Topic: Year 10 - Design and Technology in the 21st Century - Materials		**Duration: SUM 1**	**Composite:**
Key vocabulary:	**Core knowledge Components**	**Powerful knowledge components crucial to commit to long term memory**	**Links to previous and future topics**
8) Fibres, Pulp, Recycled, Bleed-proof, Cartridge, gsm, Layout, Tracing, Thickness, Weight, Paper, Boards, Corrugated, Duplex, Foam, Microns, **9)** Characteristics Rough, Planed, Plank, Sheet, Mouldings, Spindle moulder, Veneer, Timber, Grain, Strength, Deciduous, Coniferous, Durability, Aesthetic, Dowel, Categorisation, Laminates, **10)** Ferrous, Non-ferrous, Alloy, Conductivity, Toughness, Malleable, Elasticity, Ductility, Carbon, Tensile,	***Core knowledge must cover the following:*** *•understanding design and technology practice, •understanding user needs, •writing a design brief and specifications, •investigating challenges, •developing ideas, •investigating the work of others, •using design strategies, •communicating ideas •developing a prototype, •making decisions* **Section 8)** Papers and boards, **Section 9)** Natural and manufactured timber, **Section 10)** Ferrous and non-ferrous metals, **Section 11)** Thermoforming and thermosetting polymers, **Section 12)** Natural, synthetic, blended and mixed fibres, and woven, non-woven and knitted textiles. No direct links to component 2 are required due to being covered previously and because of the quantity of coverage needed for component one during this term however the teacher may decide to use the	**Section 8)** • The categorisation and properties of paper, cards, boards and composite materials. Properties to be considered in terms of their strength, folding ability, surface finish and absorbency. • Papers, cards and boards can be laminated to improve strength, finish and appearance. • The standard ISO sizes of paper. • The use of grammage i.e. grams per square metre (gsm) to measure weight of paper. • The use of microns to measure thickness of card. • The use of recycled materials to manufacture papers and boards. • The aesthetic and functional properties of common papers, cards and boards: layout paper, tracing paper, copier paper, recycled paper, corrugated board, cartridge paper, mounting board and folding boxboard. **Section 9)** • The categorisation and properties of hardwoods and softwoods. • Properties to be considered: strength, grain structure, surface finish and absorbency. • Natural timber is harvested from deciduous (hardwoods) and coniferous (softwood) trees. • Natural timber is available in the following forms: plank, board, strip, square, and dowel. • Natural timber can be identified using a range of discriminators: weight, colour, grain, texture, durability and ease of working. • Natural timber is protected using different finishes and these finishes are sometimes used to improve aesthetic appeal. • Categorisation and properties of manufactured timbers. • Manufactured timbers are made from natural timbers and made from particles/fibres or laminates. • Manufactured timbers are available in standard sizes and forms: plywood, MDF (Medium Density Fibreboard), chipboard, hardboard and veneered boards. • Manufactured timbers can be protected using finishes and these finishes are sometimes used to improve the aesthetic appeal. **Section 10**)	Links to every topic in year7. Links to aspects of some topics in year 8. Links to year 11 NEA chosen specialism for exam focus – This is worth 25% of the paper. Test – Exam style questioning from previous Eduqas exam papers and sample documents. (An array of questions from section B of the exam papers should be used to test)

Aesthetic, Protective, **11)** Polymer, Synthetic, Natural, Thermoforming, Thermoplastics, Thermoset, Properties, Insulation, Conductivity, **12)** Raw materials, Natural polymers, Animal polymers, Manufactured polymers, Insect polymers, plant polymers, Fibres, Fabrics, Materials,, Textiles, Aramid, Microfibres, Tactel, Tencel, Absorbency, Blend, Flammability, Water-repellence, Anti-static, Yarn, Resistance	component 2 'core knowledge' elements to assist coverage of materials content / powerful knowledge.	• Categorisation and working properties of ferrous metals, nonferrous metals and alloys. • Properties of metals: hardness, elasticity, conductivity, toughness, ductility, tensile strength and malleability. • Metals are sold as sheet, bar, rod, tube and angle. • Ferrous metals: cast iron, mild steel, medium carbon steel and high carbon steel. • Ferrous metals may require a protective finish and the finish is sometimes used to improve the aesthetic appeal. • Non-ferrous metals: aluminium, copper, brass, bronze. • Alloys of metals are a base metal mixed with other metals or non-metals to change their properties or appearance. • Non-ferrous metals may require a protective finish and the finish is sometimes used to improve the aesthetic appeal. **Section 11)** • Categorisation and physical properties of polymers. • Polymers can be made from both natural and synthetic resources. • Polymers are sold as sheet, film, bar, rod and tube. • The differences between a thermoforming (thermoplastic) and thermosetting material. • Properties of polymers: weight, hardness, elasticity, conductivity/insulation, toughness and strength. • The properties of thermoplastics: polythene, polystyrene, polypropylene and PVC. • The properties of the thermosetting plastics: UF (urea formaldehyde), MF (melamine formaldehyde), PR (polyester resin) and ER (epoxy resin). **Section 12)** • The categorisation and working properties of fibres and textiles. • The raw materials of textiles are classified according to their source. • Natural polymers: • Animal polymers: wool/fleece – mohair, cashmere, angora, alpaca, camel (hair). • Insect polymers: silk. • Plant polymers: cotton, linen hemp, jute, rayon, viscose. • Manufactured polymers: • Synthetic: polyester, polypropylene, nylon, acrylic, elastane, lycra, aramid fibres. • Microfibres – Tactel, Tencel (Lyocell). • The properties of textiles fibres: strength, elasticity, absorbency, durability, insulation, flammability, water-repellence, anti-static and resistance to acid, bleach and sunlight. • Blending and mixing fibres improves the properties and uses of yarns and materials.	

