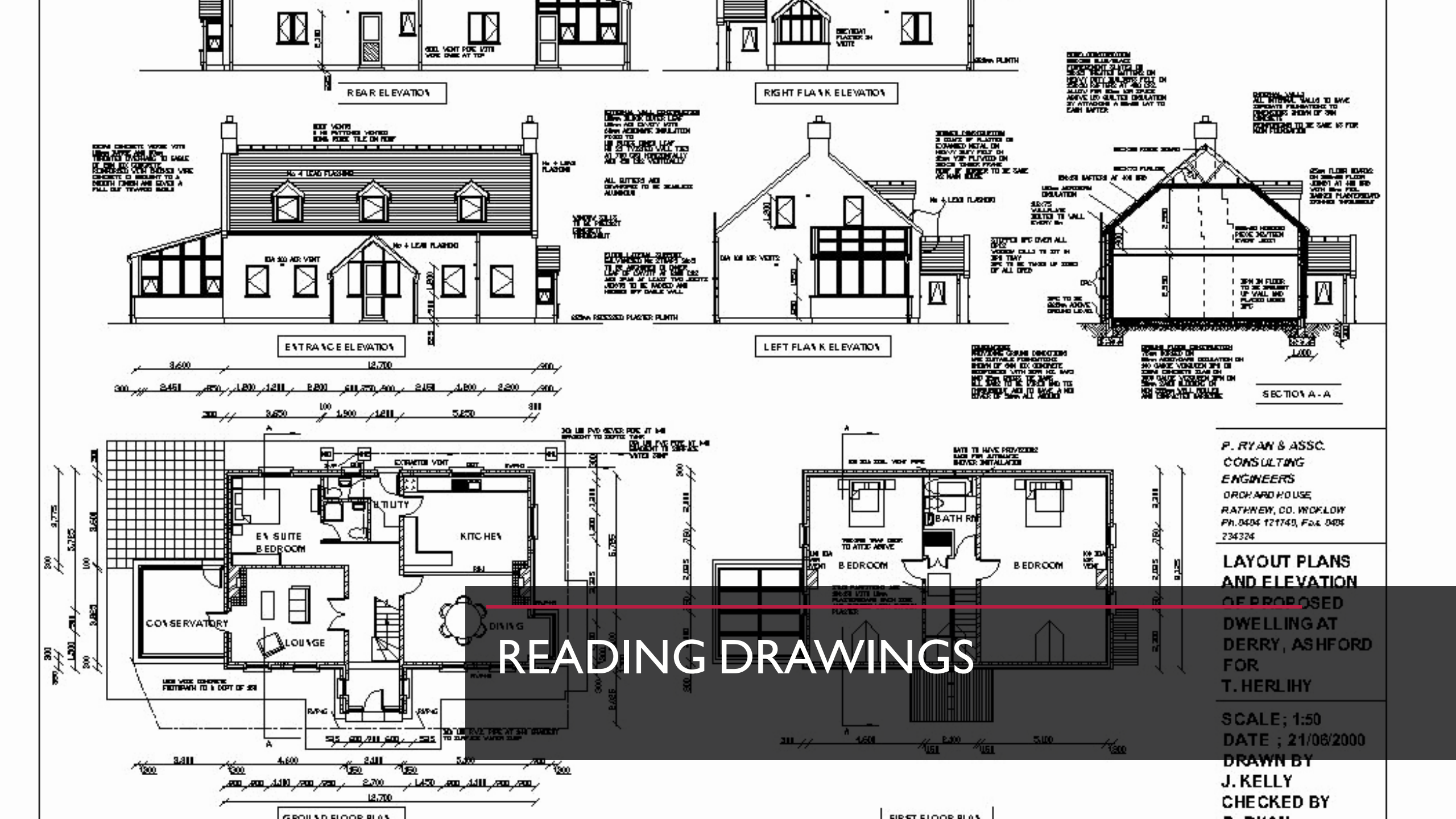
NATIONAL 4 AND 5 PRACTICAL WOODWORKING

Resources in conjunction with Whitehill Secondary School

NATIONAL 4 AND 5

PRACTICAL WOODWORKING COURSE AIMS

- This course provides opportunities for you to gain a range of theoretical and practical woodworking skills relating to tools, equipment, processes and materials. You will also develop skills in reading and interpreting working drawings and related documents as well as an understanding of health and safety.
- Through this, you will develop skills, knowledge and understanding of:
  - woodworking techniques
  - measuring and marking out timber sections and sheet materials
  - safe working practices in workshop environments
  - practical creativity and problem-solving skills
  - sustainability issues in a practical woodworking context



READING DRAWINGS

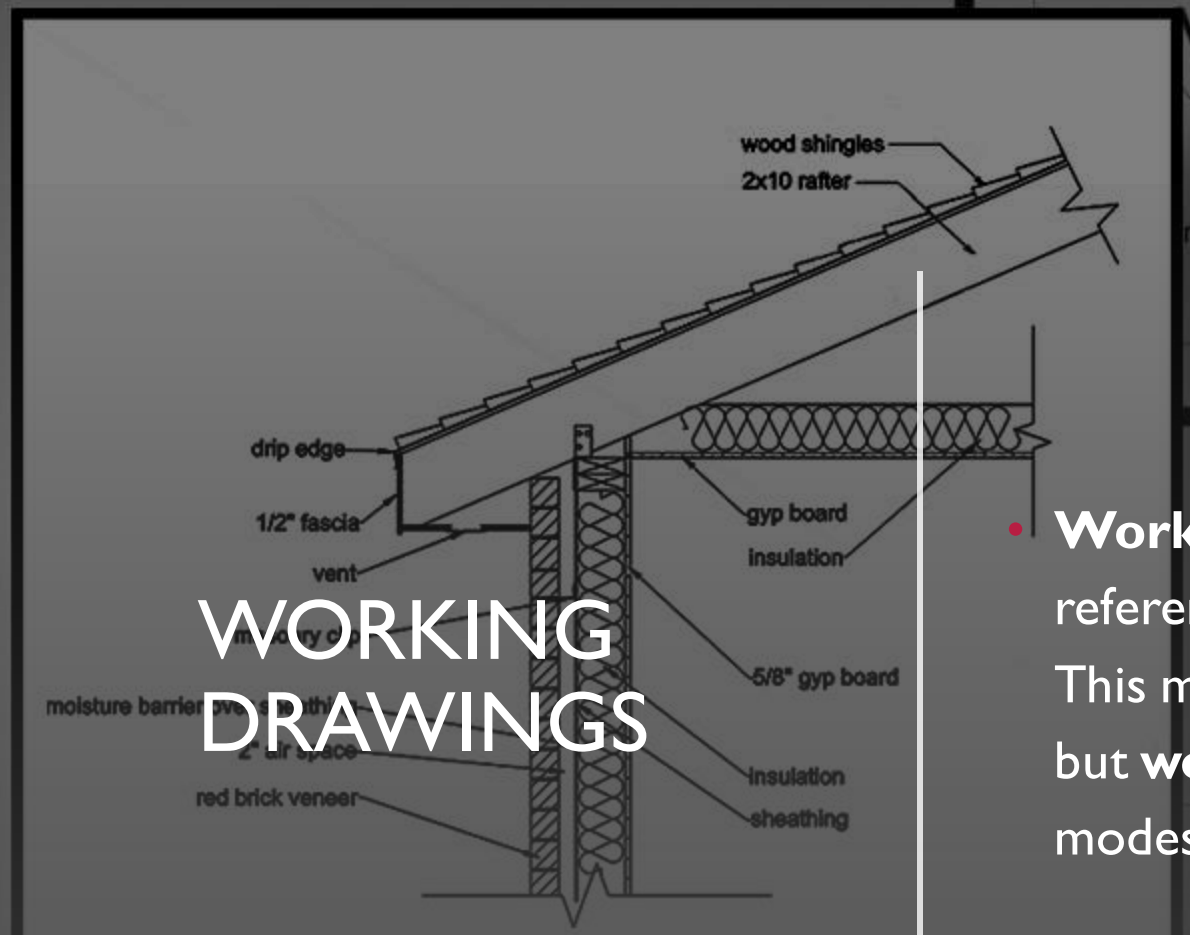
READING AND UNDERSTANDING DRAWINGS

LEARNING INTENTIONS

- To name the different types of drawing and their views
- To understand scale
- To read, interpret and create cutting lists
- To understand the different line type found on drawings
- To read and extract information from working drawings: linear, radial, angular and diametric dimensions

SUCCESS CRITERIA

- I can **state** the name of **Some/Most/all** of the various drawings
- I can **use scale to extract** the correct dimensions from drawings
- I can **extract** information from cutting lists and create my own
- I can **understand Some/Most/All** of the different line type and know when and where they should be used
- I can **read and extract information** from working drawings: linear, radial, angular and diametric dimensions

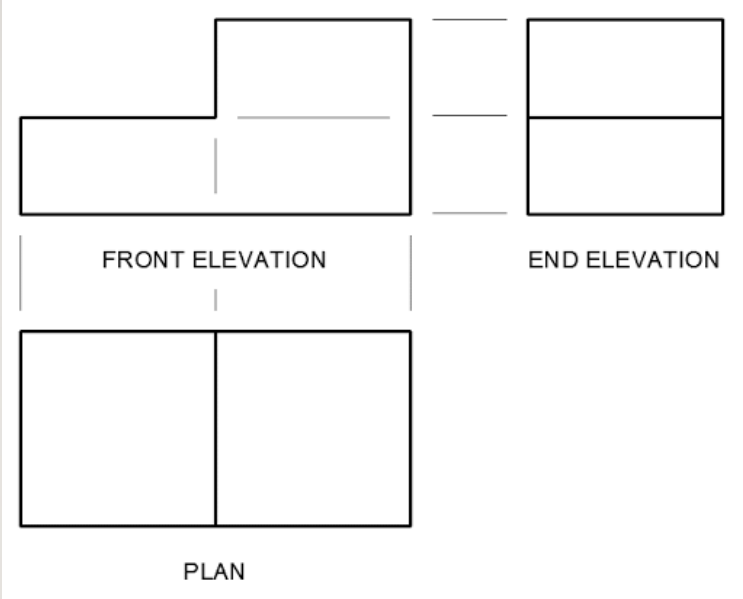


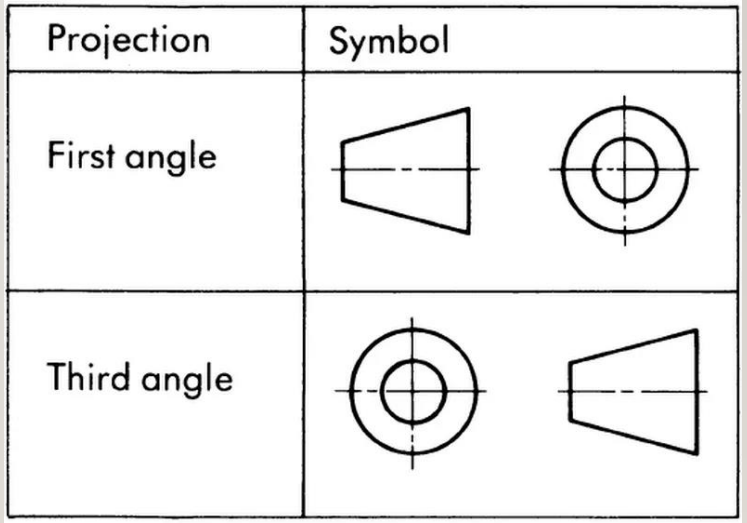
WORKING DRAWINGS

- **Working drawings** are **drawings** used as a reference or guide in the manufacture of a product. This most often refers to engineering and architecture, but **working drawings** are used in many different modes of **construction**.

ORTHOGRAPHIC DRAWINGS

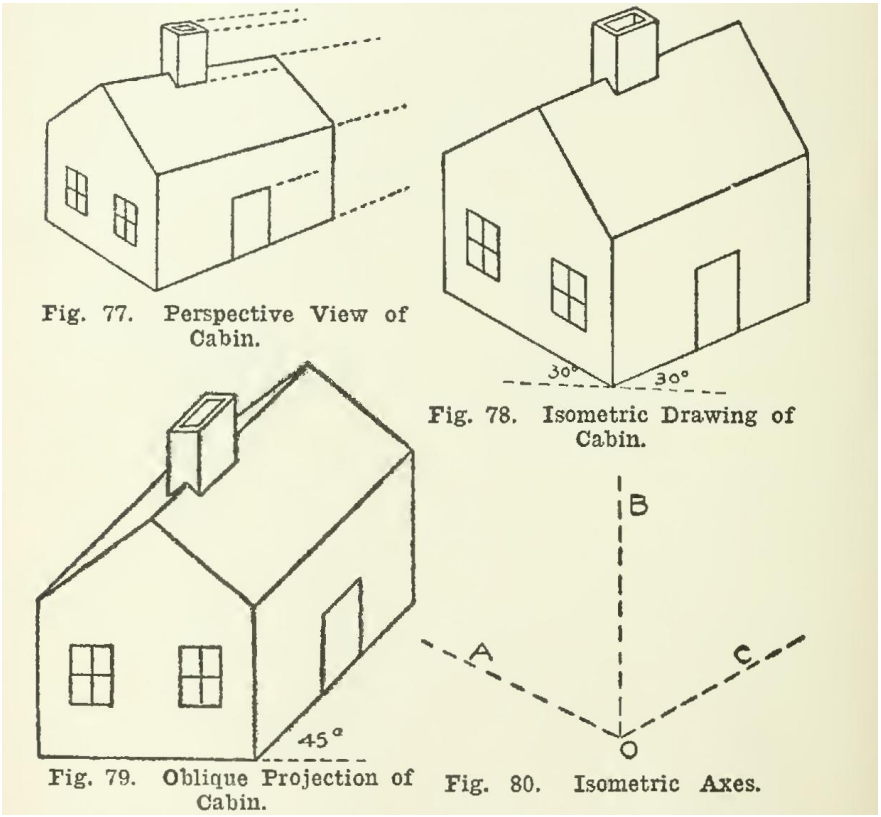
- An **orthographic drawing** represents a three-dimensional object using several two-dimensional views of the object. It is also known as an **orthographic projection**.
- The different views in Orthographic drawings are the **Plan, Elevation and End Elevation**
- Orthographic Drawings can be in **first angle or third angle projection**





PICTORIAL DRAWINGS

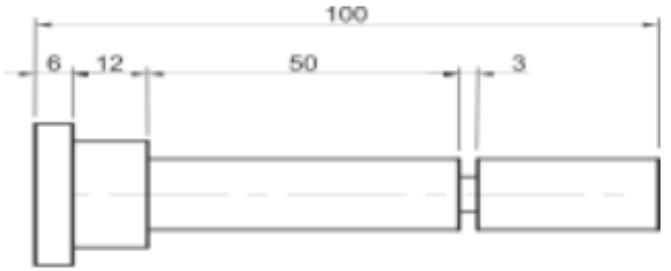
- **Pictorial drawing.** A view of an object (actual or imagined) as it would be seen by an observer who looks at the object either in a chosen direction or from a selected point of view. **Pictorial sketches** often are more readily made and more clearly understood than are front, top, and side views of an object.



TYPES OF DIMENSION

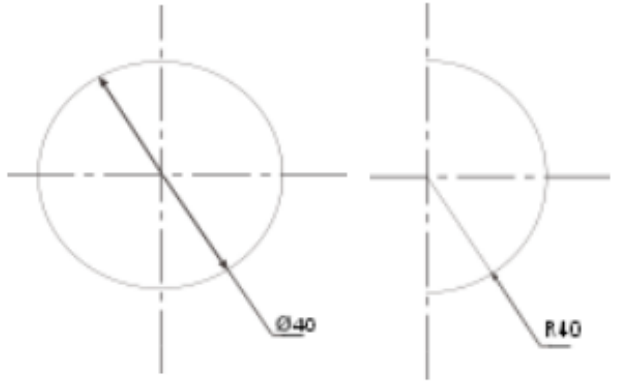
Dimensions

The largest dimension is placed on the outside of the smaller dimensions. The unit of measurement will be stated on the drawing. i.e. (All sizes in mm).



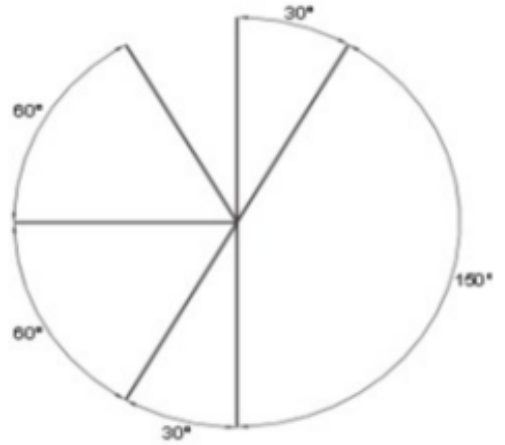
All sizes in mm

Diameter - Diameter is used when dimensioning a FULL circle. The symbol Ø is placed in front of the dimension.



Radius - Radii is used when dimensioning a part circle (arc). The symbol R is placed in front of the dimension.

Angular Dimensions - The extent of the angle is measured in degrees. The symbol ^{o} is used after the angular dimension.



LINE TYPES

Types of line used

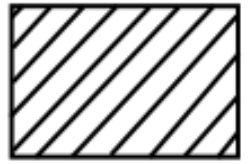
Outlines - Continuous thick lines used for visible outlines and edges.

Hidden detail - Dashed thin lines used to show hidden outlines and edges.

