

Year 10	Autumn HT 1	Autumn HT 2	Spring HT 1	Spring HT 2	Summer HT 1	Summer HT 2
Topic and/or Key Question	<u>3.1 Core Technical Principles</u> 3.1.1 New & Emerging Technologies 3.1.2 Energy Generation and Storage UNIT 1 - 2	<u>3.1 Core Technical Principles</u> 3.1.3 Developments in New Materials 3.1.4 Systems approach, to designing 3.1.5 Mechanical Devices UNIT 2	<u>3.1 Core Technical Principles</u> 3.1.6 Materials and Their Working Properties 3.1.6.1 – 3.1.6.2 UNIT 3	<u>3.1 Core Technical Principles</u> <u>3.2 Specialist Technical Principles</u> UNIT 3 - 4	<u>3.2 Specialist Technical Principles</u> UNIT 4 – 5 (A-F)	<u>3.2 Specialist Technical Principles</u> UNIT 5 (A-F)
Key Knowledge/Skills Main skills (subject specific and generic) that will be developed and how	<i>3.1.1 New and Emerging Technologies</i> Understanding of the impact of new and emerging technologies on contemporary and potential future scenarios in relation to the following areas: - Industry - Enterprise - Sustainability - People - Culture - Society - Environment - Production Techniques and Systems - How the critical evaluation of new and emerging technologies informs design decisions Maths & Science links: Ethical factors and consideration of ecological and social footprints. <i>3.1.2 Energy, materials, systems and devices</i> Understanding of how energy is generated and stored and how this is used as the basis for the selection of products and power systems: - Fossil fuels - Nuclear Power - Renewable Energy - Energy Storage systems including batteries Maths & Science links: How to choose appropriate energy sources	<i>3.1.3 Developments in New Materials</i> Understanding and awareness of developments in new materials: - Modern Materials - Smart Materials - Composite Materials - Technical Textiles Maths & Science Links: Classification of the types of properties of a range of materials, selecting appropriate material & extracting information from technical specifications. <i>3.1.4 Systems approach to designing</i> Understanding and consideration of electronic systems including programmable components to provide functionality to products and processes, and enhance and customise their operation: - Inputs - Processes - Outputs <i>3.1.5 Mechanical Devices</i> - Different types of movement - Changing magnitude and direction of force (Linkages, levers, rotary systems) Maths & Science Links: Action of forces. Arithmetic and numerical computation incl. use of ratios, angles, functions of mechanical devices to produce movement and forces.	<i>3.1.6 Materials and Their Working Properties</i> <i>3.1.6.1</i> Knowledge and understand the categorisation of the types and properties of the following materials: - Papers & Boards - Natural & manufactured Timbers - Metals and Alloys - Polymers - Textiles Maths & Science Links: Classification of the types of properties of a range of materials, physical properties of materials related to use & knowledge applied when designing and making. <i>3.1.6.2 Materials Properties</i> <i>3.1.6.2</i> Knowledge and understanding of the working and physical properties of the materials in material categories: Physical properties of all of the materials outlined above (absorbency, density, fusibility, electrical and thermal conductivity) Working properties of all of the materials outlined above (Strength, hardness, toughness, malleability, ductility and elasticity) Maths & Science Links: Scientific vocabulary (see below) and using materials and their selection in a particular design situation.	<i>3.2 Specialist Technical Principles</i> <i>3.2.1</i> Selection of materials or components – use of ACCESSFM - Papers & Boards - Natural & manufactured Timbers - Metals and Alloys - Polymers - Textiles Maths & Science Links: Calculation of material costs. Selection and use of materials considering end of life disposal. <i>3.2.2 Forces & Stresses</i> Understanding and knowledge of at least one of the material categories of the impact of forces and stresses and the way in which materials can be reinforced and stiffened. Maths & Science Links: Changing magnitude and direction of forces. <i>3.2.3 Ecological & Social Footprint</i> Understanding and knowledge of at least one of the material categories of the ecological and social footprint left by designers. Ecological issues in the design and manufacture of products. Maths & Science Links: Selecting appropriate materials. Understanding of how to choose appropriate energy sources.	<i>3.2.3 continued...</i> The 6 R's & Social issues in the design and manufacture of products. Maths & Science Links: Ethical factors and the social footprint of materials used in products. <i>3.2.4 Sources and Origins</i> Understanding and knowledge of at least one of the material categories for the sources and origins of materials. Maths & Science Links: Life cycle assessment and recycling. <i>3.2.5 Using and working with materials.