

# SUMMER TERM

- MOISTURE SENSOR  
MINI NEA
  - GCSE CORE  
KNOWLEDGE RECAP

# **YEAR 10 - SUMMER**

# **REVISION TOPICS**

- **Maths in D&T**
  - Visual representation of data
  - Percentages
  - Costings
- **Product Life Cycle**
- **Sustainability**
  - Life cycle analysis
  - Carbon footprint
  - 6R's
  - How to tackle waste
- **Smart and Modern Materials**
  - Smart Material Types and properties
  - Technical Textiles
- **Electronics**
  - Basic components
- **Mechanical Devices**
  - Levers
- **Papers and Boards**
  - Types
  - Stock forms and properties
  - Finishing techniques
- **Polymers**
  - Thermoforming
  - Thermosetting
- **Metal Based materials**
  - Specific materials (properties & uses)
- **Timber based materials**
  - Manufactured boards
  - Uses and properties
  - Finishes and Manufacturing Processes
- **Textiles based materials**
  - Natural fibres
- **Design Approaches**
  - Ergonomic design
  - User centred design
- **Scales of Manufacturing**

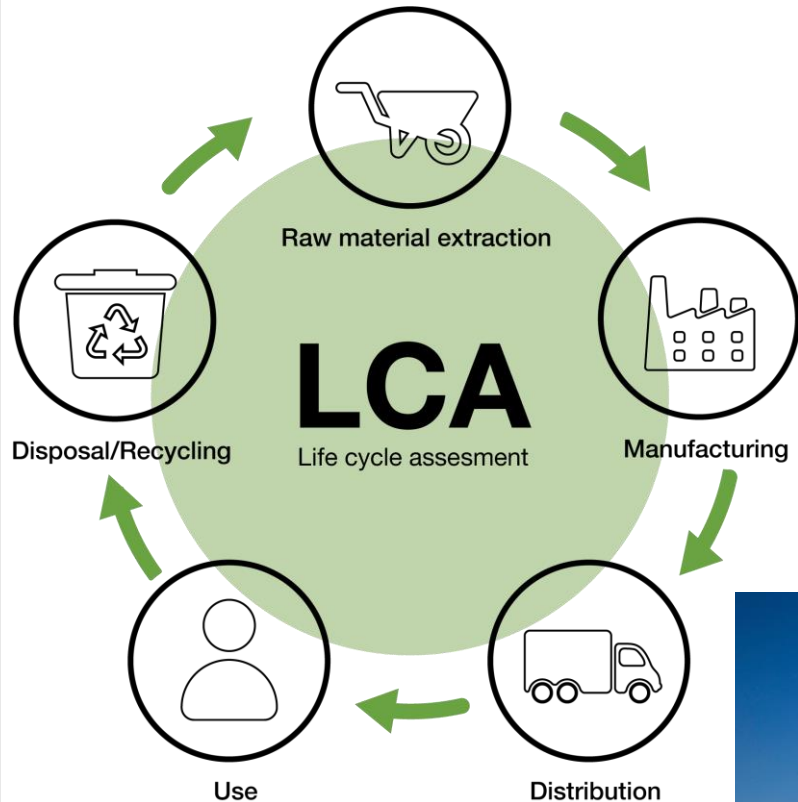
**KEY QUESTIONS**

1. HOW CAN DATA BE REPRESENTED?
2. HOW DO YOU TAKE DATA AND CREATE GRAPHS?
3. HOW ARE PERCENTAGES CALCULATED?
4. HOW ARE PRODUCT “COSTS” CALCULATED?



**KEY QUESTIONS**

1. HOW CAN YOU ASSESS THE ENVIRONMENTAL IMPACT OF A PRODUCT?
2. WHAT IS A CARBON FOOTPRINT?
3. WHAT DO THE 6R'S DO? WHAT ARE THEY?
4. HOW IS WASTE ADDRESSED?



In the UK, the most common disposal method is landfill. Incineration, anaerobic digestion and some materials can be readily recycled.

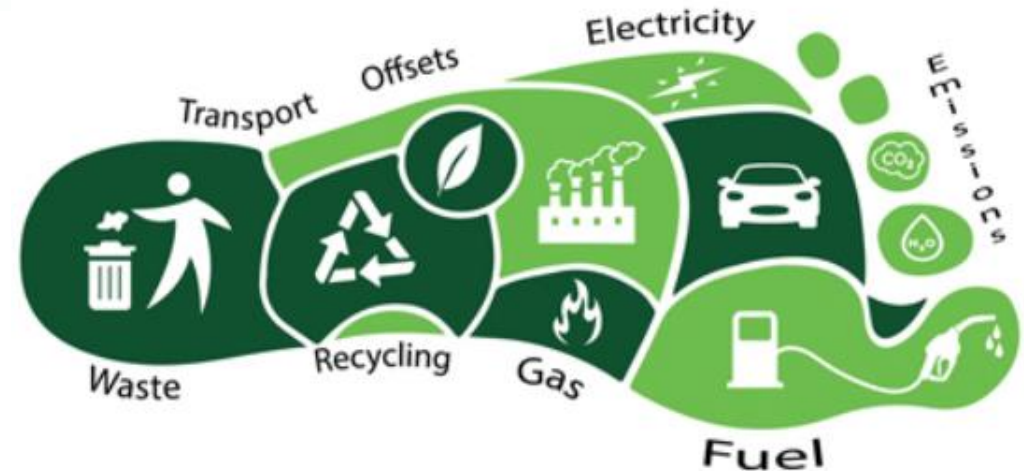


At each stage a life-cycle assessment considers:

