CURRICULUM INTENT:

Design & Technology curriculum intent

At KS3, and beyond, the intent of the Design & Technology department is to nurture pupils to develop the skills and knowledge that allow them to become independent learners and discerning consumers. Through the design process pupils develop their creativity, thinking skills, practical abilities and a sense of pride in their own work, in an iterative way. They grow in confidence, working individually and as members of a team, being able to appreciate the technological advancements that have contributed to the way of life they experience today in modern Britain, studying designers, both current and in the past. They also gain an insight into the classification and properties of materials and the sustainability issues that are faced by the planet, our use of the resources we harvest from it and the social, moral, cultural and ethical issues associated with designing and manufacturing for a range of users in a contemporary society. Pupils also develop an understanding of the increasing use of computer automation in the production of products and experience the use of CAD/CAM in lessons.

At KS4, pupils build upon their basic knowledge of materials and gain a deeper insight into the manufacturing processes involved in the journey from raw material to finished product. They study a common core of technical principles that include sustainability and the ecological and social footprint associated with responsible design. Finite and non-finite resources are researched and the technological advances that are being continually developed and incorporated into the products we, as consumers, take advantage of. Pupils gain awareness and learn from wider influences including historical, social, cultural, environmental and economic factors. Pupils have the opportunity to work creatively when designing and making and apply technical and practical expertise. Pupils experience the use of advanced software packages and CAD/CAM and understand that the equipment they use is a school-based version of industrial manufacturing techniques. In Yr11, pupils demonstrate their knowledge of the design process by carrying out a Non-exam Assessment within their chosen material area and produce a concise portfolio and working prototype within a contextual challenge set by AQA.

At KS5, students are given the practical skills and theoretical knowledge and confidence to succeed in a number of future careers, including engineering and product design. They investigate historical, social, cultural, environmental and economic influences on design and technology from the viewpoint of a designer rather than a consumer. This knowledge facilitates the opportunity to put their learning in to practice by producing a portfolio and prototype of a product of their choice through an extended Non Exam Assessment in yr13. Students gain a real understanding of what it means to be a designer maker whilst gaining the knowledge and skills that are sought by higher education and employers.

CURRICULUM MAP:

Year	Knowledge (Topics /Contexts) What pupils will 'know'.	Skills acquired What pupils will be able to ' do' .	Concepts developed What pupils will 'understand'.	Assessment (KPIs)
7 Core skills module	 The importance of health & Safety considerations in the workshop environment including risk assessment. How to use tools and machinery in a safe and sensible manner. The vacuum forming as a method of mass production. The meanings of different pictograms applied to packaging and relevant mandatory information. The age rating classifications for toys, child safety and the small parts tester. The classification of polymers, their properties and sustainability issues. The environmental issues associated with oceanic pollution. How to analyse products to given criteria. The information contained within a barcode. 	 Classify criteria in a specification into must, should and could. Demonstrate creativity when considering a range of design ideas. Shape a variety of materials including polymers and timbers with some confidence. Solve technical problems under the guidance of the class teacher. Carry out peer & SWOT assessments. Self-evaluate to given criteria. Independently research the topic of polymers. Construct 3D drawings using isometric grid. Demonstrate the safe use of the following equipment and machinery: Marking out tools Pillar drill and nippy vices Round files Dovetail saws and G clamps Scalpels & Maun safety rules Hot glue gun 	 Design in conjunction with technology is an ever-changing subject as new technologies are developed. The difference between a risk and a hazard. Planning is an integral element of designing and making activities. A safe working environment relies on the cooperation of all. Risk assessments are carried out in schools and industry to ensure the safety of all. How the vacuum forming process works and how it is carried out in industry. The importance of sustainability in design and the recycling of polymers. The misuse of machinery and not the machinery itself poses a H&S threat. Why the best design is almost always not the first design. Designers have a responsibility to carefully consider the materials used to manufacture products. Topic specific vocabulary 	 KPI 7.1: Develop and communicate design ideas using annotated sketches (Relief design task) Detailed feedback. KPI 7.2: Follow procedures for safety and understand the process of risk assessment (Practical performance) KPI 7.3: Evaluate own products against the original specification and identify ways of improving them (Peer evaluation task) KPI 7.4 Understand how to classify materials (Polymer research). Detailed feedback.

