



Wallington
County Grammar School

The Design & Technology Curriculum

Whole School Curriculum Intent:	<p>Wallington County Grammar School is a highly academic but pastorally minded school which delivers a curriculum that enables all students to embody our motto - <i>Per Ardua ad Summa</i>, Through Difficulties to the Heights. Each Subject Leader has autonomy over their own curriculum and its intent, i.e. its subject content, skills content, sequencing and assessment schedule. This is vital to ensure the academic curriculum is designed by highly qualified subject experts. The intentions behind whole school approach to curriculum design taken by senior leaders are to provide:</p> <ul style="list-style-type: none">● Breadth - We intend to provide a broad, academic and liberal curriculum that equips students with the body of human knowledge and different ways of thinking necessary to succeed in and enjoy their education, careers and wider lives.● Depth - We do not want our students to simply study the national curriculum and examination specifications with grades being our sole focus. We aim for our students to become true scholars of the disciplines that they are learning so that they achieve a deep and sophisticated level of knowledge and understanding.● Values - We aim for our students to develop our four core values: commitment, courage, compassion and creativity.● Democracy - We aim for all our students to have the necessary knowledge and confidence, not just to participate in the democracy of the United Kingdom, but to lead it.
Subject Curriculum Intent:	<p>At KS3 Design and technology is an inspiring, rigorous and practical subject. Using creativity and imagination, pupils design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, they develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation.</p> <p>GCSE Design and Technology will prepare students to participate confidently and successfully in an increasingly technological world. Students will gain awareness and learn from wider influences on Design and Technology including historical, social, cultural, environmental and economic factors. Students will get the opportunity to work creatively when designing and making and apply technical and practical expertise.</p> <p>AQA GCSE allows students to study core technical and designing and making principles, including a broad range of design processes, materials techniques and equipment. They will also have the opportunity to study specialist technical principles in greater depth.</p>
Subject Curriculum Aims:	<p>The national curriculum for design and technology aims to ensure that all pupils:</p> <ul style="list-style-type: none">● 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.

At GCSE the Design and Technology specification sets out the knowledge, understanding and skills required to undertake the iterative design process of exploring, creating and evaluating. The majority of the specification should be delivered through the practical application of this knowledge and understanding.

In order to make effective design choices students will need a breadth of core technical knowledge and understanding that consists of:

- new and emerging technologies
- energy generation and storage
- developments in new materials
- systems approach to designing
- mechanical devices
- materials and their working properties.

In addition to the core technical principles, all students should develop an in-depth knowledge and understanding of the following specialist technical principles:

- selection of materials or components
- forces and stresses
- ecological and social footprint
- sources and origins
- using and working with materials
- stock forms, types and sizes
- scales of production
- specialist techniques and processes
- surface treatments and finishes.

Each specialist technical principle should be delivered through at least one material category or system. Not all of the principles outlined above relate to every material category or system, but all must be taught.

The categories through which the principles can be delivered are:

- papers and boards
- **timber based materials**
- metal based materials
- polymers
- textile based materials
- **electronic and mechanical systems.**

Students should know and understand that all design and technology activities take place within a wide range of contexts.

They should also understand how the prototypes they develop must satisfy wants or needs and be fit for their intended use. For example, the home, school, work or leisure. They will need to demonstrate and apply knowledge and understanding of designing and making principles in relation to the following areas:

- investigation, primary and secondary data
- environmental, social and economic challenge
- the work of others

	<ul style="list-style-type: none">• design strategies• communication of design ideas• prototype development• selection of materials and components• tolerances• material management• specialist tools and equipment• specialist techniques and processes
Exam Boards	GCSE: AQA

