

Beths Grammar School KS4 Design and Technology Curriculum Map

Examination Board: Pearson Edexcel GCSE [9-1] Design and Technology

Term	INTENT	IMPLEMENTATION	IMPACT
	Substantive Knowledge This is the specific, factual content for the topic, which should be connected into a careful sequence of learning.	Disciplinary Knowledge (Skills) This is the action taken within a particular topic to gain substantive knowledge.	Assessment opportunities What assessments will be used to measure student progress? Evidence of how well students have learned the intended content.
Year 10 Foundational Skills Desk Tidy Lamp Project Term 1	Students directed through exam board power point outlining the requirements of the course. Course introduction of Specification and course outline. Passport creation: Rendering with Pencils and Overlay – use pencils to render an isometric drawing of a desk tidy. They then use tracing paper to overlay and annotate on top. Orthographic in CAD – students use 2D Design/CAD to create an orthographic drawing of the desk tidy including dimensions. Vinyl cutter competency and Laser cut Logo - Students to complete the orthographic drawing and to use 2 d design to draw their logo and then cut on the laser cutter. Final Own Design in Isometric Manufacture /Top part of desk – Student use templates to mark out their MDF base and use the hole saw to cut out the two whole sections.	Designing Skills To understand the basic design principles of line, form and colour and their application in designing. To develop and use design briefs, detailed specifications and criteria in relation to product development. To consider the conflicting demands that moral, cultural, economic, environmental, historical and social issues can make in the planning and in the designing of products. To consider their own health and safety and that of makers, manufacturers, individual users and society at large. To consider an increasing range of users of products and different societies in relation to their differing needs and values. To anticipate and design for product maintenance. To design for manufacturing in quantity. To plan for quality control and quality assurance when designing products and to be aware of the difference To generate design proposals against stated design criteria, and to modify their proposals in the light of on-going analysis, evaluation and product development.	Weekly homework Classwork Marked Assessment of Desk Tidy

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	OTHER MACHINE COMPETENCIES HEALTH AND SAFETY - machine sign off for the passport. Practical Hegner saw is used to shape one of the circles into a square and use Glass paper to smooth the edges. Students drill holes for pencils using a 12 mm drill bit and a 10 mmm drill bit. Students join the MDF to the pine base and chamfer edge using disc sander. Then use the vacuum former to create a 3D mould of their design. Seneca Learning – 1.1, 1.2, 1.3 October Half-Term EVALUATION & MINI MODERATION LAMP Mini Contextual Challenge Introduction to project - examples / layout /format timescale and resources Investigating - Iterative Design / product Client Centred Design of Product - Mood Board Design. What is client centred design?	To use graphic techniques and ICT, including CAD to generate, develop, model and communicate design proposals. to match materials and components with tools, equipment and processes, taking account of critical dimensions and tolerances when deciding how to manufacture the product. to produce and use detailed working schedules that will achieve the desired objectives in the time available, setting realistic deadlines for the various stages of manufacture, identifying critical points in the making process and providing alternatives to possible problems. To devise and apply test procedures to check the quality of their work at critical points during To ensure that the quality of their design solution will be suitable for intended clients and To understand the difference between quality of design and quality of manufacture and use essential criteria to evaluate the quality of products they have made and products which have been made commercially. Making Skills To match materials and components with tools, equipment and processes to produce quality products. To use tools and equipment safely, accurately and efficiently to achieve an appropriate fit, finish and reliable functioning in products that match their specifications. To use a range of industrial applications when working with familiar materials and processes.	
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	Design Problem - Outline of design problem and Identification of need. It is important to outline a design problem and identify a specific need for a product. Existing Products - Product Analysis & product Disassembly. Understand the need to review and analyse existing products. (ACCESS FMM) Where will the product be used? What conditions will it endure? How will it be maintained? Seneca Learning – 1.5, 1.6, 1.7, 1.8 and 1.9	To manufacture products singly and in quantity, including the practical application of quality control and quality assurance techniques. To use computer-aided manufacture (CAM) in single item production and in batch or volume production. To simulate production and assembly lines including the use of ICT; To be adaptable in their working practices, to respond to changing circumstances and new opportunities. To ensure, through testing, modification and evaluation, that the quality of their products is suitable for intended users and devise modifications where necessary that would improve performance.	
