Design Technology – Year 7
SUBJECT OVERVIEW MAP

# Year 7: How do things work and how are they made?

| | Substantive Knowledge | Disciplinary Knowledge | Assessment |
|---|---|---|---|
| Half-term 1 | **701 – Block Bot**<br>This unit introduces pupils to workshop practice and timber manufacture through designing and making a wooden Block Bot.<br>• Workshop health and safety rules<br>• Difference between hardwoods and softwoods<br>• Properties and uses of pine<br>• Names and safe use of key tools and machinery: tenon saw, pillar drill and disc sander<br>• Working drawings, dimensions and tolerances<br>• Joining using dowel<br>• Sanding and surface finishing | ✓ Read and interpret a working drawing<br>✓ Measure and mark timber accurately<br>✓ Safely use workshop tools and machinery<br>✓ Manufacture components to given dimensions and tolerances<br>✓ Produce and assemble dowel joints<br>✓ Apply an appropriate surface finish<br>✓ Check accuracy and quality throughout manufacture | □ Block Bot practical outcome – accuracy, quality of manufacture and finish |
| Half-term 1 | **702 – CAD Ruler**<br>This unit introduces pupils to CAD/CAM through the design and manufacture of a personalised ruler.<br>• Difference between CAD and CAM<br>• Basic functions and layout of TechSoft 2D Design<br>• Common CAD tools: lines, shapes, text and transform | ✓ Use 2D CAD software to create an accurate design<br>✓ Work to specified dimensions<br>✓ Create and manipulate lines, shapes, text and images<br>✓ Prepare a CAD file for laser cutting and engraving | □ CAD ruler – accuracy of CAD work and suitability of manufactured outcome |

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| | • Vectors and their use for cutting and engraving<br>• Working accurately to specified dimensions<br>• How a laser cutter manufactures a CAD-designed product<br>• Advantages and limitations of CAD/CAM | ✓ Personalise a product while maintaining its function<br>✓ Reflect on the benefits and limitations of digital manufacture | |
| Half-term 2 | **703 – Isometric Drawing & Rendering**<br>This unit develops pupils' graphical communication skills and introduces techniques used by designers to communicate three-dimensional ideas.<br>• Purpose of graphical communication in design<br>• Principles of isometric drawing and 30° guidelines<br>• Line weight and proportion<br>• Tonal rendering and shading<br>• Light and shadow<br>• Representing different materials and forms | ✓ Construct accurate isometric drawings<br>✓ Use line weight to communicate form and edges<br>✓ Apply tonal rendering and shading to create depth<br>✓ Represent different materials visually<br>✓ Communicate a design idea clearly and accurately | □ Isometric drawing and rendering assessment |
| Half-term 2 | **704 – Simple Machines & Motion**<br>This unit introduces pupils to mechanical systems and explores how everyday products transfer or transform force and motion. | ✓ Identify simple machines and mechanisms in familiar products<br>✓ Identify and describe different types of motion<br>✓ Draw and label diagrams showing how mechanisms operate | □ Simple machines and motion assessment |

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| | • Six simple machines: lever, pulley, inclined plane, screw, wheel and axle, wedge<br>• Four types of motion: rotary, linear, reciprocating and oscillating<br>• Input and output motion<br>• Three classes of lever<br>• Linkages and how they change motion<br>• Basic mechanical advantage<br>• Examples of mechanisms in everyday products | ✓ Identify input and output motion<br>✓ Predict how changes to a mechanism affect its output<br>✓ Explain how mechanisms make tasks easier or change movement | |
| Half-term 3 | **705 – Paper Circuits**<br>This unit introduces pupils to basic electronic systems through practical circuit activities.<br>• Names and functions of cells/batteries, LEDs, resistors and switches<br>• Difference between conductors and insulators<br>• Open and closed circuits<br>• Polarity and correct orientation of LEDs<br>• Inputs and outputs in electronic systems<br>• How conductive materials can complete a circuit | ✓ Construct a simple functioning circuit<br>✓ Correctly position components and observe polarity<br>✓ Apply knowledge of conductors when constructing a paper circuit<br>✓ Identify faults and make changes to solve them<br>✓ Explain how a circuit functions using appropriate technical terminology | □ Working paper circuit and understanding of basic electronic systems |