Chain Lines - Used for centrelines and lines of symmetry

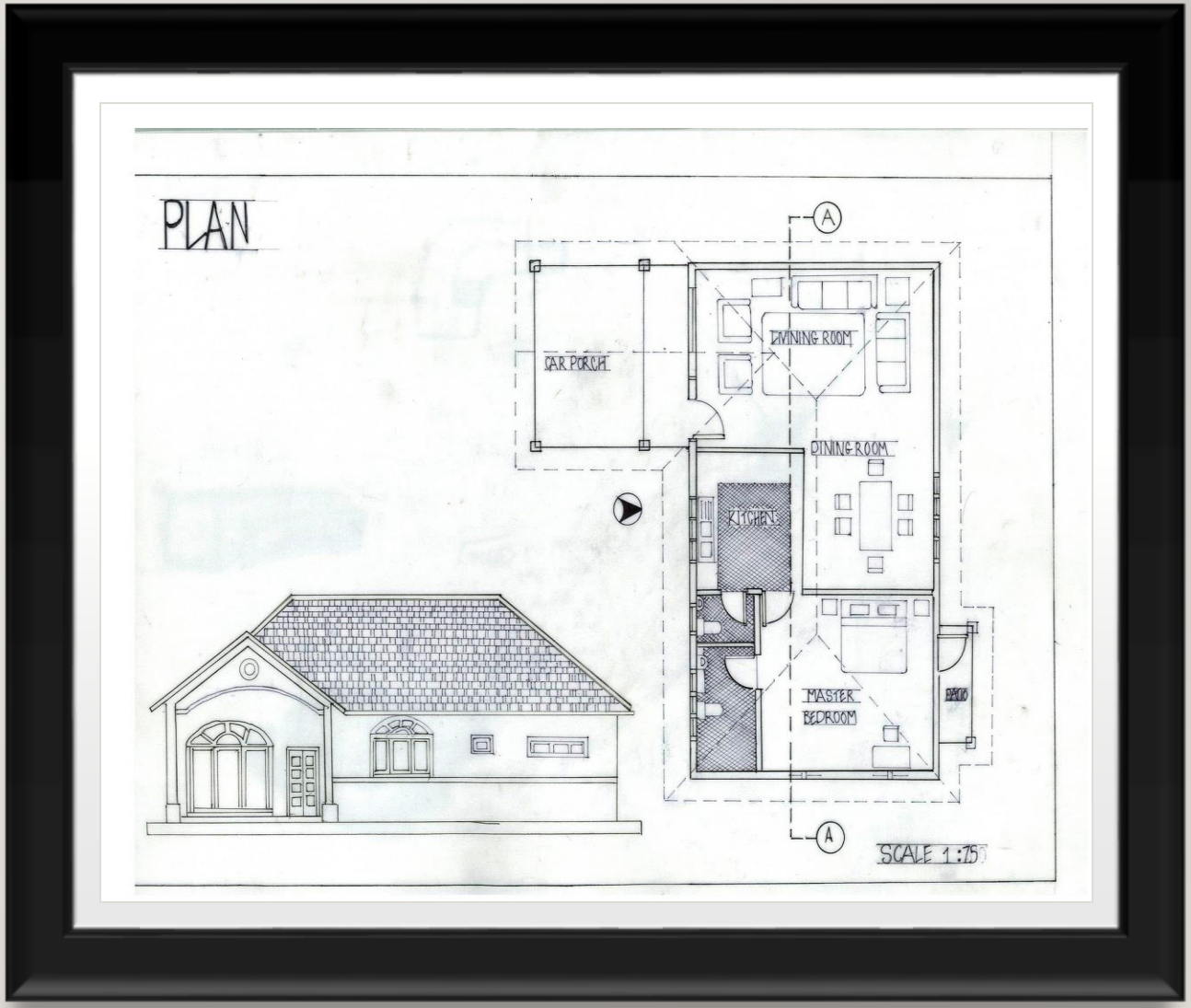
Fold Lines - Chain lines with a double dash used to show folds or bends.

Hatching - 45° lines that show a part has been sectioned (cut through).



SCALE

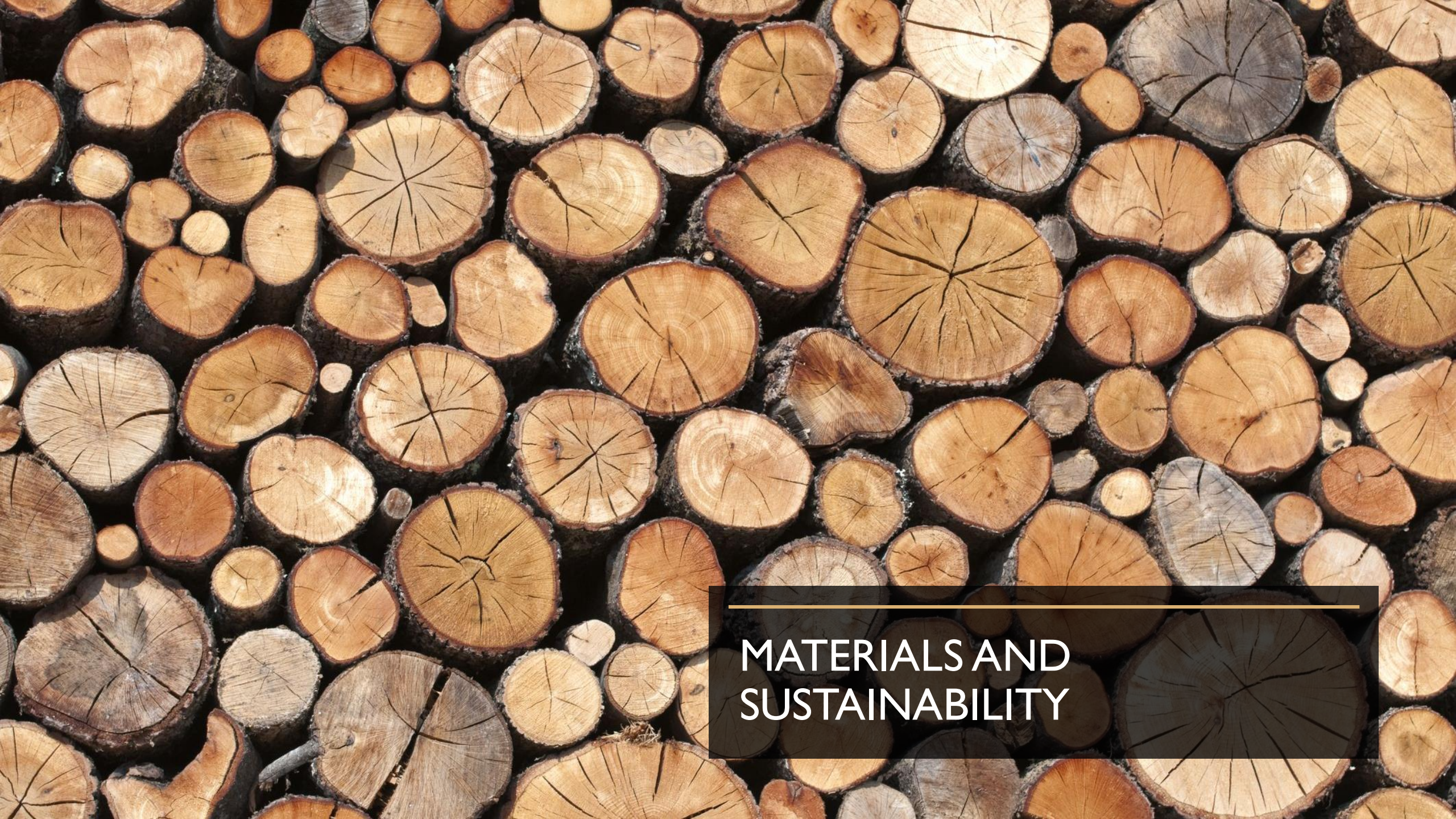
- A scale drawing shows a real object with **accurate sizes reduced or enlarged** by a certain amount (called the scale).
- The scale is shown as the length in the drawing, then a colon (":"), then the matching length on the real thing.
- Example: if a drawing has a scale of "1:10", anything drawn with the size of "1" would have a size of "10" in the real world, so a measurement of 150mm on the drawing would be 1500mm in real life.



CUTTING LIST

- A **cutting list** is simply a breakdown of all the different parts that will be going into the making of your product. Although this may seem self evident, this is a crucial part of any manufacturing process, and strangely enough, often a task that is underestimated in its complexity and importance.

Part	Wood Type	Width	Length	Thinkness	Nuber
Legs	Hoop pine	40mm	520mm	40mm	4
Top Planks (long)	Hoop pine	140	800	19mm	2
Top Plank (short)	Hoop pine	140	420	19mm	2
Side Rails	Hoop pine	40	800	199	2
Front And Back Rails	Hoop pine	40	420	19mm	2



MATERIALS AND SUSTAINABILITY

MATERIALS

LEARNING INTENTIONS

- To name different types of wood
- To state the properties, uses and appearance of different woods
- To understand sustainability of resources

SUCCESS CRITERIA

- I can **name a variety** of different woods
- I can **distinguish** the difference between hardwoods, softwoods and manufactured boards
- I can **state the properties, uses and appearance** of **Some/Most/All** of the different types of wood
- I can **explain sustainability** reason for choosing particular woods

SOFTWOODS

- Softwoods are natural timbers coming from coniferous trees which are evergreen, needle-leaved, cone-bearing trees. Softwoods grow fairly quickly ,this gives a grain which is further apart and economically they are less expensive to grow. The width & length of natural wood boards is limited to the size of tree they are cut from.

WHITE PINE

- White Pine is a soft, white or pale yellow wood which is light weight. It is an in-expensive natural timber and is supplied in rectangular and square cross section. Pine is easy to work with using hand tools, but can be difficult to use for lathework as it can be knotty with sap deposits.
- White Pine is often used for country or provincial style furniture.
- As it is in-expensive it is used by the construction industry for building frames & internal framing etc.

RED PINE

- Red Pine wood is generally light and reasonably hard. The wood grain is straight and decreasing is insignificant. Red pine is easy to work with using hand tools, but (as with yellow pine) can be difficult to use for lathework.
- Red Pine can be utilized outside and as a part of contact with soil, and is appropriate for posts, fencing, framing, log houses, garden furniture etc. It's appearance also lends well to wooden toys and family articles.

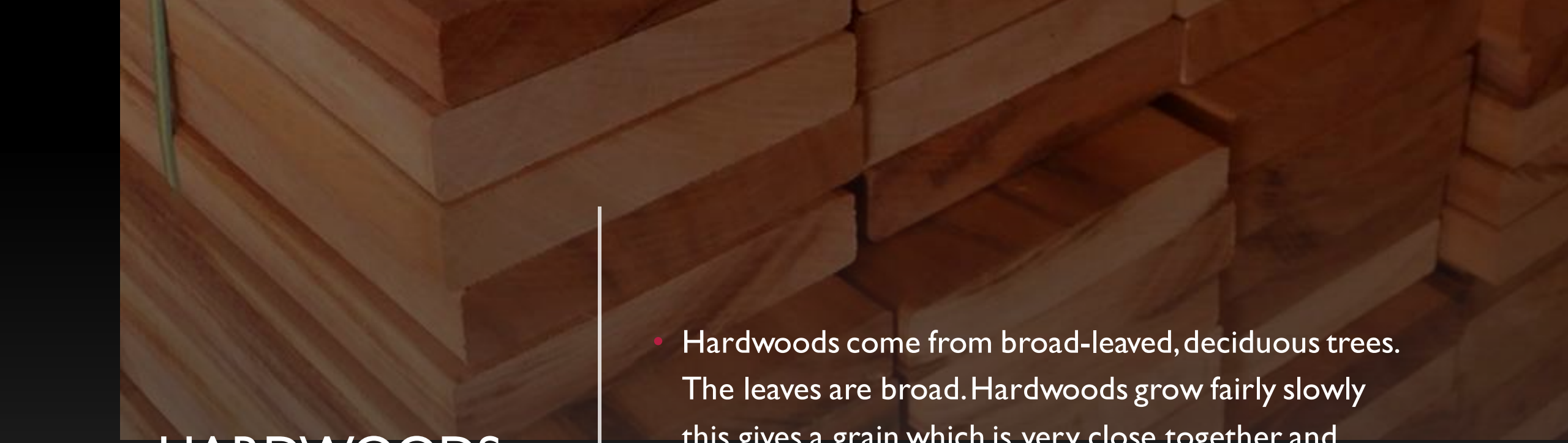
CEDAR

- Cedar is a knotty softwood, red-brown colour with light streaks. It can be brittle due to Knots and is light weight. As it is mainly grown in the American continent it can be expensive due to import and transport costs. Cedar is easy to work with both hand tools and machine tools, but care must be taken due to it's knotty properties.

- Cedar is an aromatic wood which has been found to have insect repellent qualities. This made it a popular wood for lining drawers, chests, boxes, simple cases and storage closets.

LARCH

- Larch is a hard strong timber, reddish brown, which fades to silver after prolonged exposure to sunlight. Larch heartwood is strong and is durable outside without the use of preservatives. Larch works and finishes well however some care is required to accommodate the frequently changing grain and resin pockets.
- It's strength and durability make it an ideal wood for outdoor use such as garden furniture, decking, cladding and fencing. Traditionally Larch was used in the boat building industry and some timber still finds its way into quality boat building today.



HARDWOODS

- Hardwoods come from broad-leaved, deciduous trees. The leaves are broad. Hardwoods grow fairly slowly this gives a grain which is very close together and economically they are more expensive to grow. The width & length of natural wood boards is limited to the size of tree they are cut from.

OAK

- Light brown colour, strong, hard, tough, open-grained. Due to it's chemical properties it corrodes steel screws and fittings. Oak is easy to work with using hand tools or machine tools.
- Oak is visually appealing and is often used for Interior woodwork; Panelling, Fireplaces, good quality furniture.

ASH

- **Ash wood** is strong, durable and generally light in colour. It is coarse but the grain is fairly straight. As a result of its strength and durability, **ash wood** has an array of uses but is commonly used in the making of tools, furniture and frames.
- Ash is hard, dense, tough and very strong but elastic, extensively used for making bows, tool handles, baseball bats, hurleys, and other uses demanding high strength and resilience.

BEECH

- White to pinkish-brown in colour, close-grained, hard, tough, strong, and can warp easily. Difficult to use with hand tools due to toughness, Beech is good for working with machine tools. Beech steam-bends easily which works well for chair legs and backs.
- Due to it's tough, wear resistant qualities Beech is often used for; furniture, toys, tool handles.

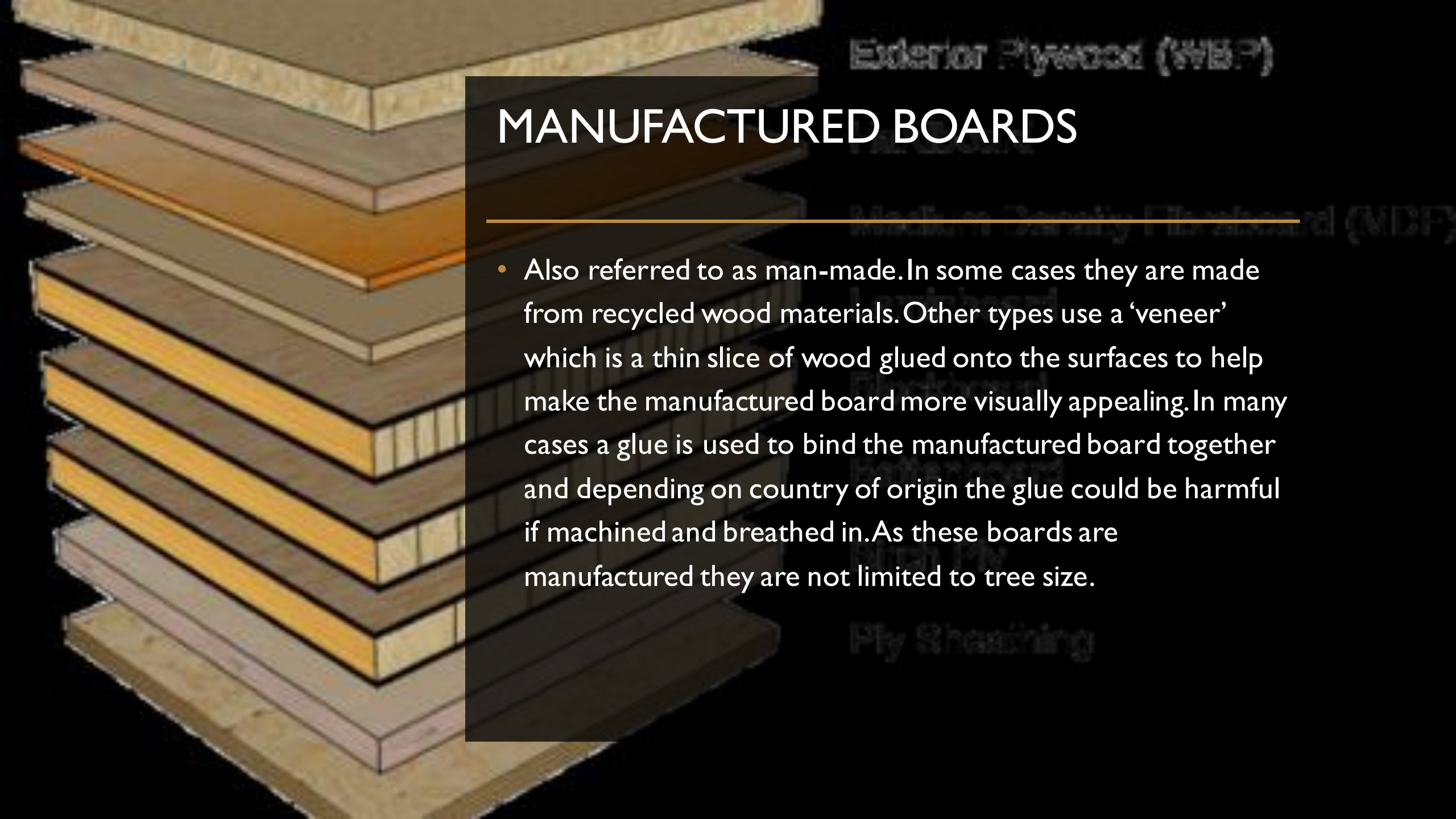
MAHOGANY

- Pink to reddish-brown colour, fairly strong, durable, some interlocking grain. Mahogany is very stable due to its close, straight-grain. It is fairly easy to cut with hand tools or machines. It has a slightly flexible quality that makes it bend without splintering or shattering.
- Mahogany is used for panelling, internal window frame & sills due to its rich colour and durability. Furniture, boats and musical instruments are other common uses.

MERANTI

- Light red to dark red. May darken to deep red, brown or dark yellow. Sometimes referred to as Philippine mahogany. Although it is not actually Mahogany. Meranti is durable for indoor uses but requires protective coatings for outdoor projects. It is fairly easy to cut with hand tools or machines.

- Meranti is used for decorative purposes such as mouldings, furniture and window frames. As veneer, it is used to make plywood, plywood panelling, cabinets, and hollow-core doors.



MANUFACTURED BOARDS

- Also referred to as man-made. In some cases they are made from recycled wood materials. Other types use a ‘veneer’ which is a thin slice of wood glued onto the surfaces to help make the manufactured board more visually appealing. In many cases a glue is used to bind the manufactured board together and depending on country of origin the glue could be harmful if machined and breathed in. As these boards are manufactured they are not limited to tree size.

PLYWOOD

- Plywood is wood veneers bonded together to produce a flat sheet with the grain running at right angles on each alternate veneer. It is supplied and named by how many layers of veneer used (3 ply, 5 ply etc). Crossing the grain of the veneer sheets gives Plywood; Increased stability, high impact resistance, high strength to weight ratio. There are four groupings of plywood products, with each group designed for specific applications: Structural, Exterior, Interior, and Marine.

- With high strength and stiffness to weight ratios,
- plywood is very cost effective to use in structural
- applications such as flooring, concrete formwork
- and storm boarding. The cross laminated
- construction of plywood ensures that plywood
- sheets remain relatively stable under changes of
- temperature and moisture. This is especially
- important in flooring and formwork construction
- where moisture exposure is very likely.

MEDIUM DENSITY FIBREBOARD MDF

- MDF is similar to hardboard, which is made from wood fibres glued under heat and pressure.
- MDF can be cut and shaped with care when using hand tools. MDF are flat, stiff, sheets. MDF has no knots and no grain and is easily painted to produce a smooth quality surface.
- Proper ventilation is required when using MDF and facemasks are needed when sanding or cutting with machinery. The dust produced when machining can be very dangerous. As MDF contains a great deal of glue the cutting edges of your tools will blunt very quickly.
- MDF is stronger and may be used to make display cabinets, storage units, wall panels and window surrounds.
- Veneered MDF can be used for tabletops and kitchen worktops. HDF is hard, tough and wear resistant. It may be used in laminated flooring, skirting board, window surrounds, door skins and under lay for flooring.

