

Year 9 DT – Theory Unit Knowledge Organiser

Manufacturing Materials: Plastics:

Plastics are a group of materials called polymers

- **Pros:** They are lightweight, easy to manufacture, durable, colourful & affordable
- **Cons:** They are sourced from crude oil & their production & disposal are harmful to the planet

Thermoplastics: easily softened or melted with heat. Recyclable & good material performance.

Examples = HDPE, Nylon, Polypropylene, Polycarbonate, Polystyrene

Thermosetting Plastics: Can't be remelted with heat. Difficult-impossible to recycle. Often higher performances for specific tasks

Examples = Polyester resin, Epoxy resin, Melamine formaldehyde, Urea formaldehyde, bakelite.

Composite Materials:

Composite materials are materials built of 2+ input materials working together as one. This way we can combine their most useful properties.

GRP; Glass Reinforced plastic – tough, strong, lightweight & affordable. Used in circuit boards

CFRP; Carbon Fibre Reinforced Plastic – excellent strength to weight ratio & tensile Strength

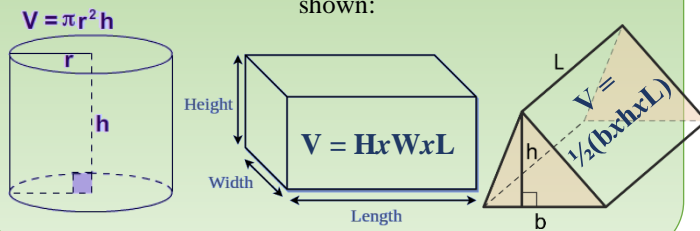
Concrete; Stone, sand & cement – very hard

Plywood; Thin layers of wood laminated together

Maths for DT & Engineering:

The volume of a shape is how much 3D Space it takes up.

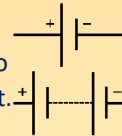
Use these formulae to find the volume for the shapes shown:



Engineering Electronics:

The below symbols are universally used to show these components in circuit diagrams:

Cell/battery: stores electricity to provide DC current.



Resistor: Controls/slow the current flow of electrons

SPST Switch; opens & closes the circuit to allow electricity to flow.



L.E.D; A Light Emitting Diode, like a bulb. Very energy efficient.



Product Investigation Product investigations are a great way to learn **why materials are chosen for specific jobs** & explore what other demands impacted on the **designer's decisions** & how they **solved problems** along the way.

Product Specifications;

What requirements or restrictions might the designer have worked to?

Design Brief; what was the designer's goal/what was their problem to solve?

Common Specifications;

- Aesthetics
- Performance requirements
- Target Audience
- Sustainability
- Cost

Investigating 2 bicycles;

After completing the product investigation, you should be able to explain:

- What a sprocket is
- Why the bicycles differ in design
- Why specific materials were chosen for each
- What design improvements could be made to each

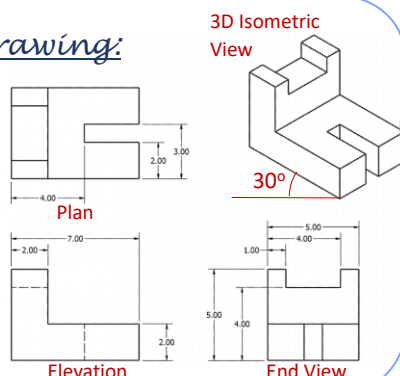
Engineering Drawing:

Orthographic Views

show the object from each angle, in 2D. Dimensions are usually attached to these 2D views.

Isometric Projection

shows a skewed version of each of these views as we see the object in 3D



Key Vocab for this term:

- Polymer
- Thermoplastic
- Thermosetting plastic
- Composite
- Voltage
- Current
- Ohms
- Isometric
- Orthographic
- Volume
- Material Properties
- Sustainable design
- C.A.D.
- C.A.M.