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| Half-term 3 | **706 – Personalised Product Design & Additive Manufacture**<br>This unit introduces pupils to 3D CAD and additive manufacture through the design of a personalised product.<br>• Basic Tinkercad tools and functions<br>• Difference between 2D and 3D CAD<br>• How additive manufacture and 3D printing work<br>• Real-world applications of 3D printing<br>• Advantages and disadvantages of additive manufacture<br>• Importance of dimensions, fit and accuracy | ✓ Generate an idea for a personalised product<br>✓ Develop an idea using 3D CAD<br>✓ Create accurate forms using dimensions<br>✓ Manipulate, align, group and combine 3D shapes<br>✓ Prepare a model for 3D printing<br>✓ Evaluate how effectively the design meets its intended purpose and identify improvements | □ Personalised 3D CAD product – CAD skills, suitability for manufacture and evaluation |

*****Rotation change after HT3 to Food technology then repeats with new classes for HT 4, 5 and 6*****

Design Technology – Year 8
SUBJECT OVERVIEW MAP

# Year 8: How do things work and how are they made?

| | Substantive Knowledge | Disciplinary Knowledge | Assessment |
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| Half-term 1 | **Unit 801 – Puzzle Project. This unit develops pupils' workshop accuracy and problem-solving through the manufacture of a functional timber puzzle.**<br>- Properties and working characteristics of natural timbers and manufactured boards used in the project<br>- How working drawings communicate dimensions, shape and manufacturing information<br>- Meaning and importance of tolerance, accuracy and quality control<br>- Names, functions and safe use of tools and machinery for marking, cutting, drilling, shaping and finishing<br>- How shaping and finishing processes affect size, fit and appearance<br>- How iterative testing during manufacture identifies errors before final assembly | ✓ Read and interpret a working drawing to identify dimensions and manufacturing requirements<br>✓ Measure and mark out accurately using appropriate equipment<br>✓ Select and use workshop tools and machinery safely and independently<br>✓ Manufacture components within suitable tolerances<br>✓ Test fit throughout manufacture and make controlled adjustments<br>✓ Evaluate accuracy, finish and function and identify justified improvements | □ Puzzle practical outcome – MAKE: accuracy, independence and quality; TECH: materials, tools, processes and tolerances; EVALUATE: testing, function and justified improvements |

Design Technology – Year 8
SUBJECT OVERVIEW MAP

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| Half-term 1 | **Unit 802 – CAD/CAM Laser Box. This unit develops pupils' understanding of digital manufacture through the design and production of a laser-cut box.**<br>- Difference between CAD and CAM and how they work together<br>- Core 2D CAD tools used to create, edit, duplicate and dimension components<br>- How tabs, slots and interlocking joints form a three-dimensional product<br>- How material thickness, tolerance and laser kerf affect component fit<br>- How line types/colours communicate cutting and engraving instructions<br>- Advantages and limitations of CAD/CAM including accuracy, repeatability, modification and waste | ✓ Create accurate CAD geometry to specified dimensions<br>✓ Use copy, transform, alignment and editing tools efficiently<br>✓ Design joints and components that account for material thickness and fit<br>✓ Prepare a valid file for laser cutting and engraving<br>✓ Test manufactured components and refine the digital design where necessary<br>✓ Compare digital and hand manufacture and justify when CAD/CAM is appropriate | □ CAD design and laser-manufactured box – DESIGN/MAKE: accurate CAD and manufacture; TECH: CAD/CAM, joints, tolerance and kerf; EVALUATE: testing and refinement |
| Half-term 2 | **Unit 803 – Designing for a Real Client. This unit introduces user-centred design and asks pupils to develop a justified solution for a genuine client.**<br>- Difference between a client, user and target market<br>- Purpose of primary and secondary research<br>- How needs, wants and constraints influence a design solution | ✓ Gather relevant information from or about a real client<br>✓ Analyse research to identify specific needs and design opportunities<br>✓ Write a focused design brief and measurable specification<br>✓ Generate a range of distinct ideas that respond to user needs<br>✓ Annotate and justify materials, features, function and manufacture | □ Real-client design task – DESIGN: research-led ideas and communication; TECH: materials/processes and design decisions; EVALUATE: client feedback, specification testing and refinement |

