

DEPARTMENT:

Design and Technology

Year	Term 1 IBO starting here for 9&10		Term 2		Term 3 TPH starting here for year 9&10		Term 4
9	Topics - Speaker Project, Analysing a brief, researching existing products , designing own products, prototyping designs , materials: plastics, sustainability of plastics, plastic forming techniques		CAD CAM, electronics, fault finding in electronic circuits, testing and evaluation of your own products. Systems approach to electronics. UTCness - This unit has been designed to develop students diagnostic skills when working with electronics. This need was highlighted by training staff at BAE systems, circuit testing lessons are also being supported by staff from BAE systems.		Topics - Casting methods, Metals: properties and categories, designing and development of designs.		Topics- Practical planning - casting, secondary processes and evaluation of practical outcome.
	Knowledge and skills - Understand how to analyse a task or brief and how to use the 5 w's to analyse and identify research. Understand how to evaluate existing products to identify strengths and weaknesses in other designs. Know the properties and characteristics of thermo plastics and how they can be moulded and formed. Product life cycle of a disposable plastic toy and the moral issues relating to this. Producing a range of Design ideas, developing design ideas and a final design.	why - To understand the design process that underpins the fundamentals of design and technology. Understand the basic properties and characteristics of thermo plastics and how they can be moulded. So you can apply the knowledge when selecting materials for your own designs.	Knowledge & Skills, How to use a soldering iron safely , how solder components correctly, how to test and fault find a circuit , how to use the basic tools of 2D design, how to vectorise bitmaps, how to use a CNC laser cutter and vinyl plotter, vacuum forming and line bending. Understanding how to plan production of a multi section product. Understanding how to assemble all the different parts (laser cut casing, vacuum formed casing, assembled circuit and vinyl stickers) to manufacture a completed product. Product testing and evaluation.	Why - Understand the basic commands of CAD software so that you can design your own products and output to a CNC machine. Know how to use thermo forming techniques so you can manufacture your own products out of plastics. Understanding how to fault find a electronic circuit has been identified as a key skill by a local employer and school business partner.	Knowledge & Skills, understand the categories of metals - ferrous non, ferrous, alloys. Understand material properties. Understand the sourcing of raw materials, recycling and sustainability of metals. Understand that metals can be melted and cast into abstract shapes, be aware of the different casting methods e.g. investment casting, die casting and sand casting, be aware of the industrial applications of these. Understanding the limitations and constraints of producing gravity fed cast products. Designing and developing pewter castings.	Why? To understand that complex shapes can be moulded or cast. Understanding this process that will help you to designs more complex products in the future. It is essential that you understand the different properties of metals in order to be able to select the best metal for a product that you are designing.	Knowledge & Skills- Understanding the selection of tools and equipment for marking out, cutting and shaping metals, finishing and polishing metals. Planning the practical tasks with quality control checks for each stage. Manufacturing the pewter casting whilst following the production plan. Evaluating the completed product and finishing techniques.
	Group Differentiation - differentiation sheets to support each topic, differentiated work books, students are generally seated in ability groups, sentence starter sheets for extended writing tasks.	Links to careers - Design, research and development.	Group Differentiation - Staggered start to practical tasks, depending on understanding and confidence. Practical support sheets. Sentence starter sheets for extended writing tasks. External specialists supporting fault finding.	Links to careers - CAD designers, sign writers, electrical engineering, System engineering, project was designed to suit the skill set of apprentices needed by BAE systems.	Group Differentiation - differentiation sheets to support each topic, differentiated work books, students are generally seated in ability groups, sentence starter sheets for extended writing tasks.	Links to careers - Engineering, Foundry work, Pattern makers, Metallurgy, Product designers.	Group Differentiation - staggered start to practical tasks, depending on understanding and confidence. Practical support sheets. sentence starter sheets for extended writing tasks.
	Reading & Extended Writing - task analysis and evaluations of existing products are both extended writing tasks.	Numeracy - Dimensional accuracy is vital when making models and following specified dimensions from a brief.	Reading & Extended Writing - Production planning and evaluation of the completed product are both extended writing tasks.	Numeracy - Dimensional accuracy in CAD CAM are vital to the success of the product. Ensuring that design sizes of different component parts fit the sizes of the pre manufactured components.	Reading & Extended Writing - Much of the research of materials and their properties will be supported by reading from text books. Task analysis, metal properties, metal characteristics and aluminium lifecycle are extended writing tasks.	Numeracy - Planning the size of the design to fit within the specified dimensions outlined in the project brief.	Reading & Extended Writing - Opportunities for extended writing in the planning of the practical activities.
	SMSC - evaluating existing products: for their selection of sustainable materials, the products ability to be recycled easily. Product life cycles for single use plastic toys and the moral questions raised by such products. Planning efficient use of materials when designing to reduce waste.		SMSC - Planning CAD work carefully including the tessellation of shapes, to ensure that designs do not waste materials.		SMSC- Sustainability and recycling of metals, cultural understanding when designing shapes and symbols.		SMSC - marking out efficiently and carefully to ensure Collection and recycling of pewter off cuts.
Topics - Wind Turbines / renewable energy project. Energy, fossil fuels, renewable energy, how energy is generated from fossil fuels/ renewable energy. CAD commands and tools.		Topics - Wind Turbines / renewable energy project. Modelling + prototyping, CAD CAM, product development and realisation		Topics - Clock project. Designing in the style of a design movement, looking at the work of designers and movements past and present.		Topics - Clock project. Drawing designs, modelling designs, planning, making and evaluating clocks.	
Knowledge and Skills - Energy generation, fossil fuels, generating energy from fossil fuels and renewable energy. How energy is generated from renewable sources and from nuclear power. Evaluating existing products, developing a design specification, initial design ideas and developing design ideas.	Why - Understand as engineers / civil engineers and as people who care about our world that we need to conserve the planets resources and use energy from renewable sources.	Knowledge & Skills - Developing design through paper and card modelling using nets to produce component parts, assembling component parts to develop a prototype, understanding how to use CAD to design the component parts and laser cutting a developed model to test the construction out of card. Developing CAD designs, production planning, laser cutting final prototype, Building final design, gluing plastics soldering circuit. Testing the final product, further development of the final product.	Why? Fundamental development skills needed for all stages of design and technology when developing designs and prototyping.	Knowledge & Skills Understanding some of the styles and influences of other designers and design movements. To be able to analyse the styles in order to use parts of it to influence your own designs. Evaluation of existing products, investigating important dimensions and sizes, testing construction techniques and writing a design specification.	Why? There is much you can learn from the work of existing designers past or present. They can help you to design products in a completely new style that you may normally have dismissed or not noticed.	Knowledge & Skills - Design sketching, developing design ideas, modelling and prototyping, 2D modelling, 3D modelling, CAD design and developing a final design. Production planning, marking out, cutting materials, drilling, joining materials and painting. CAM for clock faces, final assembly of the clock, testing and evaluating	

