Thomas More Catholic Academy
FAITH | EXCELLENCE | RESPECT

Design and Technology Curriculum Sequence – Key Stage 4

	KS3 prior learning	By the end of the term, students can:	Year 10 Term 1	Year 10 Term 2	Year 10 Term 3	Year 11 Term 1	Year 11 Term 2	Year 11 Term 3
Students who opt for Design and Technology have the option to take a Textiles or a Product Design route. Most core content is the same, the differences will be in specialist subject content where they will focus on Textiles or Wood and Polymers and practical's will be subject specific. Product Design or Textiles focus. What we want our students to know and remember	KS3 builds the understanding of Design and Technology, deepening the understanding of the design process, the use of a greater variety of tools and equipment, developing greater confidence in a real environment i.e.; workshop and food room. Making more complex practical's using a wider variety of materials and ingredients. Further developing evaluation and annotation skills. IT develops 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	Define the key tier 3 vocabulary:	• crowd funding • virtual marketing and retail • co-operatives • fair trade. finite • non-finite • disposal of waste. technology push/market pull continuous improvement • efficient working • pollution • global warming. automation • computer aided design (CAD) • computer aided manufacture (CAM) • flexible manufacturing systems (FMS) • just in time (JIT) • lean manufacturing planned obsolescence • design for maintenance • ethics • the environment. coal • gas • oil. wind • solar • tidal • hydro-electrical • biomass. Kinetic pumped storage systems. Alkaline and re-chargeable batteries Graphene, Metal foams Coated metals, Liquid Crystal Displays (LCDs) and Nanomaterials. composite materials technical textiles input output mechanical devices levers linkages rotary systems natural fibres including: • cotton • wool • silk synthetic fibres including: • polyester • polyamide (nylon) • elastane (lycra) blended and mixed fibres including: • cotton/polyester woven including: • plain weave	Functionality: application of use, ease of working. Aesthetics: surface finish, texture and colour. Environmental factors: recyclable or reused materials. Availability: ease of sourcing and purchase. Cost: bulk buying. Social factors: social responsibility. Cultural factors: sensitive to cultural influences. Ethical factors: purchased from ethical sources such as FSC. Tension, compression, bending, torsion and shear How materials can be reinforced, stiffened or made more flexible: e.g. lamination, bending, folding, webbing, fabric interfacing. Ecological issues Deforestation, mining, drilling and farming 6R's Reduce, refuse, re-use, repair, recycle and rethink. Sources and origins raw materials modification, surface finishes, shape and form using cutting, abrasion and addition, Stock forms and scales of production prototype • batch • mass • continuous. Production aids, wastage, forming and reforming	Investigation, primary and secondary data, client, market research, ergonomics, anthropometric data and percentiles. user needs, design brief, design specification, environment deforestation, Designers • Alexander McQueen • Aldo Rossi • Aljoud Lootah • Charles Rennie Macintosh • Coco Chanel • David Adjaye • Elsie Owusu • Ettore Sottsass • Gerrit Reitveld • Harry Beck • Joe Casely-Hayford • Karim Rashid • Kusheda Mensah • Louis Comfort Tiffany • Marcel Breuer • Mary Quant • Morag Myerscough • Norman Foster • Philippe Starck • Pierre Davis • Raymond Templier • Rei Kawakubo • Sir Alec Issigonis • The Singh Twins • Vivienne Westwood • William Morris • Yinka Ilori • Zaha Hadid. • Alessi • Apple • Braun • Dyson • Gap • Primark • Under Armour • Zara. Design strategies • collaboration • user centred design • a systems approach • iterative design • avoiding design fixation. sketching • modelling • testing • evaluation	NEA, presentation, interpretation, iterative, Identifying and investigating design possibilities • design brief and specification • Generating design ideas • Developing design ideas • 2D 3D isometric, working drawings, annotation, material research, material properties, realising design ideas • Analysing & evaluating	Developing designs, manufacturing specification, prototype, toile, evaluation, modelling, justification, material properties, tolerance, quality control, analysis.	Final preparation for GCSEs GCSE Examinations Dates: TBC

