Medium Term Planning Document: GCSE Design and Technology Year 10 2024-25

Curriculum Intent:

At KS4 GCSE Design and Technology will prepare students to participate confidently and successfully in an increasingly technological world. Building on their experience at KS3, students study core technical designing and making principles, including a broad range of design processes, materials techniques and equipment. The will study Timbers and Polymers in greater depth. Students gain an awareness and learn from wider influences including historical, cultural, environmental and economic factors. Students will have the opportunity to work creatively when designing and making, applying technical and practical expertise.

'Why This, Why Now?'

In Year 10 students learn the knowledge, understanding and skills required to undertake the iterative design process of exploring, creating and evaluating. This knowledge, understanding and skills is taught through three main sections as follows:

- Core technical principles
- Specialisy technical principles
- Designing and making principles

In order to make effective design choices students are taught a breadth of core technical knowledge and understanding that consists of new and emerging technologies, energy generation and storage, developments in new materials, systems approach to designing, mechanical devices and materials and their working properties.

In addition to the core technical principles, students develop an in-depth knowledge and understanding of the following specialist technical principles through the material categories of timber based materials and polymers.

- Selection of materials or components
- Forces and stresses
- Ecological and social footprint
- Sources and origins
- Using and working with materials
- Stock forms, types and sizes
- Scales of production
- Specialist techniques and processes
- Surface treatments and finishes.

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Alongside developing their knowledge, students undertake a range of focused practical tasks and project based learning to ensure that students know and understand that all design and technology activities take place within a wide range of contexts. These tasks also enable stidents to understand how the prototypes they develop must satisfy wants or needs and be fit for their intended use. Students also learn the knowledge required to be able to demonstrate designing and making principles in relation to the following:

- Investigation, primary and secondary data
- Environmental, social and economic challenge
- The work of others
- Design stategies
- Communication of design ideas
- Prototype development
- Selection of materials and components
- Tolerances
- Material management
- Specialist tools and equipment

Specialist techniques and processes.

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The Medium Term Planning document below is designed to show the journey that every student takes through our curriculum. Some elements of the curriculum may be taught over several lessons, others in a single lesson.

Design & Technology	Year 10 – Half Term 1		
Topic	**Content**	**Formative Assessments?**	**Link(s) to an example lesson**
New and Emerging Technologies	Industry and enterprise	Bell work Questioning	T1 Industry and enterprise.pptx
	Key Words: automation, computer aided design (CAD), computer aided manufacture (CAM), computer aided testing (CAT), prototype, computer numerical control (CNC), rapid prototyping, enterprise, start-up business, app design and development, patent, virtual marketing, virtual retail, search engine optimisation, cooperative, Fairtrade.		
	Sustainability and the environment	Bell work Questioning	T2 Sustainability and the environment.pptx
	Key Words: finite resources, non-finite resources, life cycle assessment (LCA), positive impact, negative impact, built in obsolescence, Kaizen.		
	People, culture and society	Bell work Questioning	T3 People, culture and society.pptx
	Key Words: technology push, market pull, graphene.		
	Production techniques and systems	Bell work Questioning	T4 Production techniques and systems.pptx
	Key Words: product data management, flexible manufacturing system (FMS), lean manufacturing, just in time (JIT).		
	Informing design decisions	Bell work Questioning	T5 Informing design decisions.pptx
	Key Words: planned obsolescence, built-in obsolescence, life cycle assessment (LCA),		
Energy, Materials, Systems and Devices	Energy generation	Bell work Questioning	L1 Energy generation.pptx
	Key Words: global warming, turbines, finite, fossil fuels, fracking, renewable, solar farms, tidal, hydroelectric power, biofuel, nuclear, radioactive.		
	Energy storage	Bell work Questioning	L2 Energy storage.pptx
	Key Words: pneumatics, hydraulics, compression, bar, kinetic, motion, potential, flywheel, batteries, cells, miniaturisation.		

