

GCSE AQA Design and Technology

Materials and their properties– Papers & Boards

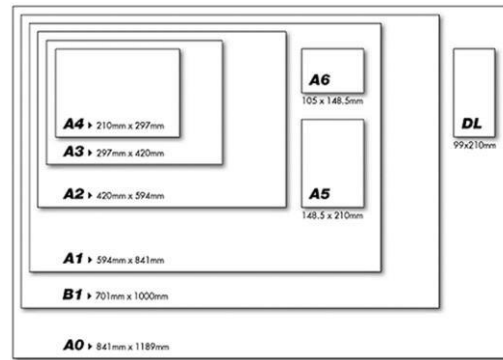
What you need to know:

- Know the primary sources of materials for producing papers & boards
- Be able to identify a range of papers & boards.
- Understand their properties and the functions they provide and how they are used?

Papers and boards are used for a variety of purposes from writing, drawing, packaging and model making. They are made from cellulose fibres found in wood or grasses which are all renewable.

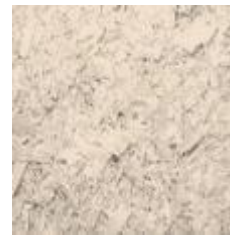
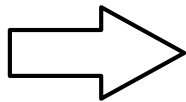
Paper & boards can be plain, textured and can be laminated with other materials like plastic to make them waterproof.

Paper and board is measured in sizes from A0 to A6 and in weight by grams per square metres (gsm). Boards (card or cardboard) are always greater than 200gsm



Processing paper & card:

This involves turning raw materials into usable products. In the case of paper, the raw material is usually **wood**.



In the first stage of paper manufacture, the wood is mashed up to make **wood pulp**.

This is done in one of two ways.

By machine

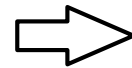
The wood is physically ground up. Paper made from machined pulp is weaker and turns yellow over time. It is used for newspapers.

By chemicals

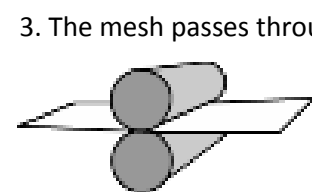
Wood chips are mixed with chemicals that dissolve the bonds between the fibres. Chemical pulp is used for writing and printing paper.

The wood pulp is then bleached to make it white, and fed into a **Fourdrinier** machine. This machine makes the pulp into paper.

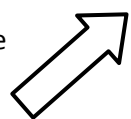
1. Firstly, dyes and other chemicals are added to the pulp.



2. The pulp is then spread onto a moving wire mesh conveyor belt.



3. The mesh passes through a series of **metal rollers**. The second rollers are heated to dry the paper.



4. The calendar rollers then smooth the paper and determine the thickness.



The first rollers squeeze out the water.

Types of papers

Paper	Example	Properties	Uses
Bleed proof		A smooth paper often used with water and marker pens which prevents bleed (e.g. when ink runs through the paper).	Presentation drawings
Cartridge paper		Good quality white paper with a slight texture.	Can be used for paints, markers and drawings
Grid		Paper printed with grids as guideline for drawing (e.g. isometric).	Quick model 3D drawings
Layout		Strong and lightweight	Initial sketching and tracing
Tracing		Fluted plastic – light, strong weather resistant material	Tracing copies of drawings

Selecting Papers & Boards

The type of paper & board used to make a product depends on the following factors:

- Aesthetics
- Size of product
- Where and how the product will be used?
- Stability
- Cost
- Size
- Weight
- Finish required
- Lifetime of the product
- Desired properties.

Types of boards

Boards	Example	Properties	Uses
Corrugated card		Strong lightweight material Made from two or more layers and has a fluted middle	Packaging such as pizza boxes, large boxes that are used to protect heavy items
Duplex board		Thin board that often has one side printed. This board can also be coated with wax so it can be used with food and drink	Packaging
Foil lined board		Board covered with one side of aluminum foil making it a good insulator	Packaging such as takeaway and ready meal packaging.
Foam core board		Two pieces of board with a foam core to increase the thickness but retain its light weight property.	Model making such as architectural models.
Solid white board		High quality cardboard, smooth on both sides which makes it good for printing.	Book covers, cards and packaging.

Sustainability

The UK use over 12 million tonnes of paper each year and it takes approximately 25 trees to make one tonne of paper. Trees take in Carbon Dioxide (CO²) and produces oxygen but it takes a lot of energy to cut them down and make paper.

An alternative is to recycle paper and this is becoming more common as this uses between 40% to 70% less energy to produce.