</i> Understanding and knowledge of at least one of the material categories: - Properties of materials - The modification of properties for specific purposes - How to shape and form using cutting, abrasion and addition Maths & Science Links: How physical and working properties are selected, related and used in commercial products when designing and making. <i>3.2.6 Stock forms, types and sizes.</i> Understanding and knowledge of at least one of the material categories for different stock forms, types and sizes in order to calculate and determine the quantity of materials or components required. Maths & Science Links: Calculation of material quantities and sizes. Calculate surface area and volume. Efficient material use, pattern spacing, nesting and minimising waste.	<i>3.2.7 Scales of Production</i> Understanding and knowledge of at least one of the material categories for the selection materials and components considering scales of production and referencing the processes including how products are produced in differing volumes and why scales of production are used. Maths & Science Links: Scale drawings, working to a datum. Material quantities required. <i>3.2.8 Specialist techniques and processes.</i> A range of tools, equipment and processes that can be used to shape, fabricate, construct and assemble high quality prototypes, as appropriate to the materials and/or components being used including - Wastage - Addition - Deforming & reforming How materials are cut to shape and formed to a tolerance. Maths & Science Links: Extracting information on tolerances and using it to control quality and make a prototype. Commercial Processes & the application and use of Quality Control including measurable and quantitative systems used during manufacture. <i>3.2.9 Surface treatments and finishes</i> Understanding and knowledge of at least one of the material category or system for surface treatment and finishes. Preparation and application of treatments and finishes to enhance functional and aesthetic properties. Maths & Science Links: Surface treatments inhibit corrosion and oxidation.



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Assessment [Summative & Formative] How knowledge and skills will be assessed formally and informally. How feedback will be given	Exam questions linked to unit (students have x3 sample papers and question map) in lesson along with modelled answers to unit worksheet questions and tasks each lesson. Unit 1 New and Emerging Technologies Summative Assessment Questions Maths skills for D&T: Decimal places & sig. fig (Q&A Do Now)	Exam questions linked to unit (students have x3 sample papers and question map) in lesson along with modelled answers to unit worksheet questions and tasks each lesson. Unit 2 Energy, materials, systems and devices Summative Assessment Questions Maths skills for D&T: Ratios and Fractions (Q&A Do Now)	Exam questions linked to unit (students have x3 sample papers and question map) in lesson along with modelled answers to unit worksheet questions and tasks each lesson. Unit 3 Materials Summative Assessment Questions Maths skills for D&T: Percentages (Q&A Do Now)	Exam questions linked to unit (students have x3 sample papers and question map) in lesson along with modelled answers to unit worksheet questions and tasks each lesson. Unit 4 Common Specialist Technical Principles Summative Assessment Questions Maths skills for D&T: Angles, area and volume (Q&A Do Now)	Exam questions linked to unit (students have x3 sample papers and question map) in lesson along with modelled answers to unit worksheet questions and tasks each lesson. UNIT 5 A, B, C Papers & boards Timber based materials Metals Maths skills for D&T: Working with data (Q&A Do Now)	Exam questions linked to unit (students have x3 sample papers and question map) in lesson along with modelled answers to unit worksheet questions and tasks each lesson. UNIT 5 A, B, C Polymers Textiles based materials Electronic systems Maths skills for D&T: Solving D^T Problems (Q&A Do Now)

Year 11	Autumn HT 1	Autumn HT 2	Spring HT 1	Spring HT 2	Summer HT 1	Summer HT 2
Topic and/or Key Question Unit 6 – Designing Principles	<u>3.3 Design & Making Principles</u> Unit 6 – Designing Principles	<u>3.3 Design & Making Principles</u> Unit 7 – Making Principles	NEA	NEA	NEA	