			non-woven including: • bonded fabrics • felted fabrics knitted textiles including: • knitted fabrics. strength • hardness • toughness • malleability • ductility and elasticity. absorbency (resistance to moisture) • density • fusibility • electrical and thermal conductivity. Polymers thermoforming thermosetting ferrous non-ferrous alloy hardwood softwood manufactured board	Tolerances, commercial processes quality control Surface treatments and finishes.	2D 3D drawing exploded view, isometric, working drawings modelling, prototype, toile, tolerance, material management, minimising waste, Surface treatments and finishes			
		Recall the knowledge:	new and emerging technologies effective business innovation. resource consumption technology push/market pull Changing job roles fashion and trends new and emerging technologies. negative impact on others Positive and negative impacts on the environment Production techniques and systems Ethical factors, ecological and social footprint. Energy generation, fossil fuels, nuclear and renewable energy. Energy storage modern smart and composite materials electronic systems and devices, linear, rotary, reciprocating and oscillating movements. Categorisation of the types and properties of materials.	Core technical principles, selection of materials or components forces and stresses ecological and social footprint sources and origins using and working with materials stock forms scales of production specialist techniques and processes surface treatments and finishes. Focus on at least one specialist area; papers and boards timber-based materials metal-based materials polymers textile-based materials electronic and mechanical systems. Usually Woods and Textiles. Selection and use of ecological and social footprint energy sources. stock forms and components Calculation of material quantities and sizes. Calculate surface area and volume e.g. material requirements for a specific use. Efficient material use, A range of tools, equipment and processes shape,	Design contexts. wants or needs intended use. designing and making principles investigation primary and secondary data environmental, social and economic challenge the work of others design strategies communication of design ideas prototype development materials and components tolerances material management specialist tools and equipment specialist techniques and processes. Alterations and modifications existing products evaluation. The environment social and economic challenges deforestation global warming fair trade. Students should investigate the work of designers and companies Develop design ideas freehand sketching, isometric and perspective 2D and 3D drawings system and schematic diagrams	Design possibilities identified and thoroughly explored, directly linked to a contextual challenge demonstrating excellent understanding of the problems/opportunities. Comprehensive design brief which clearly justifies how they have considered their user/client's needs and wants and links directly to the context selected. Imaginative, creative and innovative ideas have been generated, fully avoiding design fixation and with full consideration of functionality, aesthetics and innovation. Very detailed development work is evident, using a wide range of 2D/3D techniques (including CAD where appropriate) in order to develop a prototype. The correct tools, materials and equipment (including CAM where appropriate) have been consistently used or operated safely with an exceptionally high level of skill. Extensive evidence that various iterations are as a direct result of considerations linked to testing, analysis and evaluation of the	Application of knowledge of specialist processes and tool use to create a prototype Understanding a design brief and specification, justifying material choices, linking to wider issues. Manufacturing processes, selection of tools and equipment. Evaluation of prototype against a specification, brief and client needs and wants.	