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y7	<p>It's Rubbish!</p> <p>This transitional (KS2-3) unit introduces the concept of the iterative process of design and utilises design strategies such as user centred design & collaboration to design the ultimate kitchen bin.</p>	<p>Inspired by Industry 1 - Making Life Easier for Parents</p> <p>This unit builds upon the CAD/CAM skills introduced in the previous project and takes them to the next level. Students will design and make a USB powered colour changing night light.</p> <p>This is the first 'big project' for the students.</p> <p>There are four elements:</p>	<p>Inspired by Industry 1 - Making Life Easier for Parents</p> <p><i>Electronics</i></p> <p>Simple circuit consisting of Power supply; terminal blocks; SPST switch; 0 ohm resistor; 150 ohm resistor & colour changing 5mm LED. Constructed on a veroboard with a custom cut acrylic spacer to allow easier assembly later on.</p>	<p>Inspired by Industry 1 - Making Life Easier for Parents</p> <p><i>CAD/CAM</i></p> <p>The design element is aimed at a predetermined target audience. The ideas are sketched, reproduced using CAD (2D Design) & further developed to make them appropriate for the CAM procedure. The acrylic designs are then laser cut & etched.</p>	<p>Inspired by Industry 1 - Making Life Easier for Parents</p> <p><i>Assembly & Finishing</i></p> <p>The component parts are brought together and assembled to produce a finished product.</p> <p>This will involve the use of various adhesives and fixings.</p>	<p>Bridging the Gap Techknowledge</p> <p>This bridge building unit is intended to cover the NC requirements to understand and use the properties of materials and the performance of structural elements to achieve functioning solutions. It encourages collaboration & competition in the workshop as we set a number of construction challenges from virtual bridge building; tower constructions & physical bridge models. These are then destructively tested to discover the best bridge design in respect of strength to weight ratio.</p>
	<p>Me, Myself & I</p> <p>This unit introduces the use of CAD/CAM to design & make an ID stick for future work. Students are asked to generate a range of design ideas for a personal logo that tells a story about them. They then develop these into a working solution by using newly learned CAD skills. These are then further developed into monochrome solutions so they can be interpreted by the laser cutter.</p>	<p><i>Woodwork (FPT)</i></p> <p>Lap jointed frame with drilled 'housing joint' slots for the switch & cable. Lid is glued & pinned to the top. Base is screwed on to allow access for maintenance. The final component is sanded & finished with Danish Oil.</p>				
	<p>The sequencing of the various aspects of the Inspired by Industry Project is entirely dependent on the scheduling of classes on the timetable. It may be necessary to complete each of the tasks in a different order to that shown given the availability or staffing/rooming & resources.</p>					
	Assessment 1 Format:	MC, Short & Long Format Assessment.		Assessment 2 Format:	MC, Short & Long Format Assessment paired with practical progress. Split 50/50.	

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2	
Y8	<p>Inspired by Design - The Memphis Clock</p> <p>The project seeks to integrate research with sketched ideas and development of those ideas by model in card, using a specification derived from research to test ideas and guide the evolution of the design in the student's mind. The clock is realised in a free choice from plastics, woods and metals.</p> <p><i>Woodwork (FPT)</i> Finger jointed frame with cut out for electronic access. Laser cut ply covers for the front & top.</p>	<p>Inspired by Design - The Memphis Clock</p> <p><i>Electronics</i> Bistable circuit consisting of Power supply; terminal blocks; 2XPTM Switches; 18K & 270 ohm resistors; 10nF capacitor & warm white 5mm LED. Constructed on a custom made PCB.</p>	<p>Inspired by Design - The Memphis Clock</p> <p><i>Design, Manufacture & Assembly</i> Students have access to a range of appropriate materials depending on their chosen design.</p>	<p>Inspired By Industry 2 - Creating a Tidy Workspace</p> <p>This project is the introduction to KS4 NEA style work. It has been put together to allow students access to a simple design and make challenge which is context driven. A classic 'desk tidy' approach allows for an introduction to materials and manufacturing methods with a modern/real context.</p> <p><i>iPoD</i></p> <ul style="list-style-type: none"> • Empathise • Define • Ideate • Modelling 	<p>Inspired By Industry 2 - Creating a Tidy Workspace</p> <p><i>Prototype</i></p> <ul style="list-style-type: none"> • Revisions • Testing • Planning <p>There is also an opportunity to look at CAD work here, either simplistic block modelling, or exploring assemblies and components. Outcomes / models may be laser-cut, CNC machined, 3D printed or using more traditional methods by hand.</p>	<p>Inspired By Industry 2 - Creating a Tidy Workspace</p> <p><i>Manufacture & Assembly</i></p> <p>Students have access to a range of appropriate materials depending on their chosen design.</p>	
	<p>The sequencing of the various aspects of these units is entirely dependent on the scheduling of classes on the timetable. It may be necessary to complete each of the tasks in a different order to that shown given the availability or staffing/rooming & resources.</p>						
	Assessment 1 Format:	MC, Short & Long Format Assessment.			Assessment 2 Format:	MC, Short & Long Format Assessment paired with practical ability. Split 50/50.	