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8 Developing skills module	 The classification of timbers, their properties, characteristics and sustainability issues. How to write a design brief using 5WH. How to use ACCESS FM as a comprehensive product analysis tool How to generate a design specification and categorise the criterion as must, should and could. The use of Eduard de Bono's thinking hats to analyse products from different perspectives. How to carry out a life cycle analysis from 'cradle to grave'. The role of ergonomics and anthropometrics in product design. Many of the products that are available in Britain have been manufactured abroad and that the distance travelled from raw material to end user is known as product miles. Some of the work of designers within the Alessi company. 	 Consider and identify the positive and negative impacts products have on the wider world. Analyse a range of existing products. Generate a set of criterion for evaluation and rate their work against them. Problem solve with less intervention from class teacher. Peer assess, giving constructive feedback on how to improve. Independently research the topic of timbers and present their findings. Combine materials with an increasing degree of accuracy and competence. Accurately calculate cost and total weight of materials used. Add the following equipment and machinery to their repertoire: Fret saws Frame saws Sanding sealer Wax and wire wool 	 Different timbers are used for different applications depending on their physical and aesthetic qualities. Manufacture boards have many benefits, including workability, over timber from soft and hardwood trees. Designers have a responsibility to consider where the materials used in manufacture have been sourced and whether that source is sustainable. Deforestation can lead to desertification. Different techniques including acronyms can be used to assist in the design, analysis and evaluation of products. In the production of most products, a range of joining methods and finishing techniques are involved. That the cost of a product is a very good indicator of the quality of the working conditions of the labour force making it. Topic specific vocabulary The role of biomimicry in design 	 KPI 8.1: Evaluate products that they are less familiar with using themselves (ACCESS FM product analysis) KPI 8.2: Develop design specifications that include environmental, aesthetic, cost, maintenance, quality and safety (Design brief, specification & user needs brainstorm). Detailed feedback. KPI 8.3: Select appropriately from specialist tools, techniques, processes, equipment and machinery (Practical performance) KPI 8.4: Understand the properties of materials (Timber research). Detailed feedback.

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9 Graphical skills module	 How different target groups have different needs and wants. How to construct a viable, working design specification The origin and classification of papers and boards and how these are manufactured into products. The environmental impact of the use of papers and boards. How papers and boards are manufactured. That timber taken from non-managed forests can lead to deforestation and desertification. The classification of a 'smart' material and common uses of thermochromic, photochromic and phosphorescent pigments. About the work of at least one prominent graphic designer. The issues associated with not carrying out market research before putting a product unto production. (Sinclair C5) 	 Use tools and equipment with a higher degree of precision, focusing on overall quality and accuracy. Work safely, understanding the correct equipment to use in order to ensure safety. Plan a sequence of activities in the form of a production schedule. Create image boards that portray different target audiences and ages. Develop their own design briefs and specifications independently. Design and manufacture a commercially viable graphic product. Carry out consumer research, evaluate the results and alter their designs in the light of feedback given. Use 2D Design software with some competence. Use Adobe Photoshop to manipulate images. 	 The role of typography in design How the use of different fonts creates different impressions. That socio-economics and cultural and religious influences have an impact on the design of products. That the health and wellbeing of consumers is directly affected by where they live. Designers have moral obligations towards the target groups they are designing for. Font size is ordered in relation to the importance of the information. How commercial printing processes differ from school-based printing. How to apply graphics to a packaging net for maximum impact. How to create an eye-catching and visually appealing advertising poster. Why, in market research, it is important to ask a series of closed and multiple choice questions to gauge opinions. Topic specific vocabulary 	 KPI 9.1: Research the health and wellbeing, cultural, religious and socio-economic contexts of their intended users (User investigation). Detailed feedback KPI 9.2: Communicate their plans clearly so that others can implement them (Production schedule). Detailed feedback. KPI 9.3: Learn about an increasing range of designers and be able to relate their products to their own designing and making (Graphic designer research) KPI 9.4: Understand the properties of smart materials, and how they can be used to advantage (Smart materials research)