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Group Differentiation - differentiation sheets to support each topic, differentiated work books, students are generally seated in ability groups, sentence starter sheets for extended writing tasks.	Links to careers - Energy / power generation, Sustainable forestry sector. Electrical Lineman, Engineer, Facilities Manager, Gas Plant/Refinery Operator, Geologist, mining.	Group Differentiation - Step by step CAD instruction sheets are available to enable all students to produce a successful 3D prototype. More able students are free to design what ever they like with the guidelines of the specification, more able students are encouraged to use CAD to contour their joints and reduce the tolerance of the joints to an interference fit.	Links to careers - CAD designers, CAM prototyping, sign writers, electrical engineering, System engineering.	Group Differentiation - differentiation sheets to support each topic, differentiated work books, students are generally seated in ability groups, sentence starter sheets for extended writing tasks.	Links to careers -graphic designers, design industry, design and technology and Art based careers.	Group Differentiation - Drawing aids such as isosketch templates, isometric grid paper, exemplar designs at a range of levels from 1 -9 , design starter sheets with outline drawing started. Staggered start to practical tasks, depending on understanding and confidence. Practical support sheets. sentence starter sheets for extended writing tasks.
Reading & Extended Writing - Each power sector has an example GCSE style extended writing exam question, there are opportunities for extended writing in the evaluation of existing products and design specification. Learning about energy /renewable energy and fuels is all supported by text book reading.	Numeracy - Following specified dimensions from a brief to ensure designs are the correct size, evaluating the dimensions of existing products.	Reading & Extended Writing - There are opportunities for extended writing in the testing of the final product	Numeracy - Ensuring that different CAD drawings are correctly proportioned and dimensionally accurate to enable joints fit together with in a 0.2mm tolerance. Component parts must be able to be assembled together to produce a working 3D prototype also with a tolerance of	Reading & Extended Writing - task analysis, evaluations of existing products and the design specification are all extended writing tasks.	Numeracy - Accurately measuring the sizes of different component parts of the pre manufactured components of the clock mechanism and hands to ensure that models and clocks are dimensionally accurate.	Reading & Extended Writing - Production planning and evaluation of the completed product are both extended writing tasks.
SMSC - Sustainable and renewable energy covered in detail, understanding the harm caused to the environment by mining, deforestation and the burning of fossil fuels. Risks of using nuclear power, risks to the environment of fracking and the damage and land scarring caused by all of the above.		SMSC - Understanding why we use renewable and cheaper resources to model our designs before using less renewable resources to manufacture them. Ensuring that CAD work is nested in groups and ensure that, where possible shapes are tessellated to reduce the quantity of waste materials.		SMSC - Consideration of shapes and symbols to avoid when designing due to cultural sensitivity.		SMSC - Consideration of shapes and symbols to avoid v sensitivity. Consideration and selection of sustainable r the clock.

