams, pillars or piers, then make and test beam bridge designs. **Outcomes:** **Year 5 -** • Children use technical vocabulary to explain how beam bridges are constructed • Children understand the impact better bridge design has had on daily life • Children investigate and explore the effectiveness of different beam/pillar designs **Year 6 -** • Children use technical vocabulary to explain how beam bridges are constructed • Children understand the impact better bridge design has had on daily life • Children investigate and explore the effectiveness of different beam/pillar designs
Lesson 2	**Year 5:** To develop ideas for a product with an embedded computer system that controls it. **Year 6:** To develop ideas for a product with an embedded computer system that controls it. **Activities:** Children will learn about the work of computer hardware and software engineers, and about some famous computer engineering partnerships. They will go on	**Year 5:** To be able to make a pattern for a pair of slippers **Year 6:** To be able to make a pattern for a pair of slippers **Activities:** Children will learn about creating a pattern for a pair of slippers, thinking about their size and learning about seam-allowance. They will then design a slipper pattern following an image provided. **Outcomes:**	**Year 5:** To explore ways in which trusses can be used to strengthen bridges. **Year 6:** To explore ways in which trusses can be used to strengthen bridges. **Activities:** Children will learn how trusses are used in bridge design to spread out compression forces. They may then either build and

	to design and program a computer-controlled pelican crossing using Scratch 2 coding software. **Outcomes:** **Year 5 -** Children develop prototypes of a computer-controlled electrical system • Children incorporate one electrical components in their system • Children improve their prototype designs by 'debugging' their software and/or hardware **Year 6 -** Children develop prototypes of a computer-controlled electrical system • Children incorporate one or more different electrical components in their system • Children improve their prototype designs by 'debugging' their software and/or hardware	**Year 5 - C**hildren know why a pattern or template must be created to make a pair of slippers the same size? • Children generate ideas for products • Children measure, mark out, cut and join accurately **Year 6 - C**hildren know why a pattern or template must be created to make a pair of slippers the same size? • Children generate ideas for products • Children measure, mark out, cut and join accurately	test model truss bridges, or use software to explore how truss bridges may be constructed. **Outcomes:** **Year 5 -** • Children use technical vocabulary to explain how truss bridges spread the load of objects travelling across them • Children apply their knowledge of how to stiffen and strengthen structures • Children evaluate their models against established design criteria **Year 6 -•** Children use technical vocabulary to explain how truss bridges spread the load of objects travelling across them • Children apply their knowledge of how to stiffen and strengthen structures • Children evaluate their models against established design criteria
Lesson 3	**Year 5:** To develop, model and communicate ideas for an embedded system which monitors and controls a door or a room **Year 6:** To develop, model and communicate ideas for an embedded system which monitors and controls a door, a room or both. **Activities:** Children will consider how a range of electronic components in products might work. They will discover how pioneering computer scientists made computers easier to use over time. After that they will start to design a product such as an automatic light or an alarm/door entry buzzer that could be installed in a room. **Outcomes:** **Year 5 -** Children develop a design brief for a product • Children develop their ideas for their product through discussion and annotated sketches • Children incorporate electrical systems in their product design **Year 6 -**Children develop a design brief for a product • Children develop their ideas for their product through discussion and annotated sketches • Children incorporate electrical systems in their product design	**Year 5:** To develop a range of sewing and decorating techniques. **Year 6:** To develop a range of sewing and decorating techniques. **Activities:** Children will consider ways in which sewing techniques and decorative embellishments may make a product design more attractive. They will then practise decorative sewing methods **Outcomes:** **Year 5 -** Children experiment with a variety of sewing stitches • Children experiment with a variety of decorating techniques • Children consider which techniques would be best to use when making slippers **Year 6 -**Children experiment with a variety of sewing stitches • Children experiment with a variety of decorating techniques • Children consider and evaluate which techniques would be best to use when making slippers Children will show an understanding of the qualities of materials to choose appropriate tools to cut and shape (such as the nature of fabric may require sharper scissors than would be used to cut paper). Children will join textiles with a combination of stitching techniques (such as back stitch for seams and running stitch to attach decoration). Children will use the qualities of materials to create suitable visual and tactile effects in the