

HARDWOODS

Hardwoods come from broad-leaved, deciduous trees.

Tools used for wood



Tri-Square



Tenon Saw



Coping Saw



Bastard File



Marking Knife



Smoothing Plane



What are each of these tools used for?

TYPES OF HARDWOOD

ash, beech, birch, cherry, elm, mahogany, oak, sapele and teak.

SOFTWOODS

Softwoods come from coniferous trees which are evergreen, needle-leaved, cone-bearing trees, such as cedar, fir and pine

Processing wood for use in manufacture

Stage 1 - Tree Felling



Stage 2 - Storage



Stage 3 - To Sawmill



Stage 4 - Rough Sawing



Stage 5 - Seasoning



Stage 6 - Cutting to Size



Stage 7 - Manufacturing

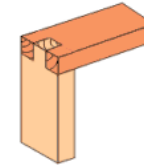


MANUFACTURED BOARDS

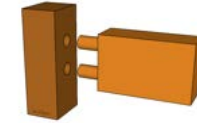
Manufactured boards are timber sheets which are produced by gluing wood layers or wood fibres together.

Manufactured boards often made use of waste wood materials.

Wood joints



Finger Joint



Dowel Joint



Cross Halving Joint



Dovetail Joint

Wood joints are used to secure two or more pieces of wood together. This is the strongest way to join wood.

Wood adhesives



Wood glue is the most common way of joining two pieces of wood together. It is also known as PVA (Polyvinyl acetate).

TYPES OF SOFTWOOD

cedar, fir, pine and spruce.

TYPES OF MANUFACTURED BOARD

plywood, chipboard, blockboard, medium density fibreboard (MDF), and hardboard.

THERMOPLASTICS

Thermoplastics can be heated and shaped many times.

THERMOSET

Thermosets, once shaped can not be reheated and reshaped. Instead they will just burn.

Tools used for plastic



Coping Saw
(narrow blade)



Scroll Saw



Wet & dry sandpaper



Polisher/buffing machine

Joining plastics

The most effective way to join plastics together is to use a liquid cement called 'Tensol'. This works by using a capillary action, this means the liquid flows between the pieces and fuses them together.



How is plastic made?

Plastic is made from a combination of natural materials. The main one being **crude oil**. To extract crude oil, drilling needs to be done deep underground. This can have a **damaging effect on the environment**. It also uses a lot of energy and creates fumes and gases that are released in to the environment during **refining and production**.

Plastic Categories

1 PETE	2 HDPE	3 PVC	4 LDPE	5 PP	6 PS	7 OTHER
Polyethylene Terephthalate	High-Density Polyethylene	Polyvinyl Chloride	Low-Density Polyethylene	Polypropylene	Polystyrene	Other
Common products: soda & water bottles; caps, jerrys, trays, clamshells	Common products: milk jugs, detergent & shampoo bottles, flower pots, grocery bags	Common products: cleaning supply jugs, pool liners, hoses, shelving, automotive product bottles, sheeting	Common products: bread bags, paper towels & tissue covering, squeeze bottles, trash bags, six-pack rings	Common products: yogurt tubs, caps, juice bottles, straws, hangers, sand & shipping bags	Common products: to-go containers & flatware, hot cups, razors, CD cases, shipping cushion, cartons, trays	Common types & products: polycarbonate, nylon, ABS, acrylic, PLA; bottles, safety glasses, CDs, headlight lenses
Recycled products: clothing, carpet, clamshells, soda & water bottles	Recycled products: detergent bottles, flower pots, crates, pipe, decking	Recycled products: pipe, wall siding, banners, carpet backing, flooring	Recycled products: trash bags, plastic lumber, furniture, shipping envelopes, compost bins	Recycled products: paint cans, speed bumps, auto parts, food containers, hangers, plant pots, razor handles	Recycled products: picture frames, crown molding, rulers, flower pots, hangers, toys, tape dispensers	Recycled products: electronic housings, auto parts

Plastics are put into different categories depending on their properties. This makes it easier to identify them when they need to be recycled or disposed of. Look out for the different symbols on different bottles/containers/packaging.

Plastic used in school

Acrylic



Advantages -

- Can be easily cut
- Supplied in large sheets
- Comes in a wide range of colours
- Can be heated to bend and curve
- Can be polished

Disadvantages -

- Can get scratched and damaged
- They are not strong and can break if dropped
- They can discolour with age
- Difficult to recycle

THERMOPLASTICS

casings for power tools, curtain rail fittings, kitchen equipment, packaging & toys.

THERMOSET

light switches, work surfaces, electrical insulation & door handles.

FERROUS

Ferrous metals contain iron and are magnetic. They will rust easily.

NON-FERROUS

Non-ferrous metals do not contain iron, they are not magnetic and are more resistant to corrosion.

Tools used for metal



Engineers Square



Junior Hacksaw



Scriber



Centre Punch



Ball Pein Hammer



Tin Snips

Joining metals - temporary

Adhesives such as Epoxy Resin can be used to join metals but the join will not be as strong as a permanent fixing technique.

