


# Year 7 D&T Knowledge Organiser


## User Centred Design

 Focuses on the **needs, wants** and **limitations** of the end user.

Designers research who will use the product and how they will use it.  
Involves: Research → Design → Test → Feedback → Improve.

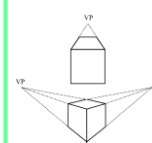
Example: Designing an ergonomic handle for all hand sizes.

## Biomimicry

 Taking inspiration from nature to solve design problems.

Examples:  
**Velcro** → inspired by burrs sticking to fur.  
**Shark skin** → inspires antibacterial surfaces.  
**Bird wings** → inspire aircraft design.

## Perspective Drawing

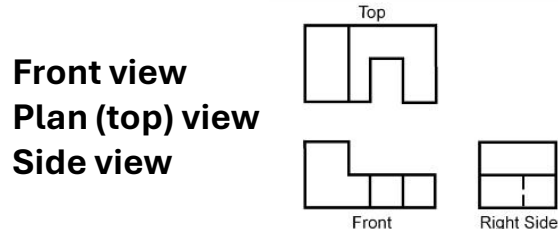
 Used to create 3D drawings that show depth and realism.

**One-point perspective:** all lines meet at one vanishing point.

**Two-point perspective:** lines meet at two vanishing points.  
Helps communicate design ideas clearly.

## Orthographic projection

A set of 2D drawings showing different views of an object:



Used for manufacturing accurate parts. Always **drawn to scale** and include **measurements**.

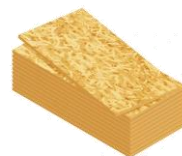
## Timbers, Boards & Finishes



**Softwoods – Coniferous**  
(keep leaves all year round)  
Pine, spruce, larch, fir – **fast-growing**, cheaper.



**Hardwoods – Deciduous**  
(Lose leaves in autumn / winter)  
Oak, beech, ash, mahogany, walnut – **slow-growing**, durable.



**Manufactured boards:**  
MDF, plywood, chipboard – made from wood fibres, layers, particles.



**Finishes:** paint, varnish, wax – protect and improve appearance.

## The 6 R's - Sustainability



**REDUCE** use less material /energy  
**REFUSE** avoid non-sustainable materials  
**REUSE** use again, maybe differently  
**RECYCLE** process materials for reuse  
**REPAIR** fix instead of replacing  
**RETHINK** design to be more sustainable

## Reducing emissions

Using renewable energy sources (solar, wind)

Switching to electric or low-emission transportation



Using sustainable or locally sourced materials

Designing products with longer lifespans

## Ergonomics & Anthropometrics



**Ergonomics:** designing for comfort, efficiency and safety.

**Example:** Games controllers

**Anthropometrics:** using human body measurements to design products.

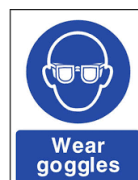
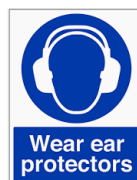
**Example:** chair height based on average leg length.

## Health & Safety



- Always wear goggles
- Tie back long hair
- Wear an apron
- No running
- No distracting others.

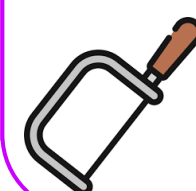
Blue signs are **mandatory** (you must do what they say)



## Using Saws



**Tenon saw:** Rigid back for straight cuts in wood. Used with a bench hook for cutting to length.



**Coping saw:** Thin blade for curved and intricate cuts. Blade can be rotated to change cutting direction

# Year 8 D&T Knowledge Organiser

## Computer Aided Design

The use of **computers** to **create**, **modify** and analyse **designs**.

### Advantages:

- Quick and accurate changes
- 3D visualisation of products
- Easy to share files and collaborate
- Can be used with Computer Aided Manufacturing (CAM)

## Design Movements



**Art Deco** – 1920's – 1940's.  
Bold geometric shapes



**Memphis**– 1980's – Known as being colourful and bizarre



**De-Stijl**– 1917 – Abstract, straight black lines, colourful

## Types of Motion



**Linear** – Movement in a straight line (train on tracks).



**Rotary** – Movement in a circle (e.g., wheels, gears).



**Oscillating** – Back-and-forth movement in an arc (a clock pendulum).



**Reciprocating** – Repeated back and forth motion in a straight line (a saw blade in a jigsaw).

## Smart Materials

Materials which change due to an external stimulus



### Thermochromic Materials –

Change colour with temperature (e.g., mood mugs, kettles).



### Photochromic Materials –

Change colour in sunlight (e.g., transition lenses).