- use of raw materials (including water)
- use of energy
- release of waste substances into the environment



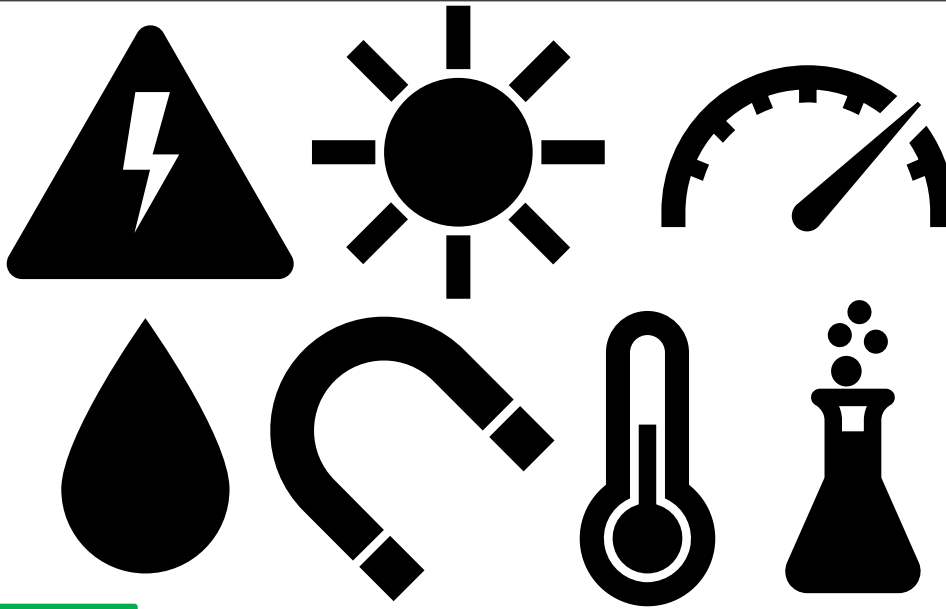
A carbon footprint is the total amount of greenhouse gas emissions that are released as a result of our individual actions. It measures the total volume of a number of greenhouse gases but is usually expressed in terms of the carbon dioxide equivalent.



**KEY QUESTIONS**

1. WHAT STIMULI CAUSE THE PROPERTIES OF SMART MATERIALS TO CHANGE?
2. WHAT ARE SOME COMMON SMART MATERIALS?
3. WHAT ARE SOME COMMON TECHNICAL TEXTILES?

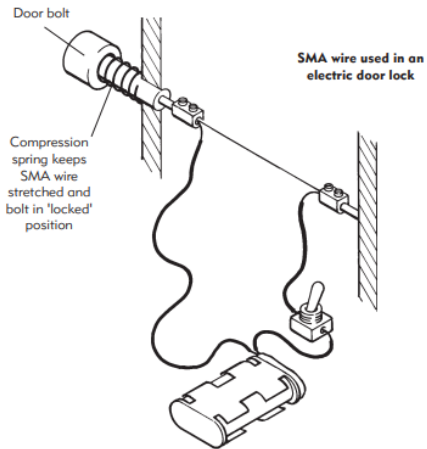




Thermochromic materials



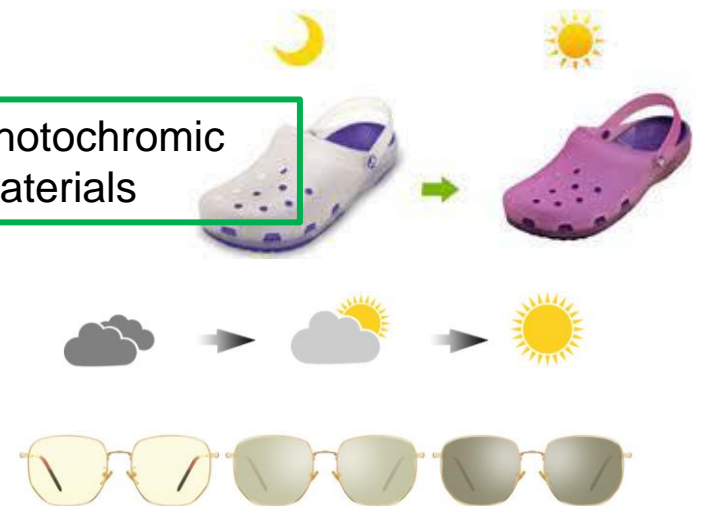
Shape Memory Alloy (SMA)



Polymorph



Photochromic materials



## Gore-Tex fabric

### Properties:

- Waterproof
- Breathable (allows moisture out)
- Holes on fabric allow sweat out, but not rain in
- Can be combined well with insulation fabric (to keep you warm)

## Kevlar fabric

### Properties:

- Eight times stronger than steel wire
- Does not melt and can withstand up to 450c
- Can withstand very low temperatures :- 96c
- Resistant to many chemicals
- Very lightweight

## Nomex fabric

### Properties:

- Thickens when heated, offering more protection
- Flexible fabric
- Lightweight
- Flame resistant
- Breathable (allows moisture)
- Durable (hard wearing)
- Abrasion resistant (does not get worn out easily)

## Coolmax fabric

### Properties:

- Draws sweat from the skin
- The fabric dries quickly
- Breathable (Lets sweat out)
- Soft
- Comfortable
- Holds its shape