HARDBOARD

- Hardboard panels are made from wooden fibres mixed with an adhesive and put under heat and pressure. Other materials may be added during the manufacturing process to improve certain properties, such as resistance to abrasion and moisture, and to increase strength and durability. Hardboard is less expensive than alternatives such as plywood. It has a uniform thickness, density and no grain. Hardboard is easily cut using machine tools and hand tools.

- Hardboard is used in a variety of applications such as; bases for drawers, backing for cabinets, moulded door skins, and underlay for flooring.

BLOCKBOARD

- Blockboard is made up of a core of softwood strips. The strips are placed edge to edge and sandwiched between veneers of hardwood. The sandwich is then glued under high pressure. The edges are often hidden using softwood strips, veneers or fill and paint the edges. Blockboard can be bought with a variety of applied finishes such as wood veneers and plastic laminate surfaces. Blockboard is strong, fairly light weight and has good resistance to warping. When using blockboard to make such things as doors or tables, it is important to ensure that the core runs lengthways in order to achieve maximum strength. It is easy to machine and works easily with hand tools.
- Blockboard is not suitable for outdoor use because the glues used are interior glues. It may be used to make shelves, doors, panelling and partitions

CHIPBOARD

- Gluing together wood particles, under heat and pressure makes chipboard. This creates a rigid board with a relatively smooth surface. Chipboard is available in a number of densities; normal, medium and high. Normal density is fairly soft, high-density is solid and hard. All grades of chipboard tend to soak up water. Once it is water logged, chipboard tends to swell and crumble apart. Chipboard often requires special fixtures which prevent tearing or breaking apart when using screws etc

- Chipboard with a veneered surface is widely used for flat-pack furniture and work surfaces such as kitchen tops (which are laminated with melamine) and fire doors. High-density chipboard is often used as under flooring. This type of chipboard is hardwearing, rigid and heavy. Other grades of chipboard are standard, flame-retardant, flooring, and moisture resistant.

DOWEL ROD

- A dowel is a solid cylindrical rod, usually made from wood, but can also be made from plastic, or metal. In its original manufactured form, a dowel is called a dowel rod. Dowel rods are often cut into short lengths called dowel pins. Wooden dowel rod can be made from any type of natural wood. The rod is often 'dried' to remove moisture so that it then absorbs moisture from gluing making it swell up and creating a much tighter fit. Dowel rod is easy to use with hand tools but care must be taken as it can split easily due to being dried out.

- Dowels are commonly used as structural reinforcements in cabinet making and shelf supports (particularly in knock down furniture).

FORM OF SUPPLY.

- **Natural timber** is limited to the size of the tree it is cut from. It is generally supplied as square or rectangular cross section (known as batons and planks), although pre-shaped timber for skirting, flooring or mouldings are readily available. A common size for maximum width of a plank is 144mm. Common lengths are 1.2m, 1.8m, 2.4m, 3m, 3.6m, 4.8m
- **Manufactured boards** are not limited in size and are usually supplied in 'sheet' form. Common sizes are; 1200x900mm, 1800x1200mm, 2400x1800mm (although many other sizes are available). Pre-shaped manufactured mouldings are available for skirting, flooring etc.

FORM OF SUPPLY.

- **CLS (Canadian Lumber Standard)** - CLS is graded in accordance with British Standards and used primarily in timber frame home construction and for internal and partition walls. Because the dimensions are standardised all people involved in the construction are better able to plan and understand plans from other construction workers (architects, joiners, brick layers, electricians, plumbers etc..). CLS is fairly easy to identify as the edges are rounded.

FORM OF SUPPLY.

- **Flatpack furniture:** Also known as ready-to-assemble furniture (RTA), knock-down furniture (KD), or kit furniture. This furniture requires that the customer assemble the product. The separate components and instructions are packed in boxes. The furniture is generally simple to assemble with basic tools such as screwdrivers and knock down fittings. There are several advantages to flat pack constructions:
- Retailers benefit as constructed furniture tends to be bulky, this is more difficult to store and to deliver. Because the assembly is done by the consumer instead of in the factory, it is also cheaper to produce.
- Consumers can save money by collecting the furniture from the store, saving delivery costs and assembling the product themselves.

SUSTAINABILITY CONSIDERATIONS

- **Sustainability** is the idea that goods and services should be produced in ways that: - Do not use resources that cannot be replaced and - That do not damage the environment. There are several ways a manufacturer can develop a sustainable attitude to using wood materials. This can reduce deforestation/protect forests & rain forests. Which in turn aids wild life and the environment.

- Using manufactured board & mouldings as these are generally made from recycled and waste timber products.
- Choice of natural timber - Replanting and growing (Faster speed of growth of softwood compared to hardwoods)
- Encourage sustainable forests.
- Lower levels of transport pollution by using softwoods that are grown in local forests.
- Buying & using reclaimed, recycled, or scrap timber.

SUSTAINABILITY

Reasons for choosing softwoods over hardwoods

- Reduce deforestation
- Protect rain forests from deforestation
- Faster speed of growth of softwood compared to hardwoods/replanting
- Softwoods are fast growing
- Encourage sustainable forests
- Lower level of transport pollution as softwoods can be grown/sourced locally.

MARKING OUT HAND TOOLS

MARKING OUT HAND TOOLS

LEARNING INTENTIONS

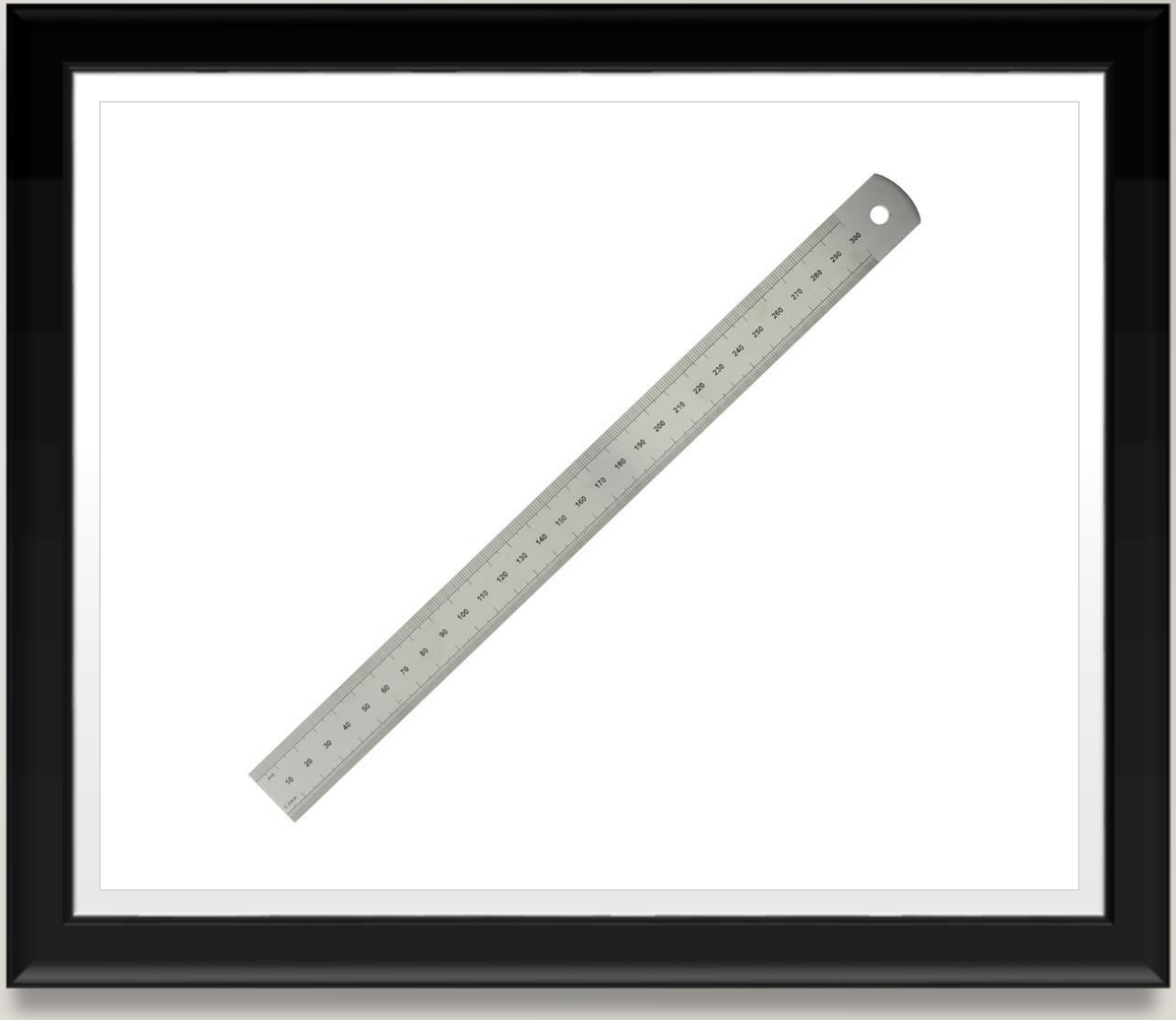
- To name the different marking out hand tools we will be required to use during this course
- To name their different parts
- To state their uses
- To use them correctly and safely

SUCCESS CRITERIA

- I can **state** the name of **Some/Most/all** of the marking out tools
- I can **name** the different parts to **Some/Most/All** of the marking out hand tools
- I can **state** the uses of **Some/Most/All** of the marking out hand tools
- I can use **Some/Most/All** of the marking out tools safely and correctly

STEEL RULE

- A **steel rule** is exactly what it sounds like... a **rule** manufactured from either spring or stainless **steel** that feature either metric or imperial (or both) scales along its length. One end is usually flat whilst the other end (frequently including a hole for hanging) is usually round. Zero always start at the flat end.



TAPE MEASURE

- A tape measure is effectively a flexible ruler and helps you to measure distance and either consists of a ribbon of cloth, plastic, fibre glass or metal strip with linear-measuring markings. The different scales and materials are based on the trade its intended for.

OUTSIDE CALLIPERS

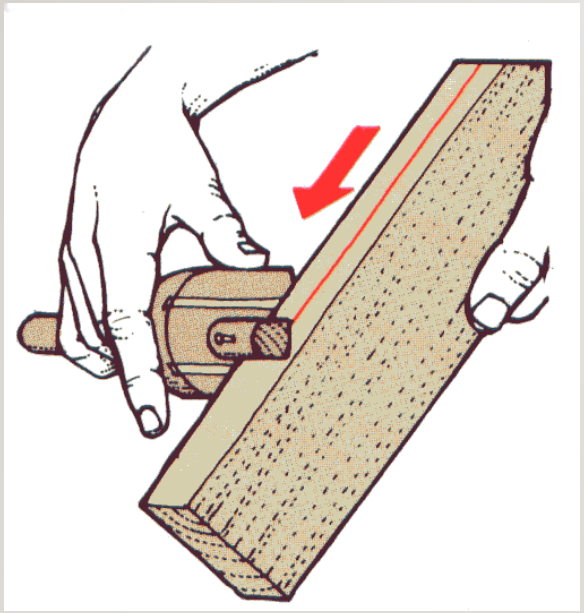
OUTSIDE CALLIPERS ARE USED TO MEASURE THE OUTSIDE DIAMETER OF A ROUNDED MATERIAL.

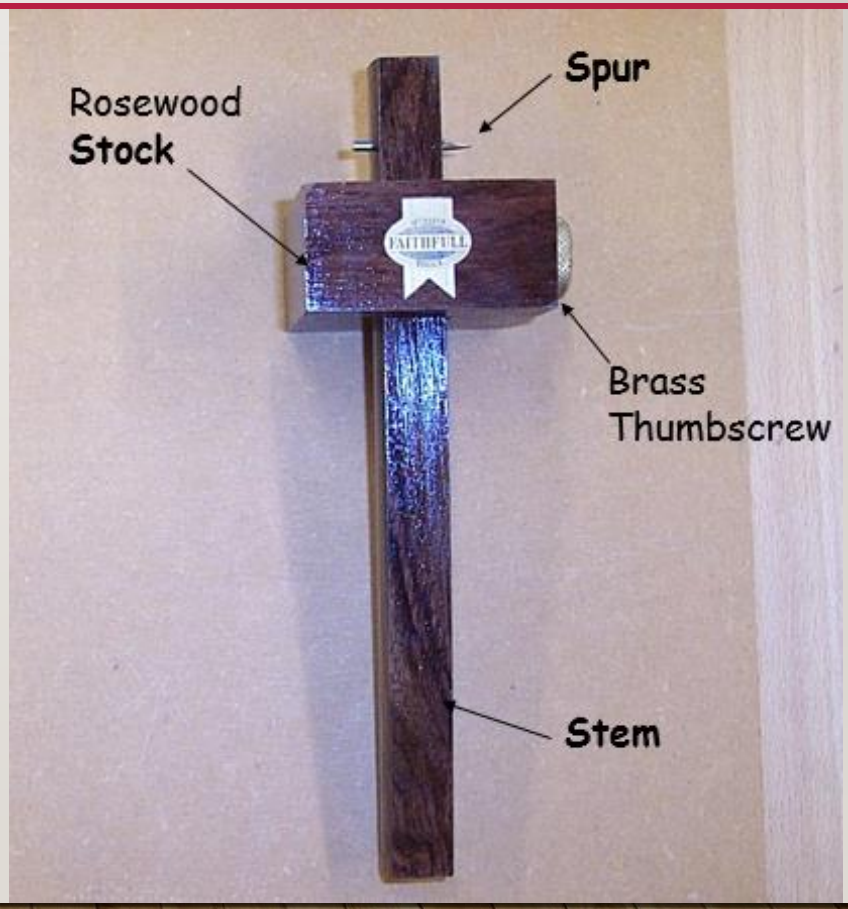
TRY SQUARE

- A try- square is used for marking and measuring a square piece of wood. The square refers to the tool's primary use of measuring the accuracy of a right angle; to try a surface is to check its straightness or correspondence to an adjoining surface.
- Measuring the diagonals is an Alternative method used to measure squareness
- The 3 parts of the try square are the Blade, Stock or Handle and the brass face.

MARKING GAUGE

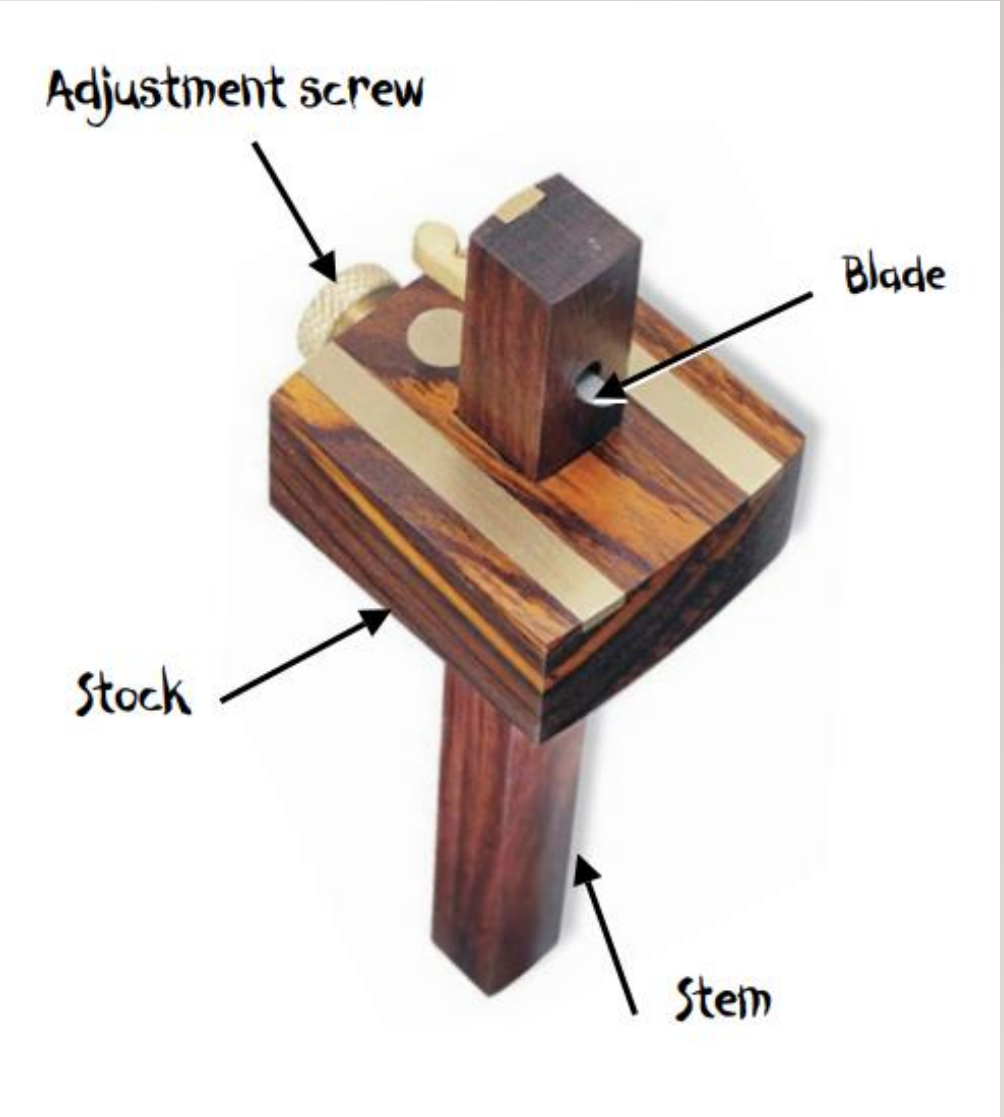
- The Marking Gauge is used to draw a line parallel to an edge.