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9 Advanced skills module	 The origin and classification of Metals and how these are processed and manufactured into products. The environmental impact of mining for and processing metals. The four types of motion (linear, reciprocating, oscillating and rotary) and be able to identify examples of products that use each. How colour is used to create different ambiences. The definitions of system, input, output and control. How to give examples of automated systems How simple automated systems are created using flowchart software. How feedback loops make flowchart programs run without ending. The work of at least one prominent product designer. 	 Use tools and machinery with a higher degree of precision, focusing on overall quality and accuracy. Self-select the most appropriate tools and equipment for the practical activity being carried out. Independently research mechanisms and present findings. Create a functioning model of a linkage mechanism. Apply render to make images look three dimensional and textured. Use 2D Design software with some competence, including 3D drawings. Work as part of a team to create an individual part of a functioning puzzle. Use Flowol software to create simulations of automated systems. Create a functional 3D puzzle with precision. Add the following equipment and machinery to their repertoire: Coping saws Disc sander Square files Punches & mallets 	 Designers have moral obligations towards the target groups they are designing for. Not all internet searches return accurate facts. The difference between rendering an image of an object by hand is significantly slower than using a software package to do the same activity. Different colours create different feelings, impressions and moods. Mining for metals can be carried out underground and by using surface mining techniques with different risks involved in both methods. Using drawing software is easier to alter than an image on paper. How plywood is constructed and what gives it strength. Topic specific vocabulary. 	 KPI 9.5: Give oral and digital presentations and use computer-based tools (2D Design rendering sheet). Detailed feedback. KPI 9.6: Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely. KPI 9.7: Produce short reports, making suggestions for improvements (3D cross evaluation). Detailed feedback. KPI 9.8: Know how to apply the concept of feedback in systems (Systems & control traffic lights task).

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10 Term 1	 The categorisation of different materials and their working properties. That the selection of materials and components should consider a variety of factors such as cost and functionality. The sources and origins of materials and how they are harvested or extracted. Stock forms, types and sizes of materials in order to calculate and determine the quantities of materials or components required. 	Theory folder: Carry out a variety of research and investigation tasks to build up a theory folder full of case studies to be used for revision and exam question answering. Complete A3 revision sheets for each topic covered. Complete practical activities to improve skill levels. Complete end of topic tests for each of the theory topics covered to ascertain understanding. Demonstrate the application of KS3 maths in their work and exam answers.	 What pupils will 'understand'. How energy is generated and stored and how this is used as the basis for selection of products and power systems. How environmental, social and economic challenges influence design and making, including deforestation, increasing carbon dioxide levels and the need for fair trade. Developments in new materials The ecological and social footprint left by designers and the issues in the design and manufacture of products. That scales of production are dependent on the demand for a product, including one-off, 	 KPI 10.1: Know and explain why a range of textiles are suitable for specific processes and uses. KPI 10.2: Know and explain why a range of polymers are suitable for specific processes and uses. KPI 10.3: Know and explain why a range of natural and manufactured timbers are suitable for specific processes and uses. KPI 10.4: Know and explain why a range of papers and boards are suitable for specific processes and uses. KPI 10.5: Know and explain why a range of metals and alloys are suitable for specific processes and uses.
10 Term 2	 The impact of new and emerging technologies on contemporary and potential future scenarios. That a systems approach can be applied to designing including programmable components. About mechanical devices and the different types of motion. 	 Develop competent practical skills working with a variety of materials, tools and equipment. NEA: Select a contextual challenge as given by AQA. Select a client and identify a need for a new or improved product. Carry out investigations, primary and secondary data to understand client/user needs. Study the work of past and 	 batch, mass and continuous production. Specialist technical principles of at least one material category Understand the impact of forces and stresses on materials and how these can be strengthened. Using and working with materials, understanding their properties, additives that are used to enhance usability Commercial processes as appropriate to their specialist material area such as offset lithography, weaving, injection 	 KPI 10.6: Know and explain the impact of new and emerging technologies including industry, enterprise and sustainability. KPI 10.7: Know and demonstrate an in-depth knowledge of the common specialist technical principles including ecological and social footprint and the 6Rs. KPI 10.8: Know and demonstrate knowledge of how energy is generated, developments in new materials, electronic systems and mechanical devices.
10 Term 3	 The requirements for their NEA projects. Deadlines in relation to the completion of each NEA section. 	present designers to inform their own designing. Study the environmental and social impacts of designing and manufacturing new products.	moulding and routing. NEA: The need to carry out research before developing design ideas for a new product.	KPI 10.9 Know and explain the designing principles including researching, the work of others and design strategies.