## Rhovyl

- is an antibacterial material that has antibacterial agents integrated into the fibre itself. thermal insulation and natural
- fire retardancy
- wicks away moisture
- resistant to mildew, fungi and chemicals

## Thermochromic dyes

### Properties:

- Can dye a fabric any colour
- The colour changes when heat or UV light reacts with the fabric
- The colour can change on a scale, depending on temperature or light (For example the colour may go more vibrant as the material is heated up more)

## Microfibre fabric

### Properties:

- Breathable (let sweat out)
- Durable (does not get worn out easily)
- Crease resistant
- Some variations can hold chemicals such as deodorants, insecticides and perfumes that are released when worn

## X-Static fabric

### Properties:

- Anti odour (Does not hold smell)
- Made with pure silver
- Very flexible
- Soft
- Long lasting
- Stretchy
- The silver reacts with bacteria
- Has been proven to eliminate 99% bacteria within one hour

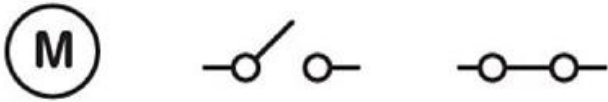
**KEY QUESTIONS**

1. WHAT ARE THE MOST COMMON BASIC ELECTRONIC COMPONENTS?
2. WHAT ARE LEVERS?
3. HOW ARE THEY USED TO GIVE A MECHANICAL ADVANTAGE?

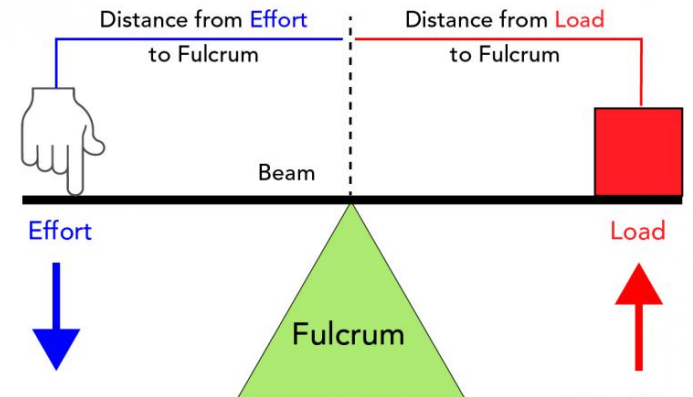
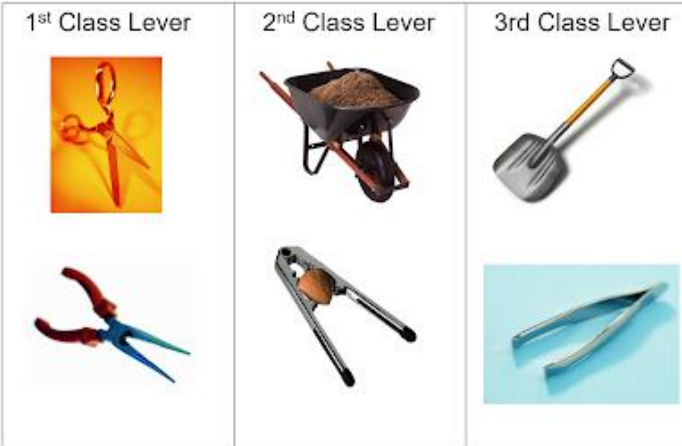
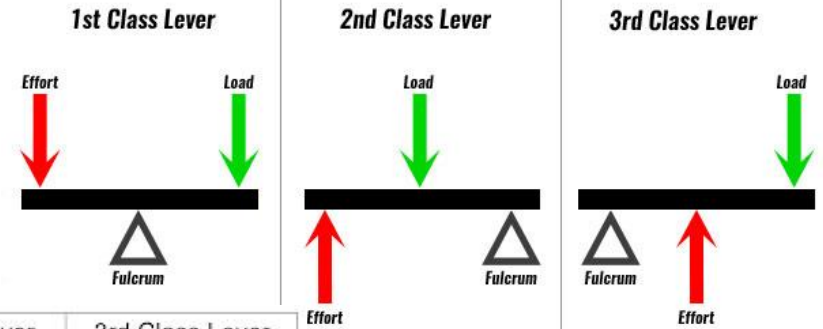
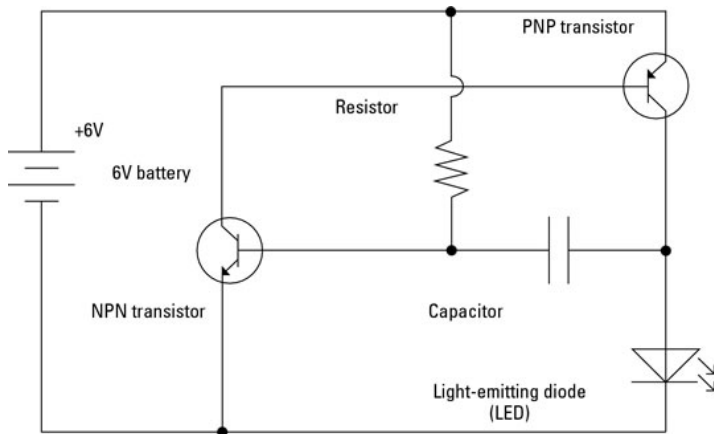
FLE  
123



Battery      Wire      Bulb      Buzzer



Motor      Switch (off)      Switch (on)



$$\text{Mechanical Advantage} = \frac{\text{Effort (input force)}}{\text{Load (output force)}} = \frac{\text{Distance from Effort to Fulcrum}}{\text{Distance from Load to Fulcrum}}$$

**KEY QUESTIONS**

1. HOW ARE PAPER BASED MATERIALS DEFINED?
2. WHAT ARE SOME COMMON TYPES OF PAPER BASED MATERIALS?
3. HOW CAN PAPER BASED MATERIALS BE FINISHED AND PROTECTED?