Key Knowledge/Skills Main skills (subject specific and generic) that will be developed and how	3.3 Students will know and understand that all design and technology activities take place within a wide range of contexts. They will also understand how the prototypes they develop must satisfy wants or needs and be fit for their intended use. For example, the home, school, work or leisure. 3.3.1 Investigation, primary and secondary data Use of primary and secondary data to understand client and/or user needs.	3.3.7 Selection of materials and components. Use of appropriate materials and components used to make a prototype. Maths & Science Links: SI units: identify appropriate commercially available stock forms and select appropriately. Composition of some important alloys; selecting appropriate metal alloys as required	Students will be working on completion of their Non-Examined Assessment (NEA) research section. Section A: Identifying & investigating design possibilities Section B: Design Brief and Specification Section C: Generating Design Ideas We will re-visit Context investigation, Primary and Secondary research techniques, how to analyse existing	Students will be working on completion of their Non-Examined Assessment (NEA) research section. Section D: Developing Design Ideas Section E: Realising Design Ideas Section F: Analysing & Evaluating	Interleaving exam technique, memory and recall activities in preparation for May exam.	

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	Maths & Science Links: Analysing responses to user questionnaires. Frequency tables and information on design decisions. Presentation of client survey responses. Percentiles ranges used in anthropometrics and/or ergonomics. How to write a design brief and produce a design and manufacturing specification. Carry out investigations in order to identify problems and needs. Maths & Science Links: Comparative chart of performance criteria as for existing products to aid evaluation. 3.3.2 Environmental, social and economic challenge Maths & Science Links: Selection of materials based on ethical factors and social and environmental footprints. 3.3.3 The work of others. Investigation, analysis and evaluation of the work of past and present designers and companies. This is used to then enable students to inform their own designs. 3.3.4 Design Strategies Generation of imaginative and creative design ideas using a range of different strategies. Exploration and development of students own design ideas. Maths & Science Links: Measurement and marking out of component parts for models. 3.3.5 Communication of design ideas. Development, communication, recording and justifying design ideas using a range of appropriate techniques. Maths & Science Links: Scaling drawings. 3.3.6 Prototype development Design and development of prototypes in response to client wants and needs. Maths & Science Links: Presentation of date; tabulate responses and findings.	3.3.8 Tolerances Maths & Science Links: SI units e.g. accurate use of appropriate tolerances +/-, resistor tolerance and seam allowance. 3.3.8 Material Management Cutting materials efficiently and minimising waste Maths & Science Links: Expression in decimal and standard form e.g. calculation of required materials. Calculate surface area and volume e.g. material requirements. Angular measures e.g. measurement and marking out. SI units e.g. measurement of materials and components using standard units as appropriate. The use of reference datum points and co- ordinates. 3.3.10 Specialist tools and equipment 3.3.11 Specialist techniques and processes. Surface treatments and finishes. Maths & Science Links: Corrosion and oxidation e.g. how corrosion and/or oxidation affects different materials, how they can be protected through different surface treatments and finishes.	products, investigating a client and user leading to writing a design criterion and brief. <table><tr><th>Sections</th></tr><tr><td>A = Identifying & investigating design possibilities</td></tr><tr><td>B = Design Brief & Specification</td></tr><tr><td>C = Generating Design Ideas</td></tr><tr><td>D = Developing Design Ideas</td></tr><tr><td>E = Realising Design Ideas</td></tr><tr><td>F = Analysing & Evaluating</td></tr></table>	Sections	A = Identifying & investigating design possibilities	B = Design Brief & Specification	C = Generating Design Ideas	D = Developing Design Ideas	E = Realising Design Ideas	F = Analysing & Evaluating			
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Key Vocabulary (School Improvement Priority)	Automation The use of control systems for operating equipment such as machinery and processes in factories; this reduces human input. Client The person/people/audience being designed for and whose needs are being met. Commercial process Manufacturing method used to produce products in quantity. Commercial product A product intended to make money. Conceptual stages (of design) Use of models, sketches and computer aided design (CAD) to show the design of a product as it develops. Continuous improvement The identification of improvements and subsequent evolution of products. Co-operative A group of people united to meet common social, economic or cultural need through a jointly-owned business. Crowd funding A large number of people who raise money for a project or venture.	