Impressive reading	Impressive speaking	Impressive writing	Resilience	Employability via:
• The use of textbooks to research each material section will require the student to be able to navigate through a glossary / content page.	• Students will be asked to present their experiences of the small FPT's to a group of people.	• Being able to answer exam style questions including 6-mark questions.	Students will be asked to complete small practical tasks that require patience and precision. The ability to harness these qualities will develop resilience and technical capabilities.	Understand the constraints and capabilities of everyday products around us. Many jobs deal with products made from the mentioned materials above. Links to the 6R's, sustainable working and QA/QC.

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- **Student buy in** – 3 Contextual challenges provided by Eduqas. Student has choice from these as to what topic they would like to persevere with for remaining of GCSE.
- **Technology -** https://www.bbc.co.uk/bitesize/guides/zkvny4j/revision/6, http://www.technologystudent.com/joints/revcard_stock1.html, https://my.dynamic-learning.co.uk/ViewPage.aspx?tid=92374d13-c0e4-430f-9fdd-c6842864f2b5&fn=dps0048-0049.swf#, http://www.technologystudent.com/joints/timber3.html
- https://resources.eduqas.co.uk/Pages/ResourceByArgs.aspx?subId=8&lvlId=2
- **Repetition of key vocabulary in every lesson**
- Texts used/alternative texts available with a consideration to reading age
- **Physical samples of materials available.**
- **Duel coding re-enforced learning.**
- **A3 laminated key word and knowledge organiser sheets available.**

Topic: Year 10 - Study section 'Natural timbers & Manufactured boards' from 2.1 Technical principles AND begin 2.2 Designing and making principles (NEA)		**Duration: SUM 2** **Component 2.1 revision / Exam preparation for specialist subject area:** **Begin preparation for NEA – June 1st** **2.2 - Section a)** Identifying and investigating design possibilities.	**Composite:**
Key vocabulary:	**Core knowledge Components**	**Powerful knowledge components crucial to commit to long term memory**	**Links to previous and future topics**
Natural, Manufactured, Properties, Characteristics Rough, Planed, Plank, Sheet, Mouldings, Spindle moulder, Veneer, Timber, Grain, Strength, Deciduous, Coniferous, Durability, Aesthetic, Dowel, Categorisation, Laminates,	**2.1 – All about Natural woods and manufactured boards:** ***2.2 -*** ***Core knowledge must cover the following:*** *•understanding design and technology practice, •understanding user needs, •writing a design brief and specifications, •investigating challenges, •developing ideas, •investigating the work of others, •using design strategies, •communicating ideas* *•developing a prototype, •making decisions*	**Component 2.1 revision / Exam preparation for specialist subject area:** **Natural woods and manufactured boards:** **1)** • The physical and working properties of hardwoods, softwoods and man-made boards: toughness, flexibility, grain structure, strength, absorbency, surface finish, colour and hardness. • Natural solid timber - strengths and weaknesses • Defects: shrinkage, splits, shakes, knots, fungal attack. • Hardwoods: beech, oak, mahogany, balsa and jelutong. • Softwoods: scots pine, western red Cedar and Parana pine. • Strengths, weaknesses of the following manufactured boards: • plywood, MDF - medium density fibreboard, chipboard, and hardboard. • The impact on the environment of deforestation. • Ecological and social footprint. • Changing society's view on waste, encourage recycling. • Living in a greener world. • Life-cycle analysis of a material or product. **2)** • Aesthetic properties of natural and manufactured timbers. • Functional properties of natural and manufactured timbers. • Responsibilities of designers and manufacturers who design using timber with respect to: • the environment. • working conditions in third world countries, low labour costs and poverty. • exploitation of employees. • recyclability and waste. • Biodiversity and deforestation. • Estimating the true costs of a prototype or product. • Comparison costs of hardwoods, softwoods, and manufactured board. **3)** • The behaviour of natural and manufactured timber under forces or under stress. • The stiffness and a strength of natural timber will depend upon the wood, the cross-sectional area and the depth of the section.	Links to all previous year 10 modules. Links directly into the remaining of the NEA in year 11 and exam. Test – Exam style questioning from previous Eduqas exam papers and sample documents.

