

Year 7 Design and Technology Graphic Products Essential Knowledge Sheet

Tools and Equipment

Cutting Mat- Self healing, Non - slip cutting surface. Used to prevent work surfaces getting damaged and scalpel blades becoming blunt.



Scalpel- A hardened steel blade used for cutting papers and boards. It can cut internal corners unlike scissors, however takes more skill.



Safety Ruler- This ruler has a raised edge for cutting along. This is for safety as it helps to prevent to sharp blade slipping and cutting the user.



Scissors- A cost effective and widely available cutting method. Products and prototypes can be quickly cut and tested.



Pencil- The pencil is probably the most commonly used drawing tool. The B range indicates blackness, the H range indicates hardness.



Isometric Drawing

Isometric projections are commonly used by engineers in technical drawings and illustrations and sometimes by architects. Early video games such as SimCity used isometric projection.

Line Weighting

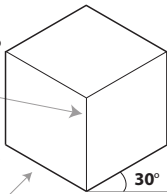
Enhances a drawing to make it appear more realistic.

Line Weighting

An edge that is connected to two visible faces stays thin.

Line Weighting

An edge that is connected to only one visible face becomes thick.



Angles are projected at 30°

30°

Name	Properties	Description	Applications	Advantages	Disadvantages
Copier paper	<ul style="list-style-type: none"> 80 GSM Thin. Lightweight. Inexpensive. 	<ul style="list-style-type: none"> Bright white paper. Smooth bleached uncoated surface. 	<ul style="list-style-type: none"> Writing. Sketching and drawing. Office and admin work. Photo-copying 	<ul style="list-style-type: none"> Takes colour well (highly printable) Good surface for pencils, pens and markers Available in a range of colours. 	<ul style="list-style-type: none"> Can be prone to jamming printers
Cartridge paper	<ul style="list-style-type: none"> 120-150 GSM Creamy white Smooth but has a slightly textured surface. 	<ul style="list-style-type: none"> Completely opaque (no light passes through) Accepts most drawing media - paints, as well as pens and pencil. 	<ul style="list-style-type: none"> Painting Mixed-media design and art work. 	<ul style="list-style-type: none"> Can be used with water colours without buckling (waviness caused by water) 	<ul style="list-style-type: none"> More expensive than copier paper.
Tracing paper	<ul style="list-style-type: none"> 60-90 GSM Strong Translucent 	<ul style="list-style-type: none"> Smooth surface texture. 	<ul style="list-style-type: none"> Making copies Overlays 	<ul style="list-style-type: none"> Translucency allows underneath image to be seen for copying. 	<ul style="list-style-type: none"> Has low absorbancy- this means ink can smudge easily More expensive than copier paper.
Solid white board	<ul style="list-style-type: none"> Rigid board Excellent printing surface Smooth texture. 	<ul style="list-style-type: none"> Made from pure, bleached wood pulp. Bright white colour conveys quality. 	<ul style="list-style-type: none"> Book covers Food packaging. 	<ul style="list-style-type: none"> Strong. Rigid. Accepts ink well. 	<ul style="list-style-type: none"> Can be expensive compared to other boards

Adhesives- Glue Stick- A quick method of bonding papers and boards. They are easy to apply, however they are not as strong as other glues, meaning edges can lift over time. Longer setting time means that materials can be moved before they are dry.

Double sided tape- Tapes keep the surface of the materials dry, this prevents any warping. Instant adhesion speeds up the time taken to assemble a model or product. No setting time means that care and attention is needed when assembling. There is also no risk of spilling the adhesive tape.

Properties of Papers and Boards

Flexibility

The amount a material bends when a force is applied. If a paper doesn't flex it will jam printer mechanisms.

Printability

The ability to accept to ink onto its surface. If a paper is too absorbant, the printed image will not appear crisp, it will look blurred and blotchy.

Biodegradability

The ability to be completely broken down by bacteria. Adding plastic to paper means that it is no longer biodegradable.

Health & Safety

Design & Technology involves a lot of practical work, some of which involves significant risks. Therefore, it is vital to implement safe working practices to ensure a positive health and safety culture.

Safety in the Workshop

Rooms must be clean, tidy and in a safe condition.

Workstations should be clean and clear of excess materials and tools. After use, tools and materials should be stored correctly, with blades and sharp edges protected. Floors should be clear of obstructions and trip hazards, such as bags and scrap off-cuts.



Clothing and Protective Equipment

Ensure you have no loose clothing; tie back long hair; remove loose jewellery; and tuck in ties and apron strings.

