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**Knowledge Rich Curriculum Plan**

Year 12 – Design

| **Year 12** **Design**  |  |  |  |  |
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| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson:** **Materials and their application** | * Students will know that materials have certain properties that a designer will have to consider when using these materials
* Students will know the certain properties a designer will consider are: Mechanical, Physical, Electrical, Thermal and Optical
* Students will know Mechanical properties include: Compressive strength, Tensile strength, Bending strength, Shear strength, Torsional strength, Hardness, Toughness and Plasticity
* Students will know Physical properties include: Density, Magnetism, Fusibility, Corrosion
* Students will know Electrical properties include: Conductor, Insulator, Thermal conductor, Thermal Insulator, Thermal expansion
* Students will know Optical properties include: Opaque, Translucent, Transparent
 | Translucent: Some aspect is covered but still allows light to showTransparent: A clear visual image | * ***Students need to already know the terms of Tensile, Bending, Compressive, Shear, Torsional***
* ***Students need to already know the terms Electrical and Thermal conductor***
* ***Students need to already know the different types of materials used in Design***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Classification of materials** | * Students will know the different types of materials used in DT
* Students will know how each material category is split into other types of materials
* Students will know the different types of materials are: Metals, Woods, Polymers, Papers and Boards, Composite, Smart materials, Modern materials
* Students will know the Metal category is split into Ferrous, Non-Ferrous and Alloys
* Students will know the Wood category is split into Hardwood, Softwood and Manufactured board
* Students will know the Polymers category is split into Thermoplastic, Thermosetting and Elastomer
 | Thermoplastic: A polymer that can be softened and moulded again and againThermosetting: A polymer that once set cannot be changed | * ***Students need to already know the different types of materials***
* ***Students need to already know how to identify different types of materials***
* ***Students need to already know the categories of materials***
* ***Students need to already be able to identify the names of materials and their properties***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Methods for investigating and testing** | * Students will know that materials will be tested as part of the investigation section of the design process
* Students will know how materials are tested as part of Workshop tests
* Students will know that workshop tests include a Hardness test, Dot punch test
* Students will know that testing materials tests for Toughness, Hardness and Malleability
* Students will know that other types of tests are Corrosion tests and Electrical conductivity tests
 | Investigation: the action of investigating something or someone; formal or systematic examination or research. | * ***Students need to already know that materials will get tested during the manufacture stage***
* ***Students need to already know the tools used for testing materials***
* ***Students need to already know why a product gets tested***
* ***Students need to already be familiar with the terms Hardness and Corrosion***
 | Exam style questions – End of topic assessments - MCQ |

| **Year 12****Design**  | **Unit: Performance characteristics of materials** |  |  |  |
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| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson:** **Papers and boards** | * Students will know the different types of papers and boards
* Students will know how to identify a paper or a board
* Students will know a board is considerably heavier and weighted than a paper
* Students will be able to identify the different sizes of paper
* Students will know the different paper sizes are classed into categories A, B and C
* Students will know the different uses and applications of papers and boards
 | Compliant: a shape able object which can be bend and folded | * ***Students need to already identify the difference between paper and board***
* ***Students need to already know how certain papers and boards are used***
* ***Students need to already know certain properties of different types of papers and boards***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Timber** | * Students will know how timber is processed into a workable material
* Students will know the term seasoning is used to describe timber being dried in order to make it a useable, workable material
* Students will know the two types of seasoning are Air dry and Kiln dry
* Students will know air dry seasoning is more economical and environmentally better but takes a longer time
* Students will know Kiln dry seasoning is costlier but can be more accurate in relation to the wood moisture content
 | Air dry: drying timber naturally outsideKiln Dry: using ovens to mechanically dry timber | * ***Students need to already know the properties of timber as a material***
* ***Students need to already know the term of seasoning in relation to Design and Technology***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Timber: Classification** | * Students will know the three classification of timber
* Students will know how each classification is used for product manufacture
* Students will know the timber classification is Hardwood, Softwood and Manufactured board
 | Hardwood: the wood from a broadleaved tree (such as oak, ash, or beech) as distinguished from that of conifers.Softwood: the wood from a conifer (such as pine, fir, or spruce) as distinguished from that of broadleaved trees. | * ***Students need to already know the materials timber***
* ***Students need to already know the categories of timber***
* ***Students need to already know the properties of timber as a material***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Timber: Stock forms of materials** | * Students will know the timber stock forms which are available to buy
* Students will know the stock forms available in timber are Rough sawn, planed square edge and Planed all around
* Students will know Rough sawn is rough material used for construction projects
* Students will know that Planed square edge is partly smooth on two of the edges