decoration of textiles (such as a soft decoration for comfort on a cushion)	**Year 5:** To explore ways in which arches are used to strengthen bridges. **Year 6:** To explore ways in which arches are used to strengthen bridges. **Activities:** Children will learn how arches are used to spread and redirect compression forces acting on bridges. They will then build and test model arch bridges. **Outcomes:** **Year 5 -** • Children use technical vocabulary to explain how arch bridges are constructed • Children use technical vocabulary to explain how arch bridges work • Children build and test models to find a strong bridge design **Year 6 -•** Children use technical vocabulary to explain how arch bridges are constructed • Children use technical vocabulary to explain how arch bridges work • Children build and test models to find a strong bridge design
Lesson 4	**Year 5:** To develop ideas for a product and start to write programs to monitor and control them. **Year 6:** To develop ideas for a product and start to write programs to monitor and control them. **Activities:** Children will learn more about why and how microcontrollers are used to control electronic products, then attempt to 'debug' a simple program written by some children to control a switch and an LED. They may then either program electronic components for their own room system designs from the previous lesson, or consider how a novelty electronic toy might be programmed. **Outcomes:** **Year 5 -** Children suggest ways in which a given product idea might be developed and improved • Children debug a defective algorithm for a given product idea • Children develop and debug their own computer-controlled product ideas • Use innovative combinations of electronics (or computing) and mechanics in product designs. **Year 6 -**Children suggest ways in which a given product idea might be developed and improved • Children debug a defective algorithm for a given product idea • Children develop and debug their own computer-controlled product ideas• Use innovative combinations of electronics (or computing) and mechanics in product designs.	**Year 5:** To be able to design a pair of slippers for a particular purpose. **Year 6:** To be able to design a pair of slippers for a particular purpose. **Activities:** Children will draw and annotate a design for their slippers, taking into consideration how they may be decorated. **Outcomes:** **Year 5 -** • Children apply what they have learnt when designing their slippers • Children draw up an appropriate design specification • Children produce detailed design criteria **Year 6 -•** Children apply what they have learnt when designing their slippers • Children draw up an appropriate design specification • Children produce detailed design criteria	**Year 5:** To understand how suspension bridges are able to span long distances. **Year 6:** To understand how suspension bridges are able to span long distances. **Activities:** Children will learn about how suspension bridges use tension to support bridge decks spanning large distances. They may then either build and test model suspension bridges, or research and write about iconic suspension bridges. **Outcomes:** **Year 5 -** Children explain how tension and compression forces are distributed by suspension bridges • Children build a model suspension bridge that will support a given weight • Children evaluate the designs of others and consider their views **Year 6 -**Children explain how tension and compression forces are distributed by suspension bridges • Children build a model suspension bridge that will support a given weight • Children evaluate the designs of others and consider their views
Lesson 5	**Year 5:** To model and communicate ideas, using either prototype models or computer-aided design.	**Year 5:** To be able to make a pair of slippers. **Year 6:** To be able to make a pair of slippers.	**Year 5:** To develop criteria and design a prototype bridge

	Year 6: To model and communicate ideas, using either prototype models or computer-aided design. **Activities:** Children will consider why we make prototype models, and how using models to explain ideas can be interesting and inspiring. They may then either make shoebox model rooms to show how their previously designed electronic systems might work, or use 3-D CAD software to create 3-D models. **Outcomes:** **Year 5 -** Children suggest ways in which models can better communicate ideas • Children make prototype models to communicate their ideas • Children control their prototypes using electronic components and computers **Year 6 -**Children suggest ways in which models can better communicate ideas than written/verbal descriptions alone • Children make prototype models to communicate their ideas • Children control their prototypes using electronic components and computers	**Activities:** Children to look through their designs carefully thinking about what materials they need before constructing their slippers. **Outcomes:** **Year 5 -** Children follow their design plan to make their slippers • Children join fabric parts together • Children use a range of decorating techniques •Cut materials with precision and refine the finish with appropriate tools (such as a more precise scissor cut after roughly cutting out a shape). • Create objects (such as a cushion) that employ a seam allowance. **Year 6 -**•Cut materials with precision and refine the finish with appropriate tools (such as sanding wood after cutting or a more precise scissor cut after roughly cutting out a shape). • Create objects (such as a cushion) that employ a seam allowance.	