## COMMON PAPER AND BOARDS

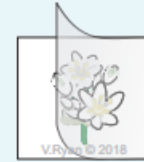
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**CARTRIDGE PAPER** - Used for general drawing. It is often good quality. This paper is used for design and technology projects and will take colour from pencils and felt pens, without too much bleeding to the opposite side of the paper. **120 to 160gsm**.



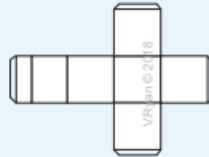
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**TRACING PAPER** - Is used by pupils, students and designers. Allows the designer to copy an existing drawing / shape. Tracing paper can be useful, when there is a need to produce several drawings, that are based on the same outline. **40 to 130gsm**



V.Ryan © 2018

**CARDBOARD** - Thicker than paper as it is made up of a number of layers, glue or laminated together. The diagram opposite shows a net / development of a package.



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**BLEED PROOF PAPER** - Does not allow felt pens/ink pens (water or spirit based), to spread or bleed through and across the surface. When a felt pen is used on the surface of cartridge paper, accuracy can be lost, as the ink is absorbed and spreads out, leaving an inaccurate line. Bleed proof paper, has a coating that prevents this happening. **70gsm**



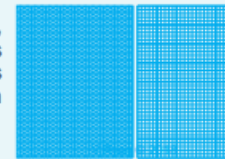
BLEED PROOF

**DUPLEX BOARD** - Used for containers and can contain liquids, as it may have a water-proof liner on the inside. It can have a wax feel. This type of card is used by the food industry and consequently recycled card is not used in its manufacture. **200 to 500 gsm**



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**GRID PAPER** - Is manufactured in a range of patterns, the most common being isometric and square grids. This type of layout helps when drawing in three dimensions (isometric) or drawing graphs and pictograms (graph paper). **Standard 80gsm**



**SOLID WHITE BOARD** - This is normally top quality cardboard, made from quality bleached wood pulp. It is suitable for printing on to and consequently, it is used for hard backed books and general, expensive items. **200 to 500gsm**

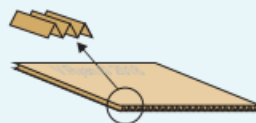


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**INK JET CARD** - A high quality paper, often used when a photograph is printed. The surface is normally gloss or matt, in texture. It is relatively expensive compared to cartridge or photocopying paper. **120 to 400gsm**

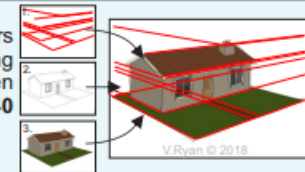


**CORRUGATED BOARD** - Often used for packaging large items. These boxes (brown in colour), protect the contents from damage. Corrugated board is strong because it is composed of a top and bottom layer and in between there is a triangulated section. A triangular section is very strong, compared to its weight. **1000 to 5500gsm**



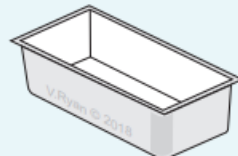
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**LAYOUT PAPER** - Used by architects, designers and artists, to lay over the top of an existing drawing, in order to copy parts / aspects. When put together, the various layers appear as one. **40 to 60gsm**



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**FOIL LINED BOARD** - Good quality cardboard with an aluminium foil lining. This type of container is ideal for ready made meals or take away meals. The foil retains the heat helping to keep the food warm. **220 to 420gsm**



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**FOR DETAIL, INFORMATION AND EXERCISES ON GRAPHICS AND VISUAL COMMUNICATION GO TO:**  
[http://www.technologystudent.com/despro\\_f1sh/graphics\\_main1.html](http://www.technologystudent.com/despro_f1sh/graphics_main1.html)  
<http://www.technologystudent.com/designpro/drawdex.htm>



Paper and boards are measured in 2 ways:

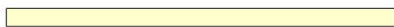
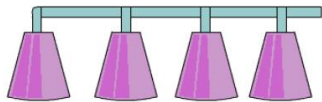
- **Microns**
- **GSM (Grams per Square Metre)**

## Vinyl Application

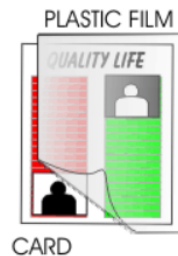
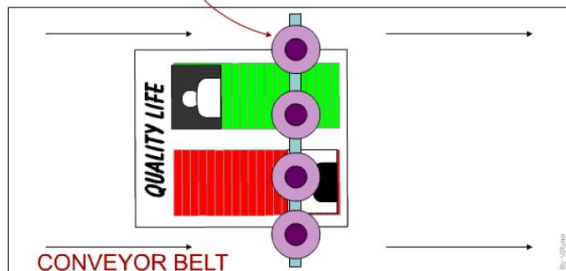


## Printing and Varnishing

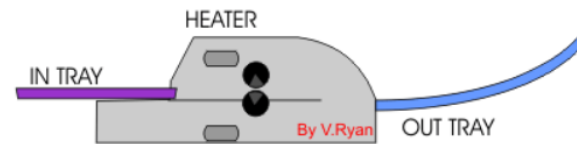
SPRAY NOZZLES



FINE VARNISH SPRAY



## Lamination or Encapsulation



## TETRAPAK



**KEY QUESTIONS**

1. WHAT IS THE PRIMARY DIFFERENCE BETWEEN THERMOFORMING POLYMERS AND THERMOSET POLYMERS?
2. WHAT ARE SOME COMMON EXAMPLES OF EACH CATEGORY?
3. WHAT COMMON APPLICATIONS ARE THESE USED FOR?