Hazardous materials: Wear an apron or overalls, goggles and the correct gloves.
Hot materials: Wear an apron and the correct gloves; a face shield is required for some jobs.
Dust: Wear a face mask and safety goggles. Ensure there is adequate extraction.



Machine Tools

Do not use machine tools without permission or training. It is important to understand:

- The design of the machine and the names of the main parts
- How to set up the machine and use guards, running speeds and cutter settings
- How to use the machine safely (learn where the emergency stop button is located.)

Keep machines and guards clean and in good condition, and never touch moving parts. If a machine has a dust extractor, ensure it is running when in use.



Hand Tools

Perform practical work standing up and ensure materials are held securely in place using the appropriate holding device, usually a vice or a clamp. Use the correct tools and technique for the job and materials used.



Carry tools with their cutting edges pointing down, and return them to their racks when not in use.

Timbers: Properties

Timbers, Metals & Polymers: Shaping & Forming

Wood, metals and polymers can be shaped and formed through cutting, abrasion and addition using a variety of tools, equipment and processes.

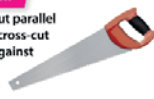
Cutting

Wood, metals and polymers can be cut to size with a variety of tools.

Rip Saw / Cross-Cut Saw

Rip saws are used to cut parallel to the grain, whereas cross-cut saws are used to cut against the grain.

Used to cut wood



Hacksaw

Has a hard, high-carbon steel blade so it can cut through metal; also available in a junior size for smaller cuts.

Used to cut metal and plastic



Tenon Saw

Cuts accurate straight lines in small pieces of wood and provides a smooth cut.

Used to cut wood



Coping Saw

Can cut intricate curves in thin materials but is difficult to control; has a blade that can snap easily.

Used to cut wood and plastic



When cutting materials, follow the steps outlined below.

1

Secure the material with a clamp, or by placing it in a vice to prevent it from moving while the material is being cut.

2

Make a mark in the material you want to cut by dragging the saw backwards a few times; this will provide you with a guide to start sawing.

3

Use the full length of the blade when sawing, and don't press down too hard. Let the blade do the work!

4

When coming to the end of the cut, support the end piece to stop it from falling off and spoiling the cut.

Chiselling

Chisels are used to cut or shape wood (special types are also used to cut or shape stone and metal). They are long-bladed, bevel-edged hand tools that are struck with a hammer or mallet to remove material. Chiselling involves forcing the blade into the target material to carve or cut it.

Safety tip: When chiselling, ensure that the blade is sharp and that the wood is securely held in place.



Different types of wood have varying properties (e.g. strength, hardness, durability) that make them suited for different purposes and commercial products. In addition to considering the properties of wood, designers must also consider how easy the materials are to manufacture.

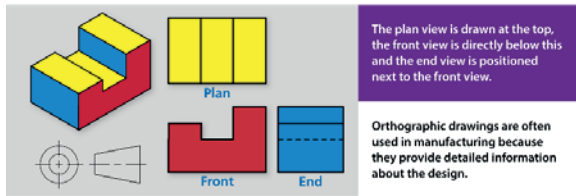
Metals: Properties

Metals have varying properties (e.g. strength, hardness, toughness, malleability) that make them suited for different purposes and commercial products. However, as well as considering the properties of the product it is also important to consider cost, availability and the environment.

Working Drawings (Orthographic Projection)

Orthographic projection is used to depict 3D objects as a set of 2D drawings. It shows the front view, plan view and end view drawn to scale, and measurements are given in millimetres.

A third angle orthographic projection is shown below.



Orthographic Drawing Conventions



Planing, Sanding & Filing

Materials can be shaped through planing, filing and sanding.

Planing



Planing is used to shape and smooth material (usually wood). It involves shaving off thin layers of the material until the desired shape and feel are achieved.

Manual hand planers and electric planers are available. Electric planers are quick and require much less effort than manual hand planers, but they are not as accurate.



Sanding

Sanding involves rubbing an abrasive paper against the surface of the material to shape and smooth it. It can be performed by hand or using machines.



Sandpaper is available in different grades. Coarse paper is ideal for heavy sanding and stripping. Conversely, extremely fine sandpaper is used for smoothing a surface and removing small imperfections.

Different versions, such as wet and dry paper, are also available for different materials. This type of sandpaper is ideal for removing paint from painted metal and wood.

Belt Sander



This is a powerful machine used to smooth wood, metals and plastics more quickly and effectively than hand sanding. It contains a motor that drives a pair of drums on which a belt of abrasive paper is held.