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| | - Purpose of a design brief and measurable specification<br>- How ergonomics, function, aesthetics, materials and manufacture influence suitability<br>- How environmental and social considerations support responsible design | ✓ Use client feedback and specification criteria to refine a proposal | |
| Half-term 2 | **Unit 804 – Perspective Drawing & Design Communication. This unit develops sophisticated graphical communication through perspective, rendering and annotation.**<br>- Why designers use perspective to communicate realistic 3D form<br>- Principles of one-point and two-point perspective<br>- Purpose of horizon lines, vanishing points and construction lines<br>- How proportion, line weight and line quality affect clarity<br>- How tonal rendering, highlights, shadows and texture communicate form and materials<br>- How technical annotation communicates function, materials, manufacture and decisions | ✓ Construct accurate one-point and two-point perspective drawings<br>✓ Maintain believable proportion and alignment<br>✓ Use line weight deliberately to distinguish edges and details<br>✓ Apply rendering, texture, highlights and shadows<br>✓ Annotate drawings with relevant technical information<br>✓ Refine a design drawing so another person can understand the intended product | □ Perspective design presentation – DESIGN/MAKE: drawing accuracy and communication; TECH: perspective, rendering and annotation; EVALUATE: refinement and clarity |

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| Half-term 3 | **Unit 805 – Structures. This unit explores how designers use structural principles to create safe, stable and efficient products.**<br>- Characteristics of frame, shell and solid structures<br>- How tension and compression act on structures<br>- How triangulation, bracing and reinforcement increase rigidity<br>- How load, span, shape and force distribution affect performance<br>- How material properties and component cross-section affect strength and stiffness<br>- Why designers model, test and iteratively improve structures | ✓ Identify structural types and areas experiencing different forces<br>✓ Use diagrams and technical vocabulary to explain forces<br>✓ Develop a structural solution to a stated problem or constraint<br>✓ Select and apply reinforcement such as triangulation or bracing<br>✓ Carry out a fair structural test and record evidence<br>✓ Analyse weakness or failure and make justified modifications | □ Structures challenge – DESIGN/MAKE: structural solution and construction; TECH: forces, reinforcement and materials; EVALUATE: testing, strength/stability and justified improvement |
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*****Rotation change after HT3 to Food technology then repeats with new classes for HT 4, 5 and 6*****

Design Technology – Year 9
SUBJECT OVERVIEW MAP

# Year 9: How do things work and how are they made?

| | Substantive Knowledge | Disciplinary Knowledge | Assessment |
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| Half-term 1 | **Unit 901 – Designing for Disabilities. Pupils use inclusive and user-centred design to develop a product concept that improves an aspect of everyday life.**<br>- Inclusive design and why designers consider a wide range of users<br>- How different disabilities can create barriers when interacting with products and environments<br>- Ergonomics and the importance of comfort, grip, reach and ease of use<br>- Primary and secondary research into user needs<br>- How a design brief and specification translate a user problem into design criteria<br>- How prototypes allow designers to test size, form, usability and accessibility | ✓ Investigate a user and identify specific needs rather than designing from assumptions<br>✓ Analyse existing products and identify strengths and limitations<br>✓ Write a focused design brief and measurable specification<br>✓ Generate a range of ideas that respond directly to user needs<br>✓ Model and prototype ideas to test size, form and usability<br>✓ Evaluate proposals against user needs and use feedback to justify improvements | □ Designing for Disabilities task – DESIGN: research-led ideas and inclusive design; TECH: ergonomics, materials/processes and prototyping; EVALUATE: user feedback, specification testing and justified refinement |