<b>Thermoforming polymer</b>	<b>Properties</b>	<b>Uses</b>
Acrylic (PMMA)	Hard with good plasticity when heated so can be folded well, resists weather well but is brittle and scratches easily, available in lots of colours	Car headlights, visors and baths
High density polythene (HDPE)	Stiff, strong but lightweight, good plasticity when heated with excellent chemical resistance	Washing-up bowls, pipes, chairs, buckets and bottles
Polypropylene (PP)	Lightweight but strong and tough, has good heat and chemical resistance	Computer game cases, chairs, children's toys and food packaging film
Polyvinyl chloride (PVC)	Can be matt or high gloss with both chemical and weather resistance, low in cost with good strength, can be made to be flexible or rigid	Window frames, building cladding, guttering

Thermoforming polymers can be **heated and formed repeatedly**. They are **pliable** and **recyclable**.

Thermosetting polymer	Properties	Uses
Epoxy resin (ER)	Supplied as two parts, one resin and one hardener (see image) - the resin and hardener combine to create an extra-strong adhesive, good chemical and heat resistance and an excellent thermal insulator, can be brittle	Bonds materials and can be used for waterproof coatings and lamination
Melamine formaldehyde (MF)	Excellent heat resistance as well as being resistant to scratching and staining, hard and strong	Laminates for worktops, food safe so used for picnic tableware
Urea formaldehyde (UF)	A hard and stiff polymer with excellent thermal insulation	Electrical fittings, toilet seats, holding the wood chips together in the making of medium-density fibreboard (MDF)

Thermosetting polymers are **brittle** and can only be **formed once**. They are **hard to recycle**. They are **good insulators** and are **resistant to heat and chemicals**.

**KEY QUESTIONS**

1. WHAT IS THE PRIMARY DIFFERENCE BETWEEN FERROUS AND NON FERROUS METALS?
2. WHAT ARE SOME COMMON EXAMPLES OF EACH CATEGORY, AND ALLOYS?
3. WHAT COMMON APPLICATIONS ARE THESE USED FOR?

# YEAR 10 – SUMMER

# METAL BASED MATERIALS

<b>Ferrous metal</b>	<b>Properties</b>	<b>Uses</b>
Cast iron	Brittle if thin, can be cast in a mould, strong compression strength, good electrical and thermal conductivity but poor resistance to corrosion	Manhole covers, pans and gates, vices
High-carbon steel (tool steel)	Hard but brittle, less malleable than mild steel, good electrical and thermal conductivity	Taps and tools, eg screwdrivers and chisels
Low-carbon steel (mild steel)	Ductile and tough, easy to form, braze and weld, good electrical and thermal conductivity but poor resistance to corrosion	Nuts, bolts, screws, bike frames and car bodies
<b>Non-ferrous metal</b>	<b>Properties</b>	<b>Uses</b>
Aluminium	Light in weight and malleable but strong, a good conductor of heat and corrosion resistant	Drink cans, saucepans, bike frames
Copper	An excellent electrical conductor of heat and electricity, extremely malleable and can be polished, oxidises to a green colour	Plumbing fittings and electrical wires, professional chef's saucepans
Silver	A precious metal that is soft and malleable when heated, highly resistant to corrosion and an excellent electrical conductor of heat	Jewellery

Alloy	Properties	Uses
Brass (alloy of copper and zinc)	Non-ferrous metal that is strong and ductile, casts well and is gold coloured but darkens when oxidised with age, a good conductor of heat	Taps, screws, castings, locks and doorknobs
Bronze (alloy of copper, aluminium and/or nickel)	Non-ferrous alloy, harder than brass and corrosion resistant, reddish/yellow in colour	Castings, bearings
Stainless steel (alloy of steel also with chromium, nickel and magnesium)	Ferrous metal that is silver when polished, hard and tough with excellent resistance to corrosion	Cutlery, sinks, saucepans, surgical equipment

## CHOOSING FERROUS VS NON-FERROUS METALS



	FERROUS	NON-FERROUS
CONTAINS IRON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HIGH MELTING POINT	<input checked="" type="checkbox"/>	<input type="checkbox"/>
DOES NOT RUST	<input type="checkbox"/>	<input checked="" type="checkbox"/>
NON-MAGNETIC	<input type="checkbox"/>	<input checked="" type="checkbox"/>
MALLEABLE	<input type="checkbox"/>	<input checked="" type="checkbox"/>
STRONGER (IN MOST CASES)	<input checked="" type="checkbox"/>	<input type="checkbox"/>