* Students will know that Planed all around are freshly cut smooth timer all around
 | Stock form: the standard shapes and sizes in which a. material is available. | * ***Students need to already know the materials timber***
* ***Students need to already know the categories of timber***
* ***Students need to already know the properties of timber as a material***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Metals** | * Students will know how Metal is taken from metal ore
* Students will know the different categories of metals
* Students will know the stock forms of metals are available in different sizes and shapes
 | Ore: a naturally occurring solid material from which a metal or valuable mineral can be extracted profitably. | * ***Students need to already know the materials metal***
* ***Students need to already know the categories of metal***
* ***Students need to already know the properties of metals as a material***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Polymers** | * Students will know polymers are formed from the raw material of crude oil
* Students will know the different categories of Polymers
* Students will know polymers are split into 3 categories: Thermoforming, Thermosetting and Elastomers
 | Elastomer: a natural or synthetic polymer having elastic properties, e.g. rubber. | * ***Students need to already know the materials polymers***
* ***Students need to already know the categories of polymers***
* ***Students need to already know the properties of polymers as a material***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Biodegradable polymer** | * Students will know that biodegradable polymers will degrade over time
* Students will know the 3 biodegradable polymers are Oxy-degradable polymers, Photodegradable polymers and Hydro-degradable polymers
* Students will know Oxy degradable polymers breaks down into a fine powder with exposure to oxygen and is subsequently degraded by the action of micro-organisms.
* Students will know Photodegradable polymer bonds are weakened and the polymer breaks down with exposure to UV light, such as UV rays from sunlight.
* Students will know Hydro-degradable polymer breaks down with exposure to water and subsequently micro-organisms. Hydro-degradable polymers tend to degrade more quickly than oxy-degradable polymers
 | Biodegradable: (of a substance or object) capable of being decomposed by bacteria or other living organisms and thereby avoiding pollution. | * ***Students need to already know the term biodegradable***
* ***Students need to already know the impacts of plastic on the environment***
* ***Students need to already know the steps taken to combat polymers in plastics***
* ***Students need to already know the terms Oxy, Photo and Hydro***
 | Exam style questions – End of topic assessments - MCQ |

| **Year 12****Design**  | **Unit: Forming, redistribution and addition processes** |  |  |  |
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| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson:** **Papers and boards** | * Students will know the different manufacturing process of die cutting
* Students will know how die cutting is used to manufacture paper and board products
* Students will know how die cutting has changed over the past few years
* Students will know how manufacturing processes are used
 | Manufacture: make (something) on a large scale using machinery.Die cutting: a process whereby a die is used to cut through materials such as paper and card on a die press. | * ***Students need to already know the term manufacture***
* ***Students need to already know the material of paper and boards***
* ***Students need to already know what a net is in reference to paper and boards***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Polymers - Vacuum forming** | * Students will know how manufacturing processes are used
* Students will know how the vacuum forming process is applied
* Students will know how the vacuum forming process is used in products
* Students will know the steps by steps of using the vacuum former
 | Vacuum former: a manufacturing method used to shape plastic materials. | * ***Students need to already know the term manufacture***
* ***Students need to already know the term vacuum***
* ***Students need to already know the different types of polymers and their uses***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Polymers - Calendaring and Line bending** | * Students will know how polymer processes are used and applied
* Students will know the polymer process of calendaring
* Calendaring is a smoothing and rolling process used towards the end of manufacturing paper and thin polymer sheets
* Students will know the polymer process of Line bending
* Students will know Line bending is the process used to produce bends in the sheet thermoplastic such as acrylic.
 |  | * ***Students need to already know the materials of acrylic and be able to discuss its properties***
* ***Students need to already know the differences in polymers***
* ***Students need to already be aware of the term 'calendaring'***
* ***Students need to already know polymer products are produced in a variety of sizes and shapes***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Polymers - Injection moulding** | * Students will know the polymer process of injection moulding
* Students will know that Injection moulding is used to create many things such as wire spools, packaging, bottle caps, automotive parts and components, toys, pocket combs, some musical instruments (and parts of them), one-piece chairs and small tables, storage containers, mechanical parts (including gears),
* Students will know that Injection moulding is the most common modern method of manufacturing plastic parts
* Students will know that Injection moulding is a very common industrial process which creates hundreds of different plastic products
 | Injection moulding: the shaping of rubber or plastic articles by injecting heated material into a mould. | * ***Students need to already know how the term Injection is used in a wider sense to understand the process***
* ***Students need to already know the term Injection refers to pushing a substance usually a liquid into something else***
* ***Students need to already know the polymer category of thermoforming***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Polymers - Blow moulding and Rotational moulding** | * Students will know the polymer process of Blow moulding
* Students will know that Blow moulding is the common process used to produce bottle and a wide rand of other hollow products.