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| Half-term 2 | **Unit 902 – Sweet Dispenser. Pupils develop increasingly independent workshop manufacture through the production of a functional mechanical product.**<br>- Properties and applications of timbers and manufactured boards used in manufacture<br>- How working drawings, dimensions and tolerances communicate manufacturing requirements<br>- How mechanisms control or change movement within a product<br>- Safe and accurate use of workshop tools and machinery<br>- Joining, shaping, drilling and finishing processes appropriate to the product<br>- How quality control and iterative testing improve fit, function and finish | ✓ Interpret drawings and plan a logical manufacturing sequence<br>✓ Measure and mark materials accurately from dimensions<br>✓ Select and use tools and machinery safely with increasing independence<br>✓ Manufacture components to suitable tolerances and quality standards<br>✓ Assemble and test a functioning mechanism, diagnosing problems where necessary<br>✓ Evaluate accuracy, function and finish and make justified improvements | □ Sweet Dispenser practical outcome – MAKE: accuracy, independence, mechanism and finish; TECH: materials, processes, mechanisms and tolerances; EVALUATE: testing, quality control and justified improvement |
| Half-term 3 | **Unit 903 – Smart Products & Programming. Pupils explore how electronic and programmable systems allow products to respond intelligently to users and their environment.**<br>- What makes a product 'smart' and examples of embedded programmable systems<br>- Inputs, processes and outputs within | ✓ Identify inputs, processes and outputs in existing smart products<br>✓ Construct and test a simple electronic or programmable system<br>✓ Create and modify programs to control outputs<br>✓ Use input data or switches to trigger an appropriate programmed response<br>✓ Test, debug and refine hardware and code systematically | □ Smart Product/programming challenge – DESIGN/MAKE: functioning programmed solution; TECH: inputs, processes, outputs and programming; EVALUATE: testing, debugging and refinement |

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| | electronic and control systems<br>- How sensors and switches provide input data<br>- How outputs such as LEDs, buzzers and motors create a response<br>- Basic programming concepts including sequence, selection and variables<br>- How programmable technology can improve function, accessibility, safety and user experience | ✓ Explain and justify how smart technology improves a product for its intended user | |
| Half-term 3 | **Unit 904 – SketchUp 3D Design. Pupils develop 3D CAD capability to model, communicate and refine design proposals digitally.**<br>- Purpose and applications of 3D CAD in professional design and manufacture<br>- Core SketchUp tools used to create and modify three-dimensional forms<br>- Importance of accurate dimensions, scale and proportion in digital modelling<br>- How groups, components and repeated features support efficient modelling<br>- How materials, textures, scenes and views improve communication of a design<br>- Advantages and limitations of virtual | ✓ Create accurate 3D models using appropriate SketchUp tools<br>✓ Work to dimensions and maintain suitable scale and proportion<br>✓ Modify and combine forms to develop increasingly complex designs<br>✓ Use groups/components and repeated features efficiently<br>✓ Apply materials, textures and presentation views to communicate intent<br>✓ Evaluate and refine a digital model against stated design requirements | □ SketchUp 3D design assessment – DESIGN/MAKE: accurate and increasingly complex digital model; TECH: 3D CAD tools and modelling conventions; EVALUATE: communication, refinement and response to design requirements |

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| | modelling when developing and presenting ideas | | |

*****Rotation change after HT3 to Food technology then repeats with new classes for HT 4, 5 and 6*****