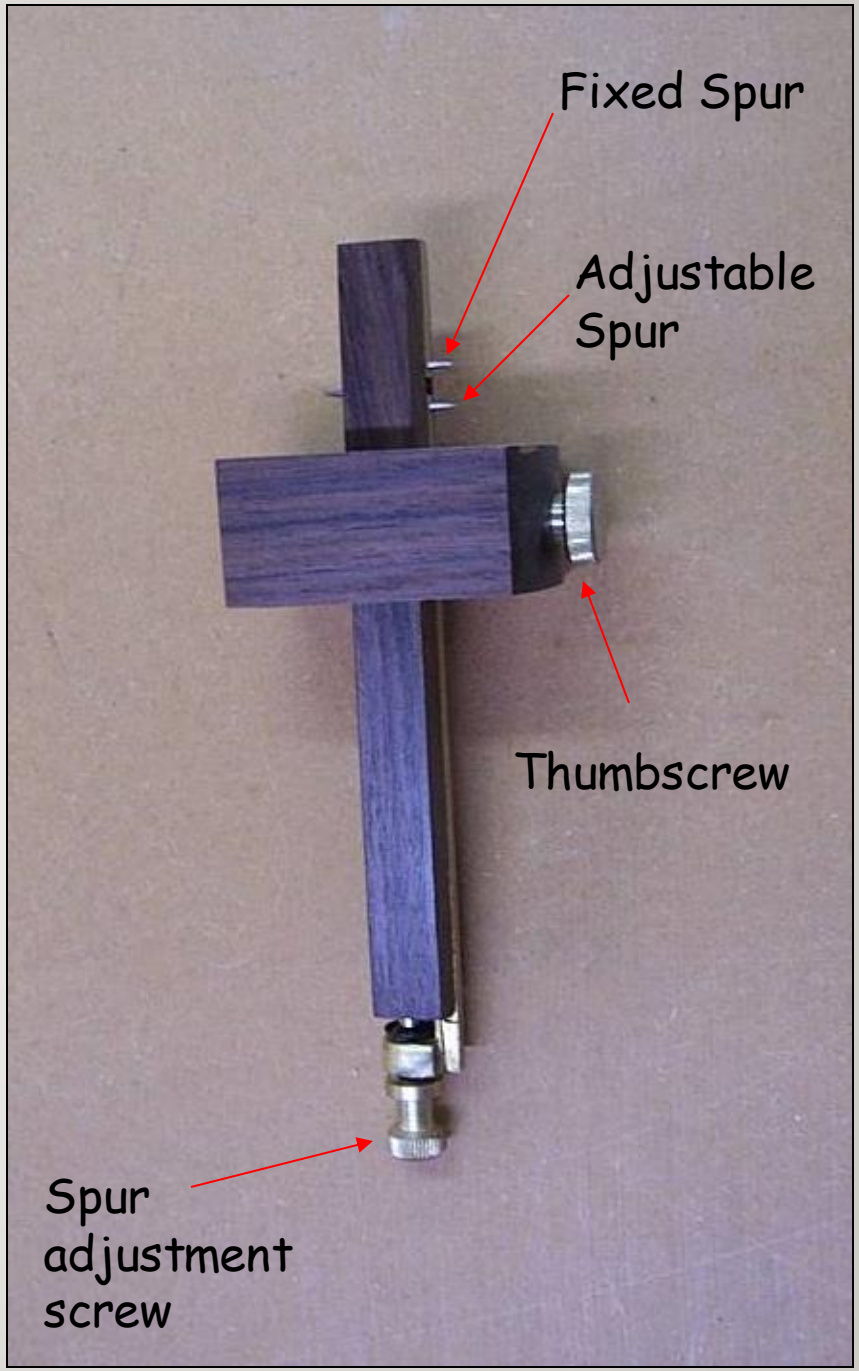
CUTTING GAUGE

- A **cutting gauge** has the same structure as a **marking gauge** but uses a knife instead of a pin to mark the wood. This allows it to mark the wood against the grain keeping the same level of accuracy as going with the grain.



MORTISE GAUGE

- The mortise gauge is used when marking out mortise and tenon joints.



TEMPLATES

- Templates can be used by manufacturers to ensure identical products are produced efficiently and to a high quality.
- A template is a tool used to mark out shapes repeatedly without the need to measure. For example, if 100 beech cutting boards are all to be shaped so they are the same, a template could be made to draw around for speed and consistency.

MARKING KNIFE

- A marking knife is used to scribe a line to be followed by a hand saw or chisel when making woodworking joints and other operations.
- Marking knives are generally used when marking out across the grain. They are avoided when laying out with the grain as the blade tends to follow the fibres, resulting in inaccurate lines.

SLIDING BEVEL

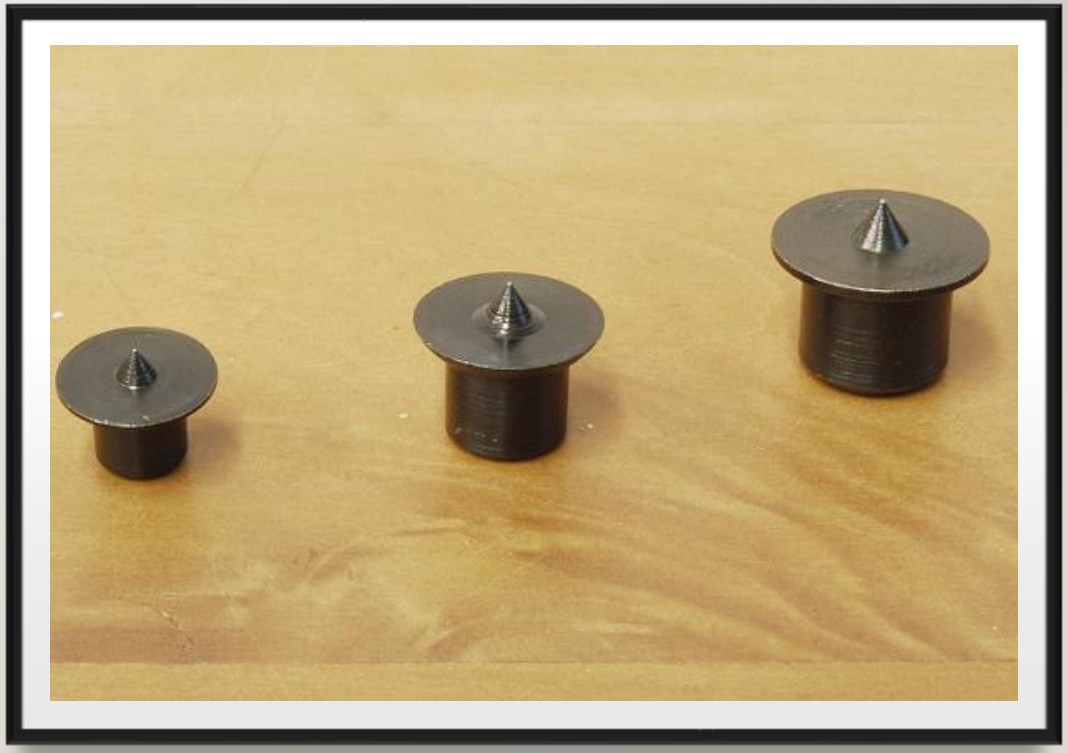
- A sliding bevel, also known as a bevel gauge or false square is an adjustable gauge for setting and transferring angles. The handle is usually made of wood or plastic and is connected to a metal blade with a thumbscrew or wing nut.

DOVETAIL TEMPLATE

- A Dovetail Template is used to mark out dovetail joints without the need for measuring the work piece

DOWEL MARKING PINS

- Dowel marker pins are used to transfer the location of a row of dowel holes to another corresponding location. You need to drill one row of holes in a board, put in the dowel marker pins and press the corresponding board edge together. The pins will precisely mark the hole locations.



CUTTING OUT HAND TOOLS

CUTTING OUT HAND TOOLS

LEARNING INTENTIONS

- To name the different cutting out hand tools we will be required to use during this course
- To identify their different parts
- To state their uses
- To use them correctly and safely

SUCCESS CRITERIA

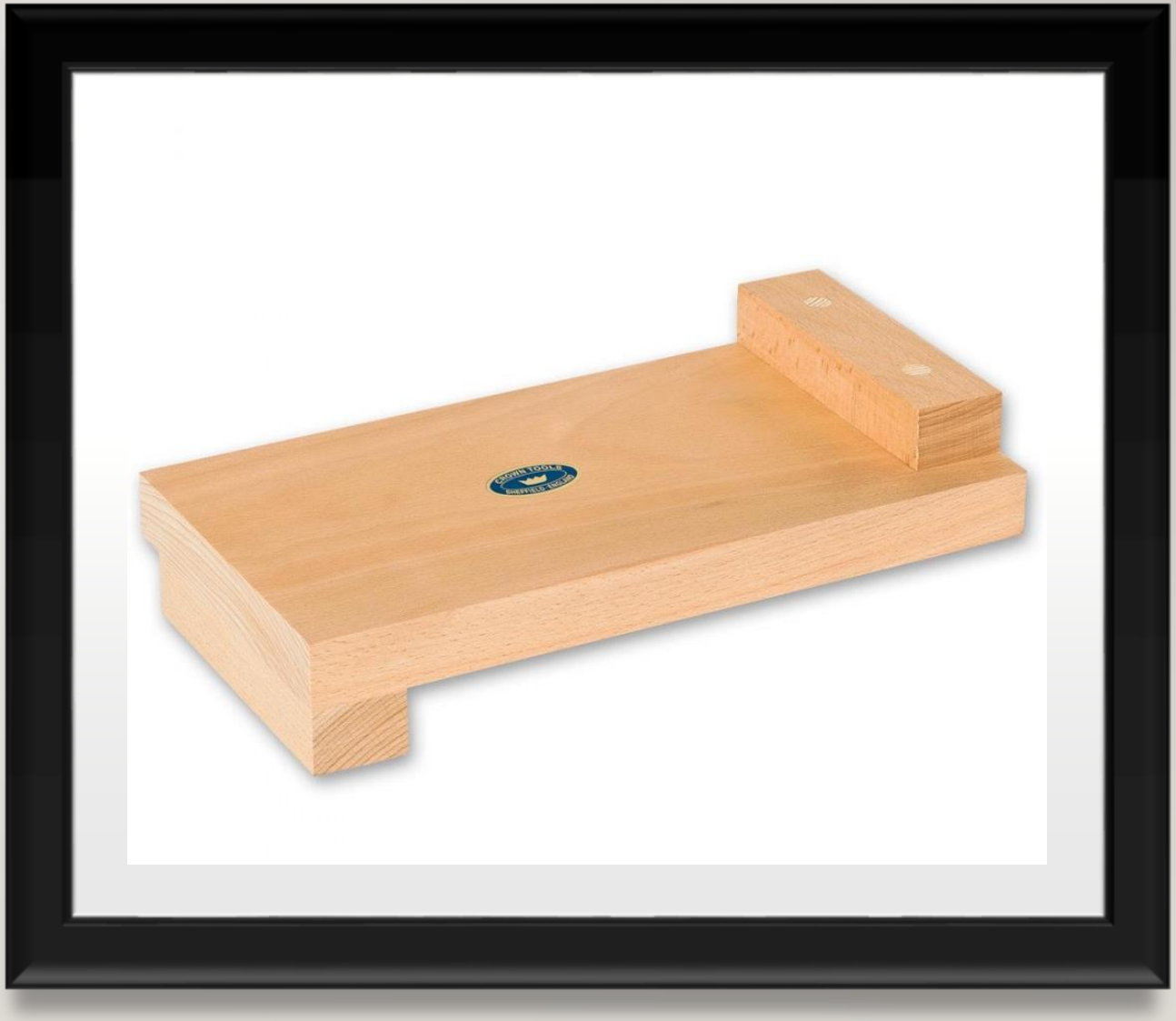
- I can **state** the name of **Some/Most/all** of the cutting out tools
- I can **identify** the different parts to **Some/Most/All** of the cutting out hand tools
- I can **state** the uses of **Some/Most/All** of the cutting out hand tools
- I can use **Some/Most/All** of the cutting out tools **safely and correctly**

BENCH VICE

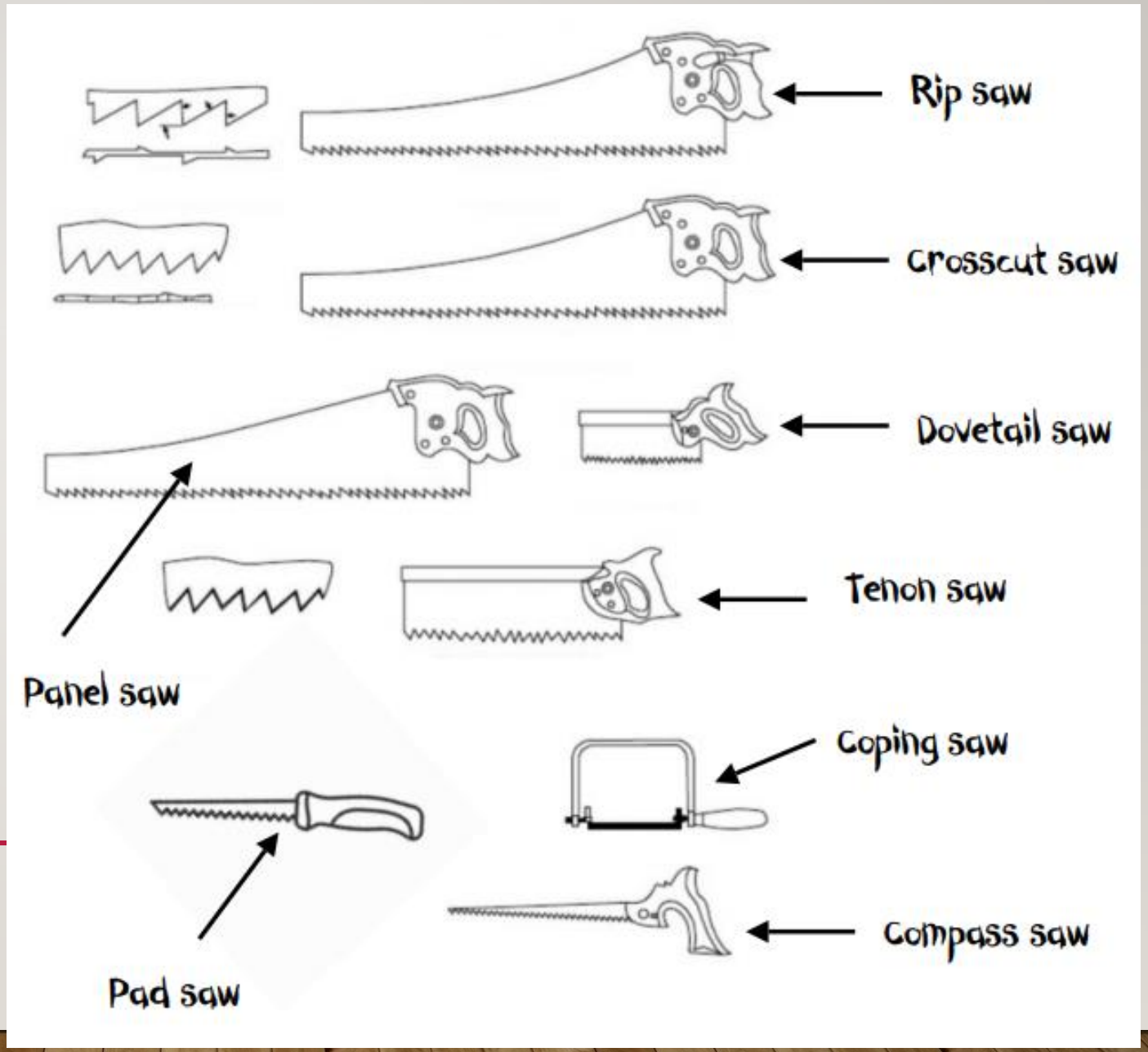
- Used for clamping a work piece, freeing up both hands and making it easier to work on.
- Wooden ‘cheeks’ which prevent work piece being damaged by the metal jaws.
- These are usually set at same height of the worktop.

SAWING BOARD / BENCH HOOK

- A bench hook is a workbench accessory and its purpose is to provide a stop against which the piece of wood being worked can be firmly held, without having to use the vice, this saves time.
- It makes handsawing safer and more accurate.

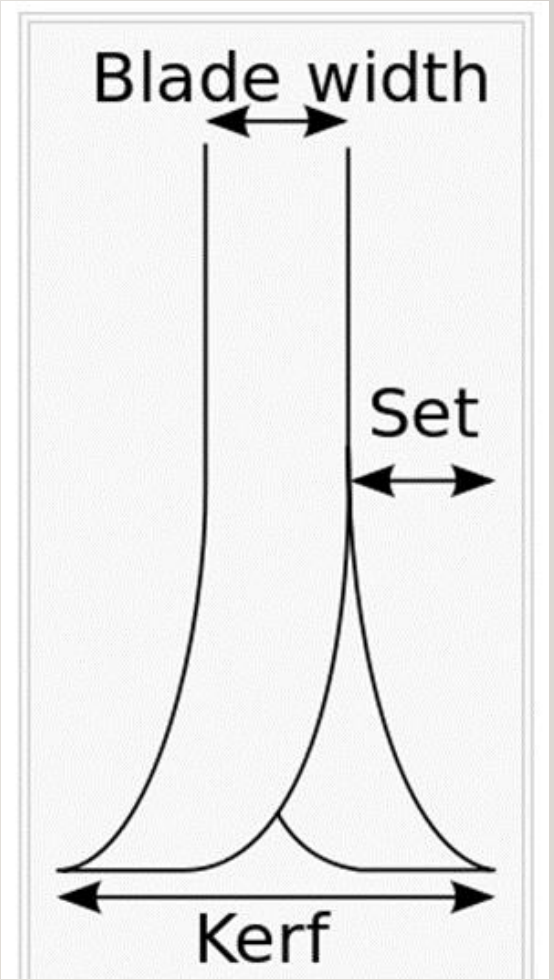


TYPES OF HANDSAW

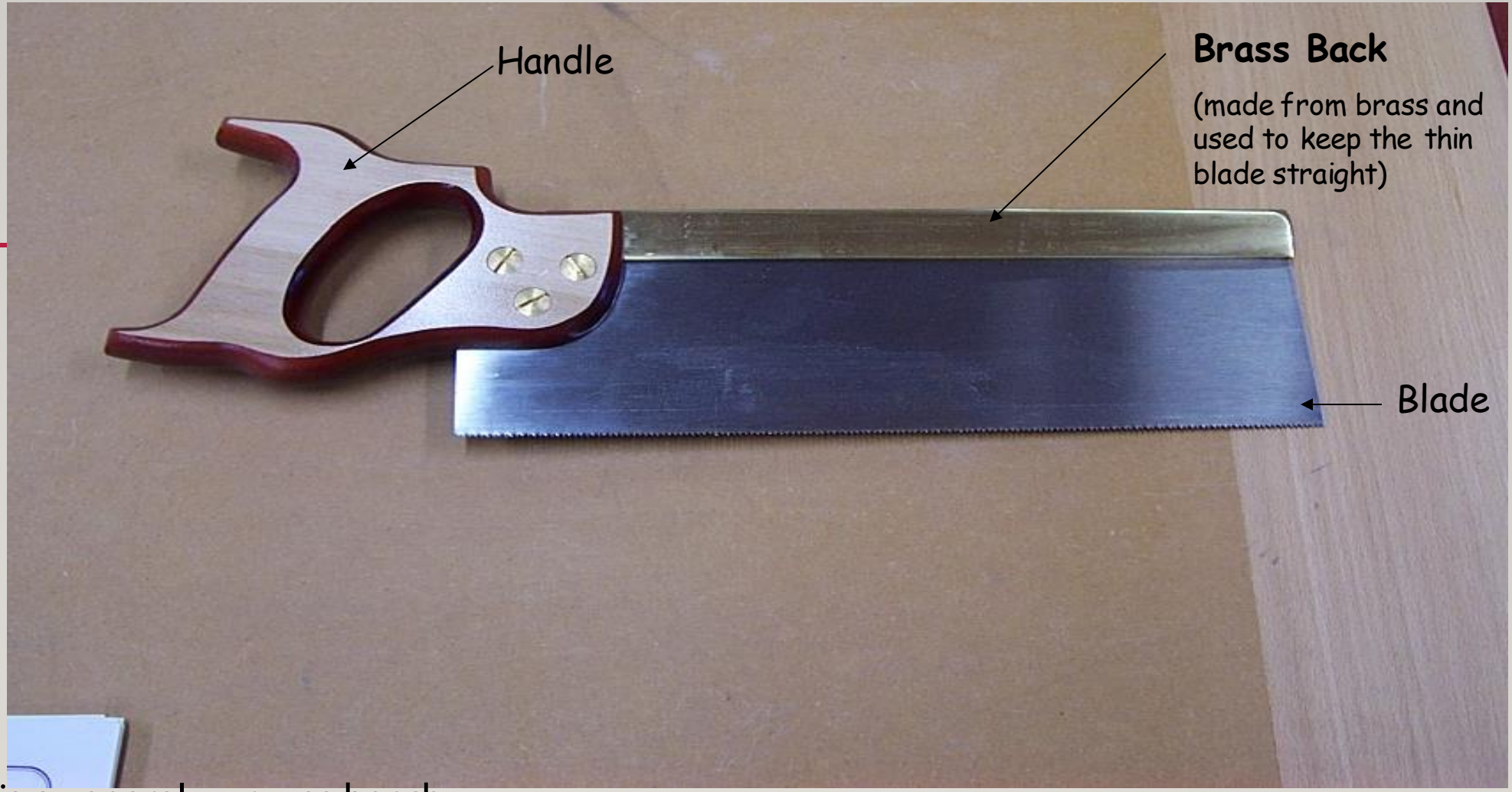


KERF OF THE SAW

- The kerf is narrow channel left behind by the saw. The kerf depends on several factors
  - the width of the saw blade; the set of the blade's teeth
  - the amount of wobble created during cutting
  - and the amount of material pulled out of the sides of the cut.