* Students will know that Blow moulding is used for water bottles or small hollow plastic bottles.
* Students will know the polymer process of Rotational moulding
* Students will know that Rotational moulding is used to produce heavy duty, seamless hollow objects that need a large wall thickness
* Students will know that Rotational moulding is used to produce traffic cones, kayaks, water tanks and children's play equipment.
 | Blow moulding: a manufacturing process for forming hollow plastic parts. | * ***Students need to already be aware of the plastic bottle.***
* ***Students need to already know that rotational means to turn around in a circle***
* ***Students need to already know the term of moulding***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Polymers - Extrusion and Compression moulding** | * Students will know the polymer process of Extrusion
* Students will know that Extrusion is used to produce either solid rod, hollow tube, angle, sections such as “I” and “T” sections or channels in polymers.
* Students will know that Extrusion can also be used to coat electrical wire with a polymer such as PVC for insulation
* Students will know the polymer process of Compression moulding
* Students will know that Compression moulding is the process of moulding in which a preheated polymer is placed into an open, heated mould cavity
 | Extrusion: the process of forming something by forcing or pushing it out, especially through a small opening | * ***Students need to already know the category of Thermoset polymers***
* ***Students need to already be aware of some extrusion products***
* ***Students need to already know the term compression***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Metal - Press forming** | * Students will know the metal process of press forming
* Students will know that Press forming is used to shape sheet material into 3D forms, for example metal seats, car body panels, boxes and containers.
* Students will know that press forming uses a similar process to die cutting (paper process)
 | Press forming: press forming is a forming technology where a pressing force is applied to a material to deform it (by bending, stretching, etc.) to match the size and shape of the die, and the material then maintains that shape forever. | * ***Students need to already know the term of forming (creating a shape)***
* ***Students need to already know the terms malleable***
* ***Students need to already know the manufacturing process of die cutting***
* ***Students need to already know the material of metal***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Metal - Spinning** | * Students will know the metal process of Spinning
* Students will know that Spinning is an alternative process to press forming for shaping object
* Students will know that Spinning is used for the body of stainless-steel kettles, saucepans of other products with radial symmetry
* Students will know that the spinning process uses a metal lathe as part of its manufacturing process
* Students will know how the spinning manufacturing process is demonstrated
 | Spinning: a metalworking process by which a disc or tube of metal is rotated at high speed and formed into an axially symmetric part. | * ***Students need to already know the term spinning refers to moving around in a rotary motion***
* ***Students need to already know the manufacturing machine of a lathe***
* ***Students need to already know different types of metal***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Metal - Cupping and deep drawing** | * Students will know the metal process of Cupping and Deep drawing
* Students will know the cupping and deep drawing process is used to form tube-like shapes
* Students will know that cupping and deep drawing is used for the body of fire extinguishers and high-pressure aerosol cans
* Students will know deep drawing is considered when the depth of the pressing exceeds the diameter
* Students will know the process only developed products with mass production
 | Cupping and deep drawing: If the depth of that bowl is greater than the radius of the initial blank – meaning the metal has been deformed a long way – the process is called deep drawing. | * ***Students need to already know cupping refers to a generic cup shape***
* ***Students need to already know the term diameter***
* ***Students need to already know the term of mass production***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:****Metal - Wrought iron, Bending, Rolling** | * Students will know the metal process of Wrought iron forging
* Students will know the term forging refers to making something
* Students will know that Wrought iron is a form of iron that is suitable for forging, rolling and bending rather than casting.
* Students will know the metal process of Rolling
* Students will know that Rolling is metal forming process in which the stick metal material is passed through sets of rollers to reduce the thickness of the material
* Students will know that the Rolling process can be complete as either Hot or Cold rolling
* Students will know Cold rolling metal (usually at room temperature) results in a material that has higher tolerance because carbon deposits are not formed during the rolling process.
* Students will know Hot rolling metal result sin material with mechanical properties that are uniform throughout the sample.
 | Forging: make or shape (a metal object) by heating it in a fire or furnace and hammering it. | * ***Students need to already know cupping refers to a generic cup shape***
* ***Students need to already know the term diameter***
* ***Students need to already know the term of mass production***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Metal - Sand casting** | * Students will know the metal process of Casting
* Students will know the term Sand casting is used to form high melting point metals into components and products.
* Students will know the sand-casting process is often carried out in specialist factories called foundries, using mould that are made from sand.