Year 10 Term 2	Lamp Project Continued Formulating a Design Brief - A design brief is a short statement that identifies what a designer plans to do, Writing a Specification for your Product project Producing Design Ideas for desktop lamp - Does it respond to the design brief? Does it meet the criteria set out in the design specification? Communicating Ideas for your Product project - Can it be manufactured to fit with the budget	Designing Skills To understand the basic design principles of line, form and colour and their application in designing. To develop and use design briefs, detailed specifications and criteria in relation to product development. To consider the conflicting demands that moral, cultural, economic, environmental, historical and social issues can make in the planning and in the designing of products. To consider their own health and safety and that of makers, manufacturers, individual users and society at large. To consider an increasing range of users of products and different societies in relation to their differing needs and values.	Weekly homework Classwork Marked Peer and self-assessment End of project assessment (Final Piece)

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	that has been set and with the ideal selling price? Do the aesthetics appeal to the user? Does it appeal to the users' cultural values? Initial Design Ideas for desktop Lamp/Perfume Project - Could it be sustainable or easily dismantled to be recycled or reused at the end of its life? Producing Lamp or Perfume Design Ideas - To help the pupil arrive at the best solution, design ideas should be questioned and reviewed during the design process. Reviewing Your desktop Lamp or perfume product Designs against specification - Course overview Understand the need to review and analyse existing products. (ACCESS FMM) Developing your lamp / perfume ideas - Students should review and compare their ideas to determine what design to take forward. Modelling and prototyping your product ideas – Throughout the iterative design process, the design ideas and models or prototypes will need to be analysed and evaluated to inform the choice of design to take forward. Modelling and prototyping different product ideas 3D Visualisation CAD/CAM introduction & Examples' of lamp/perfume - Students visualise and test how a product looks and performs in 3D.	To anticipate and design for product maintenance. To design for manufacturing in quantity. To plan for quality control and quality assurance when designing products and to be aware of the difference To generate design proposals against stated design criteria, and to modify their proposals in the light of on-going analysis, evaluation and product development. To use graphic techniques and ICT, including CAD to generate, develop, model and communicate design proposals. to match materials and components with tools, equipment and processes, taking account of critical dimensions and tolerances when deciding how to manufacture the product. to produce and use detailed working schedules that will achieve the desired objectives in the time available, setting realistic deadlines for the various stages of manufacture, identifying critical points in the making process and providing alternatives to possible problems. To devise and apply test procedures to check the quality of their work at critical points during To ensure that the quality of their design solution will be suitable for intended clients and To understand the difference between quality of design and quality of manufacture and use essential criteria to evaluate the quality of products they have made and products which have been made commercially.	
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	Analysis, evaluation & modifications of design ideas for your Lamp / perfume - Pupils learn how to Analysis, evaluation & modifications of their design ideas. Seneca Learning – 1.14, 1.15, 1.16, 1.17, 4.2, 4.3		
Year 10 Term 3	Lamp Project Continued CAD/CAM & 3D Modelling ideas for Lamp/ perfume - Computer-aided design & computer-aided manufacturing (CAD/CAM) software is used to design and manufacture prototypes, finished products, and production runs of products. CAD/CAM & 3D Virtual Modelling - Various components are drawn and rendered in google sketch Up. The scale and relative positions can be investigated and resolved. Making Activity - Selecting Tools and processes to make your Lamp / Perfume. Making Activity - Health and Safety Practices when making the lamp / perfume. Safe use of tools and materials is vital to everyone in the chain of production. Personal protective equipment (PPE) must be worn where recommended. Making Activity - Custom Manufacturing for lamp / perfume components	Making Skills To match materials and