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**Knowledge Rich Curriculum Plan**

GCSE Design Core

Core Technical Principles - 1.6 Materials and their properties



| **GCSE Design Core** | **Core Technical Principles****1.6 Materials and their properties** |  |  |  |
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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:** **Natural timbers** | * Students will know the different categories of timber
* Students will know the terms Hardwood and Softwood
* Students will know that Hardwood trees are more expensive, take longer to grow and are not as renewable
* Students will know that Softwood trees are cheaper to use, they take less time to grow and are seen as the more renewable material
 | Hardwood: A slow growing tree which takes 75-100 years to growSoftwood: A fast growing tree which takes 7-10 years to growCategory: a class or division of people or things regarded as having particular shared characteristics. | * ***Students need to already know the basics of timber as a material***
* ***Students need to already know that timber is available is different categories***
* ***Students need to already know some particular types of timber from previous projects***
 | Compare the properties of Hardwood and Softwood, which would be more suitable for furniture?Are there any differences in manufacture of these materials? |
| **Lesson:** **Natural timbers lesson 2** | * Students will know the different types of Hardwood timber
* Students will know the types of hardwood timber are Oak, Ash, Mahogany
* Students will know the different types of Softwood timber
* Students will know the types of softwood timber are Pine, Larch and Spruce
 | Hardwood: A slow growing tree which takes 75-100 years to growSoftwood: A fast growing tree which takes 7-10 years to grow | * ***Students need to already know some names of timber but may not know the classification they belong too***
* ***Students need to already know the properties of timber***
* ***Students need to already know the use of certain types of timber***
 | What are the major differences between the different types of timbers?Why do we use different types of timber? |
| **Lesson:** **Manufactured boards** | * Students will know the term manufactured boards
* Students will know that manufactured boards are manmade types of timber made up from recycled wood
* Students will know that Plywood is a type of manufactured board and that it is made up of several layers place on top of each other at 90-degree angles
* Students will know that MDF (Medium density fibre) is a type of manufactured board and that is made up of saw dust and glue then compressed together
* Students will know that Chipboard is a type of manufactured board and is made up of wood shavings and glue then compressed together
 | Manufacture: make (something) on a large-scale using machinery.Manufactured Board: A man made material used out of recycled properties Plywood: manufactured board made up of several layersMDF: a compressed board made up of saw dust and glueChipboard a compressed board made up of wood shavings and glue | * ***Students will already know timber can be recycled***
* ***Students need to already know what the term recycled means***
* ***Students need to already know certain types of timber are made from manufactured boards***
 | Compare the differences of a manufactured board and natural timber?How are the properties of manufactured board different between a natural timber? |
| **Lesson:** **Metals and Alloys** | * Students will know the different categories of metals
* Students will know that Ferrous and Non-ferrous are two of the categories of metal
* Students will know that Ferrous metals rust and types of ferrous metals are Low carbon steel, High carbon steel and Cast Iron
* Students will know that Non-ferrous metals do not rust and types of non-ferrous metals are a Aluminium, Tin and Copper
* Students will know the types of products that use Ferrous metals, these are screws, man holes, vices
 | Ferrous: containing or consisting of ironNon-ferrous: relating to or denoting a metal other than iron or steel. | * ***Students will already know the metal basics from science***
* ***Students will already be aware of metal as a material***
* ***Students will already know why metal is used for products***
* ***Students will already know the terms of ferrous and non-ferrous***
 | What are the properties of ferrous and non ferrous metals?How does the knowledge of metals affect a designers choice? |
| **Lesson:** **Alloys** | * Students will know the term Alloy
* Students will know that an Alloy is a mixture of a metal and another element, usually carbon
* Students will know that Metal Alloys exhibit different properties than natural metals
* Students will know that examples of Metal Alloys are Brass and Stainless Steel
 | Alloy: a metal made by combining two or more metallic elements, especially to give greater strength or resistance to corrosion. | * ***Students need to already know that metals can be combined***
* ***Students need to already know the benefits from combining metals***
* ***Students need to already know the term alloy from science***
 | How do Alloys and other metals compare to each other?What are the major properties of alloys to pure metals? |
| **Lesson:** **Paper** | * Students will know the different sizes of paper
* Students will know that paper sizes are A0, A1, A2, A3, A4, A5, A6
* Students will know the paper making process
* Students will be able to describe how paper is produced
 | Paper size: size standards govern the size of sheets of paper used as writing paper | * ***Students need to already know different types of paper***
* ***Students need to already know paper sizes***
* ***Students need to already know that paper is made from trees***
 | Why does a designer need to know the differences of paper?How can a designer use different types of papers for modelling? |
| **Lesson:** **Polymers** | * Students will know the different types of polymers
* Students will know that polymers are categorised into Thermoplastics and Thermosetting plastics
* Students will know that thermoplastics are recyclable and can be reused again and again
* Students will know that Thermosetting plastics are not recyclable and cannot be reused
 | Polymer: substance which has a molecular structure built up chiefly or completely from a large number of similar units bonded together, e.g. many synthetic organic materials used as plastics and resins.Thermoplastic: denoting substances (especially synthetic resins) that become plastic on heating and harden on cooling, and are able to repeat these processes.Thermosetting: denoting substances (especially synthetic resins) which set permanently when heated. | * ***Students need to already know the basics of plastics***
* ***Students need to already know products that uses plastics***
* ***Students need to already know how plastic is made (this will be learnt in science)***
 | How are plastics creating an issues for the environment?How does a designer affect the use of plastic in a product? |
| **Lesson:** **Textiles** | * Students will know the different types of textile categories
* Students will know that textiles are either natural or synthetic
* Students will know that natural fibres are Cotton, Silk, Wool
* Students will know that Synthetic fibres are Lycra
 | Textile: a type of cloth or woven fabric.Fibre: a thread or filament from which a vegetable tissue, mineral substance, or textile is formed. | * ***Students need to already know the basics of fabrics***
* ***Students need to already know some fabric properties***
* ***Students need to already know some fabric names***
 | What are the major differences between textile manufacture?How can the use of textile affect the aesthetic of a product? |