* Students will know the examples of products made by sand casting include railway carriage wheels, wood working clamps and vies, motor and pump housing as well as bollards, heavy duty park benches, drain covers and post boxes.
 | Casting: the making of an object by pouring molten metal or other material into a mould. | * ***Students need to already know metals can be heated and melted down***
* ***Students need to already know the material of sand***
* ***Students need to already know the material of metal***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Metal - Die casting** | * Students will know the metal process of Die casting
* Students will know the term Die casting is generally used to mould lower melting point metals such as aluminium, alloys of aluminium and zinc-based alloys
* Students will know Die casting produces casting with a very high-quality surface finish. Typical examples of products that are die cast are alloy wheels, engine components, toy cars, collectible figures, door knobs and handles.
* Students will know Die casting can be split into 2 types: Gravity Die casting and Pressure Die casting
* Students will know Gravity die casting is the simplest form of die casting because it involves melting the metal and then pouring it into the mould
* Students will know that Pressure die casting is used to produce cast items quickly and in high volumes
 |  | * ***Students need to already know casting is a process used for metal work***
* ***Students need to already know the terms die***
* ***Students need to already know the term alloys***
* ***Students need to already know the gravity***
* ***Students need to already know the term pressure***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Metal - Welding** | * Students will know the metal process of Welding
* Welding is a fabrication or sculptural process that joins materials, usually metals or thermoplastics, by using high heat to melt the parts together and allowing them to cool causing fusion.
* Students will know the two types of welding: MIG and TIG welding
* Students will know MIG welding is an arc welding process in which a continuous solid wire electrode is fed through a welding gun and into the weld pool, joining the two base materials together.
* Students will know TIG (tungsten inert gas) welding is a process used to weld metals such as stainless steel as well as non-ferrous metals such as aluminium and copper or magnesium alloys.
 | Welding: join together (metal parts) by heating the surfaces to the point of melting with a blowpipe, electric arc, or other means, and uniting them by pressing, hammering, etc. | * ***Students need to already know the term of welding***
* ***Students need to already know how the process of welding is used***
* ***Students need to already know where welding products are used***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Wood - Wood joints** | * Students will know the wood process of wood joints
* Students will know Wood joints are a common method of fabrication
* Students will know the types of wood joints are Butt joint, Dowel joint, Mitre joint, Comb joint, Dovetail joint, Mortise and tenon joint, Housing joint and a Half lap joint
 |  | * ***Students need to already know the term of wood joint***
* ***Students need to already be aware of the different tools and equipment used for making wood joints***
* ***Students need to already know the names of different types of wood joints***
* ***Students need to already be able to offer alternatives joints to products***
* ***Students need to already know how different types of wood joints are used in products***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Wood - Wastage** | * Students will know the wood process of wood wastage
* Students will know Wasting material is a process of removing part of the material using a variety of different methods.
* Students will know the wood process of turning
* Students will know that the turning process involves machining material using a lathe, there are three methods for doing this; turning between centres, turning on a faceplate or turning in a chuck.
* Students will know the wood process of milling
* Students will know milling machines are used to help create and waste parts of timber and manufactured boards
 |  | * ***Students need to already know the term of wood joint***
* ***Students need to already know the term turning refers to the round motion of movement***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Wood - Knock down fittings** | * Students will know the wood process of knock down fittings
* Students will know Knock-down (KD) fittings are used to manufacture flat-pack furniture.
* Students will know the types of knock down fittings are: Modesty block, Barrel and nut and Cam lock connectors
* Students will know that Modesty blocks are small, rigid, polymer blocks. They have moulded holes that take screws which are used to join the block to panels
* Students will know that Barrel and nut is a common KD fitting is the barrel nut and bolt
* Students will know Cam-lock connectors consist of a metal dowel that is screwed into one of the pieces by inserting a screwdriver into the slot on the side.
 | KD fitting: those that help put the furniture or a product together quickly and easily without using clamps and any glue. | * ***Students need to already know the term of knock down fittings***
* ***Students need to already know the benefits of KD fittings***
* ***Students need to already know the major companies that use KD fittings***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Wood - Adhesives** | * Students will know the wood adhesives used
* Students will know Adhesives are substances used to stick materials together. Different types of adhesives are used for different materials and applications.
* Students will know Polyvinyl acetate (PVA) is commonly used to bond most woods and wood-based materials together
* Students will know that Contact adhesive is used for large areas such as sheet material. It can be used to join the same or different materials together such as wood sheet to wood sheet, metal sheet to polymer sheet
* Students will know UV hardening adhesive is a clear liquid which ‘cures’ to form a bond when exposed to UV (ultraviolet) light.