**Year 6:** To develop criteria and design a prototype bridge for a purpose. **Activities:** Having been presented with a design brief, children must develop criteria for a bridge design that will meet the terms of the brief. They will then either design a bridge according to their criteria, or generate more criteria for a range of given design briefs. **Outcomes:** **Year 5 -** Children write design criteria according to a given brief • Children design a prototype model according to design criteria • Children work collaboratively to produce a prototype according to an agreed design **Year 6 -**Children write design criteria according to a given brief • Children design a prototype model according to design criteria • Children work collaboratively to produce a prototype according to an agreed design
Lesson 6	**Year 5:** To evaluate your design for a computer-controlled system **Year 6:** To evaluate your design for a computer-controlled system and consider the views of others to improve your work. **Activities:** Children will reflect on their learning during previous lessons in this scheme of work, then evaluate their own product designs and design process. They will also consider ways in which the ideas of others helped them, and how they were able to help others, too. **Outcomes:** **Year 5 -** • Children explain ways in which they debugged and improved their programs for controlling products • Children identify ways in which their DT and programming skills have developed, and ways in which they could further develop their learning **Year 6 -**• Children explain ways in which they debugged and improved their programs for controlling products • Children explain how they learned from others and improved their own designs • Children identify ways in which their DT and programming skills have developed, and ways in which they could further develop their learning	**Year 5:** To be able to evaluate a finished product. **Year 6:** To be able to evaluate a finished product. **Activities:** Children will show off their slippers in the slipper boutique, then evaluate both their process and their finished product, either individually or with a partner **Outcomes:** **Year 5 -** • Children evaluate the work of others • Children evaluate their own work against the design specification • Children describe improvements they could make to their finished product **Year 6 -**• Children evaluate the work of others • Children evaluate their own work against the design specification • Children describe improvements they could make to their finished product	**Year 5:** To analyse and evaluate products according to design criteria. **Year 6:** To devise tests and analyse and evaluate products according to design criteria. **Activities:** Following on from the previous lesson, children will consider ways in which they might test their bridge design once constructed. They will then build and test their designs. **Outcomes: Year 5 -** • Children evaluate their product according to design criteria • Children consider the views of others and think of ways to improve their work •Cut materials with precision and refine the finish with appropriate tools (such as sanding wood after cutting or a more precise scissor cut after roughly cutting out a shape). **Year 6 -**Children devise tests to analyse a product according to design criteria • Children evaluate their product according to design criteria • Children consider the views of others and think of ways to improve their work •Cut materials with precision and refine the finish with appropriate tools (such as sanding wood after cutting or a more precise scissor cut after roughly cutting out a shape).

Assessment Criteria

	Exploring Existing Products	Developing Ideas	Making New Products	Evaluating
Year 5	I can investigate, analyse and evaluate a range of existing products.	• I can work from my own detailed plans when constructing my product.	• I can measure, cut and shape a range of materials with increasing accuracy. • I can assemble, join and combine components accurately. • I can sew a button onto material, threading a needle independently. • I can use pattern pieces and seam allowance to create a 3D product which includes decorative stitching. • I can use a range of construction tools (eg hand-drill, hammer, hacksaw, bench-hook) safely and accurately.	• I can evaluate finished products, suggesting alternative techniques which could achieve improvements, showing an awareness of fitness for purpose.
Year 6	I can identify a range of products which incorporate mechanical systems and explain how these work.	• I can use my understanding of the characteristics of familiar products when developing and communicating my own ideas. • I can work from my own detailed plans when constructing my product, modifying them as appropriate.	• I can measure, cut and shape a range of materials with increasing accuracy and select materials according to fitness for purpose. • I can construct a model incorporating at least one control mechanism• I can sew a button onto material, threading a needle independently. • I can use pattern pieces and seam allowance to create a 3D product which includes decorative stitching. • I can use a range of construction tools (eg hand-drill, hammer, hacksaw, bench-hook) safely and accurately.	. • I can evaluate my work as it develops, and modify my approach in the light of progress.