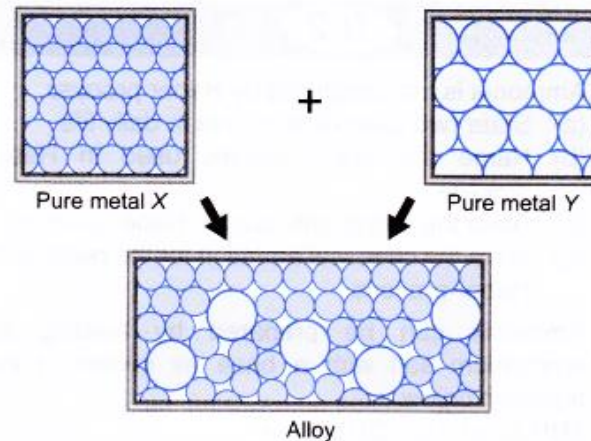


Figure Making of alloy



**KEY QUESTIONS**

1. WHAT IS THE PRIMARY DIFFERENCE BETWEEN SOFT AND HARD WOOD?
2. WHAT ARE SOME COMMON EXAMPLES OF EACH CATEGORY, AND MAN MADE BOARDS?
3. WHAT COMMON APPLICATIONS ARE THESE USED FOR?
4. HOW SHOULD TIMBER BASED MATERIALS BE FINISHED?

# YEAR 10 – SUMMER

# TIMBER BASED MATERIALS

Hardwood	Properties	Uses
Balsa	Soft and easy to form, lightweight, pale in colour, not durable but cheap	To make models
Beech	Close-grained, hard, strong and tough, can be challenging to work with and is prone to warping and splitting	Furniture, toys and tool handles, a veneer for worktops
Jelutong	A pale, close-grained timber, with medium toughness, easy to work with	Sculpture and pattern making
Mahogany	Deep reddish colour that is strong and durable, fairly strong and of medium weight, relatively easy to work with but prone to warping	Indoor furniture, panelling and veneers
Oak	Moderate-brown colour with unique and attractive grain markings, tough and durable, polishes well	High-quality furniture, kitchens units, flooring and for veneers as an expensive material

Softwood	Properties	Uses
Paraná pine	Hard, straight-grained, strong and durable with a smooth finish, almost knot free, expensive and tends to warp	Quality, indoor joinery, eg staircases and built-in furniture
Scots pine	Straight-grained but knotty, fairly strong and easy to work with and paint, cheap	Indoor joinery, eg staircases and furniture - if used outdoors it needs regular protection
Western red cedar	Lightweight and knot free, has natural oils that protect it, easy to work but weak and expensive	Outdoors including building cladding

Manufactured board	Properties	Uses
Chipboard (particle board)	Large chips or flakes of wood glued together under pressure, brittle, difficult to shape and finishes poorly, absorbent to water and low in cost	Used for veneered worktops and flooring
Medium-density fibreboard (MDF)	A compressed board made from wood fibres glued together, smooth, light brown, can be veneered and painted, hard, keeps edges well on cutting, goes soggy when exposed to water if not protected	Used for kitchens and flat pack furniture
Plywood	Odd number of layers of veneer glued at 90 degree angles for strength, aesthetically pleasing outer layer, it is stiff and hard to bend unless glued into set shapes	Used for shelving work surfaces, floors and furniture

Clear Finished



No Finish



**When finishing wood**, abrasives are commonly used **Wax** is used to apply a protective coating to wood. It first to remove excess material, to remove blemishes, and to smooth surfaces. can also change the colour of wood and make it smooth.

Common abrasives are **glasspaper**, **sandpaper**, and **steel wool**. Glass and sandpaper come in different grades depending on the amount of grit on the paper. The more grit, the more abrasion, and the smoother the surface finish.

Once the surfaces have been prepared, a finishing product is often added to add a layer of protection and to give a more pleasing appearance to the item.

**Varnish** and **stains** can bring out the grain of the wood and also change the wood's colour and appearance. Typically several layers are applied to build up a good finish.

**Paint** can massively transform the look of a wood by drastically changing its colour. Built up in layers, it also provides protection from the elements to the wood. Polish can also be applied to provide a protective coating.





**KEY QUESTIONS**

1. WHAT MANUFACTURING METHODS ARE SPECIFIC TO TIMBER BASED MATERIALS

## Types of wood joints



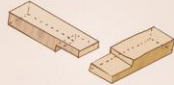
Basic Butt



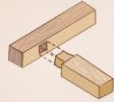
Tongue and Groove



Mitered Butt



Half-Lap



Mortise and Tenon



Biscuit Joint



Pocket Joint



Rabbet Joint

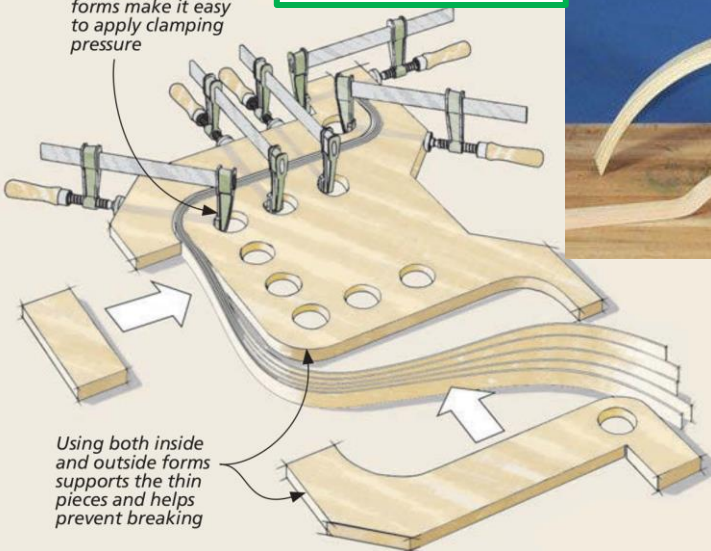


Half-Blind Dovetail

the spruce

## Lamination

Holes in bending forms make it easy to apply clamping pressure



Using both inside and outside forms supports the thin pieces and helps prevent breaking