Disc Sander



This is a machine that has a powered disc of abrasive paper that is spun at high speed. It smooths surfaces and removes old finishes (e.g. paint) when wood, metals or plastics are pressed up against it.

Safety tip: Sanders create a lot of dust, so dust extractors must be switched on to reduce the risk of fire and inhalation. Goggles must also be worn to protect the eyes, and fingers should be kept away from abrasive materials on power sanders.

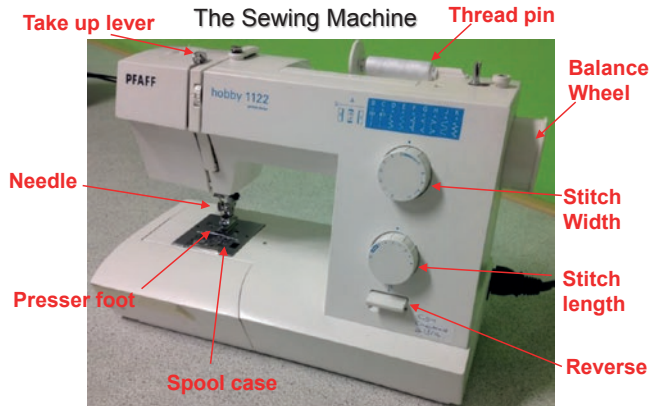
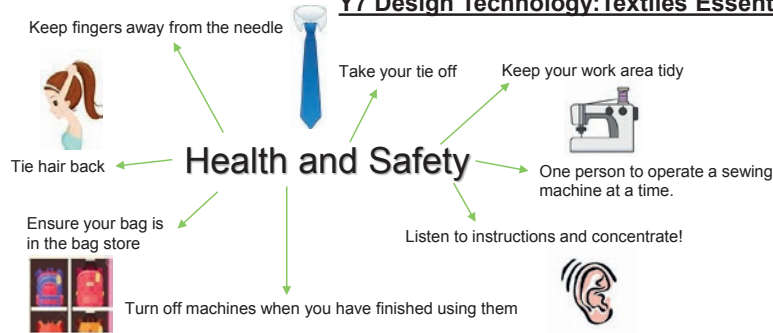
Filing

Files have a serrated (toothed) surface so when they are rubbed over a material, some of the target material is removed. They can be used on a variety of materials and are available in different forms.

Files with larger teeth remove more material than those with smaller teeth, which are better suited for smoothing.



Y7 Design Technology: Textiles Essential Knowledge Organiser



Equipment



Shears
These are for cutting fabric



Unpicker
Its used to remove unwanted stitches



Tape Measure
Its flexible so easily measures body curves and malleable fabrics



Pins
These temporarily hold fabric together



Embroidery Scissors
Used to cut threads



Spool
It holds the thread under the sewing machine

Embroidery Stitches



Back Stitch



Fly Stitch



French Knot Stitch



Chain Stitch



Couching Stitch



Y7 Design Technology: Textiles Essential Knowledge Organiser



Preparing To Sew



Cut your thread (the length of your arm). Tie a large knot at one end and thread the other end through the eye of the needle.

Knotting Off



Make a small stitch in the fabric (on the back).

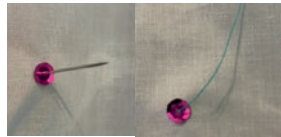


As you pull the thread through you will create a loop. Place your needle through the loop creating a stitch.

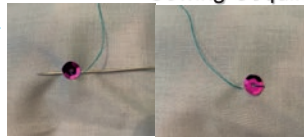


Pull the thread to create a small knot. Repeat these steps once more to create a secure knot.

Sewing Sequins



Bring your needle through the back of the fabric and through the centre of the sequin.



Make stitch down one side of the sequin and come up again at the other side of the sequin.



Now stitch back down through the centre of the sequin.

Securing Sequins With Beads



Bring your needle through the back of the fabric and through the centre of the sequin and the bead.



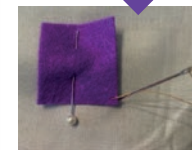
Move the bead to the side and stitch back through the sequin hole. Pull the thread through and the bead will sit on top of the sequin and hold in place!



Hand Applique



Pin your applique in place to ensure it doesn't move. Bring your needle through the back of the fabric and through your applique close to the edge.



Next make a stitch over the raw edge of the fabric onto your base fabric and pull the thread through. Repeat this step around your applique. Knot off to secure.

For a high quality finish keep stitches even in length and distance apart.

Attaching Buttons



Hold the button in place by hand and stitch up and down through the holes ensuring your thread is taught and the button is secure. You can create different patterns on a 4 hole button. Knot off to secure.

