Long Term Plan – Design & Technology (2024-25)

Vision: Our vision for Design & Technology education is to inspire and empower students to become innovative thinkers, creative problem solvers, and proficient makers. We aim to cultivate a passion for design and technology that transcends the classroom, equipping students with the skills, knowledge, and mindset necessary to thrive in a rapidly evolving world.

	HT1	HT2	HT3	HT4	HT5	HT6	Year End Points
Year 7	**Timbers, Sustainability, Branding, Workshop Skills** Learning about different types of wood, their properties, and sustainability. Introduction to branding. The importance of a brand name, logos, slogans and colour scheme. Designing a nature-themed clock using scrap wood, focusing on sustainable practices.	**Timbers, Sustainability, Branding, Workshop Skills** Introduction to workshop safety and basic hand tools. Marking out, coping saw, abrasives, adhesives. Constructing the clock, emphasizing accurate measuring, cutting, assembling, and finishing techniques.	**User Focussed Iterative Design & Product Analysis / Evaluation** Introduction to user-centred design principles and identifying user needs. Evaluating existing products: analysing function, aesthetics, and usability.	**User Focussed Iterative Design & Product Analysis / Evaluation** Designing a product for a specific user, following the iterative design process (sketching, prototyping, testing, and refining). Presenting and evaluating own designs, incorporating feedback and suggesting improvements.	**Catering**	**Catering**	By the end of Year Seven, students will have developed a foundational understanding and practical skills in Design & Technology, covering several key areas. These include: **User-Centred Design** Students will learn the principles of user-centred design, focusing on understanding and meeting the needs of specific users. They will gain experience in identifying user requirements and creating designs that address these needs effectively. **Product Analysis / Evaluation** Students will be equipped with the skills to analyze and evaluate existing products. They will learn to assess the function, aesthetics, usability, and overall effectiveness of products. This critical evaluation will help them understand what makes a design successful and how improvements can be made. **Iterative Design Process** Through engaging in the iterative design process, students will learn the importance of continuous improvement in design. They will practice sketching, prototyping, testing, and refining their designs, understanding that the design process is ongoing and cyclical. **Basic Workshop Skills** Students will acquire basic workshop skills, including the safe and effective use of hand tools and basic machinery. They will learn how to measure, cut, and assemble materials accurately, developing their practical abilities in a workshop setting. **Sustainability** An introduction to sustainability will teach students about the environmental impact of materials and products. They will explore sustainable practices in design and manufacturing, learning to consider the ecological footprint of their projects and the importance of using resources responsibly. **Technical Knowledge about Timbers (Classification and Properties)** Students will gain technical knowledge about timbers, including the classification of different types of wood and their properties. They will learn about the various uses and advantages of different timbers, which will inform their material choices and design decisions. By integrating these knowledge areas, students will complete Year Seven with a solid foundation in Design & Technology, ready to build upon these skills and concepts in subsequent years.