* Students will know Solvent cement works by softening the surface of the polymers to be joined, allowing them to fuse together
 | Adhesive: able to stick fast to a surface or object; sticky.Contact adhesive: a type of adhesive that is rubber based | * ***Students need to already know the term adhesive***
* ***Students need to already know the name and use of some of the adhesives covered***
* ***Students need to already know the applications of some of the adhesives***
 | Exam style questions – End of topic assessments - MCQ |

| **Year 12** **Design**  | **Unit: The use of finishes** |  |  |  |
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| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson:** **Papers and boards** | * Students will know how a finish is applied to products
* Students will know materials are finished to enhance the aesthetics of the final product as well as provide protection against aspects such as weathering, moisture, decay and insect attack
* Students will know the different types of finishes for the material of paper and boards
* Students will know the papers and board finishes are: Laminating, embossing, debossing, Foil block and Varnish
* Students will know that Lamination via a surface coating: The surface coating lamination of papers can board will either be a liquid lamination or a film lamination.
* Students will know that Embossing creates a raised design on the surface of the paper or card to give a visual and tactical effect
* Students will know that Debossing is the opposite of embossing, and produces an imprinted depression which sites below the surface of the paper or card.
* Students will know that Foil blocking involves the application of heat and pressure to a metallic paper (foil) to create areas of depth and texture to add aesthetic impact to the product
* Students will know Varnish is a clear, non-pigmented ink used on pre-coated papers and boards to enhance the colour, as well as offer some protection against dirt, fingerprints and water.
 | Finish: a coating other than an adhesive | * ***Students need to already know the term finish is reference to the end of something. In this instance, the end of a product then gets finished***
* ***Students need to already know the variety of different materials available***
* ***Students need to already know what is meant by the term finish***
* ***Students need to already be aware of certain material finishes***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Screen printing and Flexography** | * Students will know the printing processes of papers and boards
* Students will know the types of printing process are Screen printing and Flexography, Offset Lithography and digital printing
* Students will know printing processes such as flexography, offset lithography and digital printing use a four-colour process
* Students will know the four-colours used are Cyan, Magenta, Yellow and Black
 | Printing process: any operation or system wherein printing ink or a combination of printing ink and surface coating is applied, dried, or cured and that is subject to the same emission standard. | * ***Students need to already know some paper printing processes***
* ***Students need to already know how a standard paper printer works***
* ***Students need to already know the primary colours***
* ***Students need to already know the different types of paper***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Polymer finishes** | * Students will know the finishing techniques for polymers
* Students will know that Polymers are considered to be self-finishing materials because they require no additional finishing process once manufactured
* Students will know that Over moulding can be used as part of the polymer finish
 |  | * ***Students need to already know the different types of polymers***
* ***Students need to already know the term over refers to being over another product***
* ***Students need to already know the term moulding refers to creating a shape of another thing***
* ***Students need to already know the different types of paper***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Metal finishes** | * Students will know the finishing techniques of metal
* Students will know that most metals have an oxide layer which provides some barrier against the effects of the environment
* Students will know that one type of metal finish is called Electroplating
* Students will know that Electroplating involves using a metal to coat a (usually cheaper) base metal, to provide both a protective layer and give a greater aesthetic.
* Students will know that one type of metal finish is called Dip coating
* Students will know that Dip coating is a finishing process where a product is dipped to into another material to help improve its properties.
 | Oxide: a binary compound of oxygen with another element or group.Base metal: a common metal that is not considered precious, such as copper, tin, or zinc. | * ***Students need to already know how voltage works***
* ***Students need to already know what is mean by the term of dip***
* ***Students need to already know what is meant by the term coating***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Wood finishes** | * Students will know the finishing techniques of wood
* Students will know the purpose of finishing wood or wood-based products (such as manufactured boards are to prevent the wood from absorbing moisture.