components with tools, equipment and processes to produce quality products. To use tools and equipment safely, accurately and efficiently to achieve an appropriate fit, finish and reliable functioning in products that match their specifications. To use a range of industrial applications when working with familiar materials and processes. To manufacture products singly and in quantity, including the practical application of quality control and quality assurance techniques. To use computer-aided manufacture (CAM) in single item production and in batch or volume production. To simulate production and assembly lines including the use of ICT; To be adaptable in their working practices, to respond to changing circumstances and new opportunities; To ensure, through testing, modification and evaluation, that the quality of their products is suitable for intended users and devise modifications where necessary that would improve performance. Combining Materials	Weekly homework Classwork Marked Peer and self-assessment End of project assessment (Final Piece)

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	Pupils understand the advantages of Custom manufacturing allowing greater flexibility when manufacturing components for their Lamp. Making Activity - Custom Manufacturing for lamp / perfume components. Making Activity - Design and Manufacturing Methodologies - Just-in-Time (JIT) Manufacturing Making Activity - Precision in Manufacture Be able to work safely with independence. Be able to cut, shape and drill lamp arm. Evaluating - Ensuring quality and accuracy QA & QC Checking the quality and accuracy of your make. Ensuring quality and accuracy QA & QC E-commerce Web Site Home Page for lamp / perfume Evaluating - Testing & Feedback on finished lamp. Analysing testing results for lamp – Evaluating against the specification End of Project Seneca Learning – 4.4, 4.5, 4.6, 4.7,	To learn how materials can be combined and processed to create more useful, or desirable, properties. To learn how these properties are utilised in industrial contexts To learn how a range of materials are prepared for manufacture, allowing for waste and fine finishing. To learn about a variety of self-finishing and applied finishing processes and appreciate their importance for aesthetic and functional reasons. To be able to achieve the optimum use of materials and components, account needs to be taken of the complex inter-relationships between materials, form and manufacturing processes. To learn how pre-manufactured standard components are used to improve the effectiveness of the manufacturing process. Evolution of the product To be able to recognise that products evolve over time because of developments in ideas, materials, manufacturing processes and technologies as well as because of social changes. To be able to recognise that design movements and cultural influences are still influencing new product development. To be aware that manufacturing industries are involved in continuous improvement (CI) and this is a major influence in product evolution. To be aware that sometimes new products are developed because of marketing pull and sometimes because of technological push;	
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	NEA/Contextual Challenge given out at the beginning of June. The purpose of the NEA component is for candidates to: • Carry out investigation into a problem linked to a contextual challenge. • Identify a suitable brief and set of specification criteria. • Design a range of solutions and develop one of these for manufacture. • Manufacture a prototype to a high level of accuracy. • Test and evaluate the solution against the specification. Investigation of needs and research 1.1a – Identify the needs of the end user. 1.1b – Outline a design problem from the context provided and identify a need for a product that could solve the problem. 1.1c – Investigate existing products to inform the product specification for the prototype, from past and present designers. 1.1d – Carry out a range of research strategies to gather relevant information, to inform the design specification for the prototype: market research, research into the context in which the prototypes will used, research into other	To be able to identify an end user/client or group of users associated with their chosen contextual challenge. To understand the role of the user/client is to influence the decisions made throughout the project. To able to identify a need for a problem they can solve.	
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	possible materials and any sustainability issues that would be considered relevant to the intended prototype.	To be able to analyse relevant existing products associated with the problem and contextual challenge.	