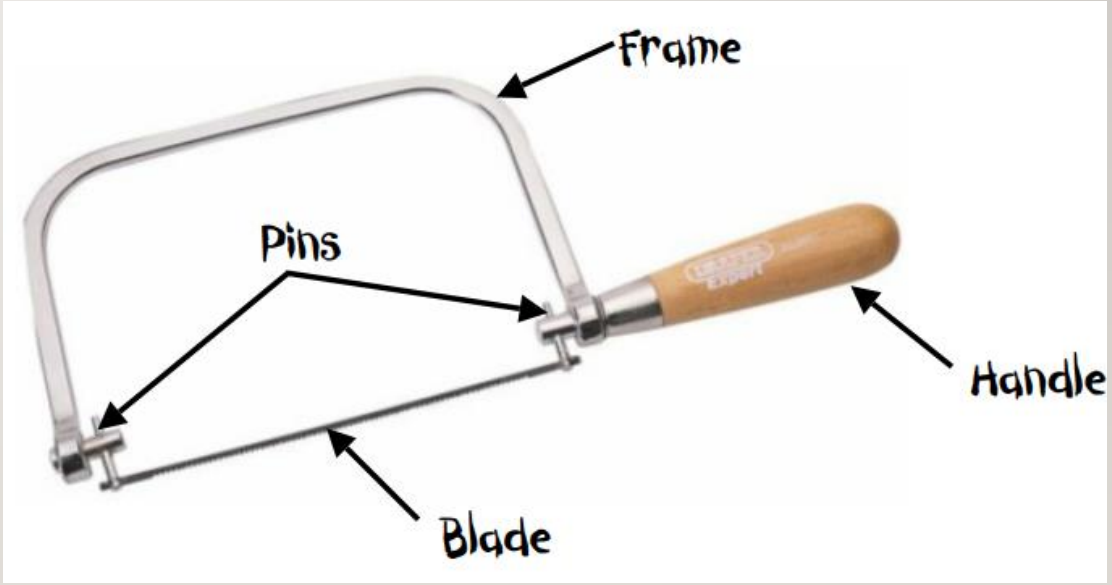
TENON SAW



- The Tenon Saw is a general-purpose bench saw normally used with a saw board to cut straight lines.

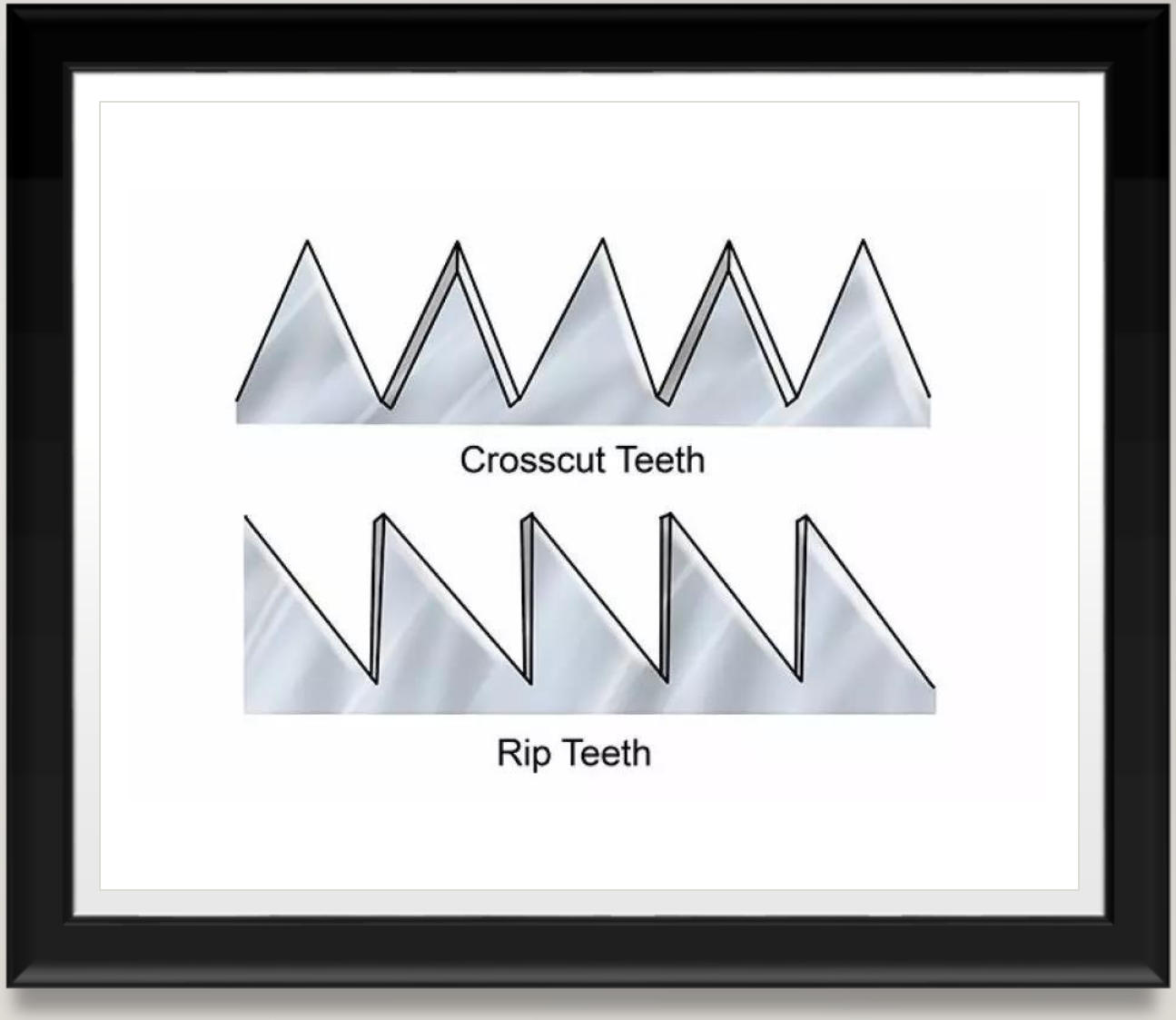
COPING SAW

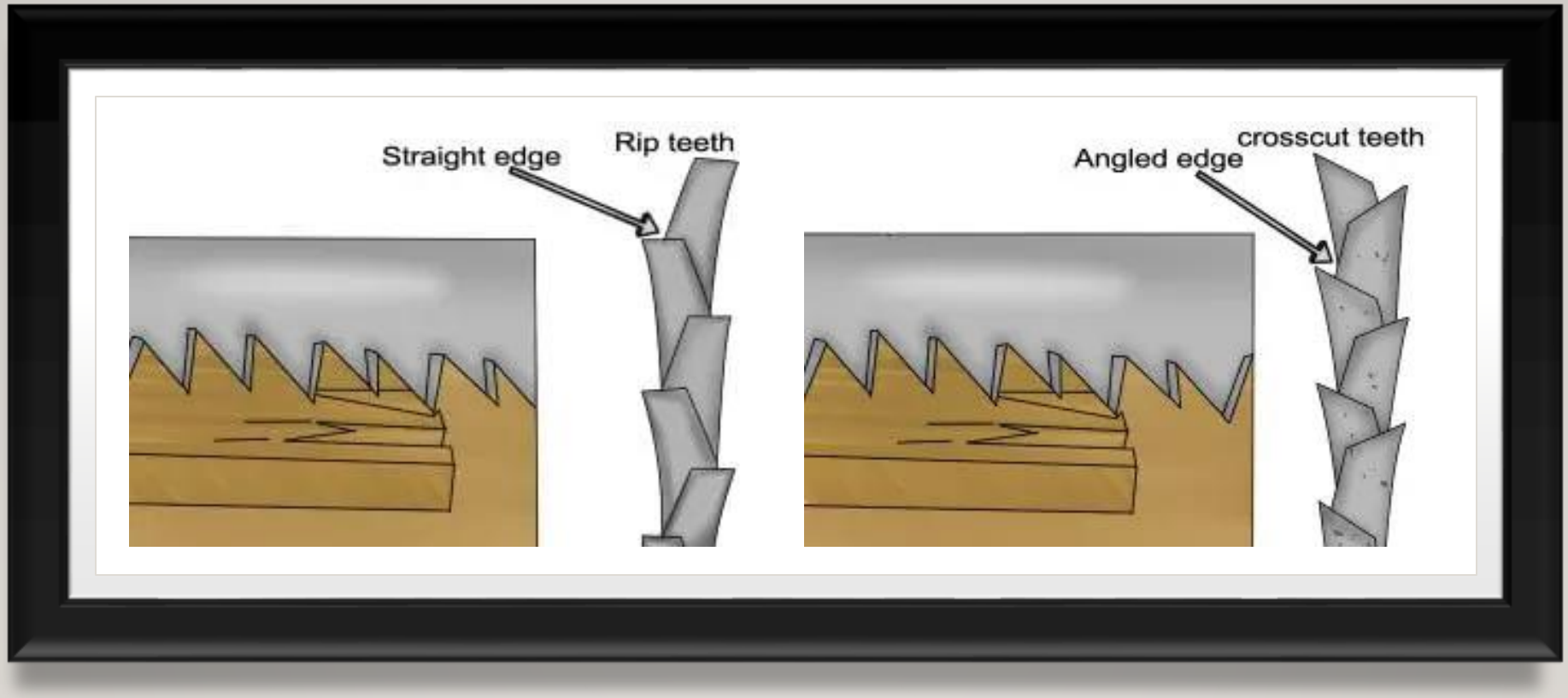
- A coping saw is a type of bow saw used to cut intricate external shapes and interior cut-outs in woodworking or carpentry.
- It is widely used to cut mouldings to create coped rather than mitre joints.



CROSSCUT VERSES RIP SAW

- Traditionally, when saws were mainly used for woodworking applications, there were only two types of saws: crosscut teeth saws and rip teeth saws.
- Both crosscut saws and rip saws teeth are ‘set’ (bent away from the blade) but crosscut teeth are angled on their inside edge, whereas rip teeth aren’t.
- This sharp angled edge means that crosscut teeth can slice through material like a series of little knives.





CROSSCUT VERSES RIP SAW

PANEL SAW

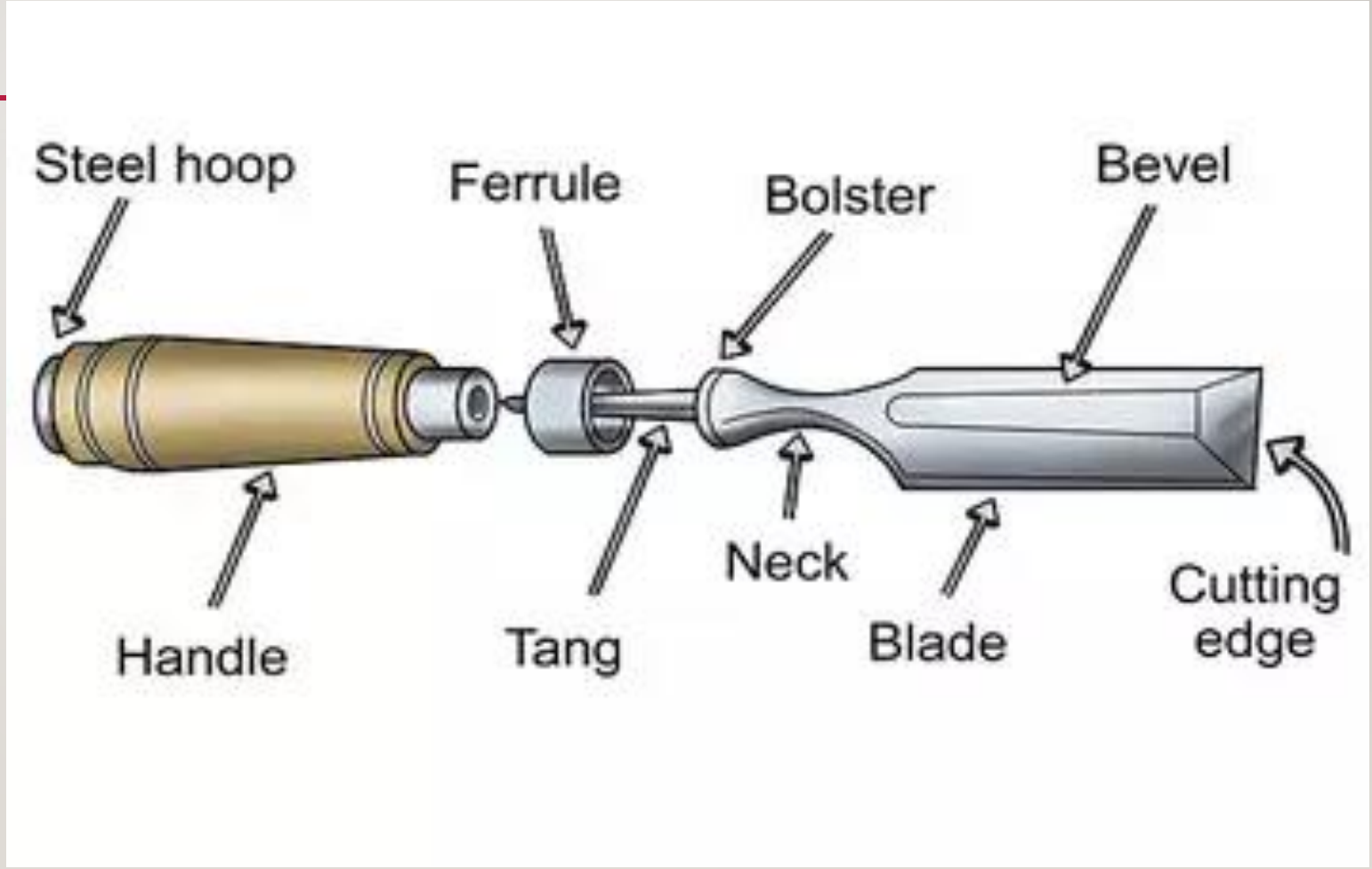
- Panel saws are ideal for coarse and fine cuts in timber and are a popular trade choice
- They cut using the push and the pull stroke for efficiency and can be used for both straight and angled cuts
- More teeth (measured as Teeth Per Inch or TPI) result in a finer finish. Fewer teeth are better for a coarser and faster cut

FRET SAW

- The fretsaw is a bow saw used for intricate cutting work which often incorporates tight curves. Although the coping saw is often used for similar work, the fretsaw is capable of much tighter radii and more delicate work.

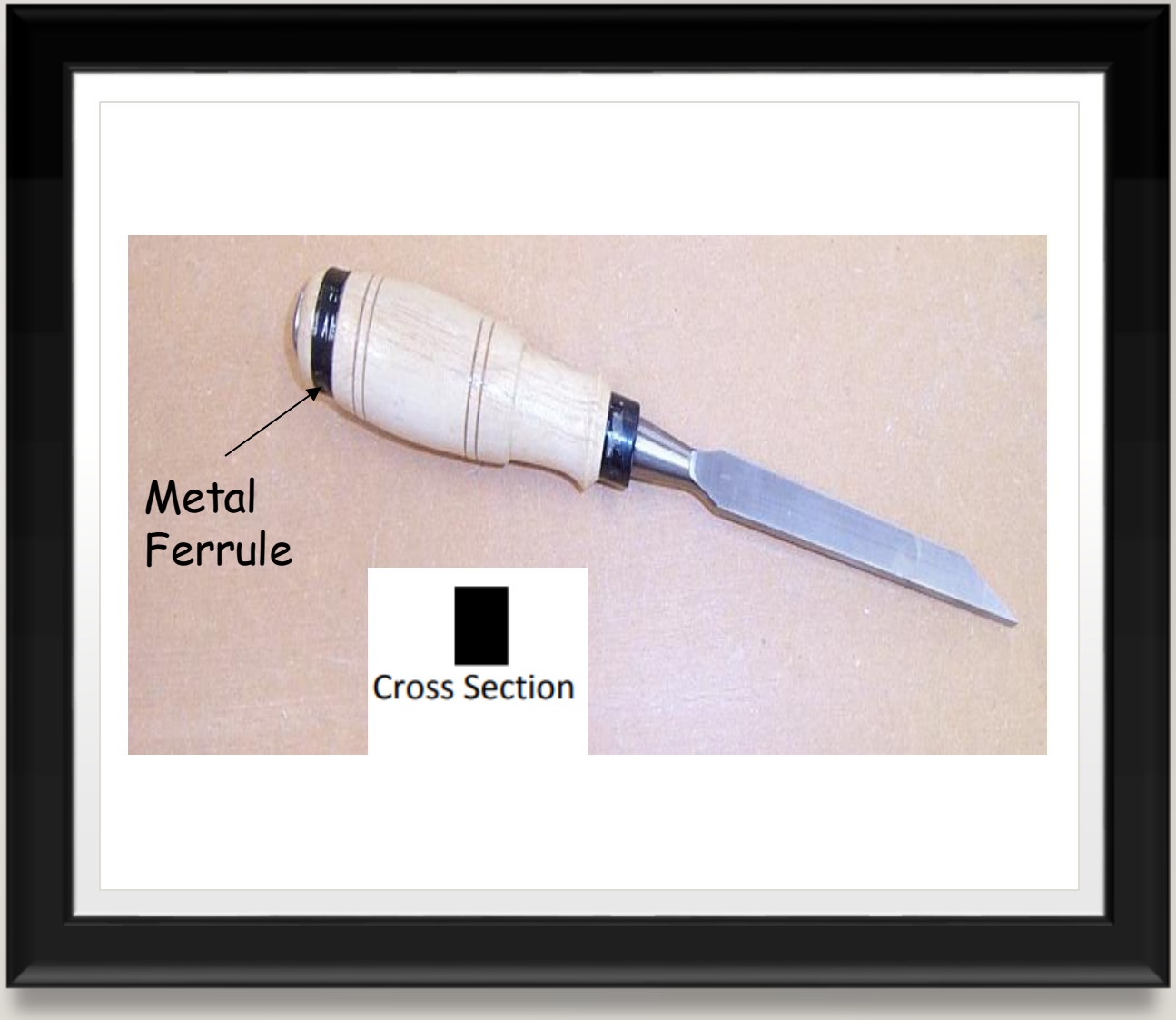
TYPES OF CHISEL

- There are 3 different types of chisel that we use in Practical Woodworking
  - Mortise Chisel
  - Bevel edge Chisel
  - Firmer Chisel
- When using a chisel
- Always keep all ten fingers behind the cutting edge,
- Make sure your timber is held securely
- Store your chisel safely when not in use