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y9 EP	<p>Optical Theremin This introduction to GCSE D&T (Electronics) is designed to provide the students with their first exploration of digital microelectronics. This will cover:</p> <ul style="list-style-type: none"> • Analogue V Digital Signals • Analogue to Digital Conversion • NE555 Timer IC • Bistables • Monostables • Astable 	<p>Optical Theremin <i>Circuit Design & Development</i></p> <p>Students will design & develop a working optical theremin circuit & PCB. This will include the introduction of sensors.</p>	<p>Optical Theremin <i>Casing Design & Development</i></p> <p>The decorative relief design on the casing is based upon elements of iconic design. This is produced using laser cut card that will sit on top of the standard vacuum forming mould.</p>	<p>Optical Theremin <i>Manufacture & Assembly</i></p> <p>Students have access to a range of appropriate materials depending on their chosen design. The main casing body will be vacuum formed with a tapped & line bent acrylic base.</p>	<p>Microcontroller Systems Design</p> <p>This unit introduces the concept of programming microcontrollers to sense and respond to external stimuli.</p> <p>Students are provided with an introductory course that covers the history & basics of PIC microcontrollers.</p>	<p>Microcontroller Systems Design</p> <p>Students move on to design & develop numerous systems within the contexts of Microcontrollers in the Home and Health Care.</p> <p>The aim is for the students to build a catalogue of subsystems that can be used at a later date.</p>
	Specialist Technical Principles - Unit 5F - Electronic Systems.	Designing & Making Principles - Unit 6 - Designing Principles.	Designing & Making Principles - Unit 7 - Making Principles.	Specialist Technical Principles - Unit 4 - Common Specialist Principles.		
	Assessment 1 Format:	GCSE Paper - Section C		Assessment 2 Format:	GCSE Paper - Sections B&C	

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y9 RM	<p>Mechanical Toy Mechanisms & Motion</p> <p>Theory</p> <p>(Health & safety (risk assessment, PPE) Mechanisms & motion (STEM principles) - Linkages and Levers, CAMs and movement</p> <p>Product design development and creativity - Develop design thinking and problem-solving & iteration.</p>	<p>Mechanical Toy Mechanisms & Motion</p> <p>Design & Development</p> <p>Understand properties and uses of timber and manufactured boards. Timber types & properties (hardwoods, softwoods, manufactured boards)</p> <p>Develop practical woodworking skills - Joints, Marking out and measuring accurately. Surface preparation and finishing techniques</p>	<p>Mechanical Toy Mechanisms & Motion</p> <p>Fabricating Parts</p> <p>CAD - Technical accuracy of drawings and plans</p> <p>Evaluating design decisions and finished products,</p> <p>Manufacturing diary - Peer & self Assessment.</p>	<p>Mechanical Toy Mechanisms & Motion</p> <p>Assembly & Finishing</p> <p>Students have access to a range of appropriate tools, materials and equipment depending on their chosen design.</p>	<p>Take a Seat</p> <p>This project is intended to be a 'mini NEA'. It will introduce the students to the demands and rigours of the NEA that they will complete next year, worth 50% of their final grade.</p> <p>The project is to design & manufacture a scale model of a chair. This will consolidate their understanding of Units 4-6, studied earlier in the year.</p> <p>This unit focuses on Section A: Identifying & investigating design possibilities and Section B: Producing a design brief & specification.</p>	<p>Take a Seat</p> <p>This unit focuses on Section C: Generating design ideas and Section D: Developing design ideas.</p>
	Specialist Technical Principles - Unit 5B - Timber Based Materials.	Designing & Making Principles - Unit 6 - Designing Principles.	Designing & Making Principles - Unit 7 - Making Principles.	Specialist Technical Principles - Unit 4 - Common Specialist Principles.		
	Assessment 1 Format:	GCSE Paper - Section C			Assessment 2 Format:	GCSE Paper - Sections B&C