Year 11 Term 1	The NEA requires students to carry out a single project that is identifiable against one of the contextual challenges, which are released on the 1 st of June before the assessment window the following May. About the contextual challenges There are 3 themes, and each theme has 2 contextual challenges, a total of six to choose from. Candidates must choose one of these six contextual challenges from the appropriate release, and follow an iterative design and make process, which is chronologically recorded into a digital portfolio. Specification 1.2a – Production of a design brief, that addresses all the needs previously identified. 1.2b – Production of a product specification that includes statements that are technical, measurable, and justified and included consideration of form, function, user requirements, performance requirements, material and component requirements, scale of production, cost and sustainability. 1.2c – Identification of criteria, which will be used to evaluate the success of the prototype.	To be able to carry out and evidence primary research activities such as an interview, a group survey, the observation of a task being carried out, or an environment analysis. To be able to write a clear and concise design brief that refers to the needs and wants of the identified user/client or user group. To be able to write a list of specification criteria that are realistic in their expectation and justified. To be able to produce 3-4 quality design ideas that are visibly different and meet the needs or wants of the user/client or user group and solve the identified problem. To be able to show considerations of budget, aesthetics, and cultural and sustainability issues, through written annotation. To be able to show exploration of materials, components, processes, and techniques through annotation. To be able to review all the design ideas that have been produced. To be able to conduct additional research which supports the refinement of the chosen initial idea towards a final design suitable for prototyping. To be able to make refinements which support an improvement against the specification.	Weekly homework Classwork Marked Peer and self-assessment End of project assessment (Final Piece)

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	Design Ideas 2.1a – Production of a range of design ideas that address the criteria in the design brief and product specification. 2.1b – Consideration of a range of issues when producing the design ideas, including: budget, aesthetics, cultural issues, and sustainability issues. 2.1c Exploration of different design approaches, including: materials, components, processes, and techniques. Review of initial design ideas 2.2a – Analysis and evaluation of how each design idea meets the design brief and product specification. 2.2b – Determine which designs follow the design brief and product specification and should be taken forwards for development. 2.2c – Modification of design ideas to fit the design brief and product specification.	To be able to communicate how they are developing their design idea towards a final design, through analysing their options and evaluating their choices as an ongoing activity. To be able to present a “final design” within the evidence for development. To be able to develop a final design sufficient in detail and consideration so that another person with D&T knowledge such as can interpret the intentions for making. To be able to apply a range of different techniques throughout their design and development work. To be able to choose appropriate techniques at different stages to demonstrate their understanding of how and when to use different communication techniques in the context of a D&T project. To be able to communicate design ideas clearly and effectively using written techniques. To be able to analyse the chosen developed design idea against the list of specification criteria. To be able to demonstrate consideration for the materials, processes and techniques that would be used to make the prototype. To be able to seek authentic feedback from the user/client or user group identified for their project.	
Year 11 Term 2 and 3 Exam	Development of design ideas into a chosen design 2.3a – Consideration of user group needs and preferences, of design ideas, conducting further research where necessary.	To be able to conclusively communicate how they intend to manufacture the prototype. To be able to make and evidence decisions in relation to tools, equipment, and techniques and show their application when making the prototype.	Weekly homework Classwork Marked Peer and self-assessment End of project assessment (Final Piece)

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	2.3b – Consideration of the design, rather than focussing on component parts in isolation. 2.3c – Modelling/simulation used to test the features of design ideas. 2.3d – Analysis and evaluation of the design ideas, to inform choice as the chosen design to take forward. 2.3e Modification of designs to produce the chosen design, which meets the design brief and product specification. 2.3f – Use of calculations to determine all material quantities and technical details of materials, processes and components that could be interpreted by a third party. Communication of design ideas 2.4a – Use a range of communication techniques and media to present the design ideas, including: Free hand sketching (2D and/or 3D), annotated sketches, cut and paste techniques, digital photography/media, 3D models, isometric and oblique projection, perspective drawing, orthographic and exploded views, assemble drawings, system and schematic diagrams, computer-aided design (CAD) and other specialist computer drawing programs. 2.4b – Communicate the design ideas clearly and effectively using written techniques. Review of chosen design	To be able to evidence their ability to carry out practical activity using safe working practices that account for both them and for others. To be able to include photographic and/or video evidence sufficient to show that the prototype they have made Functions as intended (or does not), meets the needs of the user/client (or does not), solves the identified problem (or does not) and meets the full list of specification criteria (or attempted to). To be able to test their final prototype with the user/client or user group. To be able to analyse how their prototype performed against the measurable specification points. To be able to critically judge if their prototype met, partially met, or did not meet each specification point. To be able to carry out an LCA based on their final made prototype.	
