D&T Year 7 Health & Safety

You must be safe when working in a DT workshop.
Safety is for yourself and other around you.
You should:

1. Remove your blazer when carrying out any practical work.
2. Tie long hair back.
3. Place bags underneath the work benches to avoid anyone from tripping.
4. Wear an apron when carrying out any practical work.
5. Only use machines that you have been trained to use.
6. Wear safety glasses when operating machinery or when you are cutting something by hand that may break and hit you in the eye.
7. Tuck away any lose items (e.g. your tie)
8. Put the guard down on the pillar drill when drilling.
9. Secure your work in a machine vice when using a pillar drill.
10. Operate machinery one at a time.
11. Stand behind the yellow lines when waiting to use machinery.
12. Carry equipment carefully when moving around the workshop.
13. Walk and do NOT run in the workshop.
14. NOT shout and make loud noises as it can distract others.
15. Ensure that others are being safe in the workshop.

The Design Process

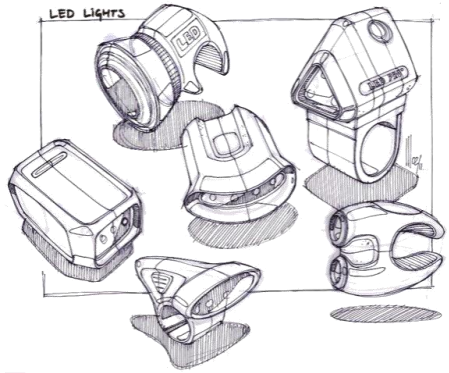
Scan the QR code to learn how to carry out a Task Analysis using ACCESSFM

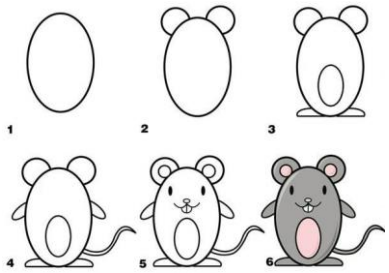
Product Analysis

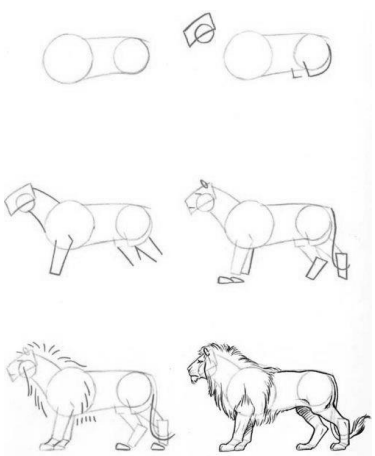
ACCESSFM

- **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?

Sketching





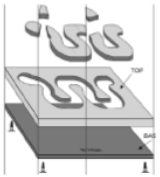


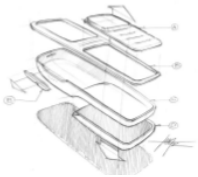
Scan the QR code to learn how to draw using simple shapes……

Exploded Isometric

Exploded views

Exploded drawings are extremely useful when explaining a design / idea. The drawing opposite is a design for an educational toy (for a young child) has been drawn with all the parts disassembled.
It is important when drawing an exploded view that all the parts line up with each other when disassembled. The vertical guidelines clearly show how the various parts are in line with each other. If an exploded drawing is constructed properly anyone looking at the drawing should be able to see how the various parts go together to form the finished design/object.



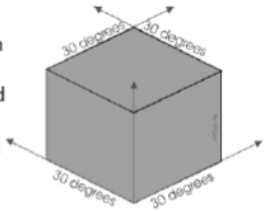


Scan the QR code to learn how to draw simple shapes in exploded isometric

Isometric Drawing

Isometric drawing is way of presenting designs/drawings in three dimensions. In order for a design to appear three dimensional, a 30 degree angle is applied to its sides. The cube opposite, has been drawn in isometric projection. Isometric project always looks at the view of a product from the corner.

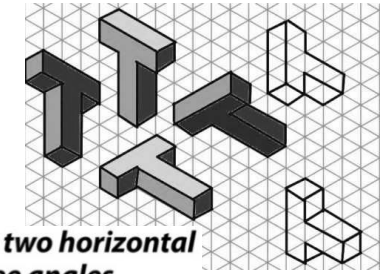
Isometric



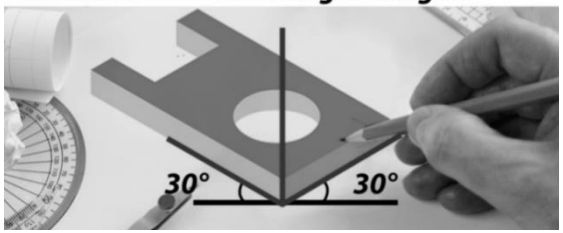
Drawing in isometric projection, normally means drawing very accurately using traditional drawing equipment. This includes using parallel motions, set squares and measuring accurately.