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Design & Technology	Year 10 – Half Term 2		
Topic	**Content**	**Formative Assessments?**	**Link(s) to an example lesson**
Energy, Materials, Systems and Devices	Modern materials	Bell work Questioning	L3 Modern materials.pptx
	Key Words: biodegradable, titanium, graphene, liquid crystal displays, nanotechnology, Polymorph, biodegradable, prototyping.		
	Smart materials	Bell work Questioning	L4 Smart materials (2).pptx
	Key Words: ultraviolet, shape memory alloy (SMA), nitinol, muscle wire, conductor, insulator, piezoelectric, quartz,		
	Composite materials and technical textiles	Bell work Questioning	L5 Composite materials and technical textiles.pptx
	Key Words: thermosetting, condensation, vapour, aramids, e-textiles, Nomex, Kevlar, aramid, flame retardants, microfibres, synthetic, microencapsulation.		
	Systems approach to designing	Bell work Questioning	L6 Systems approach to designing.pptx
	Key Words: subtasks, subsystems, input, process, output, open loop system, closed-loop system, feedback, polarity, pole, throw, transducer drivers,		
	Electronic systems processing	Bell work Questioning	L7 Electronic systems processing.pptx
	Key Words: integrated circuits, microcontroller, analogue signal, digital signal, peripheral interface controller (PICs), integrated circuit (IC) monostable, astable, passive infrared sensor, oscillating, frequency, hertz,		
	Mechanical devices	Bell work Questioning	L8 Mechanical devices.pptx
	Key Words: mechanical advantage (MA), fulcrum, effort, load, camshaft, follower, dwell, block and tackle,		
Materials	Papers and boards	Bell work Questioning	T1 Papers and boards.PPTX
	Key Words: absorbency, density, fusibility, electrical conductivity, thermal conductivity, strength, hardness, toughness, malleability, ductility, elasticity, GSM, microns,		
	Timbers	Bell work Questioning	T2 Timbers.PPTX
	Key Words: hardwood, softwood, deciduous, coniferous, evergreen, felling, veneer,		
	Metals and alloys	Bell work Questioning	T3 Metals and alloys.PPTX
	Key Words: ferrous, non-ferrous, alloys, ore, furnace, Bauxite, ferrite, carbon, oxidise, verdigris, patina, galvanise,		
	Polymers	Bell work	T4 Polymers.pptx

		Questioning	
	Key Words: polymers, thermoforming, thermosetting, thermosets, Bakelite		

Summative Assessment:

End of topic assessments take place at the end of each topic. These assessments inform reporting home and teacher planning.
Pupil End of Year Assessments will take place at beginning of Term 6. These will cover all content taught in half terms 1-5. This assessment will inform pupil Rank Order in the subject. There is an expectation that staff will work with pupils to improve knowledge in areas of weakness identified in the summative assessments. This may include in school and out of school intervention, and collaborative and independent study.

Design & Technology	**Year 10 – Half Term 3**		
Topic	**Content**	**Formative Assessments?**	**Link(s) to an example lesson**
Materials	textiles	Bell work Questioning	T5 Textile based materials.PPTX
	Key Words: yarn, warp, weft, selvedge, plain weave, felting.		
Common Specialist Technical Principles	Forces and stresses	Bell work Questioning	T1 Forces and stresses.pptx
	Key Words: static load, dynamic load, tension, tensile strength, compression, compressive strength, torsion, torsional strength, bending, stiffness, shear force.		
	Improving functionality	Bell work Questioning	T2 Improving functionality.pptx

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	Key Words: dynamic forces, static forces, reinforced concrete, composite material, webbing, laminated, interfacing, folding and bending, flexibility, net, cut-lines, score-lines, tabs.		
	Ecological and social footprint	Bell work Questioning	T3 Ecological and social footprint.pptx
	Key Words: carbon footprint, ecological footprint, social footprint, Health and Safety Executive (HSE), Fairtrade, deforestation, slash and burn, desertification, mining, borehole, pipelines, farming, life cycle assessment.		
	The 6 R's	Bell work Questioning	T4 The six Rs.pptx
	Key Words: hierarchy of sustainability, miniaturisation, primary recycling, secondary recycling, upcycle, tertiary recycling.		
	Scales of production	Bell work Questioning	T5 Scales of production.pptx
	Key Words: bespoke, one-off, batch, lead time, continuous production.		