	During SUM2, students will have the opportunity to research into the contextual challenges released. This will cover the 10-mark section a) and work presented should be no more that 3.5 hours taught time.	• Reinforcement of natural timber by laminating. • The strength of plywood will depend upon the number of layers and the wood grain being at right angles. • The strength of a timber product will depend upon how the product is jointed or what fixing method is used. **4)** • Natural timber is available in different sectional forms, various standard sizes and can have a different finish (sawn or planed). • Manufactured boards are commonly available in sheet form and in standard sizes and various thicknesses. • Calculate the costs involved in the design of products: fixtures, fittings, finishes required and the material cost. **5)** • Advantages and disadvantages of producing single, one off products. • The advantages and disadvantages of producing products in limited quantities (batch production). • The need to produce a number of identical products. • Jigs and devices to control repeat activities. • The advantages and disadvantages of high volume, continuous production. • Issues related to high volume production. • The importance of CAM in modern high volume production. **6)** **Wastage/Addition** • Tools and equipment to mark out, hold, cut, shape, drill and form laminates of natural timbers and manufactured boards. • The pillar drill to drill holes to various diameters. • Jigs and formers to ensure accuracy as part of the process of drilling, bending, cutting wood materials. **Deforming/Reforming** • Material joining can be permanent or temporary. • The principles of producing wood products using the following processes: jointing, veneering, laminating and steam bending. • Classification of wood joints as frame or box construction. • Frame: mitre, dowel, mortise and tenon, halving and bridle joint. • Box/carcass: butt, lap, housing, dovetail and comb joint. • Adhesives: PVA (wood to wood), contact adhesive and epoxy resin (wood to other materials). • Temporary: screw (countersunk and round head) and knock down fittings. • Lasers.	

	1. Understand that all design and technological practice takes place within contexts which inform outcomes. 2. Identify and understand client and user needs through the collection of primary and secondary data. *) What are the 3 contextual challenges that have been released? *) What are your initial thoughts surrounding each challenge? *) What existing products are there on the market that fall into these categories? *) What products can you identify as being obsolete or soon to be obsolete that need modification or improvement? *) What are the appropriate target market(s)?	• CAM machines. **7)** • Surface treatments of natural timber and manufactured boards to prolong life of a product: sealants and primers. • Finishes for aesthetic or functional reasons: varnish, wood stains, oils, polishes and preservative paints. • Contexts are a starting point to inform possible outcomes, situations to create design briefs. • Identify the needs and wants of the end user. • Suggest possible design problems from the contexts. • Explore and investigate existing products, situations before deciding upon whether there is a real need for a product. • Explore and investigate existing products, situations to inform possible specification points for designing. • Primary research data: collecting data and using this to explore and aid further work. • Secondary research data: collecting existing data and using this to explore and aid further work.	

Impressive reading	Impressive speaking	Impressive writing	Resilience	Employability via:
• Eduqas resource materials provide intensive information on ALL areas of study.	• Will be able to communicate with strangers to gain insight of students selected target market.	• Will analyse work throughout project. Will evaluate design ideas, request peer assessments and respond with personal opinion to their opinion.	Perseverance and being able to see a project from conception to fruition.	Being able to analyse data and use it to inform design decisions. Problem solving. First-hand research including - Communication with the public.
SEND				

- **Student buy in** – 3 Contextual challenges provided by Eduqas. Student has choice from these as to what topic they would like to persevere with for remaining of GCSE.
- **Technology -** https://resources.eduqas.co.uk/Pages/ResourceByArgs.aspx?subId=8&lvlId=2
- **Repetition of key vocabulary in every lesson**
- **Opportunities for retrieval practice** - building on prior knowledge built in SUM 1 term.
- **Duel coding re-enforced learning.**
- **A3 laminated key word and knowledge organiser sheets available.**