Mining of Iron Ore

In order to **produce steel**, iron ore is required, in large quantities. **Iron ore is dug out of the ground from open cast mines or mined deep underground.** The ore is crushed into a fine powder, mixed with water, making a **slurry**. Clay is added to the slurry and the mixture shaped into pellets and baked, forming a hard shell. The pellets are sent to a steel mill in order to **extract the iron** which is normally **converted into steel**.

Joining metals - permanent

Brazing



Welding



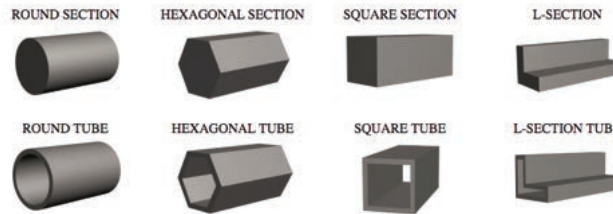
Soldering



Rivets & Screws



How metals are supplied

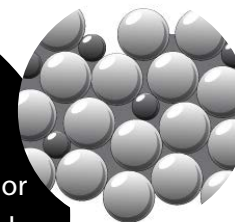


Metals can come in solid bars of different shapes or tubes. Most metals are also available as sheet metals.

Alloys are often stronger than the metals they contain.

ALLOYS

Alloys are a mixture of two or more metals. When a metal with certain properties is needed, metals can be combined.



FERROUS METALS

cast iron, mild steel, high carbon steel and stainless steel.

NON-FERROUS METALS

aluminium, brass, copper, lead, zinc, titanium and tin.

Aesthetics

Does the product look good?
Does it make good use of colour and texture?
What has inspired its appearance?
(E.g. is it organic? Is it industrial?)

Cost

What is the estimated cost of the product?
What is the retail price?
What is the relationship between the two?
Is the product affordable?
Does it offer value for money?
What is the product's cost in relation to the income of potential buyers/users?

Safety

How has the designer considered safety issues in the products design?
Think about the ways it is being used and how different parts have been joined together.
Are there any risk assessment issues in relation to the use of the product?

Size

Are the product's proportions appropriate for its use?
If you increased or decreased the products size, would it look or function better?

Customer

Who is the product designed for?
How and where would they use it?
What effect will it have on their lives and relationships?
Will it add value?
How is the product promoted to attract customers?
Has the designer considered how people will interact with the product?
Does the product target a particular age group or sector of people?
What assumptions have been made about the potential buyers/users?

Environment

What is the product's impact on the environment?
What happens to the product after use?
How long will it last?
What factors limit/lengthen its life span?
Can it be repaired? Can parts be replaced?
How easily can it be recycled?
Who would pay for the cost of recycling?

Function

Does the product do the job it was intended to do?
How does it work?
How easy is it to use?
What effects will using it have, including those beyond intended use and user?

Material

What materials are used to make the product and why?
Would another type of material work better?
What impact could the designers choice of material have on the environment?
Where do the materials and other resources needed for production come from?
Are they likely to run out?

Key tools & fittings



Tenon saw



File



Drill bit



Chuck key



Bench hook



Pliers



Screwdriver



Craft knife



Soldering iron



Solder



Screw



Nut & bolt



Rotary cutter

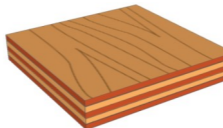
Key materials & glues



MDF



Pine



Plywood



Mahogany



Acrylic plastic



HIPS plastic



Styrofoam



PVA glue



Contact adhesive

Safety first



Always wear gloves when using the glue gun.