				fabricate, construct and assemble.	annotated drawings exploded diagrams working drawings: 3rd angle orthographic, interviews with client or users mathematical modelling computer-based tools working directly with materials and components select and use materials and components specialist tools and equipment, including hand tools, machinery, digital design specialist techniques and processes surface treatments and finishes	prototype, including well considered feedback from third parties.		
What we want our students to do	The GCSE is a 2-year pathway, year 10 focuses on building theory and practical skills and knowledge. The subject content has been split into three sections as follows: • Core technical principles • Specialist technical principles • Designing and making principles *Year 11 focuses on the NEA task.* • Non-exam assessment (NEA): 30–35 hours approx. • 100 marks • 50% of GCSE	Demonstrate excellence in these skills:	Students should know; Industry -The impact of new and emerging technologies Enterprise- Enterprise based on the development of an effective business innovation. The impact of resource consumption on the planet: People- How technology push/market pull affects choice. Changing job roles due to the emergence of new ways of working driven by technological change. Culture- Changes in fashion and trends in relation to new and emergent technologies. Society- How products are designed and made to avoid having a negative impact on others Environment -Positive and negative impacts new products have on the environment: Production techniques and systems Ethical factors and consideration of ecological and social footprint.	Students should know; 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-	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 • design strategies • communication of design ideas • prototype development • selection of materials and components • tolerances • material management • specialist tools and equipment • Students should consider their own needs, wants and interests and those of	Students now apply the knowledge, understanding and skills required to undertake the iterative design process of exploring, creating and evaluating. Students will be required to undertake a small-scale design and make task and produce a final prototype based on a design brief produced by the student. The contextual challenges for the task will be set by AQA and allow students to select from a list issued to schools. The contexts will change every year. students will be expected to develop a specific brief that meets the needs of a user, client or market. Students must produce a written or digital design folder clearly evidencing how the assessment criteria have been met, together with photographic evidence of the final manufactured prototype. Students should produce a concise folder. We recommend that this folder does not exceed 20 pages of A3 paper,	Fully justified detailed analysis of contextual challenge.	

			Energy generation including fossil fuels, nuclear and renewable energy. Energy storage Understanding modern smart and composite materials and their properties Students should consider electronic systems including programmable components to provide functionality to products and processes, and enhance and customise their operation. The functions of mechanical devices to produce linear, rotary, reciprocating and oscillating movements. Students should know and understand the categorisation of the types and properties of materials.	based materials • electronic and mechanical systems. Selection and use of materials considering end of life disposal. students should have a knowledge and understanding of the ecological and social footprint left by designers. Understanding of how to choose appropriate energy sources. students should know and understand the different stock forms types and sizes in order to calculate and determine the quantity of materials or components required. Calculation of material quantities and sizes. Calculate surface area and volume e.g. material requirements for a specific use. Efficient material use, pattern spacing, nesting and minimising waste. A range of tools, equipment and processes that can be used to shape, fabricate, construct and assemble high quality prototypes, as appropriate to the materials and/or components being used	others. specialist techniques and processes. Why a designer considers alterations to a brief and modifying the brief as required. Comparative chart of performance criteria as for existing products to help evaluate them. The environment, social and economic challenges that influence design and making. How the following might present opportunities and constraints that influence the processes of designing and making: • deforestation • possible increase in carbon dioxide levels leading to potential global warming • the need for fair trade. Students should investigate, analyse and evaluate the work of past and present designers and companies to inform their own designing. Students should investigate the work of a minimum of two designers and companies Develop, communicate, record and justify design ideas using a range of appropriate techniques such as: • freehand sketching, isometric and perspective • 2D and 3D drawings • system and schematic diagrams • annotated drawings that explain detailed development or the conceptual stages of designing • exploded diagrams to show constructional detail or assembly • working drawings: 3rd angle orthographic, using conventions, dimensions and drawn to scale • audio and	equivalent A4 paper or the digital equivalent. The coursework is divided into the following sections; AO1 Identify, investigate and outline design possibilities Producing a design brief & specification Design and make prototypes that are fit for purpose Generating design ideas Developing design ideas Realising design ideas Analyse and Evaluate		