## Polymers – Thermoforming and Thermosetting



**Thermoplastics:** Plastics that **can be** reheated and reshaped.

**Acrylic** – transparent, used for signs

**Polyethylene (PE)** – bottles, bags

**PVC** – pipes, window frames

Made from crude oil; produced through refining and polymerisation.



**Thermosetting:** Plastics that **cannot** be reshaped once set.

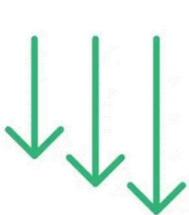
**Epoxy Resin** – adhesives, coatings

**Melamine Formaldehyde** – kitchenware

**Urea Formaldehyde** – electrical fittings

Formed using chemical reactions that create permanent bonds.

## The 6 R's - Sustainability



### REDUCE

use less material /energy



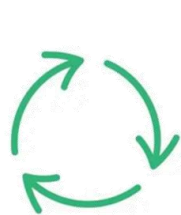
### REFUSE

avoid non-sustainable materials



### REUSE

use again, maybe differently



### RECYCLE

process materials for reuse



### REPAIR

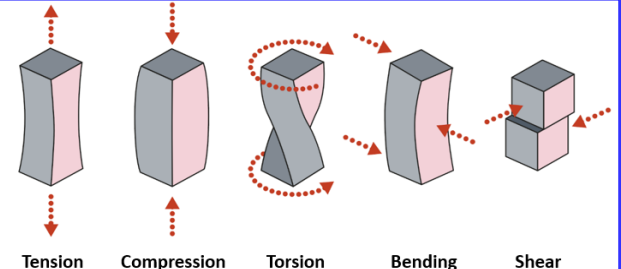
fix instead of replacing



### RETHINK

design to be more sustainable

## Reducing emissions



**Compression** – a pushing force that tries to squash  
**Tension** – a pulling force that attempts to stretch  
**Bending** – forces that attempt to cause bending  
**Torsion** – forces that cause twisting.  
**Shear** – 'sliding' forces act in opposite directions.

## Design specifications



A list of requirements that a product must meet.

Ensures the design meets user needs.  
Helps focus ideas during development  
Used to evaluate the final product

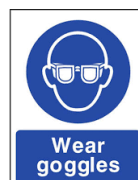
**ACCESS FM:** Aesthetics, Cost, Customer, Environment, Size, Safety, Function, Materials

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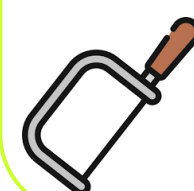
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# Year 9 D&T Knowledge Organiser

## Computer Aided Design and Manufacture



**CAD** - The use of **computers** to **create, modify** and analyse **designs**.

### Advantages:

- Quick and accurate changes
- 3D visualisation of products
- Easy to share files and collaborate
- Can be used with Computer Aided Manufacturing (CAM)



**CAM** - Machines controlled by computers to make products.

### Examples:

- Laser cutters
- 3D printers
- CNC machines like routers and lathes

## Inclusive Design

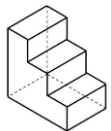


Designing products so they can be used by as many people as possible.

Considers different ages, abilities, backgrounds and needs.

**Examples:** adjustable furniture, tactile indicators, ramps, clear instructions.

## Isometric Drawing



A 3D drawing method where all lines are drawn at 30° angles from the horizontal.

### Key Features:

- Shows three sides of an object
- Uses parallel lines and equal measurements
- Helps designers visualise final products.

## Timbers, Boards & Finishes



**Softwoods – Coniferous**  
(keep leaves all year round)

Pine, spruce, larch, fir – **fast-growing**, cheaper.



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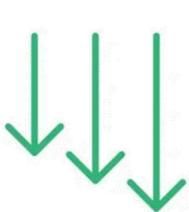


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## The 6 R's - Sustainability



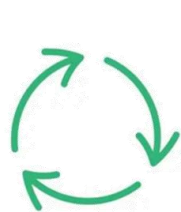
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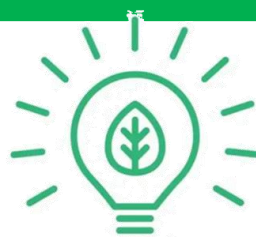
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## Dieter Rams 10 principles of good Design



- Good design is innovative
- Good design makes a product useful
- Good design is aesthetic
- Good design makes a product understandable
- Good design is unobtrusive
- Good design is honest
- Good design is long-lasting
- Good design is thorough down to the last detail
- Good design is environmentally-friendly
- Good design is as little design as possible