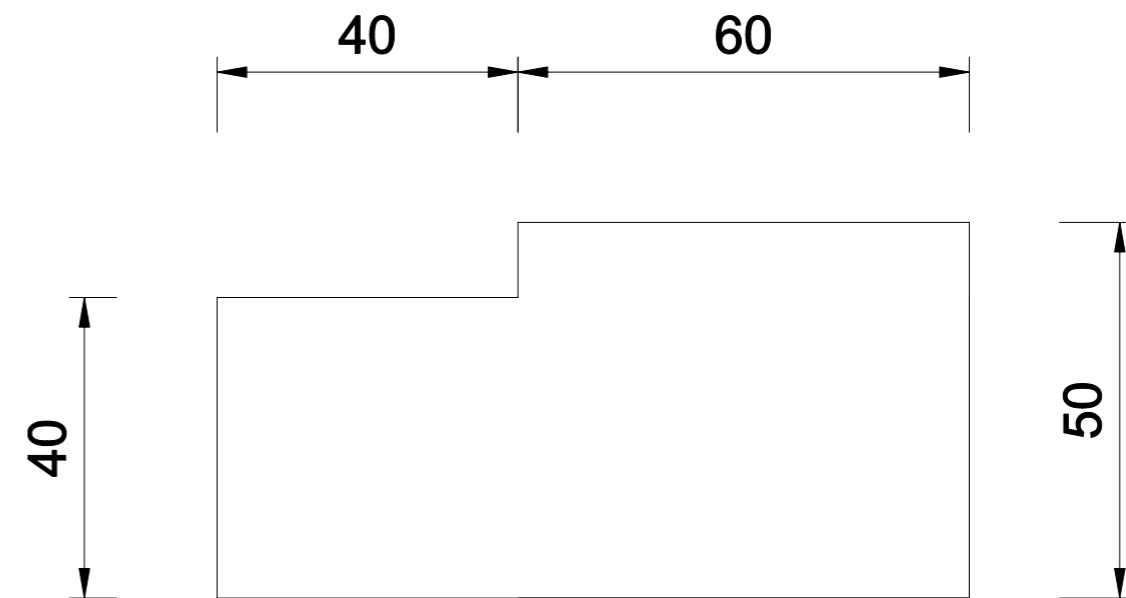


Always wear goggles when using machinery.

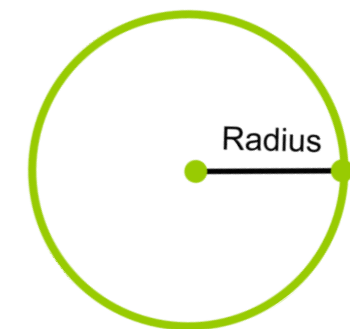
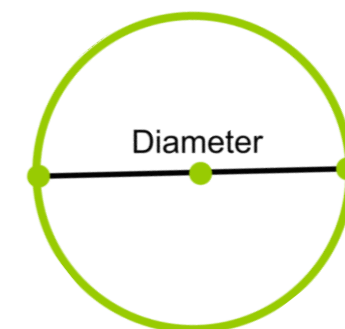


Always wear an apron in the workshop.

Adding measurements to a shape



Radius & diameter explained



Diameter

Radius

KS3 Design Technology Sentence Starters - Annotation Support

Analysing Sentence Starters

I think that.....

I liked/disliked this design as.....

It would appeal to a target audience of.....

The strengths of this design are..... because.....

The weaknesses of this work are..... because.....

Aesthetically this design.....

The use of the colours..... means/allows.....

Design Explanation Sentence Starters

I have chosen the colours..... because

This product is designed to.....

My product is made from.....

What I like about my design is.....

My design follows the theme of.....

I could improve my design further by.....

Annotation

Negatives:

What are the negatives about your design?

Positives:

What parts of your design work well?

Improvements:

What could you change and improve about your design?

Environment:

What impact would your design have on the environment?

Manufacture:

How would your design be manufactured?

Target Market:

Who would this design appeal to and why?

Materials

What materials would you use to create this?

Key Words

Design

Technology

Analysis

Investigate

Research

Generate

Develop

Model

Evaluate

Reflect

Manufacture

Sketch

Prototype

Aesthetics

Safety

Tenon saw

Coping saw

Pillar drill

Bench hook

Pine

Plywood

Describing Words

Accurate

Cheap

Curved

Fragile

Overlapping

Uneven

Attractive

Complex

Defective

Imaginative

Repeated

Smooth

Bland

Colourful

Delicate

Innovative

Rough

Subtle

Bright

Contrasting

Elegant

Interesting

Shiny

Suitable

Bulky

Creative

Geometric

Organic

Simple

Symmetrical

Successful writing in Design & Technology

Connectives to explain

You need to be able to link your ideas in a paragraph and to explain why you made particular decisions.

“I started by drilling a hole in the wood then I inserted the dowel rod **so that** I could attach the wheel”.

in addition	furthermore	also	and
in spite of	besides	because	then
next	previously	so that	this meant
it would	moreover	as well as	too

Time sequences

You need to be able to describe what you did in chronological order.

“**At first** I used a steel rule to measure and mark out the size of the material, **next** I marked the line using a tri-square”.

at first	until	from that point	lastly
at length	after	meanwhile	finally
eventually	next	ultimately	secondly
later	soon	earlier	before

Connectives to compare and contrast design ideas

You need to be able to contrast design ideas in a sentence or a paragraph.

“My first idea features lots of colour and looks really effective. **However** my second idea appeals more to teenagers. **By comparison**, my third idea uses recyclable materials which makes it much more eco-friendly”.

although	yet	in spite of	while
likewise	whereas	despite this	in contrast
however	by comparison	similarly	otherwise
nevertheless	instead	even so	alternatively
as long as	in the same way	nonetheless	unlike
apart from	except	equally	still
though	similar to	just like	compared to

Group your opinions and make suggestions

You need to be able to write about your own ideas and suggest improvements.

“I am really pleased with the storage unit I have designed. **I like it because** it **reflects** the art deco era as shown in my research. Whilst I think that the first idea also **portrays** the art deco era I feel that the size of my product might be too big”.

I think that	reminds me of	gives the impression that
reflects	I likebecause	this particular idea
makes me feel	it could be that	what I like about this idea is
it could	it's almost as if	another idea would be to
next time	portrays	what I like about this idea is