* Students will know the types of wood finishes are: Varnish, Wax, Paint, Pressure treating, Stains, Yacht varnish, Colour wash and Oil
 | Absorbing: to take in (something, such as water) in a natural or gradual way. | * ***Students need to already know how to apply the finishing types for timber***
* ***Students need to already know the different types of wood finishes***
 | Exam style questions – End of topic assessments - MCQ |

| **Year 12****Design**  | **Unit: Modern and industrial scales of practice** |  |  |  |
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| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson:****Modern and industrial scales of practice** | * Students will know the different scales of production used in product manufacture
* Students will know the different types of production are One off, Batch production, Mass/line production
* Students will know that One off production involves creating one product, bespoke never been seen before
* Students will know that Batch production involves creating a small number of products at once the exact same way
* Students will know that Mass production involves creating a large number of products at the same time
 | Production: the action of making or manufacturing from components or raw materials, or the process of being so manufactured. | * ***Students need to already know the different types of production***
* ***Students need to already know the advantages and disadvantages of the different production processes***
* ***Students need to already know the products used in different types of production***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Production systems** | * Students will know different types of modern manufacturing processes
* Students will know the process of Unit production systems
* Students will know Unit production systems (UPS) are used extensively in the manufacture of textile products and are based on the principle of using an overhead transporter system
* Students will know the process of Quick response manufacturing
* Students will know QRM strategy is focused on going through the design process and developing products to meet a customer’s needs quickly
* Students will know the process Vertical in-house production
* Vertical in-house production (also known as vertical integration) is an arrangement in which the supply chain of a company is owned by that company
 |  | * ***Students need to already know the term of production systems***
* ***Students need to already know the term of quick***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Efficient use of materials** | * Students will know how materials are used to achieve the best possible performance
* Students will know how cost plays an impact in the material choice of a product
* Students will know differences between different products are understand how consumers choose the products they want
 |  | * ***Students need to already know the different types of production processes***
* ***Students need to already know how consumers make their choice***
* ***Students need to already know factors that affect a consumer’s choice***
* ***Students need to already know the different types of materials***
* ***Students need to already know the different properties of materials***
 | Exam style questions – End of topic assessments - MCQ |
| **Lesson:** **Design and the economic use of material** | * Students will know how economics play a factor in the design process
* Students will know environmental factors play a factor in the design process
* Students will know how products can be designed a produced to be more sustainable
 | Economics: the branch of knowledge concerned with the production, consumption, and transfer of wealth. | * ***Students need to already know the term sustainable***
* ***Students need to already know how consumers feel about sustainable products***
* ***Students need to already know how products can be designed and manufactured sustainably***
* ***Students need to already know the term economic***
* ***Students need to already know how products can help support the economy***
 | Exam style questions – End of topic assessments - MCQ |

| **Year 12****Design**  | **Unit: Digital design and manufacture** |  |  |  |
| --- | --- | --- | --- | --- |
| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson:** **Digital design** | * Students will know the design process of the modern industrial designer
* Students will know designers can design using computer software which is referred to as CAD
* Students will know that CAD stands for Computer Aided Design
* Students will know the digital way to manufacture products is referred to as CAM
* Students will know that CAM stands Computer Aided Manufacture
 | Industrial designer: is the creative act of determining and defining a product's form and features, which takes place in advance of the manufacture or production of the product. | * ***Students need to already know what is meant by the term digital***
* ***Students need to already know the term CAD***
* ***Students need to already know the advantages and disadvantages of CAD***
* ***Students need to already know types of CAD software***
* ***Students need to already know the term CAM***
* ***Students need to already know the advantages and disadvantages of CAM***
* ***Students need to already know types of CAM machines***
 |  |
| **Lesson:** **Computer aided manufacture** | * Students will know how Computer aided manufacture is used in industry
* Students will know the three main types of CAM are: Laser cutting, Routing and Milling
* Students will know that Laser cutting uses a high-energy laser beam to cut or vaporise materials and compressed gas or air to blow the waste material away, leaving a clean edge
* Students will know a Router is used to help create thicker pieces of timber be cut and shaped
* Students will know Milling machines work in a similar way to routers, and can be fitted with tools to drill holes, cut slots or shape the surface and edges of a range of materials.
* Students will know the term Virtual modelling
* Students will know that Virtual modelling is used as a 3D model and allows designers to test a product before manufacture
 | CAD: Computer aided designCAM: Computer aided manufacture | * ***Students need to already know what is meant by the term digital***
* ***Students need to already know the term CAM***
* ***Students need to already know the advantages and disadvantages of CAM***
* ***Students need to already know types of CAM machines***
* ***Students need to already know the term virtual***
* ***Students need to already know the term model***
* ***Students need to already be familiar with virtual modelling***
 |  |
| **Lesson:** **Rapid prototyping** | * Students will know how Rapid prototyping is used in industry
* Students will know Rapid prototyping is the process of downloading a 3D CAD file to a machine that will produce a 3D model of the drawing.