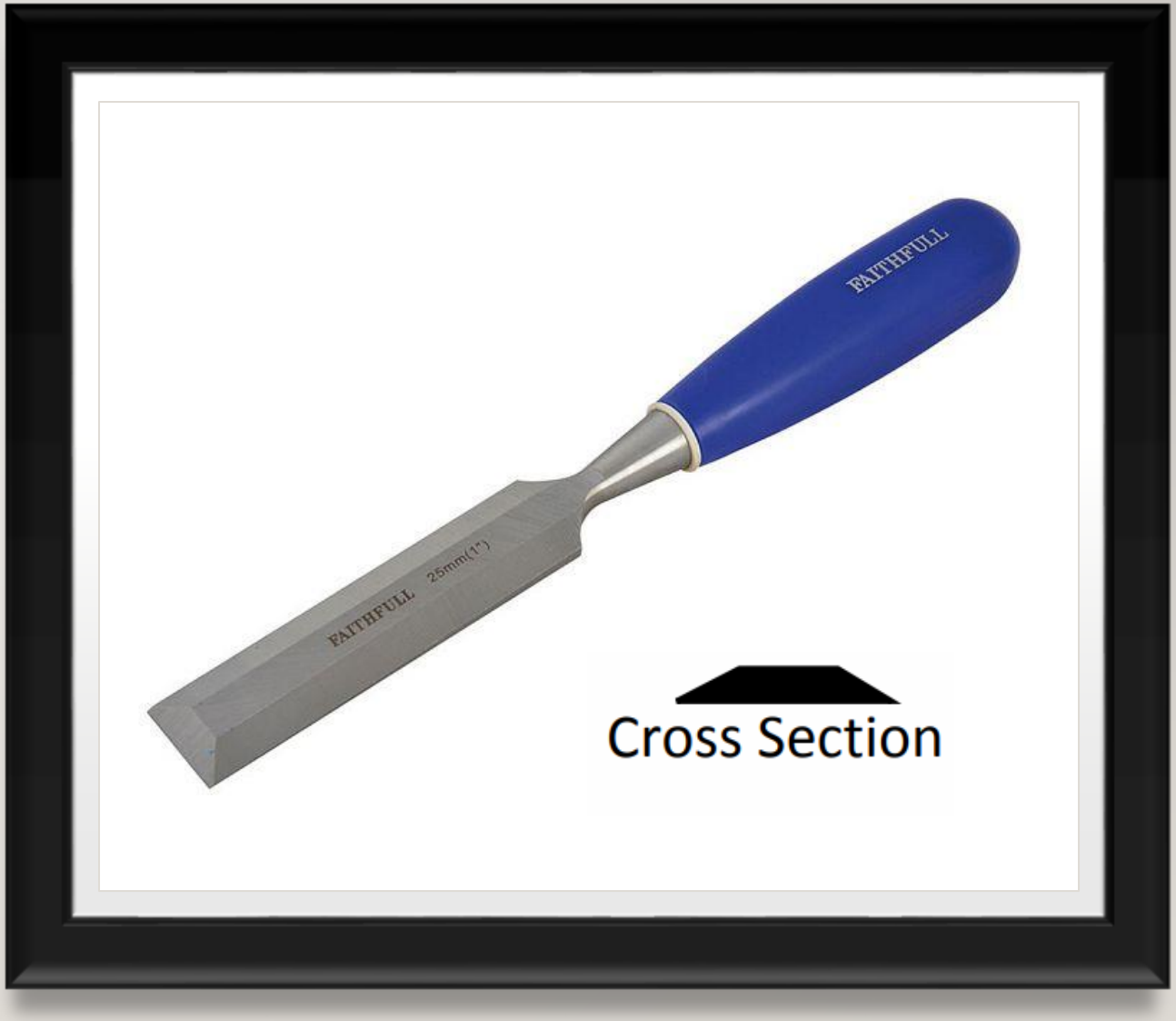
MORTISE CHISEL

- This chisel has a rectangular cross section. It is honed to a shallower angle than the firmer chisel as it is driven into the wood to form a mortise (square/rectangular hole). Because it requires to be continually hit with a mallet it has a ferrule at each end of the handle and a leather washer which acts as a ‘shock absorber’.



BEVEL EDGE CHISEL

- This is used for most tasks which require removing waste to shape or form a piece of wood.
- The edges are chamfered which allows this chisel to get into tight/angular corners.



FIRMER CHISEL

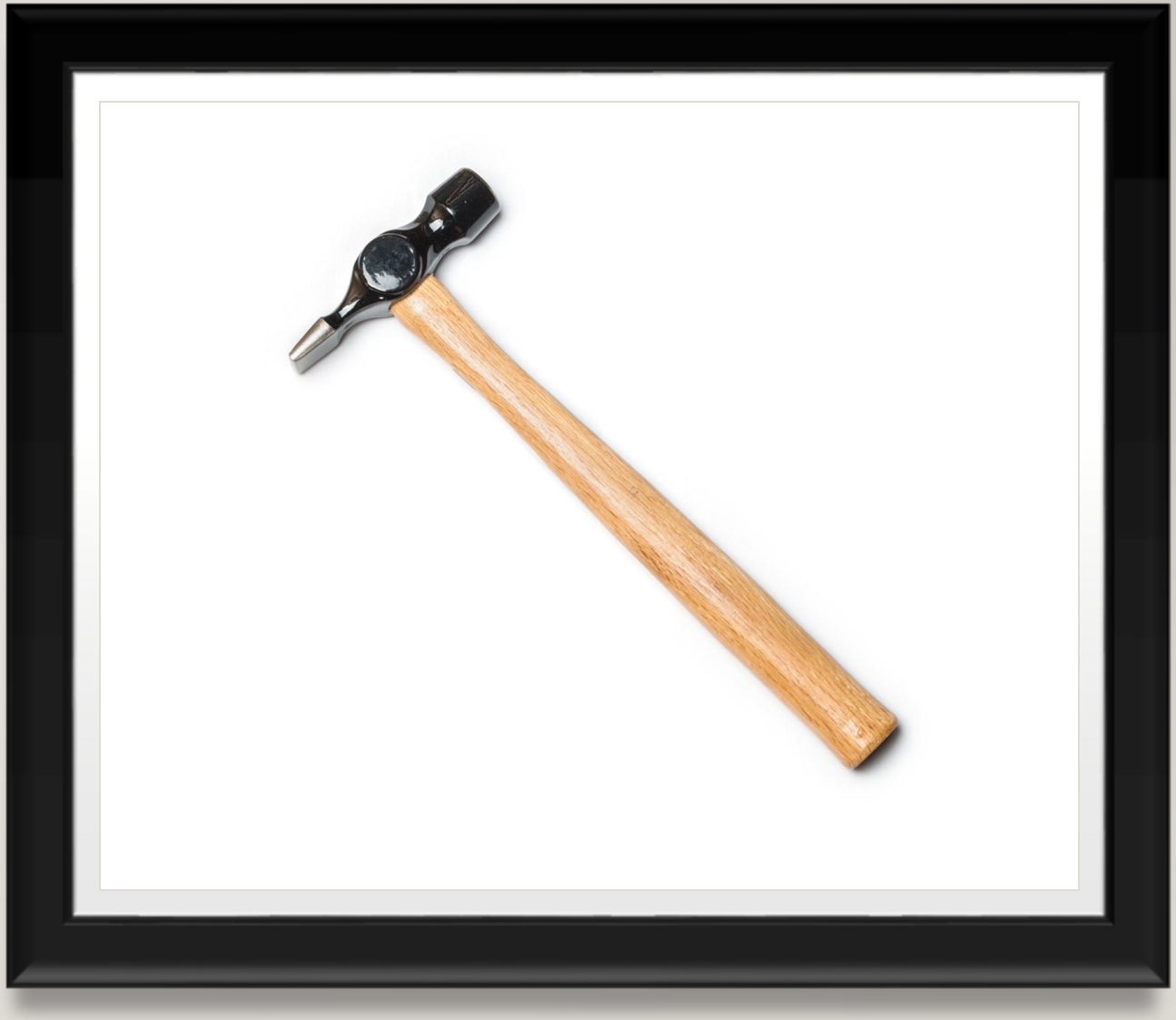
- This chisel has a blade with a rectangular cross-section. This means that they are stronger and can be used for tougher/heavier work. They often have a ferrule on the end so that the handle doesn't split when being hit with a malllet.

MALLET

- The Mallet is used for striking a chisel and assembling work.
- Note: A Mallet should never be used to "hammer" in nails, panel pins or to hit a centre punch. This will damage the face of the Mallet.

CROSS PEIN HAMMER

- The Cross Pein Hammer is used for driving in nails, panel pins and hitting a centre punch.
- The Cross Pein is used to start small nails without injury
- The handle is usually made from ash

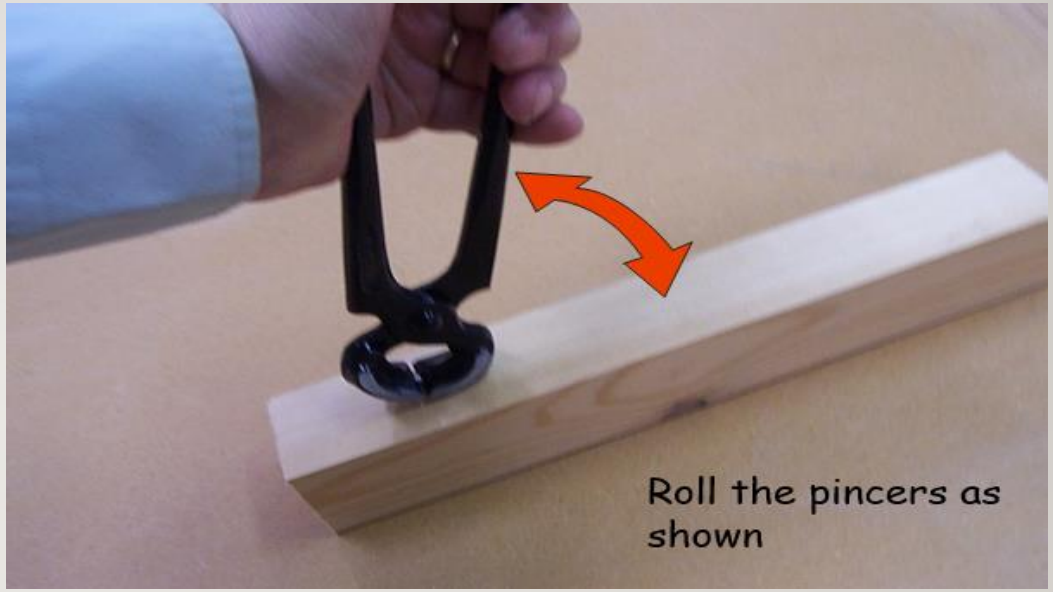


CLAW HAMMER

- A claw hammer is a tool primarily used for driving nails into, or pulling nails from, some other object. Generally, a claw hammer is associated with woodworking but is not limited to use with wood products.

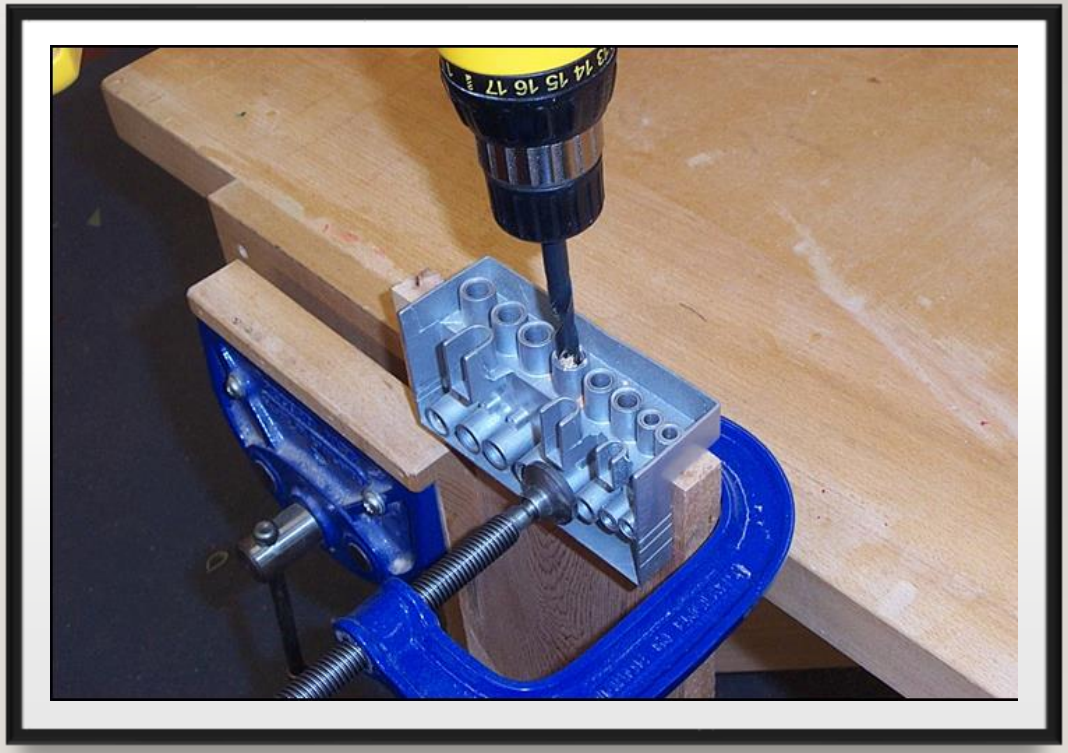
PINCERS

- Pincers are used to remove panel pins. To use the Pincers grip the small pin and roll the pincers to one side.



DOWEL JIG

- The heart of the jig is a steel block with holes to guide your drill bit. On many models, the holes are threaded, which lets you install bushings for drill bits of various sizes. The holes are precisely perpendicular and located in the exact centre of the block.

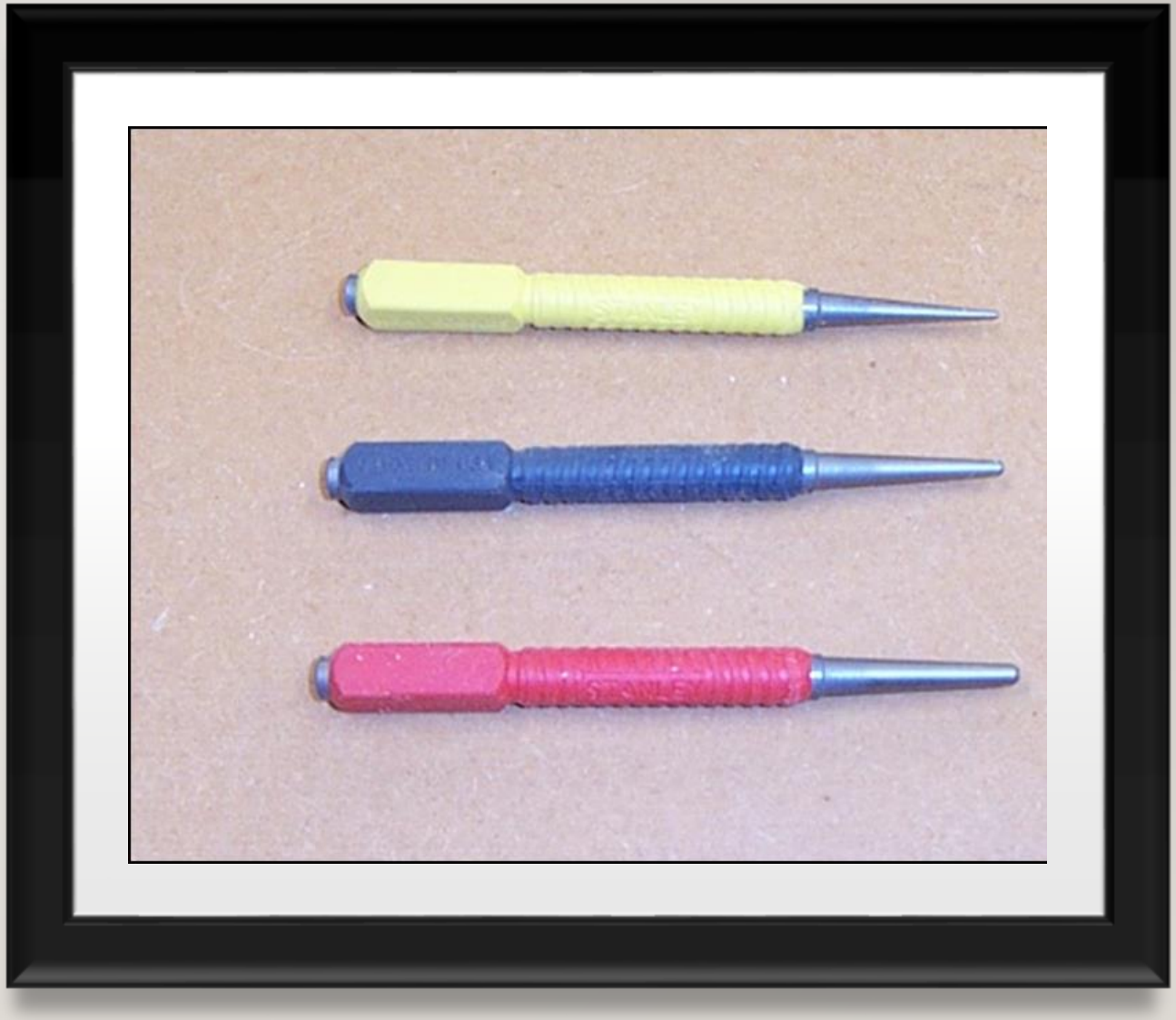


BRADAWL

- A bradawl is used to make indentations in wood or other materials in order to ease the insertion of a nail or screw. The blade is placed across the fibres of the wood, cutting them when pressure is applied. The bradawl is then twisted through 90 degrees which displaces the fibres creating a hole. This cutting action helps to prevent splitting of the wood along the grain.