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Topics - GCSE coursework Designing a product for the exam board specified brief.		Topics - Developing a product through prototyping and designing		Topics - Making a product , testing and evaluating the final product		Topics - Exam preparation and revisions
Knowledge & Skills, identification of a client, writing a design specification, writing a design brief, investigating important dimensions relevant to product design, testing different finishes.	Why? Students need to know who they are designing for and need to be able to identify the clients needs and requirements for a product before they start designing to ensure the product they design is tailored to the clients needs. Design brief and specification is needed to ensure students have outlined specifically what they need to be designing. It is vital that student understand the sizes of any interacting products in order to ensure the product that they design is the correct size to function as intended. Pupils will test paints and other finishes on a range of different materials in order for them to evaluate the pros and cons of each and enable them to make an educated decision on what type of finish to use on their product.	Knowledge & Skills Sketching initial design ideas, annotating design ideas, evaluation of design ideas, modelling and prototyping, development of designs, CAD development, planning the manufacture of a product.	Why? Students need to be able to design and manufacture their own products, developing the design helps to understand and visualise form, function, construction, dimensions and aesthetics.	Knowledge & Skills Students will manufacture their products using a range of techniques, wasting / shaping, joining, fabrication, forming, construction and assembly. The prototypes will be finished to a high standard with function as intended Skills- -Measuring and marking out - A range of manufacturing techniques sawing, sanding, planning, filing, drilling, routing, morticing, forming, laminating, welding, casting, electronics, CNC vinyl cutting, CNC laser cutting, CNC routing, CNC plasma cutting. -Finishing techniques: Varnishing, painting, waxing, staining, sanding and smoothing, Self Adhesive decals Testing strategy and testing of the final product. Evaluation, modification and development of the finished product.	Why? This is the students opportunity to showcase every practical skill they have learned, to produce a high quality practical outcome to contribute towards their final GCSE grade in design and technology.	Knowledge & Skills - How to tackle extended writing questions in exams. Review all the topics from the start of year 9: Materials, Material properties and their origins, stock forms and finishes. Pre manufactured components, tools, manufacturing processes, scales of production, mechanisms, levers and linkages, directions, forces and stresses. Industry, production techniques and systems enterprise, sustainability, environment, fuel power and energy, recycling, ecological footprints, people, society and cultures. Electrical systems and control systems. Measurements and tolerances, quality control and assurance. Designing and Making principles, work of famous designers and movements past and present.
Group Differentiation - Exemplar portfolio sheets to show the structure and layout of the work. Help sheets to support each task. Sentence starters for extended writing tasks. Students will be sat according to ability. Step by step guide sheets and staggered starting points for practical tasks	Links to careers - Graphic designers, design industry, product designer, painting and decorating.	Group Differentiation - Exemplar portfolio sheets to show the structure and layout of the work. Help sheets to support each task. Sentence starters for extended writing tasks. Students will be sat according to ability. Step by step guide sheets and staggered starting points for practical tasks	Links to careers - CAD designers, CAM prototyping, sign writers, graphic designers, design industry, model makers, engineers, design and technology and Art based careers.	Group Differentiation - Staggered start to practical tasks, depending on understanding and confidence. Help sheets available for some manufacturing processes, technician support available for practical. Small group enrichment opportunities available for those who need more help. Students will have individual targets for practical lessons. Exemplar material and sentence starters will be available for extended writing tasks.	Links to careers - CAD designers, CAM prototypes, sign writers, graphic designers, design industry, model makers, engineers, carpenters, joiners, prototypes, design and technology and Art based careers.	Group Differentiation - Practice exam questions for a wide range of abilities, past papers, mark schemes and text books to allow more able to move on if desired.