* Students will know designers used rapid prototyping to produce quick ideas and part of their final products
 | Rapid prototyping: the fast fabrication of a physical part, model or assembly using 3D computer aided design (CAD). | * ***Students need to already know what is meant by the term Rapid***
* ***Students need to already know the term Prototype***
* ***Students need to already know the advantages and disadvantages of CAM and CAD***
 |  |

| **Year 12****Design**  | **Unit: The requirements for product design and developments** |  |  |  |
| --- | --- | --- | --- | --- |
| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson:** **The requirements for product design and developments** | * Students will know how products are developed throughout the design process
* Students will know the term 'Good Design'
* Students will know the term 'Good Design' refers to if a product has met its specification
* Students will know the 10 principles of Design by Dieter Rams
 |  | * ***Students need to already know how to identify a 'Good Design' product***
* ***Students need to already know how to analyse products***
* ***Students need to already know how a specification works***
* ***Students need to already know Dieter Rams***
 |  |
| **Lesson:** **Working with a variety of materials** | * Students will know how the use of different materials can help aid the prototype stage of design
* Students will know how block modelling is used to help shape and design a prototype
* Students will know that how to create 3D designs
* Students will know how the Rapid prototyping process is used
 |  | * ***Students need to already know how the modelling process is used in design***
* ***Students need to already know materials used in the modelling process***
* ***Students need to already know the term model***
* ***Students need to already be familiar with virtual modelling***
 |  |

| **Year 12****Design**  | **Unit: Health and safety** |  |  |  |
| --- | --- | --- | --- | --- |
| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson: Health and safety** | * Students will know how health and safety is used throughout the design and technology manufacture
* Students will know the different types of legislation surrounding Design and Technology
* Students will know the third-party company known as The Health and Safety Executive
* Students will know The Health and Safety Executive (HSE) is a national independent watchdog for work-related health, safety and illness.
* Students will know the methods used to help control chemical and harmful substances
* Students will know that to comply with COSHH (Control of substances hazardous to health) regulations (2002) employers need to prevent, reduce or control their workers’ exposure to substances that may be hazardous or cause ill health.
 | COSHH: Control of substances hazardous to health | * ***Students need to already know the term health and safety***
* ***Students need to already know basic health and safety for the workshop***
* ***Students need to already know who to report a health a safety breach to in a school setting***
 |  |
| **Lesson:** **Health and safety symbols** | * Students will know how health and safety symbols are used to help display important information
* Students will know the British Standards Institute
* Students will know that The BSI kitemark is a quality mark, and is one of the most recognised symbols of quality and safety in the world
* Students will know how the safety of toys is considered by manufactures
* Students will know The British Toy and Hobby Association (BTHA) developed the lion mark in 1988 to show consumers that the toy had been made with quality and safety in mind
 |  | * ***Students need to already know the basics of health and safety***
* ***Students need to already know some of the health and safety symbols***
* ***Students need to already know third party companies that are used in the manufacture of products***
 |  |

| **Year 12****Design**  | **Unit: Protecting designs and intellectual property** |  |  |  |
| --- | --- | --- | --- | --- |
| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson:** **Intellectual property and patents** | * Students will know the legal legislation used as part of a designer
* Students will know Intellectual property (IP) is something that has been physically created and did not exist before,
* Students will know Copyright and Design rights
* Students will know Copyright is a legal right that provides protection for work such as books, photography, drama, music, films, television programmes, software, etc., and lasts, in most cases, for 70 years after the death of the creator of the work.
* Students will know the use of Patents
* Students will know that Patents for an invention are granted by the government to the inventor, and are granted in order to give investors up to 30 years’ legal protection of their ideas from being stolen and used by other people without their permission.
 | Intellectual property: intangible property that is the result of creativity, such as patents, copyrights, etc.Copyright: the legal right of the owner of intellectual property. | * ***Students need to already know the term property***
* ***Students need to already know the copyright symbols***
* ***Students need to already know how the copyright symbol is used in products***
* ***Students need to already understand why designers protect their ideas***
 |  |
| **Lesson:** **Registered design and open designs** | * Students will know how designers protect their designs and ideas
* Students will know the term of Open Design
* Students will know that Open design is an approach to designing and manufacturing which operates outside the protection of patents and other types of IP that are eagerly sought by most individuals and companies.