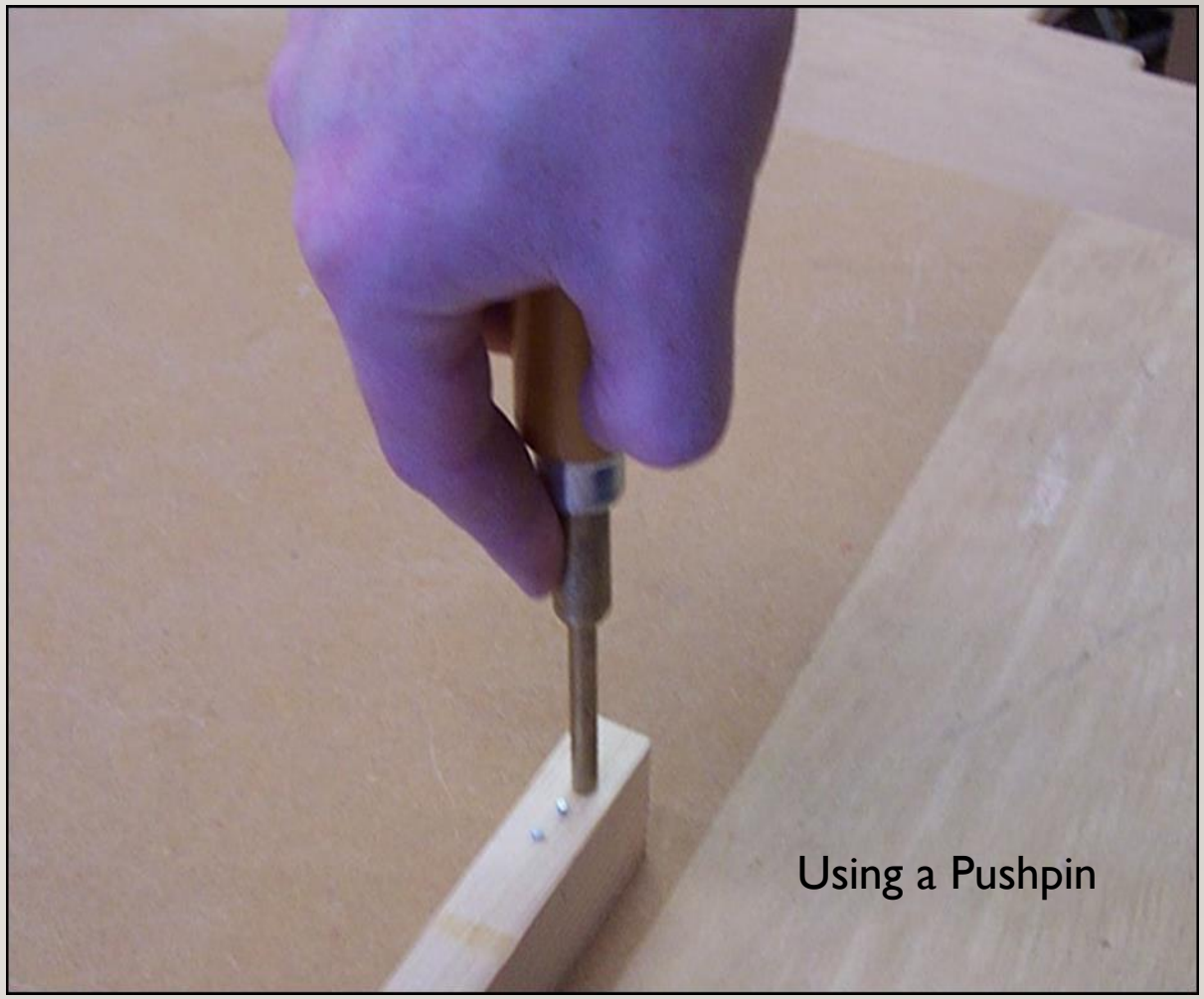
NAIL PUNCHES

- Nail punches are used to drive the heads of panel pins below the surface of the wood.
- The only difference between a Nail punch and a Centre punch is the Nail punch has a hollow point.
- In the workshop nail punches are available in 3 different sizes



PUSH PIN

- The Pushpin can be used in place of a Hammer to push small panel pins into softwood.



Using a Pushpin

WOODWORK PLANES

WOODWORK PLANES

LEARNING INTENTIONS

- To name the different types of plane
- To state the uses for different planes
- To name the parts of a plane
- To use planes correctly and safely

SUCCESS CRITERIA

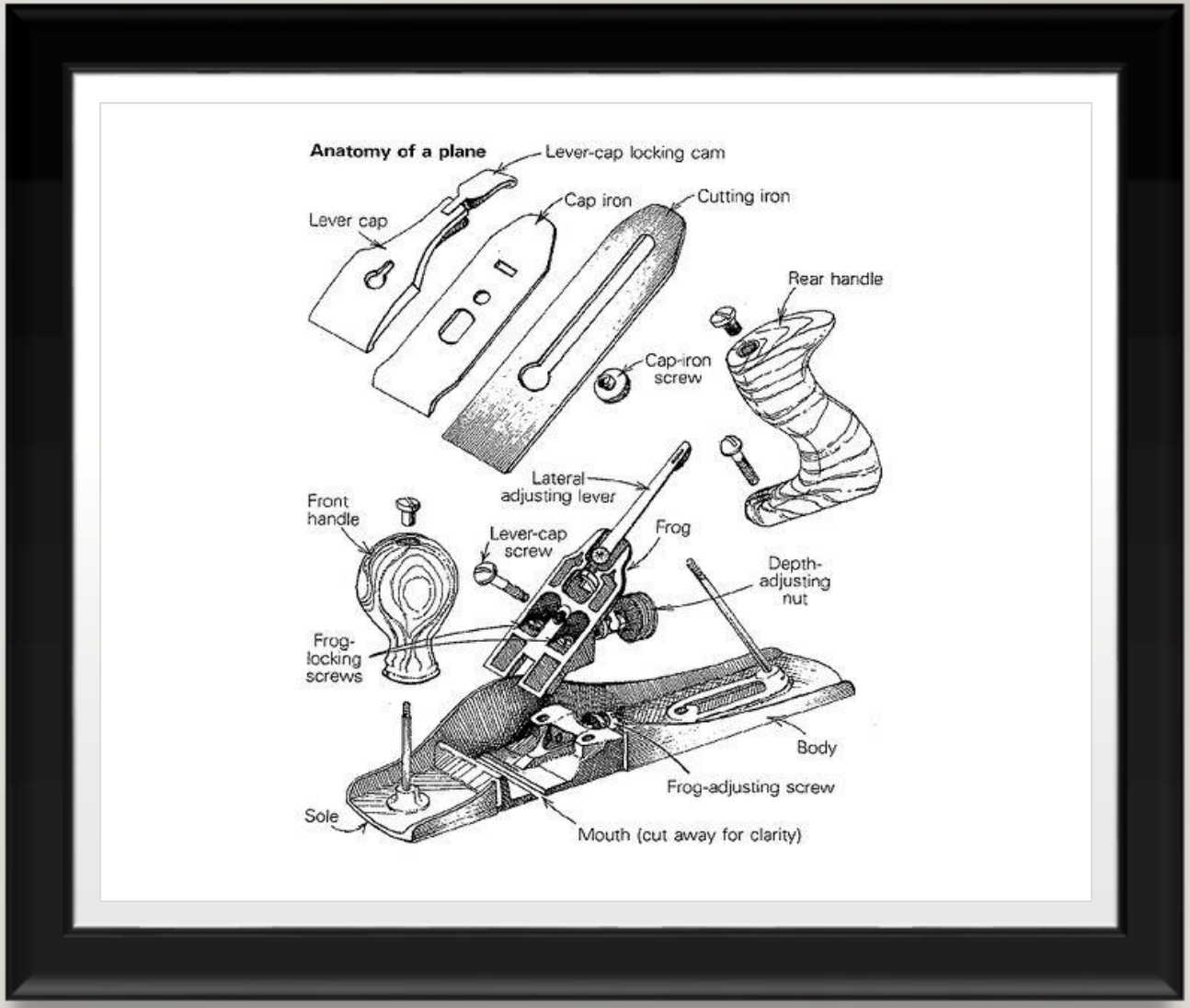
- I can **identify Some/Most/All** of the **different types of plane**
- I can **state** the uses of **Some/Most/All** the different planes
- I can **identify Some/Most/A**ll of the parts of a plane
- I can **use** planes **safely and correctly**

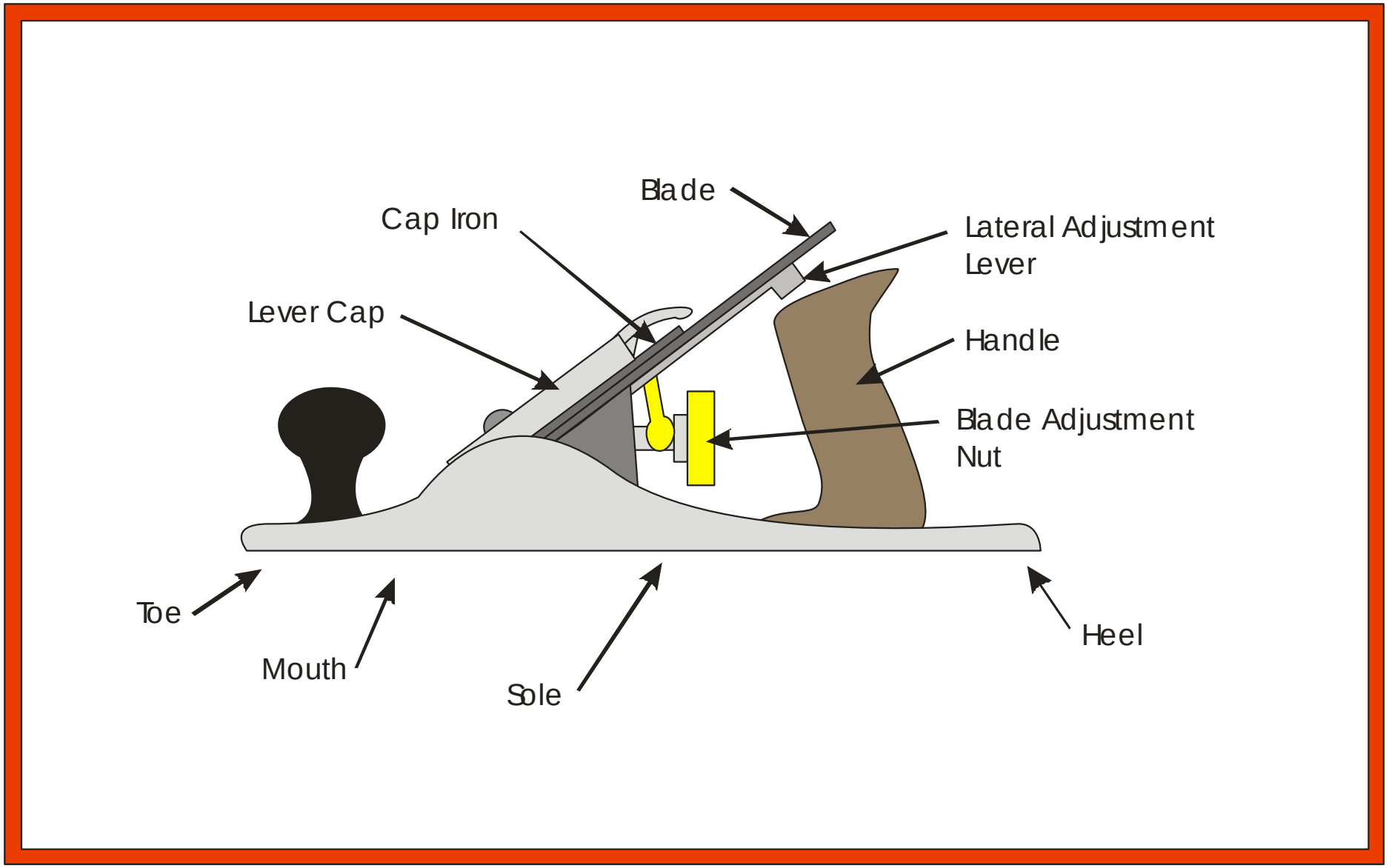
WOODWORK PLANES

- Types of plane
  - Jack
  - Smoothing
  - Plough
  - Bull-nose
  - Block
  - Rebate
  - Combination
  - Hand Router

PARTS OF THE WOODWORK PLANE

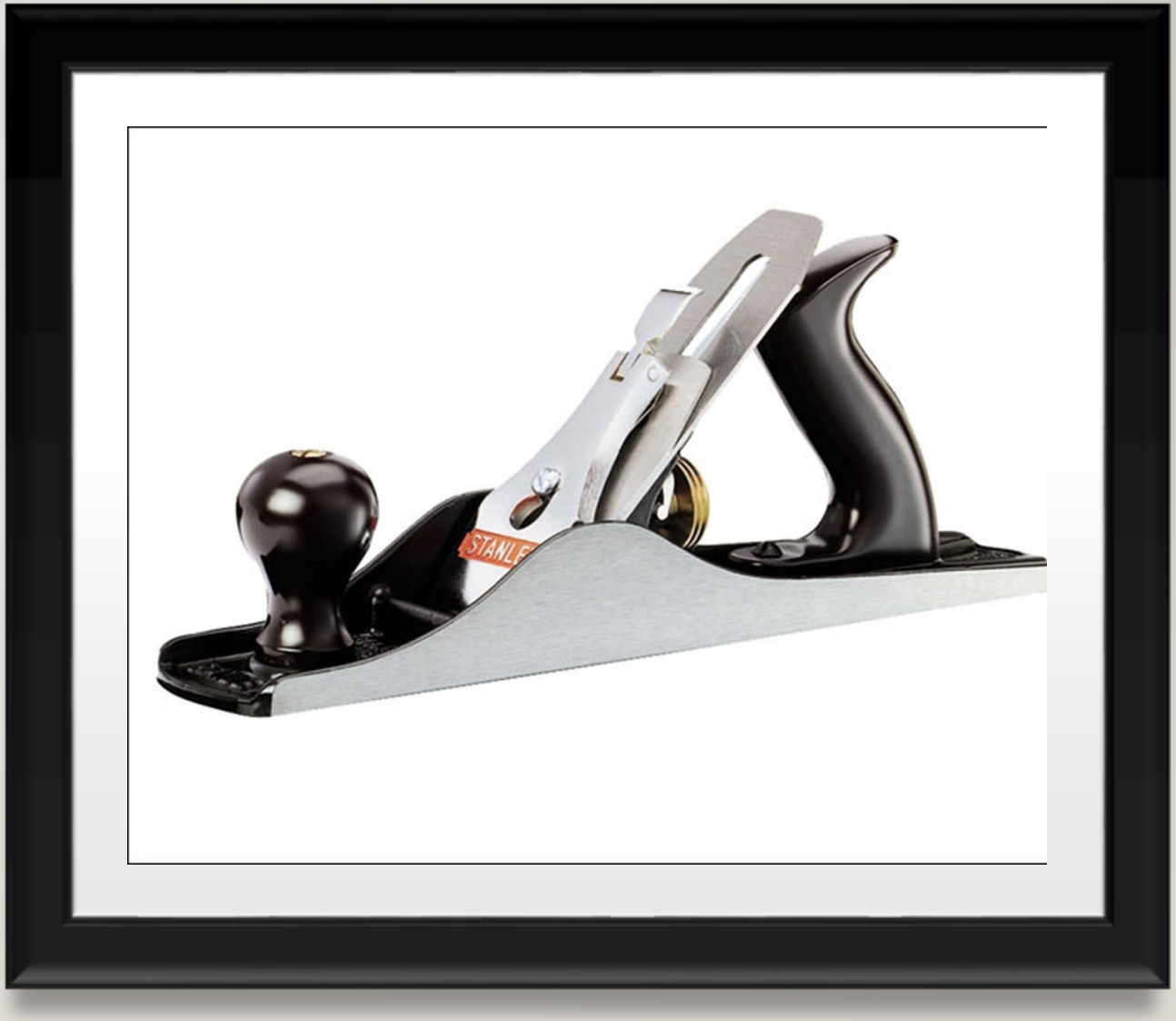
- Main parts of plane
- Cap iron
- Cutting iron
- Adjusting lever
- Adjusting nut
- Depth stops and fences




Blade
Cap Iron
Lateral Adjustment Lever
Lever Cap
Handle
Blade Adjustment Nut
Toe
Mouth
Sole
Heel

JACK PLANE

- A jack plane is a general-purpose woodworking bench plane, used for dressing timber down to the correct size in preparation for truing and/or edge jointing. It is usually the first plane used on rough timber.