<p>Reading & Extended Writing -Identification of a client, design brief and the design specification are all extended writing tasks.</p>	<p>Numeracy - investigating important dimensions relevant to product design will involve accurate measuring and some calculations to work out the ideal dimensions of the product being designed.</p>	<p>Reading & Extended Writing -Evaluation of design ideas and production planning are both extended writing tasks.</p>	<p>Numeracy - opportunities for numeracy in, dimensioning designs, preparing cutting list of materials, dimensional accuracy in CAD CAM are vital to the success of the product. Ensuring that design sizes of different component parts fit the sizes of the pre manufactured components.</p>	<p>Reading & Extended Writing - Testing and evaluation are both extended writing tasks</p>	<p>Numeracy - opportunities for numeracy in marking out of materials, dimensional accuracy and correct speeds and power settings in CAD CAM are vital to the success of the product. Ensuring that sizes of pre manufactured components fits the product being manufactured by the student.</p>	<p>Reading & Extended Writing - Area of focus in this unit is extended writing exam questions and reading exam questions carefully to identify exactly what the question is asking for.</p>
<p>SMSC- identification of a client and writing a design specification will have many opportunities for consideration of the needs of different users and clients including abilities and disabilities, cultures, beliefs and backgrounds.</p>	<p>SMSC- Evaluation of design ideas will have opportunities for consideration of the needs of different users and clients including abilities and disabilities, cultures, beliefs and backgrounds.</p>	<p>SMSC - Marking out materials efficiently and carefully to ensure materials are not wasted. Collection of off cuts for the use in future products. Planning CAD work carefully including the tessellation of shapes, to ensure that designs do not waste materials. Consideration of inclusive design for people of all backgrounds, abilities, cultures and beliefs when testing and evaluating the final outcome.</p>	<p>SMSC - there will exam questions focused on SMSC issues</p>			

	Term 5		Term 6	
is and finishing cast products,	Topics - Mechanical toy project, Mechanisms, designing mechanical systems, Materials: woods, design specification, designing and modelling.		Topics- Production planning, making and development of mechanical toys, testing and evaluating mechanical toys	
Why? Key skills needed for working in metals and plastics. Production planning and product evaluation are both fundamental skills required in design and technology and life.	Knowledge & Skills, understand the categories of woods - hard wood, soft wood and manufactured boards. Understand the sourcing of raw materials, recycling and sustainability of wooden materials. Understanding joining methods for woods: lap joints, housing joints, screws and glue. Understanding mechanisms: Cams, cranks, levers, linkages. Understanding the different types of motion created by mechanisms. Understanding how to write a design specification. Designing through sketching, development through isometric drawing and modelling, development of a final design.	Why? It is essential that you understand the different properties of wooden materials in order to be able to select the best metal for a product that you are designing. You need to understand how to join woods as it cannot be moulded or cast like plastics and metals can. Understanding mechanism and motions related to these is a key skill for mechanical engineers and design and technology. Writing a design specification is a key skill needed in the design process.	Knowledge & Skills - Selecting materials and tools to enable you to realise your own design, Manufacturing wood joints, safe use of pillar drills, hegener saws, sanding machines, battery drills and other hand tools. Using paints to finish's products to a high standard. Understanding the importance of 3rd party evaluation and testing.	Why? Safe use of tools and machinery, practical skills and painting skills are essential skills in both every day life and in design and technology.
Links to careers - Engineering, Foundry work, Pattern makers, Metallurgy, Product designers.	Group Differentiation - differentiation sheets to support each topic, differentiated work books, students are generally seated in ability groups, sentence starter sheets for extended writing tasks. Drawing aids such as iso sketch templates, isometric grid paper, exemplar designs sheets at a range of stages in the design process.	Links to careers - product designer, carpenter and joiner, mechanical engineer.	Group Differentiation - Staggered start to practical tasks, depending on understanding and confidence. Practical support sheets. Sentence starter sheets for extended writing tasks.	Links to careers - product designer, carpenter and joiner, painters, special effect artists, product designers.
Numeracy - quality control checks for dimensional accuracy.	Reading & Extended Writing - Much of the research of materials and their properties, mechanisms, motion and levers will be supported by reading from text books. Task analysis, wood properties, motion, levers and design specification are extended writing tasks.	Numeracy measuring and marking out wood joints, applying dimensions to design ideas, specifying design dimensions in a design specification. Calculating moments and gear ratios.	Reading & Extended Writing - Testing and evaluation will be extended writing tasks.	Numeracy- accurate marking out, measuring to ensure success and function of the product.
materials are not wasted.	SMSC- Sustainable forestry /deforestation and recycling of timber based products, cultural understanding when designing shapes and characters.		SMSC - Marking out materials economically	
gns, modifying and developing	Topics - Inclusive design, respecting people of different faiths and beliefs. Enterprise based on the development of an effective business innovation, How technology push/market pull affects choice. Changes in fashion and trends in relation to new and emergent technologies.		Topics - Start of the GCSE NEA topic set by the exam board on the 1st June.	
Why? - To build and reinforce the designing and modelling skills they have already learned. Production planning is a key skill used in planning any practical activity used in life and an essential skill needed for GCSE	Knowledge & Skills - Inclusive design - Designing products that are suitable for all of society, considering peoples needs, ability, disabilities, sizes, beliefs and culture. Business and enterprise in product design.	Why? These are all essential areas and skills for every day life that are not covered in depth in the projects up to this point. Students will need this knowledge before they can access all the marks available in their GCSE.	Knowledge & Skills - Analysis of the design context, social and economic issues relating to the brief. Research planning, mood board and evaluation of existing products. Testing construction techniques.	Why? Analysis is a critical skill needed to fully understand the project and its context. Understanding the social and economic factors linked to a design will help students to be able to design products that are worthwhile and benefit the wider community.