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Year 8	**CAD and Architectural Design** Introduction to CAD software and basic design principles Researching and choosing an architect for inspiration. Anaylsis and evaluation of their work. Researching the needs of the user by surveying / interviewing family members and making justified design decisions based on their feedback.	**CAD and Architectural Design** Designing a family home using CAD, incorporating elements inspired by the chosen architect and the needs of the end user. Presenting CAD designs, evaluating the design process, and making revisions based on feedback	**Electronics** Introduction to basic electronic components (resistors, switches, LEDs, sensors & motors) and their functions. Learning and practicing soldering techniques	**Electronics** Designing a simple electronic device (e.g., a bedroom alarm that teaches students about inputs, outputs and programable control systems). Constructing and testing the device, evaluating its functionality and design, and making improvements.	**Catering**	**Catering**	By the end of Year Eight, students will have significantly advanced their knowledge and practical skills in Design & Technology. They will cover a range of topics that build on their Year Seven experiences, focusing on more complex design and engineering principles. The key areas of learning will include: **CAD Skills** Students will learn to use Computer-Aided Design (CAD) software to create detailed digital models of their designs. They will develop proficiency in using CAD tools to visualize and refine their projects, enhancing their ability to communicate design ideas clearly and precisely. **Architectural Styles** Students will explore various architectural styles, learning about the historical and cultural contexts that influence architectural design. They will study the works of notable architects and apply these stylistic elements to their own design projects, particularly in the context of designing family homes. **Design & Engineering Communication** Effective communication is crucial in design and engineering. Students will learn to convey their ideas through clear and detailed drawings, presentations, and written reports. They will practice articulating their design rationale and process, both orally and in written form, to diverse audiences. **User-Centred Design** Building on their Year Seven knowledge, students will deepen their understanding of user-centred design. They will continue to focus on designing products that meet specific user needs, incorporating feedback and evaluations to improve their designs. **Product Analysis / Evaluation** Students will enhance their ability to analyse and evaluate products, using systematic approaches to assess functionality, aesthetics, and usability. They will learn to identify strengths and weaknesses in existing products and apply these insights to their own design work. **Iterative Design Process** The iterative design process will remain a core component of the curriculum. Students will practice refining their designs through multiple iterations, using prototyping, testing, and feedback to achieve the best possible outcomes. **Soldering: Students will learn soldering techniques as part of their electronics projects. They will gain hands-on experience in creating reliable electrical connections, which are crucial for assembling and repairing electronic devices.** **Technical Knowledge about Components** In addition to practical soldering skills, students will acquire technical knowledge about electronic components such as resistors, sensors, actuators, and LEDs. They will learn how these components function within circuits and how to select and integrate them into their own electronic projects. Students will also learn about programmable components such as microcontrollers and how they can be used to provide a specific output for a given input. By the end of Year Eight, students will have a well-rounded skill set in Design & Technology, preparing them for more advanced studies and projects in Year Nine. They will have developed a strong foundation in CAD, architectural design, engineering communication, and electronics, all of which are essential for success in the field.

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Year 9	**Metals** Introduction to different types of metals and their properties Designing a promotional bottle opener for a local company, adhering to a specific brief.	**Metals** Learning basic metalworking wasting processes (cutting, shaping, drilling) Constructing the bottle opener, ensuring precision and quality, and evaluating the final product against the brief.	**Textiles (Leather Crafting)** Patterns, jigs and formers. What other industries make use of patterns (sheet metal etc). Material properties. Accurate & safe use of cutting tools.	**Textiles (Leather Crafting)** Joining methods eg different adhesives and their uses. Sewing, riveting. Permanant and non-permanent jointing methods. Where leather comes from, sustainability and animal welfare.	**Catering**	**Catering**	By the end of Year Nine, students will have acquired significant skills and knowledge in Design & Technology, preparing them for further study at KS4. The curriculum for Year Nine focuses on metalwork and leather crafting / textiles, along with essential design processes and client-oriented projects. The key areas of learning include: **Responding to a Design Brief** Students will learn how to respond effectively to a design brief. They will understand the importance of adhering to specific requirements and constraints set by the client or project guidelines. **Technical Knowledge about MetalsStudents will gain a thorough understanding of different types of metals and their properties. They will learn about the applications and characteristics of various metals, such as steel, aluminum, and copper, which will inform their material choices and design decisions.