					visual recordings in support of aspects of designing: eg interviews with client or users • mathematical modelling • computer based tools • modelling: working directly with materials and components, eg card modelling, producing a toile when designing garments, constructing a circuit using breadboard. How to select and use materials and components appropriate to the task considering: • functional need • cost • availability. How to select and use specialist tools and equipment, including hand tools, machinery, digital design and manufacture, appropriate for the material and/or task to complete quality outcomes. How to use them safely to protect themselves and others from harm. How to select and use specialist techniques and processes appropriate for the material and/or task and use them to the required level of accuracy in order to complete quality outcomes. Students should know and understand that surface treatments and finishes are applied for functional and aesthetic purposes.			
Key assessment questions:			2hr paper. SECTION A – Core Technical Principles 10 multiple choice questions. 3x 2-mark questions	2hr paper. SECTION A – Core Technical Principles 10 multiple choice questions. 3x 2-mark questions	2hr paper. SECTION A – Core Technical Principles 10 multiple choice questions. 3x 2-mark questions	In Year 11 students will be completing the NEA. The Non-exam assessment will contribute towards 50% of the students' overall mark. The NEA project in its entirety should take between 30–35 hours to complete and consist of		What's assessed • Core technical principles • Specialist technical principles • Designing and making principles In addition: • at least 15% of the exam will assess maths • at least 10% of the exam will assess science.

			SECTION B – Specialist Technical Principles Deeper understanding extended writing required. SECTION C – Designing and Making Principles Including maths and design questions. Students will also be assessed on making proficiency. Textile based materials (how to sew, pleat, gather, quilt and pipe). Timber based materials (how to cut, drill, chisel, sand and plane). In addition to surface finishes Textile based materials (printing, dyes and stain protection) Timber based materials (painting, varnishing and tanalising).	SECTION B – Specialist Technical Principles Deeper understanding extended writing required. SECTION C – Designing and Making Principles Including maths and design questions. Students will also be assessed on making proficiency. Textile based materials (how to sew, pleat, gather, quilt and pipe). Timber based materials (how to cut, drill, chisel, sand and plane). In addition to surface finishes Textile based materials (printing, dyes and stain protection) Timber based materials (painting, varnishing and tanalising).	SECTION B – Specialist Technical Principles Deeper understanding extended writing required. SECTION C – Designing and Making Principles Including maths and design questions. Students will also be assessed on making proficiency. Textile based materials (how to sew, pleat, gather, quilt and pipe). Timber based materials (how to cut, drill, chisel, sand and plane). In addition to surface finishes Textile based materials (printing, dyes and stain protection) Timber based materials (painting, varnishing and tanalising).	a working prototype and a concise portfolio of approximately 20 pages of A3 paper, equivalent A4 paper or the digital equivalent. Students' work should consist of an investigation into a contextual challenge, defining the needs and wants of the user and include relevant research to produce a design brief and specification. Students should generate design ideas with flair and creativity and develop these to create a final 38 Visit for the most up-to-date specification, resources, support and administration design solution (including modelling). A manufacturing specification should be produced to conclude your design findings leading into the realisation of a final prototype that is fit for purpose and a final evaluation. Students should investigate, analyse and evaluate throughout the portfolio and evidence all decisions made.		How it's assessed • Written exam: 2 hours • 100 marks • 50% of GCSE Questions Section A – Core technical principles (20 marks) A mixture of multiple choice and short answer questions assessing a breadth of technical knowledge and understanding. Section B – Specialist technical principles (30 marks) Several short answer questions (2–5 marks) and one extended response to assess a more in-depth knowledge of technical principles. Section C – Designing and making principles (50 marks) A mixture of short answer and extended response questions. Non-exam assessment (NEA) What's assessed Practical application of: • Core technical principles • Specialist technical principles • Designing and making principles How it's assessed • Non-exam assessment (NEA): 30–35 hours approx. • 100 marks • 50% of GCSE Task(s) • Substantial design and make task • Assessment criteria: • Identifying and investigating design possibilities • Producing a design brief and specification • Generating design ideas • Developing design ideas • Realising design ideas • Analysing & evaluating Find past papers and mark schemes, and specimen papers for new courses, on our website at aqa.org.uk/past papers

Disciplinary Rigour		What makes your subject different to other subjects?	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. Student develop an understanding of wider issues, social economical, environmental, material sources and energy generation. It gives them a better understanding of social and ecological issues. Fair trade, FSC and renewable energy sources are a small example of the greater understanding of current climate concerns. It creates a holistic and creative outlook to a global community.					