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Design & Technology	Year 10 – Half Term 4		
Topic	**Content**	**Formative Assessments?**	**Link(s) to an example lesson**
Specialist DT Resources - Timber	Sources and origins	Bell work Questioning	T1 Sources and origins.pptx
	Key Words: rough sawn, planed all round (PAR), seasoned, lamination, compression, veneer, desertification, deforestation, global warming, provenance.		
	Working with timbers	Bell work Questioning	T2 Working with timber.pptx
	Key Words: mouldings, skirting boards, architrave, dowel rods, knock-down fittings (KDF), rebating, former, jog, steamer box.		
	Commercial manufacturing	Bell work Questioning	T3 Commercial manufacturing.pptx
	Key Words: quality control, go/no go, tolerances, aesthetics, protection, tanalised, volatile organic compounds (VOCs).		
Specialist DT Resources - Polymers	Sources and origins	Bell work Questioning	T1 Sources, origins and properties.pptx
	Key Words: biopolymers, polymerisation, monomers, crude oil, fractional distillation, catalyst, thermoplastics, thermosetting plastics, pigments, plasticisers, fragrances, stabilisers, life cycle assessment (LCA), energy recovery.		
	Working with polymers	Bell work Questioning	T2 Working with polymers.pptx
	Key Words: gauge, toque, self-tapping screws, laminating, jig, former, stereolithography, digital light processing, laser sintering, Fused Deposition Modelling (FDM), catalyst, cure, capillary action.		
	Manufacturing and finishing	Bell work Questioning	T3 Manufacture and finishing.pptx
	Key Words: blow moulding, rotational moulding, vacuum forming, injection moulding, extrusion, hydraulic piston, ejector pins, extrusion, die, parison, quality control.		
Designing Principles	Investigation, primary and secondary data	Bell work Questioning	T1 Investigation, primary and secondary data.pptx
	Key Words: Iterative design, feedback, primary, secondary, site study, ergonomics, anthropometrics, design and manufacturing specification,		
	The work of others	Bell work Questioning	T2A The work of others.pptx T2B The work of others.pptx
	Key Words: Arts and Crafts Movement, Bauhaus, Art Nouveau, Post-Modern, De Stijl, Cubism, Art Deco.		

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Design & Technology	Year 10 – Half Term 5		
Topic	**Content**	**Formative Assessments?**	**Link(s) to an example lesson**
Designing Principles	Design strategies	Bell work Questioning	T3 Design strategies.pptx
	Key Words: user-centred design, iterative design process, intuitive design, design fixation.		
	Communication of design ideas	Bell work Questioning	T4 Communication of design ideas.pptx
	Key Words: freehand sketching, oblique projection, isometric projection, two-point perspective, vanishing points, construction lines, systems diagrams, schematics, exploded drawing, sectional view, orthographic projection, scale, commercially viable,		
	Selection of materials and components	Bell work Questioning	T1 Selection of materials and components.pptx
	Key Words: aesthetic, functional, CAD, render, component, prototype.		
	Tolerances	Bell work Questioning	T2 Tolerances.pptx
	Key Words:		
	Material management	Bell work Questioning	T3 Material management.pptx
	Key Words: nesting, tessellation, datum, templates, jigs, patterns, batch.		
	Tools, equipment, techniques and finishes	Bell work Questioning	T4 Specialist tools.pptx
	Key Words: PPE, data sheet, outsourcing,		
	Surface treatments and finishes	Bell work Questioning	T5 Surface treatments and finishes.pptx
	Key Words: rust, corrosion, wood decay fungus,.		

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Summative Assessment:

Pupil End of Year Assessments will take place at the start of half term 6. These will cover all content taught in the first 5 half terms. This assessment will inform pupil Rank Order in the subject. As well as the content listed below, there is an expectation that staff will work with pupils to improve knowledge in areas of weakness identified in the summative assessments. This may include in school and out of school intervention, and collaborative and independent study.

Design & Technology	**Year 10 – Half Term 6**		
Topic	**Content**	**Formative Assessments?**	**Link(s) to an example lesson**
Example NEA style project	Core technical principles	Bell work Questioning Observation of Practical Outcomes	MINI NEA - Lamp Project - MWA.pptx
	NEA style project	Bell work Questioning Observation of Practical Outcomes	
	Key Words:		
NEA	**NEA – AO1 Section A**		
	Key Words: identify, investigate, outline, design possibilities		