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	2.5a – Produce a chosen design solution for the product that meets the design brief and product specification. 2.5b – Consideration given to the materials, techniques and processes required to produce the chosen design solution. 2.5c – Incorporation of feedback from research into the chosen design. Manufacture – Selection of materials 3.1a – Production of a prototype that meets the requirements of the design brief and product specification, showing a wide range of making skills with precision and accuracy. 3,1b – Selection and application of: Materials, range of tools including marking out tools – hand tools and machinery, range of techniques, fixtures, templates, jigs and/or patterns, components, surface treatments and finishes used in the manufacture of the prototype. 3.1c – Demonstration of safe working practices, for themselves and others. Manufacture – Skills and processes 3.1a – Production of a prototype that meets the requirements of the design brief and product specification, showing a wide range of making skills with precision and accuracy. 3,1b – Selection and application of: Materials, range of tools including marking out tools – hand tools and machinery, range of techniques,		
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	fixtures, templates, jigs and/or patterns, components, surface treatments and finishes used in the manufacture of the prototype. 3.1c – Demonstration of safe working practices, for themselves and others. Quality and accuracy 3.2a – Measuring the degree to which the prototype performs as intended. 3.2b – The prototype is accurately assembled and finished to a high quality. Testing and evaluation 4.1a – Analyse the prototype against the product specification by conducting a variety of tests under realistic conditions, to ensure fitness for purpose. 4.1b – Analyse the results of the prototype testing. 4.1c – Evaluate whether the prototype meets the product specification. 4.1d – Evaluate the sustainability of the final prototype by carrying out a life cycle assessment (LCA), to assess the impact on the environment. Exam revision and preparation • Designing and Making Principles: Know the design process, including research,		
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	specification writing, development of ideas, and testing. • Technical Principles: Understand materials, their properties, uses, and manufacturing processes. • Specialist Technical Principles: Focus on the specific material areas relevant to your course (e.g., textiles, metals, timbers, polymers, papers and boards, or systems and control). 2. Key Areas to Focus On Core Technical Principles: • New and Emerging Technologies: Impact on production and society, ethical considerations. • Energy Generation and Storage: Different types of energy sources, sustainability. • Developments in New Materials: Smart materials, composites, technical textiles. • Systems Approach to Designing: Basic electronic systems, programmable components. • Mechanical Devices: Levers, linkages, rotary systems. • Material Properties: Working with different materials (e.g., woods, metals, polymers). Specialist Technical Principles: • Material Categories: Specific details about the materials you focus on.		
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	• Processes and Techniques: Methods for shaping, joining, and finishing materials. • Surface Treatments and Finishes: Techniques to improve aesthetics and functionality. Designing and Making Principles: • Investigating and Researching: User needs, market research, anthropometrics, ergonomics. • The Design Process: Sketching, modelling, prototyping, CAD/CAM. • Tools and Equipment: Safe use, different tools for different tasks. • Evaluating: Testing and evaluating designs, user feedback, iteration. 3. Exam Preparation Past Papers and Mark Schemes: • Practice with Past Papers: Regular practice with past exam papers to familiarize yourself with the format and types of questions. • Review Mark Schemes: Understand how marks are awarded and the level of detail required in answers. Practical Skills: • Practice Practical Tasks: If possible, work on practical projects to hone your skills in designing and making.		
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	• Document Processes: Keep a detailed portfolio of your work, documenting each stage of the design process. 4. Study Resources Textbooks and Revision Guides: • Use recommended textbooks and revision guides tailored to the Edexcel syllabus. Online Resources: • Utilize online platforms such as BBC Bitesize, Seneca Learning, and other educational websites that offer resources and quizzes for GCSE Design and Technology. Revision Cards: • Create flashcards for key terms, definitions, and processes. Diagrams and Visual Aids: • Make use of diagrams, flowcharts, and other visual aids to understand and remember processes and systems. 5. Time Management Create a Revision Schedule:		
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	- Plan your revision time, breaking down topics into manageable chunks. - Allocate more time to areas where you feel less confident. Regular Breaks and Review: - Take regular breaks to avoid burnout. - Regularly review what you’ve learned to reinforce your memory. 6. Practical Tips Stay Organized: - Keep all your notes, materials, and resources organized. Seek Help When Needed: - Don’t hesitate to ask your teacher for clarification or additional help on topics you find challenging. Group Study: - Consider studying with classmates to discuss and reinforce different concepts.		
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