** **Working Skillfully and Accurately with Metal** Students will develop proficiency in metalworking techniques. They will learn to: • Mark out using layout fluid, scribe, square, callipers, and centre punching. • Drill accurately and safely. • Cut, file, and mill metals to precise dimensions. These skills will be applied in creating a promotional bottle opener for a local company, ensuring accuracy and quality in their work. **Patterns, Jigs, and Formers** • **Patterns**: Understanding the role of patterns in designing and crafting leather products. Knowledge of how to create and use patterns to cut leather pieces accurately. • **Jigs**: Learning about jigs, their purpose in ensuring repeatability and precision in leather crafting, and how to make and use simple jigs for various tasks. • **Formers**: Understanding formers, which help shape leather into desired forms. Knowledge of how to use formers to ensure consistency in products. **Industries Using Patterns** • **Sheet Metal Industry**: Recognizing how patterns are used in the sheet metal industry for cutting and forming metal sheets into specific shapes. • **Textile Industry**: Understanding the use of patterns in the textile industry for cutting fabric and creating clothing and other fabric-based products. • **Woodworking**: Learning about the use of patterns in woodworking for cutting and shaping wood pieces. • **Plastic Molding**: Understanding how patterns are used in the plastic industry for molding plastic into specific shapes. **Material Properties** • **Leather Types**: Knowledge of different types of leather (e.g., full-grain, top-grain, genuine leather, suede) and their properties. • **Durability and Flexibility**: Understanding the durability, flexibility, and other key properties of leather that affect its use in crafting. **Sustainability**: Awareness of the environmental impact of leather production and the importance of sustainable practices. **Accurate & Safe Use of Cutting Tools** • **Cutting Tools**: Familiarity with different cutting tools used in leather crafting, such as utility knives, rotary cutters, and shears. • **Safety Measures**: Knowledge of safety measures to take when using cutting tools to prevent accidents and injuries. • **Precision Cutting**: Techniques for achieving accurate and precise cuts to ensure high-quality finished products. **Joining Methods** • **Adhesives**: Understanding different types of adhesives used in leather crafting (e.g., contact cement, rubber cement) and their appropriate uses. • **Sewing**: Learning hand sewing techniques and the use of sewing machines for stitching leather pieces together. • **Riveting**: Understanding the use of rivets for joining leather pieces and the tools required for riveting **Permanent and Non-Permanent Jointing Methods**

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Year 10 Engineering	**Tap Wrench / Drill Stop** Intro Project. Focussed practical skills building project. marking out, wasting processes, CAD, Orthographic Projection. Milling, Turning, Drilling & cutting.	**Design & Make Intro Project- Egg up / Pizza cutter** Intro Project. Covers the basics of the design & make process. Brief, Specification, Sketching, CAD, Orthographic Projection. Foam mould making, Sand Casting, Milling, Turning, Drilling & cutting.	**Design & Make Intro Project- Egg up / Pizza cutter** Covers the basics of the design & make process. Brief, Specification, Sketching, CAD, Orthographic Projection. Foam mould making, Sand Casting, Milling, Turning, Drilling & cutting.	**Begin focus on unit 3** (Exam-Solving Engineering Problems). Aim to teach the bulk of the theory knowledge through focused Practical Tasks with write ups set as HW. Focus on Plastics & Metals.	**NEA practical preparation** Mock practical NEA using a brief from previous years. Students gain experience of working to a tolerance from engineering drawings, process planning and the time management required by the Unit 1 NEA.	**Focus on unit 3** (Exam-Solving Engineering Problems). Aim to teach the bulk of the theory knowledge through focused Practical Tasks with write ups set as HW. Focus on Plastics & Metals.	By the end of Year Ten, students will have developed a solid foundation in engineering principles and practices. They will acquire a comprehensive set of skills and knowledge that will prepare them for their controlled assessment and evetually more advanced studies or careers in engineering. The key areas of learning will include: **Classification and Properties of Metals and Plastics** Students will learn to classify different types of metals and plastics, understanding their properties and applications. They will study the physical and mechanical properties of these materials, such as strength, ductility, conductivity, and thermal resistance. This knowledge will help them select appropriate materials for various engineering applications. **Product Analysis / Evaluation** Students will develop skills in analyzing and evaluating products. They will learn to assess the functionality, aesthetics, usability, and overall effectiveness of products. This critical evaluation process will enable them to identify strengths and