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11 Term 1	 How to design and develop design ideas for a client to a written brief. How to shape and form materials, using cutting, abrasion and addition. How to use specialist techniques and processes such as jigs, patterns and templates where suitable. How surface treatments and finishes are applied to enhance aesthetics, functionality and durability of products. 	NEA: > Use a range of design strategies to generate imaginative and creative designs. > Develop the use of a range of appropriate techniques to communicate design ideas including 2D and 3D drawings and computer modelling. > Select materials and components appropriate to the task considering cost, functionality and availability. > Work to specific tolerances,	possibilities, avoiding design fixation. The need to research materials, components, joining and finishing methods before finalising design ideas.	 KPI 11.1: Know, explain and demonstrate the making principles of material management, health and safety and manufacturing processes. KPI 11.2: Section A: Identifying & investigating design possibilities KPI 11.3: Section B: Producing a design brief & specification KPI 11.4: Section C: Generating design ideas KPI 11.5: Section D: Developing design ideas
11 Term 2	How to evaluate their prototypes fully using client feedback and testing to suggest improvements.	cutting, shaping and forming materials. Material management and the economical use of material. Work with specialist tools and equipment with precision.	 The need for accuracy in manufacture in order to produce a functioning and high-quality prototype. The need to carry out market research on a finished 	 KPI 11.6: Section E: Realising design ideas KPI 11.7: Section F: Analysing & evaluating
11 Term 3	➤ The internally moderated mark for their NEA.	 Use specialist techniques and processes. Design and develop prototypes in response to client needs and wants. 	 prototype to gauge opinions on suitability. The need to test a prototype fully with the client and others. The need to evaluate the prototype and suggest improvements. 	Success with exam style questions during theory revision sessions.

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12 Term 1	 The uses of materials and their applications. The theory of Polymers and polymer processing and finishing techniques. The theory of Timbers and timber processing and finishing techniques The theory of Papers & boards and associated processing and finishing techniques. The theory of Composites, smart and modern materials and associated processing and finishing techniques. The theory of Metals and metal processing and finishing techniques. Modern and industrial scales of production. Digital design and manufacture The requirements for product design and development 	 Be able to demonstrate skills in a range of communication and presentational techniques for conveying proposals and intentions to clients and potential users. Be able to describe how computers are used in modern manufacturing, giving specific industrial examples. Use different approaches to user centred design, using not only one strategy or process but a variety. Study the work of key historical design styles, design movements and influential designers. Articulate the principles of key design styles and movements and how the work of influential designers represents those principles. 	 The different scales of production in modern industrial and commercial practice. The relationship between material cost, form and manufacturing processes in the efficient use of materials. How computer systems are used to plan and control manufacturing, reduce waste and respond quickly to changes in consumer demand. Sub-assembly as a separate line of manufacture for certain parts of a product. Digital design and manufacture, including CAD/CAM, virtual modelling, rapid prototyping electronic data interchange, production, planning and control networking. Copyright, patents, registered designs, trademarks and logos 	 Level of engagement with written and practical tasks set within lessons. Regular Q&A sessions to check understanding and to address misconceptions. Actions taken by pupils in the light of verbal feedback. Quality of homework tasks designed to check for understanding of topics covered. Performance in end of topic tests. Performance in Yr12 exam against good progress target. Attendance at revision sessions and success in mark-worthy completion of
12 Term 2	 Health & safety Protecting designs and intellectual property. Design for manufacturing, maintenance, repair and disposal Feasibility studies Enterprise and marketing in the development of products Design communication Design methods and processes Technology and cultural changes Design processes Critical analysis and evaluation Selecting appropriate tools, equipment and processes 	 Discuss how socio economic influences and major developments in technology have helped shape product design and manufacture. Discuss and implement the stages of a range of design processes and methodologies in order to apply personal judgement in the NEA. Work in an iterative way, revisiting stages in the design process to develop and produce the best possible design solution. Select appropriate tools, equipment and processes and demonstrate good and safe working practices. 	 and 'open design'. The importance of marketing and brand identity including corporate identification and global marketing. The importance of design for manufacturing, maintenance, repair and disposal and the need to modify designs to make them more efficient to manufacture. The importance of accuracy in manufacturing and how testing can eliminate errors. Understand the importance of national and international standards in product design. 	practise questions. Detailed feedback: Topic feedback sheet at the end of each topic covered. End of topic test feedback Joints exercise, Styrofoam modelling, Yr12 examination feedback