## Types of Wood Glue

There are different types of wood glue, and you need to know about wood glue advantages and disadvantages for your project(s). The basic wood glues are:

- Polyvinyl acetate (PVA)
- Polyurethane
- Cyanoacrylate
- Animal or hide
- Epoxy

## Wood turning – using a lathe



## CNC Routing



**KEY QUESTIONS**

1. WHAT IS THE PRIMARY DIFFERENCE BETWEEN SYNTHETIC (MANUFACTURED) AND NATURAL FIBRES?
2. WHAT ARE SOME COMMON EXAMPLES OF EACH CATEGORY?
3. WHAT COMMON APPLICATIONS ARE THESE USED FOR?

Natural fibre	Properties	Uses
Cotton (plant)	Highly absorbent so is comfortable to wear, strong and durable, easy to care for but can shrink and has poor elasticity so creases	Most clothing, bed linen, upholstery fabric and in the medical industry (because it can be boiled)
Linen (plant)	Highly absorbent and cool to wear, very strong and durable, poor elasticity so creases easily	Summer clothing, upholstery fabric, table clothes and napkins
Hemp (plant)	Absorbent, strong and naturally antibacterial	Carpets, rugs and ropes
Jute (plant)	Absorbent and very strong but coarse	Bags, sacks for vegetables, carpets and twine
Wool (animal)	Absorbent with good insulating properties due to the fibre's natural crimp (curl), has good elasticity so doesn't crease much, relatively strong but can shrink on washing	Jumpers, suits, carpets and blankets
Silk (insect)	Drapes well and has good lustre (sheen), absorbent but difficult to wash and creases	Luxury clothing, eg dresses, underwear and bedding

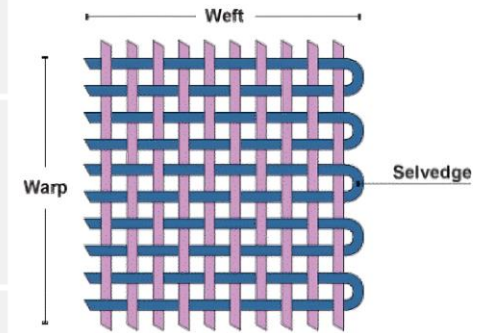


Figure 3. Woven fabric (general).

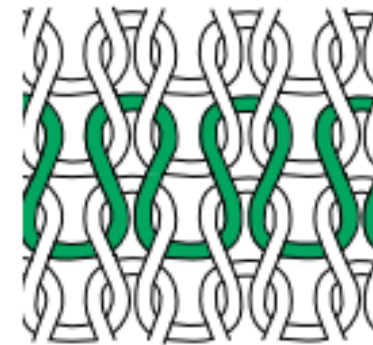


Figure 7. Weft knit.

Manufactured fibre	Properties	Uses
Acrylic	Like all synthetic fibres, has good strength with good elastic properties so doesn't crease, has poor absorbency but can be a good insulator if crimp is added to replicate wool fibres	Jumpers and other knitted clothing that looks like wool, fake fur jackets
Polyester	Hardwearing with good tensile strength, good elasticity but poor absorbency, a highly versatile fibre	Clothing and sportswear
Nylon (polyamide)	A hardwearing fibre with good tensile strength, has good elasticity so doesn't crease and is resistant to chemicals, not absorbent and melts easily	Parachutes, tents, rucksacks, sports clothing, rope and carpets
Elastane	Highly elastic and stretchy, strong and hardwearing	Clothing such as leotards, swimming costumes and gym clothing, mixed with cotton in T-shirts for a better fit

**Felt** is made by matting together wool, other hair fibers, or certain man-made fibers. Felting is done by applying heat, moisture, and pressure to a layered web of tangled fibers. Felt does not ravel and does not have a yarn direction or grain. Felt is not durable as a garment fabric, but it is often used in decorative projects for home furnishings.

**Fusing, laminating, and bonding** use adhesives to interlock short fibers or glue fabrics together. Interfacing is an example of fused fibers. A laminated fabric may be a bond of fabric to fabric, fabric to foam, or a combination fabric and foam. Fabrics are laminated or bonded to increase warmth, reduce cost, improve handling, reduce shrinkage, and increase the uses of the fabric.

**KEY QUESTIONS**

1. WHAT ARE THE MAIN “SCALES OF MANUFACTURING”?
2. WHAT SORTS OF PRODUCTS ARE MANUFACTURED WITH EACH PRODUCTION APPROACH?
3. HOW DO THEY COMPARE, IN TERMS OF COST PER PART VS INITIAL SETUP COSTS?

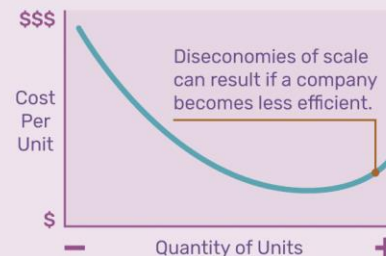
**Mass production** is a way of making many identical products quickly and efficiently. It involves using machines and assembly lines to produce large quantities of goods, such as cars, electronics, and toys. In mass production, each worker is responsible for a specific task or job. They repeat the same task over and over again, which allows them to become very skilled and efficient at it. The machines and equipment are also designed to perform specific functions quickly and accurately.