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y10 EP	<p>Microcontroller Systems Design</p> <p>In this final iteration, students are asked to provide a complete working system based on the contextual challenge provided by their teacher.</p> <p>For this they will have to Produce working simulations of the following:</p> <ul style="list-style-type: none"> ● Circuit Diagram ● Programmed Flowchart ● PCB ● Optimised PCB 	<p>Electronic Dice (Mini-NEA)</p> <p>This unit is designed to build students familiarity & confidence when tackling contextual design challenges.</p> <p><i>Circuit Design, Development Programming & Testing</i></p> <p>The dice should mimic the functionality of a traditional six-sided die, displaying a random number (1–6) when activated—typically via a button press or shake sensor. The display will be achieved using LEDs.</p>	<p>Electronic Dice (Mini-NEA)</p> <p><i>PCB Design, Development & Testing</i></p> <p>The circuit is converted into a PCB, virtually tested and then acid etched, cleaned & drilled in preparation for component population & soldering.</p>	<p>Electronic Dice (Mini-NEA)</p> <p><i>Electronic Assembly</i></p> <p>Properly soldered or connected components. Tidy wiring and secure connections. Integration of microcontroller, LEDs and power supply.</p> <p>Concept Sketches / Design Plan</p> <p>Initial sketches or CAD mockups of the dice layout and housing.</p> <p>Description of how input will be triggered (e.g., button, shake).</p>	<p>Electronic Dice (Mini-NEA)</p> <p>Final Assembly & finishing</p> <p>To complete the project, the electronic components will be housed in a custom-designed, laser-cut plywood enclosure. This casing should not only be functional—protecting the electronics and providing access to inputs and outputs—but also visually appealing and well-fitted to the hardware.</p>	<p>NEA Sections A&B</p> <p>Students will complete the first five pages of the NEA task.</p>
	Core Technical Principles - Unit 1 - New & Emerging Technologies	Core Technical Principles - Unit 2 - Energy Materials, Systems & Devices.	Core Technical Principles - Unit 3 - Materials & Their Working Properties	Revision & Exam Preparation		
	Assessment 1 Format:	Unit 1 - End of Unit Assessment		Assessment 2 Format:	GCSE Paper Sections A&B	