Scan the QR code to learn how to draw simple shapes in isometric

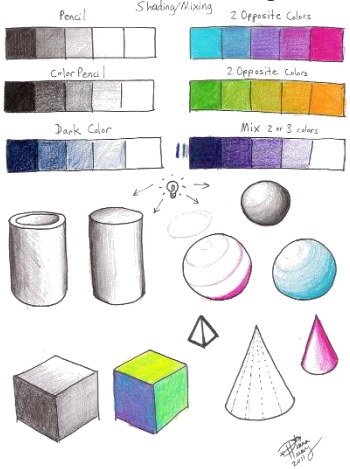
Drawing using simple shapes....



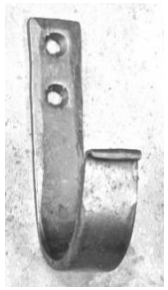
axes are drawn so that the two horizontal axes are drawn at 30 degree angles



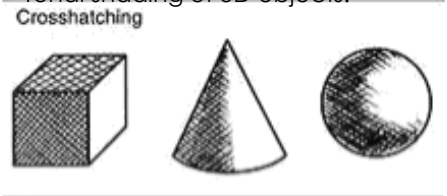
Colour blending.



Shading an object to look like metal.

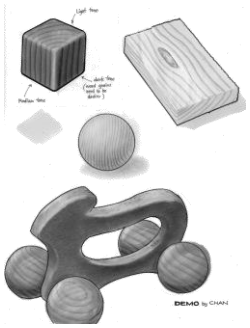


Tonal shading of 3D objects.



Scan the QR code to learn how to shade shiny surfaces like metal.

Shading an object to look like wood.

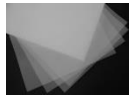


Scan the QR code to learn how to shade a wooden texture.

Wood

Metal

Marking Out


Tracing Paper


Masking Tape


Scribe

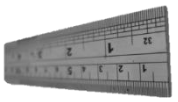
Masking Tape



Ball Pein Hammer

Centre Punch


Engineers Square


Steel Rule

Cutting


Coping Saw


Bench Vice


Hack Saw


Metal Vice

Shaping


File

Finishing


Sand Paper

Drilling


Pillar Drill


Machine Vice

Wood & Metal


Counter Sink Drill


Twist Drill

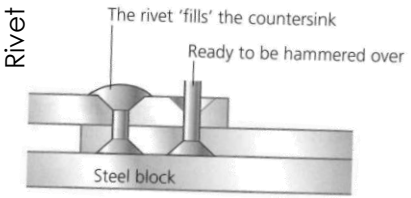
Joining methods

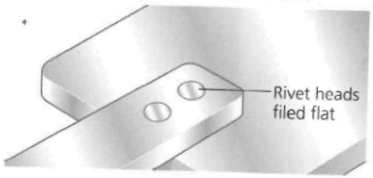

Nut and bolt


Rivet


Ball Pein Hammer

Solid riveting





Tools and Equipment

Types of wood

Natural Woods

There are two basic types of tree: hardwood and softwood. Hardwoods are generally deciduous, while softwoods are generally coniferous (often called evergreen). The size of natural timber is determined by the size of the tree. All natural woods are seasons. Approximately 80% of the wood used in the UK comes from other countered.

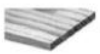
Hardwoods- Hardwood trees grow more slowly than softwoods. Examples of hardwood trees gown in the UK include oak, ask, beech, sycamore and willow. Imported tropical hardwoods include teak and mahogany.

Softwoods- Softwood, which grows quickly, is often managed as a sustainable resource. There are a smaller number of useable softwoods than hardwoods. Some softwoods (larch, spruce and Scots pine) is grown in the UK.

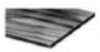
Manufactured wood- Manufactured, or man-made, wood is board produced using industrial production techniques. It consists of gluing together wood layers or wood fibres. Manufactured boards are usually made in very large sheets. Designers choose manufactured boards when they require consistency in strength, workability and texture. Their plain appearance is often disguised by more decorative material.

Examples of Hardwoods

Mahogany- Is quite expensive and is used for good quality furniture and hardwood windows. It is light brown in colour and more difficult to use compared to pine.



Oak- This is an expensive material and is used in for making quality, expensive furniture. Steel fittings such as hinges will stain oak so it is important to use brass ones.



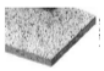
Teak- A hardwood that contains oils which means it is resistant to decay. This is often used to make garden furniture or for wood block flooring.

Examples of Softwoods

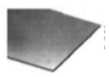
Pine- Is a relatively cheap wood used in the building trade and for furniture. It is pale in colour, quite easy to cut and shape, and machines relatively well.

Examples of Manufactured Boards

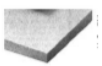
Block board- This is built up with a core of softwood strips bonded together with adhesive and covered with a sheet of plywood on either side. Used as a building material and for furniture manufacture including fitted kitchens/bedrooms.



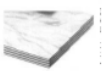
Chip board- This is made up of small chips of wood bonded together with resin and formed into sheets by compression. It is not as strong as plywood and block board but it is not expensive. Chipboard is often covered with a plastic laminate or wood veneer and used in furniture.