 | Open design: the development of physical products, machines and systems through use of publicly shared design information. | * ***Students need to already know how designers protect their ideas***
* ***Students need to already know how designers share their ideas***
 |  |

| **Year 12****Design**  | **Unit: Designing for manufacturing, maintenance, repair and disposal** |  |  |  |
| --- | --- | --- | --- | --- |
| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson:** **Designing for manufacturing, maintenance, repair and disposal** | * Students will know the importance of Sustainability
* Students will know the importance of material choice when designing a product
* Students will know how the differences of materials can affect a products performance
* Students will know the six Rs of sustainability
* Students will know the six Rs are: Reduce, Reuse, Rethink, Refuse, Recycle, Repair
 | Sustainability: avoidance of the depletion of natural resources in order to maintain an ecological balance. | * ***Students need to already know the term sustainable***
* ***Students need to already know the different types of materials available***
* ***Students need to already know how the role of a designer***
* ***Students need to already know the 6 Rs of sustainability***
 |  |
| **Lesson:** **The six Rs** | * Students will know how designers apply the 6 Rs to their designs
* Students will know how each of the 6 Rs is used when making a product more sustainable
 |  | * ***Students need to already know the 6 Rs***
* ***Students need to already know how each R can help a designer***
 |  |
| **Lesson:** **Product disassembly** | * Students will know how products are upcycled
* Students will know that product upcycling refers to reusing a product not for its original intentions
* Students will know how product disassembly is used in product analysis
* Students will know how different products use disassembly in order to help the product repair
 | Upcycle: reuse (discarded objects or material) in such a way as to create a product of higher quality or value than the original. | * ***Students need to already know the 6 Rs***
* ***Students need to already know how products can be recycled***
* ***Students need to already know the term upcycling***
* ***Students need to already know the term disassembly***
 |  |

| **Year 12****Design**  | **Unit: Feasibility studies** |  |  |  |
| --- | --- | --- | --- | --- |
| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson:** **Feasibility studies** | * Students will know the term Feasibility studies
* Students will know a feasibility study is an analysis that takes all of a project's relevant factors into account—including economic, technical, legal, and scheduling considerations—to ascertain the likelihood of completing the project successfully.
* Students will know Feasibility can be a much-discussed issues in design especially during the design process
 |  | * ***Students need to already know the design process***
* ***Students need to already know how to model ideas***
* ***Students need to already know how to develop ideas***
 |  |

| **Year 12****Design**  | **Unit: Non examined assessment****Unit: Section A** |  |  |  |
| --- | --- | --- | --- | --- |
| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
| **Lesson:** **Investigation** | * Students will know the basics in how a design investigation will be accessed by a designer
* Students will know how to begin investigating the context of their design problem and explore design possibilities
* Students will know how to explore a design possibility needs and wants
* Students will know how to use primary and secondary information to inform their design investigation
* Students will know how to identify a user or cohort to their possible design possibility
* Students will know how to discuss and evaluate their findings from a design investigation
 | Investigation: the action of investigating something or someone; formal or systematic examination or research. | * ***Students need to already know how to identity a designs context***
* ***Students need to already know how to perform basic investigation using both primary and secondary methods***
* ***Students need to already be able to analysis products***
* ***Students need to already know how to develop ideas and thoughts***
 |  |
| **Lesson:** **Research plan** | * Students will know how to identify the key issues of their proposed idea
* Students will know how to identify the proposed products advantages
* Students will know how to explore their proposed products key features
* Students will know how to assign effective time management to their proposed research
 | Identify: establish or indicate who or what (someone or something) is | * ***Students need to already know how to create a time plan***
* ***Students need to already know how to prioritise different tasks***
* ***Students need to already know the difference between primary and secondary data***
 |  |
| **Lesson:** **Product analysis** | * Students will know how to identify the key issues of their product analysis
* Students will know how to identify a product key feature
* Students will know how to explore a products material choice
* Students will know how to disassemble a product
* Students will know how to analyse different types of products
 | Disassemble: take (something) to pieces. | * ***Students need to already know what is meant by the term disassembly***
* ***Students need to already know how to perform a basic analysis***
* ***Students need to already know how to discuss positives and negatives***
* ***Students need to already know how to compare a variety of different products***
 |  |
| **Lesson:** **Practical testing** | * Students will know how to identify a range of materials
* Students will know how to perform a range of workshop tests
* Students will know how to perform a dot punch test
* Students will know a dot punch test will test the strength and brittleness of a material
* Students will know how to analyse different types of products
 |  | * ***Students need to already know what is meant by the term disassembly***
* ***Students need to already know how to perform a basic analysis***
* ***Students need to already know how to discuss positives and negatives***
* ***Students need to already know how to compare a variety of different products***
 |  |
| **Lesson:** **Initial Ideas** | * Students will know how to generate a range of different design ideas
* Students will know how to generate a range of rough, initial ideas
* Students will know how to perform analysis on design ideas
* Students will know an initial idea is a rough sketch of a product idea
* Students will know how to analyse different types of products
 |  | * ***Students need to already know what is meant by the term design ideas***
* ***Students need to already know how to annotate ideas***
* ***Students need to already know the term annotate***
 |  |