Scale of manufacturing	Initial setup costs	Cost per part
Mass/ Continuous	High	Low
Batch	Mid	Mid
One-off/ bespoke	Low	High

## Economies of Scale

An economics term that describes a competitive advantage that large entities have over smaller entities.



### Internal

The sheer size of the company allowing bulk purchases.

### External

Receiving preferential treatment from government or other external sources.



Large shipping companies can use ships that carry as many goods as 16 freight trains.

**Batch** production is a manufacturing process where a specific quantity of a product is produced in a single batch, rather than being produced continuously. This means that all the materials and equipment needed for the production of a specific batch are gathered and prepared at once, and then the production process is carried out for that entire batch.

For example, let's say a company wants to produce 1000 jars of peanut butter. Instead of making each jar one at a time, they would gather all the necessary materials and equipment, like peanuts, jars, labels, and packaging, and prepare them for a batch production run. They would then produce all 1000 jars in a single batch, ensuring that each jar is consistent in quality and meets the same standards.



**One-off** production is a type of manufacturing process where a single unique product is made. This means that the product is not mass-produced or made in large quantities, but rather each item is custom-made to meet specific requirements or needs.



**KEY QUESTIONS**

1. WHAT IS USER-CENTRED DESIGN?
2. WHAT FACTORS AFFECT THE DESIGN AND MANUFACTURE OF PRODUCTS?

We use **ACCESS FM** to help us write a **specification** - a list of requirements for a design - and to help us **analyse and describe** an already existing product.

## ACCESS FM - Helpsheet

**A** is for **Aesthetics**



**Aesthetics** means **what does the product look like?**  
What is the: Colour? Shape? Texture? Pattern? Appearance? Feel?  
Weight? Style?

**C** is for **Cost**



**Cost** means **how much does the product cost to buy?**  
How much does it: Cost to buy? Cost to make?  
How much do the different materials cost? Is it good value?

**C** is for **Customer**



**Customer** means **who will buy or use your product?**  
Who will buy your product? Who will use your product?  
What is their: Age? Gender?  
What are their: Likes? Dislikes? Needs? Preferences?

**E** is for **Environment**



**Environment** means **will the product affect the environment?**  
Is the product: Recyclable? Reuseable? Repairable? Sustainable?  
Environmentally friendly? Bad for the environment?  
**6R's of Design:** Recycle / Reuse / Repair / Rethink / Reduce / Refuse

**S** is for **Size**



**Size** means **how big or small is the product?**  
What is the size of the product in millimeters (mm)? Is this the same size as similar products? Is it comfortable to use? Does it fit?  
Would it be improved if it was bigger or smaller?

**S** is for **Safety**



**Safety** means **how safe is the product when it is used?**  
Will it be safe for the customer to use? Could they hurt themselves?  
What's the correct and safest way to use the product? What are the risks?

**F** is for **Function**



**Function** means **how does the product work?**  
What is the products job and role? What is it needed for? How well does it work? How could it be improved? Why is it used this way?

**M** is for **Material**

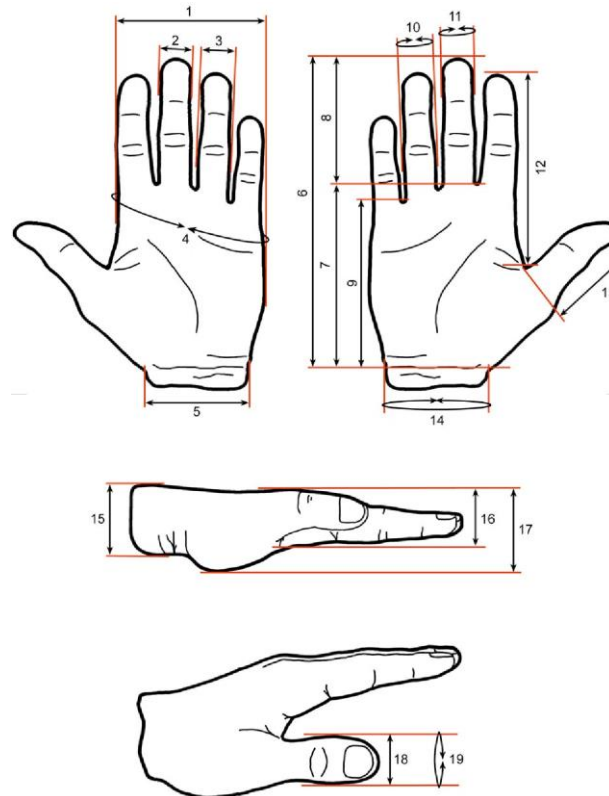


**Material** means **what is the product made out of?**  
What materials is the product made from? Why were these materials used? Would a different material be better? How was the product made? What manufacturing techniques were used?

**User-centered design** (UCD) is a way of designing products or services with the user in mind. It is an approach that focuses on understanding the needs, goals, and preferences of the people who will be using the product, and designing it in a way that meets those needs.

UCD involves several steps, including user research, prototyping, and testing. During the user research phase, designers gather information about the users and their needs through methods like surveys, interviews, and observation. This information is then used to create prototypes of the product or service, which are tested with users to see how well they meet their needs.

**Ergonomics** is all about designing things so that people can use them comfortably and safely. It's a way of making sure that everything fits well with the human body and makes tasks easier to do.



**Anthropometrics** is the study of the measurement of the human body. This includes things like height, weight, body mass index (BMI), and other physical features like the length of limbs, the size of hands and feet, and the circumference of the head.