Year	Knowledge (Topics / contexts) What pupils will 'know'.	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Assessment
	 Accuracy in design and manufacture Responsible design Design for manufacture and project management National and international standards in product design The requirements for their NEA projects and the implications of designing a product for a reallife client. Deadlines in relation to the completion of each NEA section. That the design process is iterative rather than linear. 	 Plan for accuracy when making prototypes and demonstrate the procedures used to reduce waste and ensure manufacturing is within tolerance. NEA: Select a client and identify a need for a new or improved product. Carry out investigations, primary and secondary data to understand client/user needs. Study the work of past and present designers to inform their own designing. Study the environmental and social impacts of designing and manufacturing new products. 	NEA: The need to select a client that they can have regular access to. The need to carry out research before developing design ideas for a new product.	
13 Term 1	 How to design and develop design ideas for a client to a written brief. How to develop a wide range of design ideas, avoiding design fixation. How to shape and form materials, using cutting, abrasion and addition. How to use specialist techniques and processes such as jigs, patterns and templates where suitable. How surface treatments and finishes are applied to enhance aesthetics, functionality and durability of products. 	 Use a range of design strategies to generate imaginative and creative designs. Develop the use of a range of appropriate techniques to communicate design ideas including 2D and 3D drawings and computer modelling. Select materials and components appropriate to the task considering cost, functionality and availability. Work to specific tolerances, cutting, shaping and forming materials. Material management and the 	 The importance of considering the needs and wants of a client when designing for them. The need to develop a specification that gives details of the constraints on a design project. The need to consider a wide range of design ideas and possibilities, avoiding design fixation. The need to research materials, components, joining and finishing methods before finalising design ideas. The need for accuracy in manufacture in order to 	 Level of engagement with NEA sections. Regular Q&A sessions to check understanding and to address misconceptions. Actions taken by pupils in the light of verbal feedback. Quality of homework tasks designed to check for understanding of topics covered. Performance in Yr13 mock exam against good progress target. Deadline meeting for each
13Term 2	 How to evaluate their prototypes fully using client feedback and testing to suggest improvements. 	economical use of material. Work with specialist tools and equipment with precision.	produce a functioning and high- quality prototype. The need to carry out market research on a finished	section of the NEA completed in Yr13 and the overall mark and grade

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13 Term	> The internally moderated mark for their NEA.	 Use specialist techniques and processes. Design and develop prototypes in response to client needs and wants. 	prototype to gauge opinions on suitability. The need to test a prototype fully with the client and others. The need to evaluate the prototype and suggest improvements.	achieved prior to external moderation. Attendance at revision sessions and success in mark-worthy completion of practise questions. Detailed feedback: Feedback after the marking of each NEA section Yr13 mock feedback