Ecological The consideration of the environment and the impact that design can have on it. Ethics Moral decisions when designing and manufacturing. Fabricate Using processes such as cutting, bending, joining and assembly to produce products. Finite A material or source which will one day run out. Functionality How well a product carries out its purpose. Fusibility How well a material is converted by heat into a molten or liquid state dependent on its melting point.	Iterative design Design methodology based on a cyclical process of analysing, prototyping and testing to refine a product. Each iteration and result start the process again. Lean manufacturing Reducing and eliminating waste in a manufacturing process. Life cycle assessment A technique used to assess the environmental impact of a product at all stages of its manufacture, use and disposal. Market pull Products developed to meet the needs of society or a specific section of the market. Mechanical device Mechanism which produces and/or changes movement.	Nesting The tessellation of shapes or nets on a material to minimise the amount of waste during manufacture. Physical properties Properties that refer to the actual matter that forms the material (e.g. insulation, conductivity, fusibility). Planned obsolescence Deliberately designing the lifecycle of a product to be short, forcing the user to update their products quickly. Primary source Research collected first-hand by a designer to develop a product or idea.	Primary source (of materials) Where materials originate (polymers from oil etc) and the raw material that needs to be converted into a workable form. Product Item or artefact developed for an intended audience to solve a problem or meet a need. Prototype An early model or sample of a product used to test a concept. Schematic diagram Graphic symbols or simplistic diagrams used to convey a system (e.g. an underground map) Social footprint The impact a product or individual has on society. Social responsibility The idea that a designer needs to evaluate the impact their product could have on society and take action to make this better. Stock form The standard shape and size of materials as they are bought.	Technology push Technological discoveries used to drive the development of a product. Tolerance The minimum and maximum measurements that can be accepted when manufacturing. User The person/people who make use of the product that has been developed by a designer. User centred design Design development with the user at the centre of the focus. The designer tries to envisage how the product will actually be used, as opposed to focusing on other areas such as cost. Working properties How a material reacts to external forces.
Extended Writing Extended writing opportunities and skill development (School Improvement Priority)	Each unit contains linked worksheets, textbook tasks and unit assessment questions. These contain a mixture of multiple choice, short and extended written answers.	Each unit contains linked worksheets, textbook tasks and unit assessment questions. These contain a mixture of multiple choice, short and extended written answers.	Extended Exam Questions NEA content	Extended Exam Questions NEA content	Extended Exam Questions NEA content	

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Assessment [Summative & Formative] How knowledge and skills will be assessed formally and informally. How feedback will be given	Exam questions linked to unit (students have x3 sample papers and question map) in lesson along with modelled answers to unit worksheet questions and tasks each lesson. Unit 6 Design Principles Summative Assessment Questions Practice multiple choice D&T exam questions: (Do Now)	Exam questions linked to unit (students have x3 sample papers and question map) in lesson along with modelled answers to unit worksheet questions and tasks each lesson. Unit 7 Making Principles Summative Assessment Questions Practice multiple choice D&T exam questions: (Do Now)	Students will be assessed on their GCSE NEA coursework using the AQA GCSE marks criteria. Questioning to check student's knowledge and understanding of the content which has been delivered. Use of sample exam papers each lesson as Do Now.	Students will be assessed on their GCSE NEA coursework using the AQA GCSE marks criteria. Questioning to check student's knowledge and understanding of the content which has been delivered. Use of sample exam papers each lesson as Do Now.	Students will be assessed on their GCSE NEA coursework using the AQA GCSE marks criteria. Questioning to check student's knowledge and understanding of the content which has been delivered. Use of sample exam papers each lesson as Do Now.	
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