weaknesses in existing products and apply these insights to improve their own designs. **Material Testing (Destructive and Non-Destructive)** Students will gain hands-on experience in material testing, learning both destructive and non-destructive testing methods. They will understand how to test the properties and performance of materials, such as tensile strength, hardness, and impact resistance. This knowledge will be crucial for ensuring the quality and reliability of engineered products. **Metal Work Processes** Students will acquire practical skills in various metalworking processes, including: • Cutting, shaping, and forming metals using tools and machinery. • Surface finishing processes like polishing, painting, and coating. These skills will be applied in hands-on projects, allowing students to create precise and functional metal components. **Interpreting and Producing Technical Drawings (Third Angle Orthographic and Isometric)** Students will learn to interpret and produce technical drawings, including third angle orthographic and isometric projections. They will understand how to create detailed and accurate engineering drawings that communicate design specifications clearly. This skill is essential for planning and executing engineering projects and for collaborating with other engineers and manufacturers. **The Work of Others and the Impact of Engineering Developments** Students will study the work of influential engineers and the impact of significant engineering developments on society and the environment. They will learn about historical and contemporary engineering achievements and how these advancements have shaped the world. This knowledge will inspire students and help them understand the broader context of their work in engineering. By the end of Year Ten, students will have a well-rounded understanding of engineering concepts and practices. They will be proficient in material classification, product evaluation, material testing, metalworking, technical drawing, and understanding the impact of engineering developments. These skills and knowledge will provide a strong foundation for further education and careers in engineering.

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Year 11 Engineering	**Begin Unit 1**. Producing Engineering Products NEA. Reading & Interpreting Technical drawings. Symbols, Conventions, Data charts. Project planning, method statement, Plan of manufacture. Jigs & Manufacturing aids.	**Unit 1**. Producing Engineering Products NEA. Reading & Interpreting Technical drawings. Symbols, Conventions, Data charts. Project planning, method statement, Plan of manufacture. Jigs & Manufacturing aids.	**Begin NEA Unit 2**, Engineering Design. Product analysis, research into manufacturing techniques, Design specification. Production of initial designs, CAD & hand drawn isometric & orthographic projections to British standard conventions.	**Unit 3 Solving Engineering problems** (exam). Environmental Issues. Properties of materials & material classification. Recap on Isometric & Orthographic.	**Unit 3 Solving Engineering problems** (exam). Environmental Issues. Properties of materials & material classification. Recap on Isometric & Orthographic.	**Finished**	By the end of Year Eleven, students will have completed significant projects and assessments that will deepen their understanding of engineering principles and practices. They will cover a comprehensive curriculum that includes both practical and theoretical components, preparing them for further education or careers in engineering. The key areas of learning will include: **Reading & Interpreting Technical Drawings:** Students will learn to read and interpret technical drawings, understanding symbols, conventions, and data charts. This will enable them to accurately understand and follow design specifications. **Project Planning:** Students will develop skills in project planning, creating detailed method statements and plans of manufacture. They will learn how to outline each step of the manufacturing process, ensuring efficient and effective production. **Jigs & Manufacturing Aids:** Students will learn about the use of jigs and manufacturing aids to improve accuracy and efficiency in production. They will understand how to design and utilize these tools in their engineering projects. **Product Analysis & Research:** Students will conduct product analysis and research into manufacturing techniques. They will learn how to evaluate existing products and investigate different methods of production. **Design Specification:** Students will create detailed design specifications for their projects, outlining the requirements and constraints for their designs. **Production of Initial Designs:** Students will produce initial designs using both CAD software and hand-drawn techniques. They will create isometric and orthographic projections that adhere to British standard conventions. **Environmental Issues:** Students will explore the environmental issues related to engineering, understanding the impact of engineering practices on the environment and learning about sustainable engineering solutions. **Properties of Materials & Material Classification:** Students will deepen their knowledge of material properties and classification, understanding how to select appropriate materials for different engineering applications. **Recap on Isometric & Orthographic Projections:** Students will review and reinforce their skills in creating isometric and orthographic projections, ensuring they can accurately represent their designs.