Links to careers - Graphic designers, design industry, product designer, carpenter and joiner, CAD designers, CAM prototyping, sign writers.	Group Differentiation - Differentiation sheets to support each topic, students are generally seated in ability groups, sentence starter sheets for extended writing tasks.	Links to careers - Business, enterprise, product designer.	Group Differentiation - Exemplar portfolio sheets to show the structure and layout of the work. Help sheets to support each task. Sentence starters for extended writing tasks. Students will be sat according to ability. Step by step guide sheets and staggered starting points for practical tasks	Links to careers - Design, research and development. Product design, carpenter, joiner and engineers.
Numeracy - opportunities for numeracy in marking out, symmetry of designs, dimensions and angles to make an accurate clock face.	Reading & Extended Writing - task analysis and design specification are both extended writing tasks.	Numeracy - The business and enterprise section of this unit will involve costings and profit margin calculations. The hand sizes and anthropometric data section of the unit involves measuring and calculating mean values.	Reading & Extended Writing - context analysis, research planning and the evaluation of existing products are all extended writing tasks.	Numeracy- accurate marking out, measuring of test joints to ensure success.
when designing due to cultural materials for the construction of	SMSC - This unit is all about inclusive design for all of society, cultural and religious understanding in designing.		SMSC_ consideration and analysis of the social and economic issues related to the context set by the exam board.	
	Topics		Topics A level taster day	
Why? Extended writing questions in design technology exams carry up to 8 marks, This is almost a grade boundary. Students traditionally avoid these questions and need to learn the exam technique. It is important to revisit all the curriculum areas so that students can recall the fine details that they may have forgotten over time.	Knowledge & Skills	Why?	Knowledge & Skills - looking at the work of other designers, research planning and designing a product.	Why? To introduce students to A level product design, to highlight the similarities and differences from GCSE design and technology. To give the students a flavour of what A level product design will be like.
Links to careers - CAD designers, CAM prototypes, sign writers, graphic designers, design industry, model makers, engineers, carpenters, joiners, prototypes, design and technology and Art based careers.	Group Differentiation	Links to careers	Group Differentiation - some templates sheets to help design starting points, sentence starters for research plan.	Links to careers - product designer, architecture, engineering, design industry.

<p>Numeracy - Arithmetic and numerical computation, Handling data, Graphs and Geometry and Trigonometry are all areas of maths that may appear in a GCSE technology exam. Revision of these areas will be covered in this unit.</p>	<p>Reading & Extended Writing</p>	<p>Numeracy</p>	<p>Reading & Extended Writing - Research plan is an extended writing task</p>	<p>Numeracy - Not covered in the taster day</p>
<p>ies.</p>	<p>SMSC</p>		<p>SMSC - research planning for SMSC issues.</p>	