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y10 RM	<p>Take Seat</p> <p>Mini NEA - Section E - Realising design ideas and Section F - Analysing & evaluating.</p>	<p>Tulipwood Box</p> <p>This project focuses on developing practical skills. The students will be making a box from tulipwood using traditional woodwork skills. They will study a range of box joints and select two to use in joining their box together. It will feature a hinged lid and decorative details created using a laser cutter.</p>	<p>Tulipwood Box</p> <p>1. Research & Design Study different types of box joints (finger, dovetail, lap, mitre, etc.). Decide on box dimensions, layout, and two joints to incorporate. Sketch design ideas and include joint placement. Design decorative patterns to be engraved or cut with a laser.</p> <p>2. Material Preparation Select tulipwood blanks; check for defects.</p> <p>Mark and cut pieces for: Front/back Sides Base Lid (fixed or overhanging)</p> <p>3. Cutting to Size Saw each component slightly oversize. Plane to final dimensions. Check squareness using try square.</p>	<p>Tulipwood Box</p> <p>4. Marking & Cutting Joints Carefully mark out two types of joints (e.g., dovetail at front, finger joints at back). Cut joints using saws and chisels. Test fit and refine for accuracy.</p> <p>5. Decorative Details (Laser Cutting) Prepare digital files. Engrave or cut designs into selected panels (e.g., lid or front face). Consider backing through-cuts with contrasting wood or acrylic.</p> <p>6. Assembly & Gluing Dry fit the box. Apply wood glue to joints and clamp securely. Check all sides for squareness. Attach the base (glued or rebated).Hinge Fitting Mortising with chisels, precise screw placement. Sanding & Finishing Manual sanding and applying finishes like oil, wax, or lacquer.</p>	<p>Tulipwood Box</p> <p>7. Hinge Fitting Mark out and chisel hinge mortices on box and lid. Pre-drill screw holes. Fit hinges and test lid movement.</p> <p>8. Surface Preparation & Finishing Sand all surfaces (progressively finer grits). Apply chosen finish (oil, wax, lacquer). Allow to dry and buff if necessary.</p> <p>9. Final Checks & Presentation Ensure all parts function properly. Evaluate quality of joints and decorative elements. Add lining (optional) or hardware such as a clasp.</p>	NEA Sections A&B
	Core Technical Principles - Unit 1 - New & Emerging Technologies	Core Technical Principles - Unit 2 - Energy Materials, Systems & Devices.	Core Technical Principles - Unit 3 - Materials & Their Working Properties	Revision & Exam Preparation		

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Assessment 1 Format:	Unit 1 - End of Unit Assessment		Assessment 2 Format:	GCSE Paper Sections A&B	
Y11 EP & RM	NEA Section C: Generating design ideas and Section D: Developing design ideas.	Section E - Realising design ideas.	Section E - Realising design ideas.	NEA Section F - Analysing & evaluating and Exam Preparation.		
	Mock Format:	Full GCSE Paper				

Key Vocabulary

Core Technical Principles	Specialist Technical Principles	Designing and Making Principles
New and emerging technologies Energy generation and storage Renewable energy Fossil fuels Systems approach to designing Mechanical devices Materials and their working properties Smart materials Composite materials Technical textiles Inputs, Processes, Outputs	Material categories (e.g., papers and boards, timbers, metals, polymers, textiles) Selection of materials or components Forces and stresses Ecological and social footprint Sources and origins Stock forms, types and sizes Scales of production Specialist techniques and processes Surface treatments and finishes	Design brief Design specification Primary and secondary data Ergonomics Anthropometrics Iterative design Market research Modelling (2D/3D, CAD/CAM) Prototype Tolerances Material management Communication of ideas (e.g., freehand sketching, isometric drawing, orthographic projection)

Suggested Reading List

Clarke D. (Ed.) (1977) The Encyclopedia of How it Works. Marshall Cavendish
 Harrison I. (2004) The Book of Inventions CASSELL ILLUSTRATED
 Macaulay D. (1988) The Way Thing Work CLB
 Duchting H et al (Ed.) (2012) 50 Designers You Should Know PRESTEL
 Anderson P. & Draisey J. (2011) Design & Technology Resistant Materials Technology Foundations NELSON THORNES
 Fiell Charlotte & Peter (Ed.) (2003) Designing in the 21st Century TASCHEN
 Lefteri C. (2007) Making It: Manufacturing Techniques for Product Design LAURENCE KING
 McDermott C. (1997) Design Museum 20th Century Design TED SMART
 Duchting H et al (Ed.) (2012) 50 Designers You Should Know PRESTEL
 Lidwell W. & Manacsa G. (2009) Deconstructing Product Design ROCKPORT