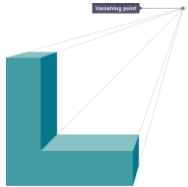
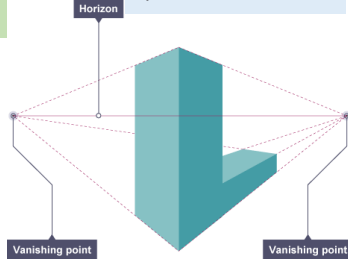


Year 7 Resistant Materials Knowledge Organiser

Single-point perspective - This shows an object from the front in a realistic way as it gets smaller going into the distance. The front view goes back towards a **vanishing point**, which is a point on the horizon line that all lines meet at.



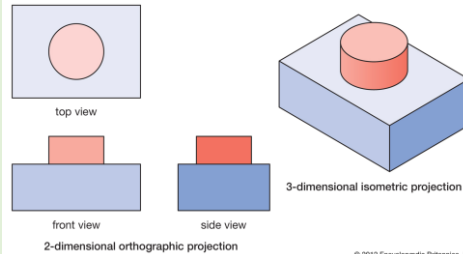
Two-point perspective - This shows an object from the side with two vanishing points.



Orthographic Projection

They are used to show an object from every angle to help manufacturers plan production. Starting with a front view of a product, **construction lines** show where areas join and are used to draw a side and plan (top) view, ensuring that the drawing is accurate from all angles. These drawings are **to scale** and must show **dimensions**.

Orthographic and isometric projections of an object



Freehand sketching is the quickest way of getting your initial designs on paper before an idea is forgotten. Freehand sketches are often done without a ruler or template and instead are produced quickly and freely.

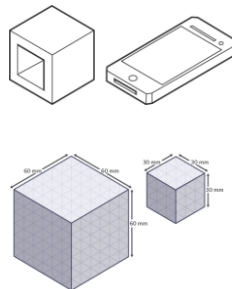


Isometric

Isometric drawings, sometimes called isometric projections, are a good way of showing measurements and how components fit together. Unlike perspective drawings, they don't get smaller as the lines go into the distance.

There are three main rules to isometric drawing:

- **horizontal** edges are drawn at 30 degrees
- **vertical** edges are drawn as vertical lines
- **parallel** edges appear as parallel lines

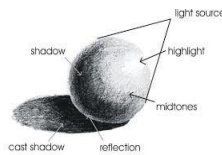


Rendering

Creating the illusion of light, tone and texture using graphic materials. Creating the illusion that an object is made from a particular material.



3 Tone shading



Personal protective equipment (PPE)

- Apron
- Leather gloves
- Goggles
- Sturdy shoes

Surface treatments and finishes

Used to improve the appearance and protect the material. Polish, varnish, paint, wax and stain are examples.

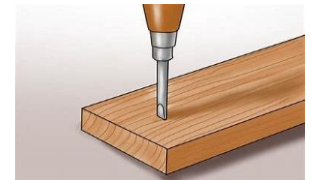


Wasting tools

Coping saw – used to cut curved lines
Junior hacksaw – used for sawing plastic and metal
Hand file – used to shape materials
Rasp – used to shape wood
Pillar drill – used to drill holes
Needle file – used to shape materials, remove material in small spaces
Disc sander : used to waste material

Marking and measuring tools

Steel rule
Bradawl
Centre punch
Marking knife
Try square



Metals and alloys

Metals are found naturally and are mined from the earth. Metals used in products are **extracted** from the natural **ore** using large heat furnaces.

Ferrous metals

Ferrous metals contain iron and are **magnetic**. They are prone to **rust**.



Non-ferrous metals do not contain iron and are not magnetic. They do not rust.

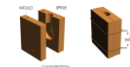
Alloys are mixtures of metal with an element to improve its properties or **aesthetic**. For example brass is a mixture of copper and zinc. Alloys can also be classified as ferrous or non-ferrous.

Timbers Wood comes from trees that are felled. There are three main groups of wood:

Hardwoods - take longer to grow, are not easily sourced and are expensive to buy. Oak, beech and mahogany are hardwoods.

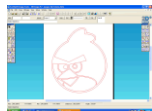
Softwoods - They are faster growing than hardwoods, making them cheaper to buy, and are considered a **sustainable** material. Pine is a softwood

Manufactured board - Manufactured boards are usually made from timber waste and **adhesive**. To make them more aesthetically pleasing they are often **veneered**. They are cheap to buy.



Moulds and casting – used to make complex shapes

Computer aided design (CAD) now has the capability to design new products in 3D, visualise them in a variety of materials and send images around the world for collaboration and consultation.



By using **computer aided manufacture (CAM)**, designs can be sent to CAM machines such as laser cutters, 3D printers and milling machines.

