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**Knowledge Rich Curriculum Plan**

GCSE Design Core

Core Technical Principles - 1.3 Developments in new materials



| **GCSE Design Core** | **Core Technical Principles****1.3 Developments in new 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:** **Smart materials** | * Students will know the term smart materials
* Smart materials: materials that change their properties due to changes in the environment
* Students will know the types of smart materials
* Smart materials: Thermochromic, Photochromic, Shape memory alloy
* Students will know how different smart materials are used
* Students will know that thermochromic changes colour due to temperature change
* Students will know that Photochromic darkens colour due to UV light change
* Students will know that Shape memory alloy changes shape due to temperature change
 | Smart material: are designed materials that have one or more properties that can be significantly changedThermochromic: undergoing a reversible change of colour when heated or cooled.Photochromic: undergoing a reversible change in colour or shade when exposed to light of a particular frequency or intensity.Shape memory alloy: an alloy that can be deformed when cold but returns to its pre-deformed ("remembered") shape when heated. | * ***Students need to already know the term ‘properties’***
* ***Students need to already know the term environment can mean surroundings as well as global environment***
 | How can the use of the new material help develop a product?Are there any advantages or disadvantages from the use of these smart materials? |
| **Lesson:** **Modern materials** | * Students will know the term modern material
* Students will know modern materials that have been discovered over the past 50 years
* Students will know the types of modern materials
* Metal foam
* Nanomaterials
* Liquid crystal display
* Students will know how each modern material is used
* Students will know metal foam is a sponge like metal, which is used for cars and planes
* Students will know nanomaterials is an Atom by atom materials used to create protective covers
* Students will know liquid crystal display is used display for TVs that use LCD technology
 | Modern material: a material that has been engineered to have improved propertiesMetal Foam: a cellular structure consisting of a solid metal (frequently aluminium) with gas-filled pores comprising a large portion of the volume.Nanomaterial: a material having particles or constituents of nanoscale dimensions, or one that is produced by nanotechnology.LCD: a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid. | * ***Students need to already know the term industry***
* ***Students need to already know how products are made in industry***
 | Compare the differences between smart and modern materials. Which one would be more suitable to different product?How can the use of modern materials aid a product? |
| **Lesson:****Composite materials** | * Students will know the term composite material
* Students will know that Composite materials are materials that are created by combining two or more materials
* Students will know the types of composite materials
* Glass reinforced plastic
* Carbon fibre
* Manufactured boards
* Students will know how each composite material is used
* Students will know that glass reinforced plastic is composed of small strands of glass
* Students will know that carbon fibre is a woven textiles material
* Manufactured boards: man made board used as a natural alternative
 | Composite material: formed by combining two or more materials with different properties, without dissolving or blending them into each other.Glass reinforced plastic: a composite material made of a polymer matrix reinforced with fibres.Carbon fibre: a material consisting of thin, strong crystalline filaments of carbon, used as a strengthening material, especially in resins and ceramics.Manufactured Board: comprise a range of sheet materials produced by pressing and bonding together. | * ***Students need to already know the term manufactured board***
* ***Students need to already know the term properties `***
 | How is the combination of different materials help strengthening the properties?Why is it important to understand material property? |