Hardboard- This is made from wood fibres that have been pulped. The pulp is put under pressure until the fibres bond to produce a tough board that is smooth on one side and rough on the other. It is not as strong as the other boards.



Medium Density Fibreboard (MDF)- A quality board, relatively cheap. This board is composed of fine wood dust and resin pressed into a board. This material can be worked, shaped and machined easily. Paint can be applied to it without the need for an undercoat or primer. Used in the building and furniture trades.



Plywood- This is made from veneers (plies) of timber with each grain layer being at right angles to each other and bonded together by resin and pressure. A number of grades are available, designed to suit a variety of situations.

Types of metal

Metal is made from metal ores, which have to be mined and processed to transform them into usable materials. It is rare for metals to be used in pure form. Normally they are mixed with other metals to improve their properties: the mixture is called an **alloy**. Most metals are good conductors. There are two main types of metal alloys: **ferrous and non-ferrous**.

Ferrous Metals

Ferrous Metals mostly contain Iron. They have small amounts of other metals or elements added, to give the required properties. Ferrous Metals are magnetic and give little resistance to corrosion.

Mild steel- Tough. High tensile strength. Can be case hardened. Rusts very easily. Most common metal used in school workshops. Used in general metal products and engineering.

Carbon steel- Tough. Can be hardened and tempered. Cutting tools such as drills.

Stainless steel- Tough, resistant to rust and stains. Cutlery, medical instruments.

Cast iron- Strong but brittle. Compressive strength very high. Castings, manhole covers, engines.

Wrought iron- us, tough, ductile, resistant to rusting. Ornamental gates and railings. Not in much use today.

Non- Ferrous Metals

Non-Ferrous Metals do not contain Iron, are not magnetic and are usually more resistant to corrosion than ferrous metals.

Aluminium- Ductile, soft, malleable, machines well. Very light. Window frames, aircraft, kitchen ware.

Copper- Ductile, can be beaten into shape. Conducts electricity and heat. Electrical wiring, tubing, kettles, bowls, pipes.

Brass- Hard. Casts and machines well. Surface tarnishes. Conducts electricity. Parts for electrical fittings, ornaments.

Silver- Ductile, Malleable, solders, resists corrosion. Jewellery, solder, ornaments.

Lead- Soft, heavy, ductile, loses its shape under pressure. Solders, pipes, batteries, roofing.

Working properties of materials

The following key words all link to the working properties of various materials including metals.

Strength- is the ability of a material to withstand a force without breaking or bending

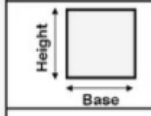
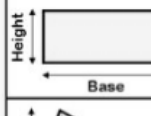
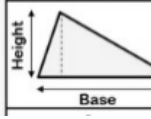
Toughness- is the ability of a material to withstand blows or sudden shocks without breaking

Tensile strength- the resistance of a material to breaking under tension.

Brittle- hard but liable to break easily.

Maths in Design Technology

Area of 2D shapes

Shape	Name	Formula for Area
	Square	Base x Height
	Rectangle	Base x Height
	Triangle	Base x Perpendicular Height ÷ 2

Measuring

There are 10 mm in a cm.
Each small line on a ruler is a mm
5mm = 0.5cm
10mm = 1cm

Scale

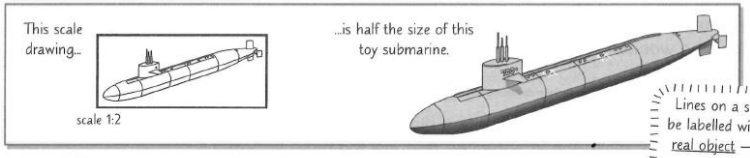
Scale Drawings are Used to Draw Big Things (but smaller)

1) To draw a big object on a small piece of paper, you have to scale it down.
2) The object's still drawn in proportion — it's just smaller.
3) The scale is shown as a ratio. For example:

Scale drawings are said to be "drawn to scale".

- A scale of 1:2 means that the drawing is half the size of the real object.
- A scale of 1:4 means that the drawing is a quarter of the size of the real object.
- Anything drawn at 1:1 is full sized.

4) You can also scale things up. A scale of 2:1 means the drawing is twice the size of the real object.
5) The scale needs to be clearly shown on the diagram. It's a ratio, so it doesn't have any units.



Lines on a scale drawing should be labelled with the lengths of the real object — not the lengths of the lines on the paper.

EXAMPLE:

A jet ski is 1.2 m tall. A scale drawing of the jet ski has a height of 40 cm.
What is the scale of the drawing?
First, convert the measurements to the same units.
Scale drawing height = 40 cm Jet ski height = 1.2 m = 120 cm
Write the measurements as a ratio — "scale drawing : real object" = 40 : 120
Simplify the ratio by dividing each side by the same number.
Both sides will divide by 40.
40 ÷ 40 = 1 and 120 ÷ 40 = 3, so the scale of the drawing is 1 : 3

6) To check you've scaled an object down properly, measure the lengths of the lines in your drawing. If you multiply those lengths by the scale, you should get the dimensions of the real object.