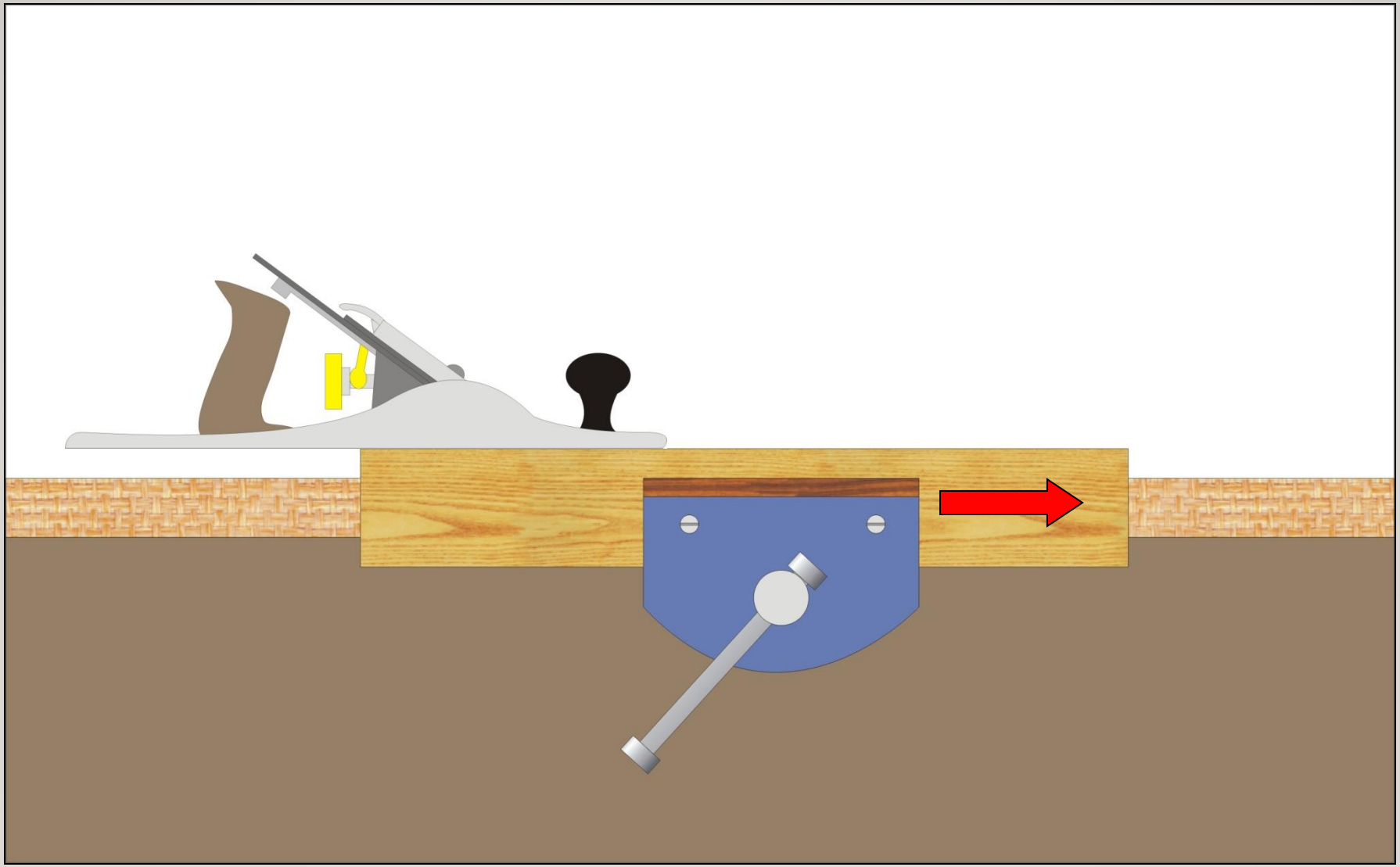


SMOOTHING PLANE

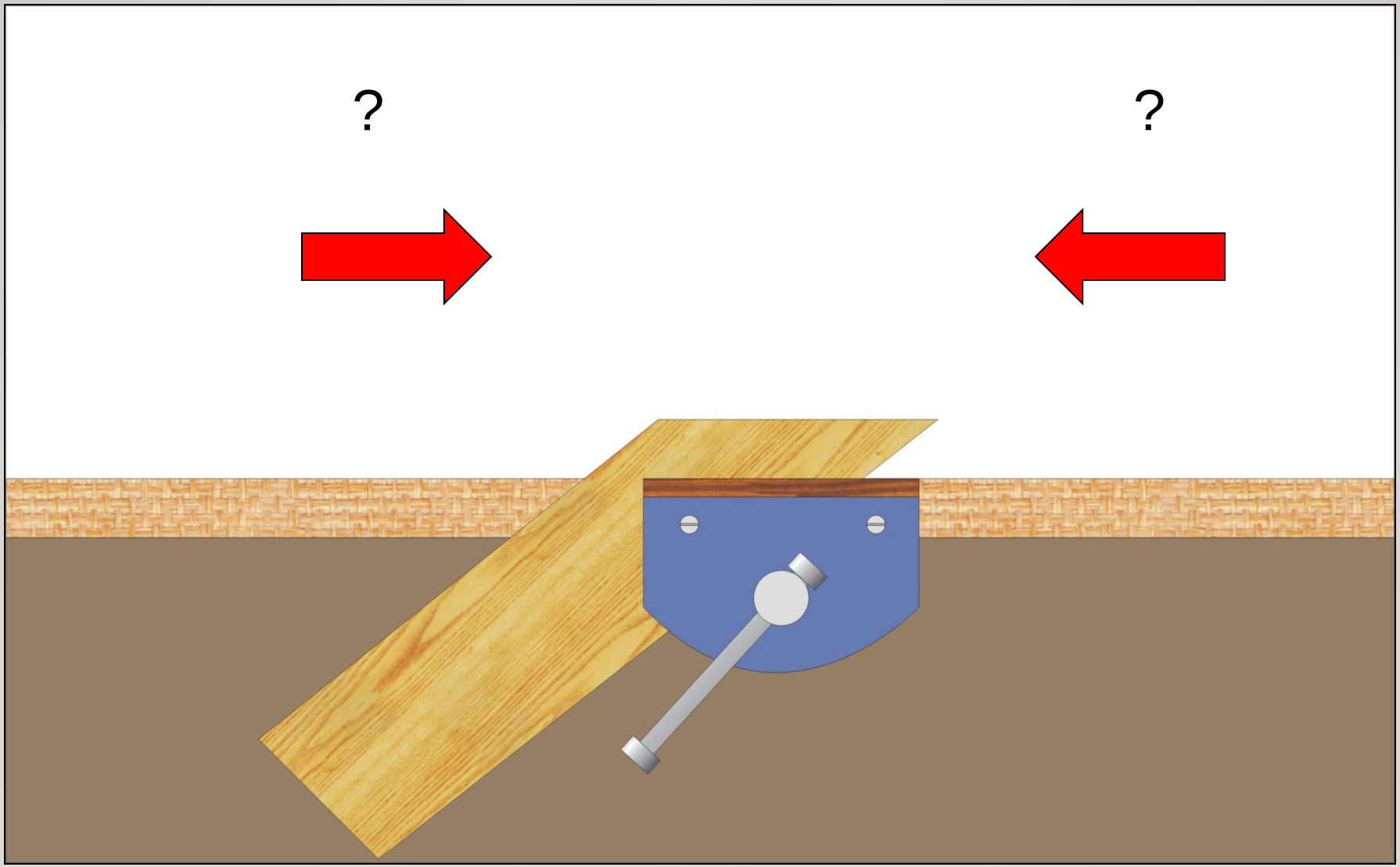
- A smoothing plane or smooth plane is a type of bench plane used in woodworking. The smoothing plane is typically the last plane used on a wood surface. When used properly, it produces a finish that equals or surpasses that made by sandpaper.

When Sharpening the blade of a Smoothing plane the corners should be slightly rounded as shown

Smoothing Plane Blade

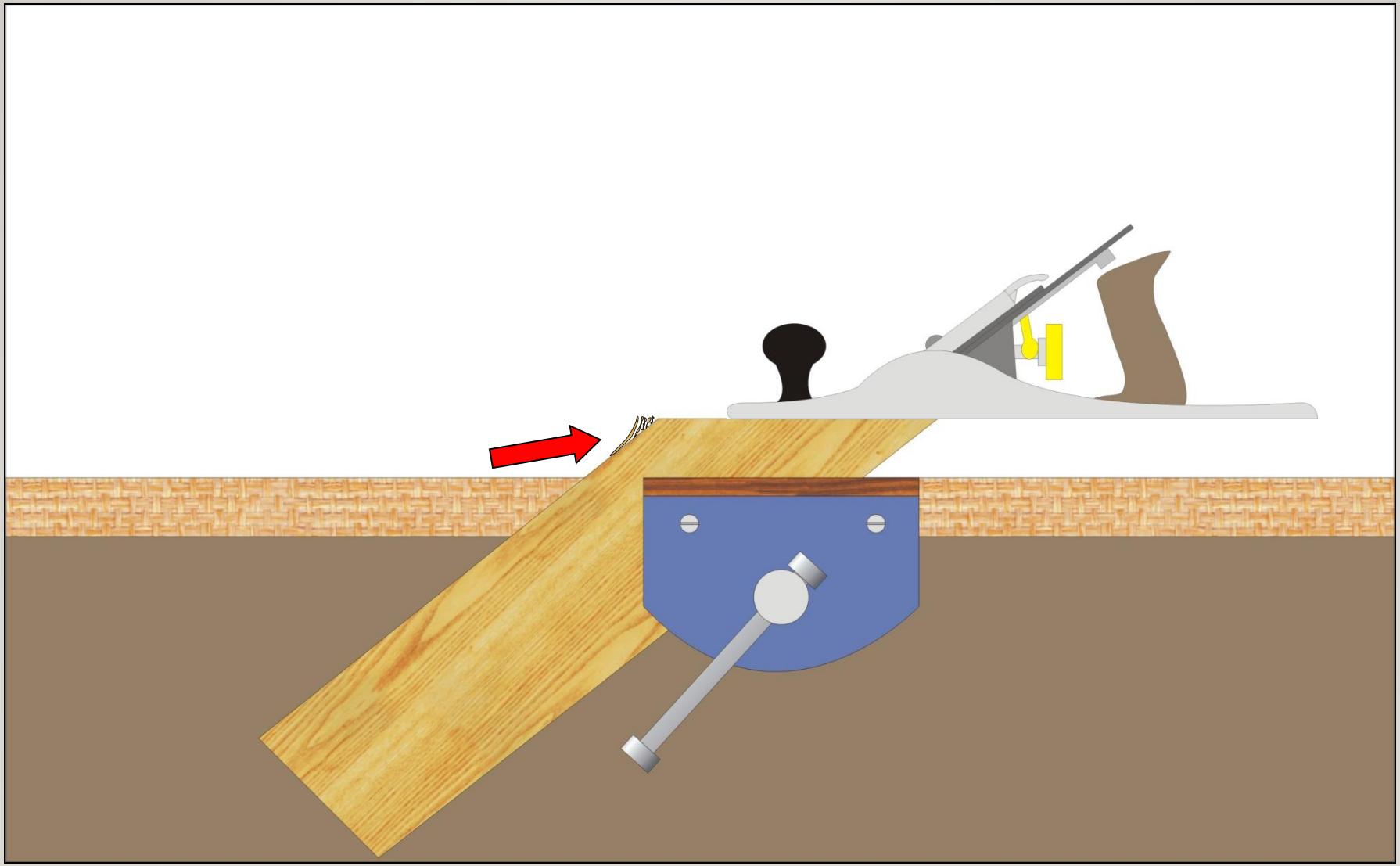


When using a Jack plane always try to plane with the grain

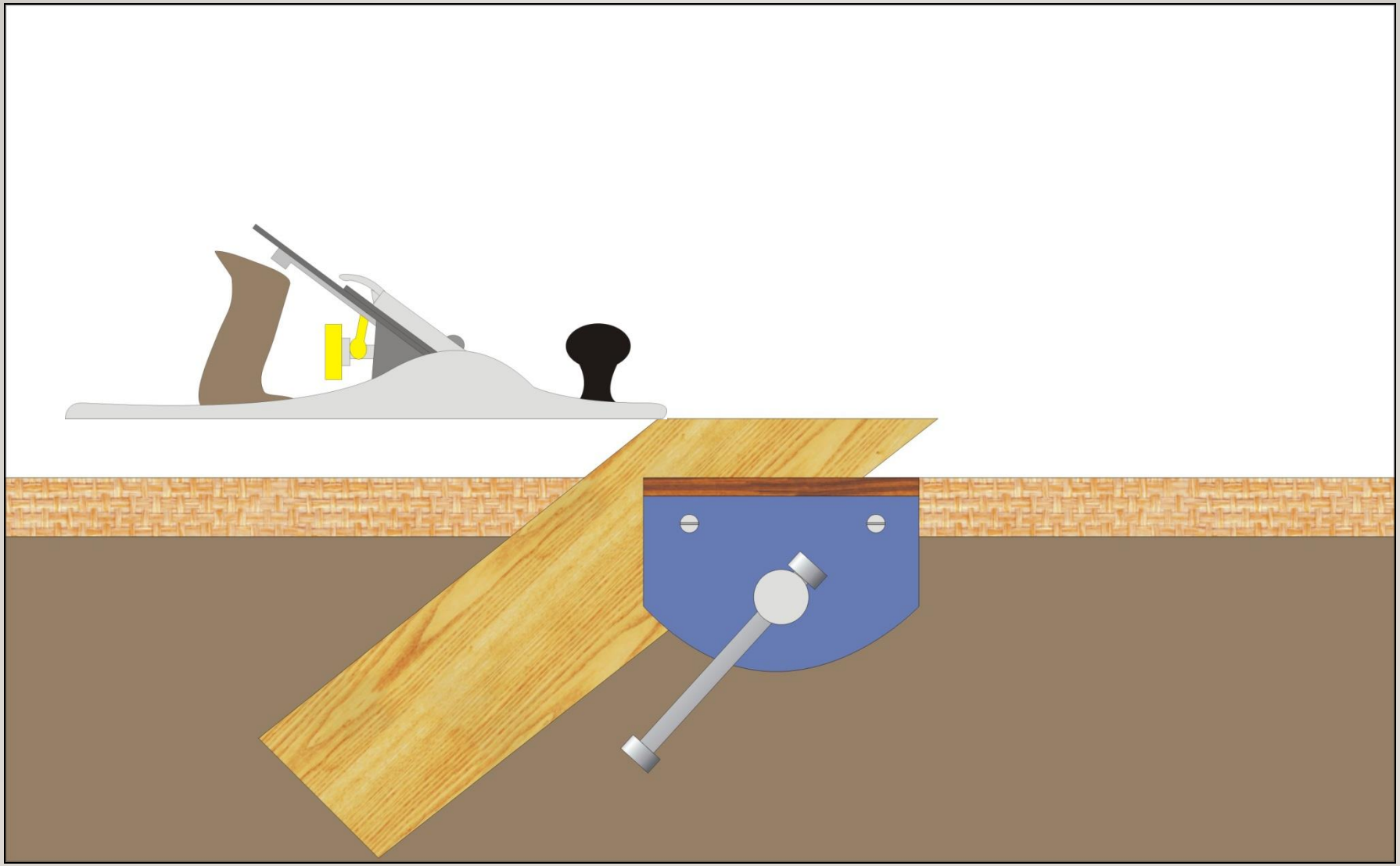


Which direction should we plane here?

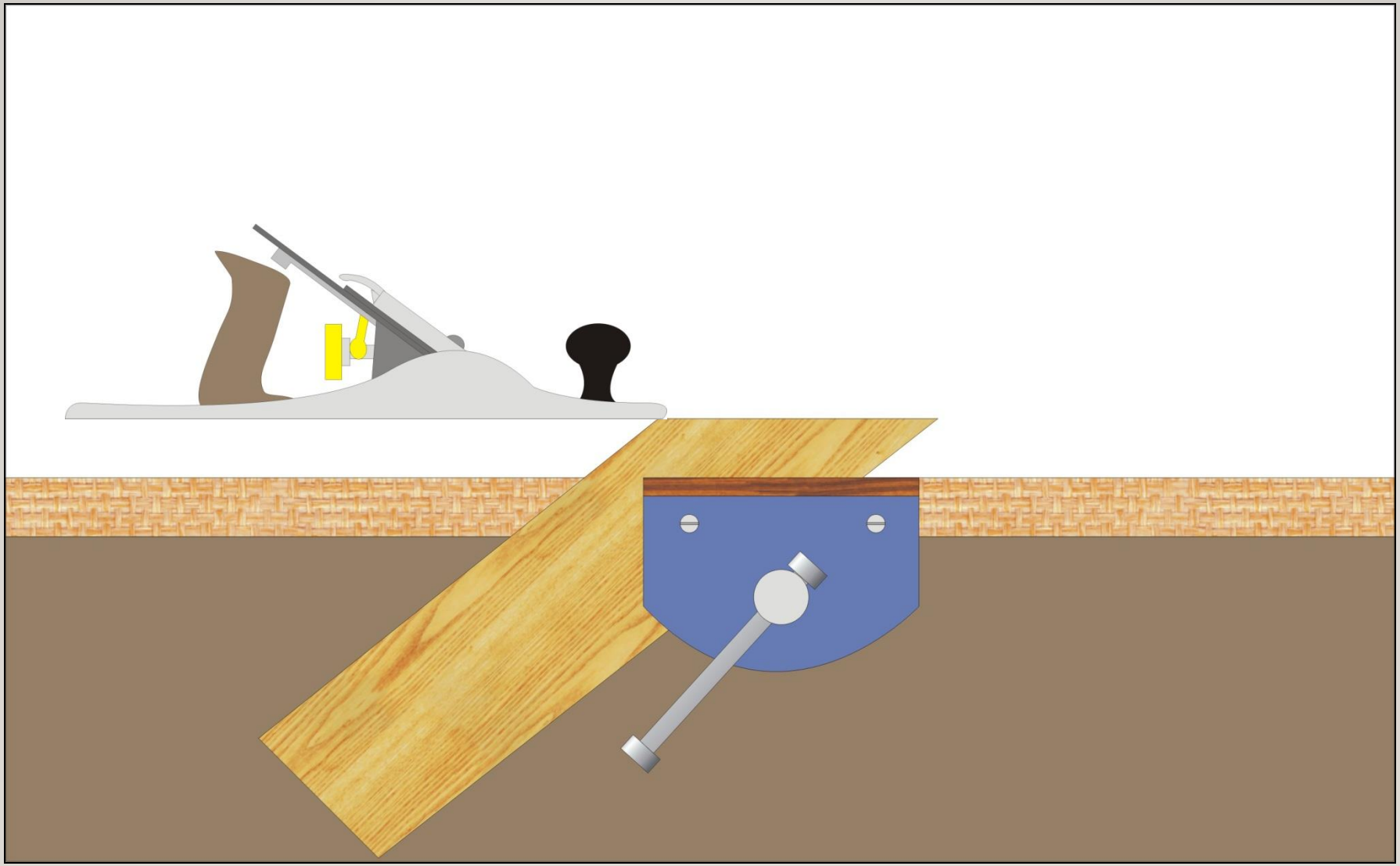
Click on the correct arrow



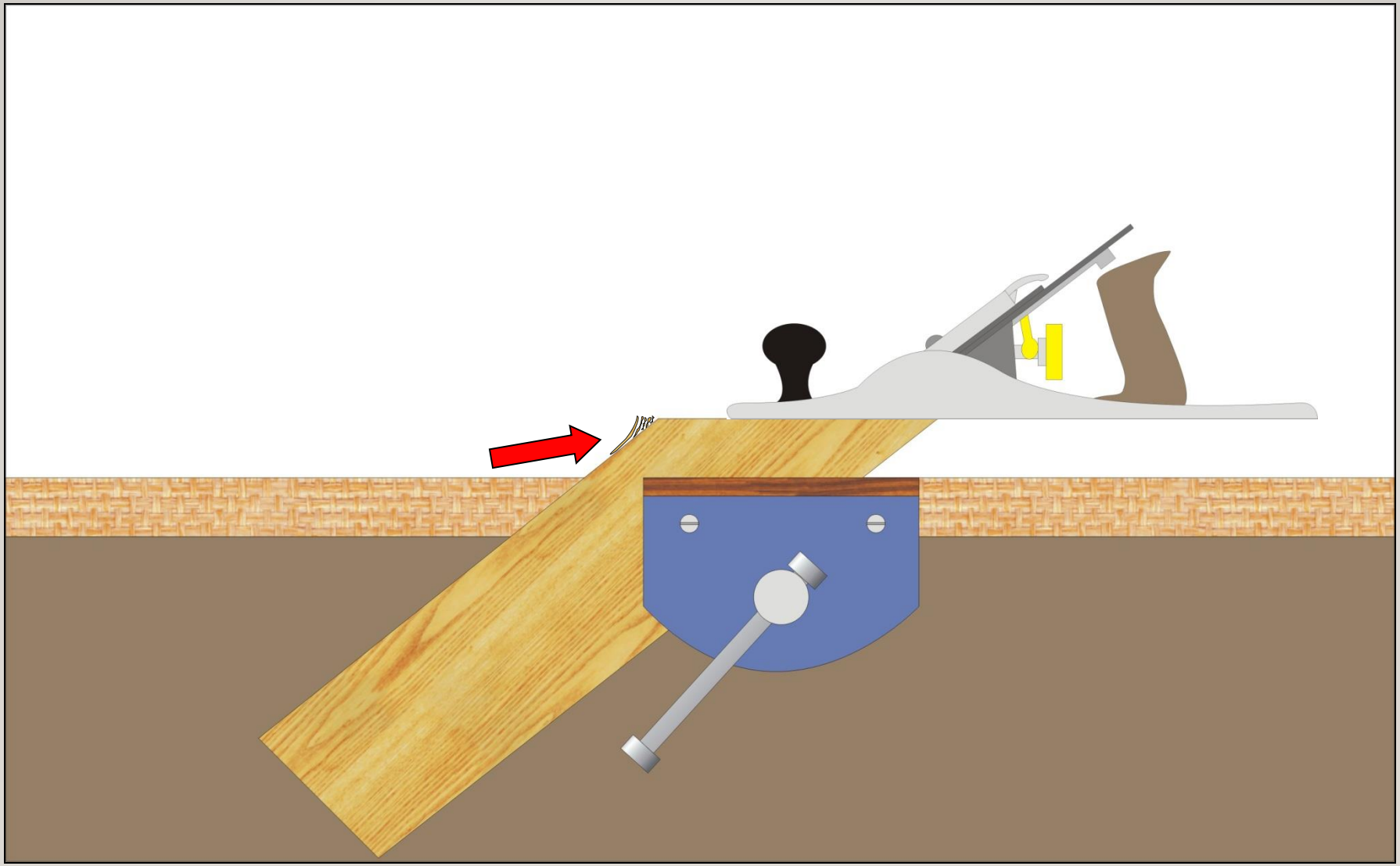
Wrong, If you planed in this direction there is a good chance that the wood could break and splinter here.



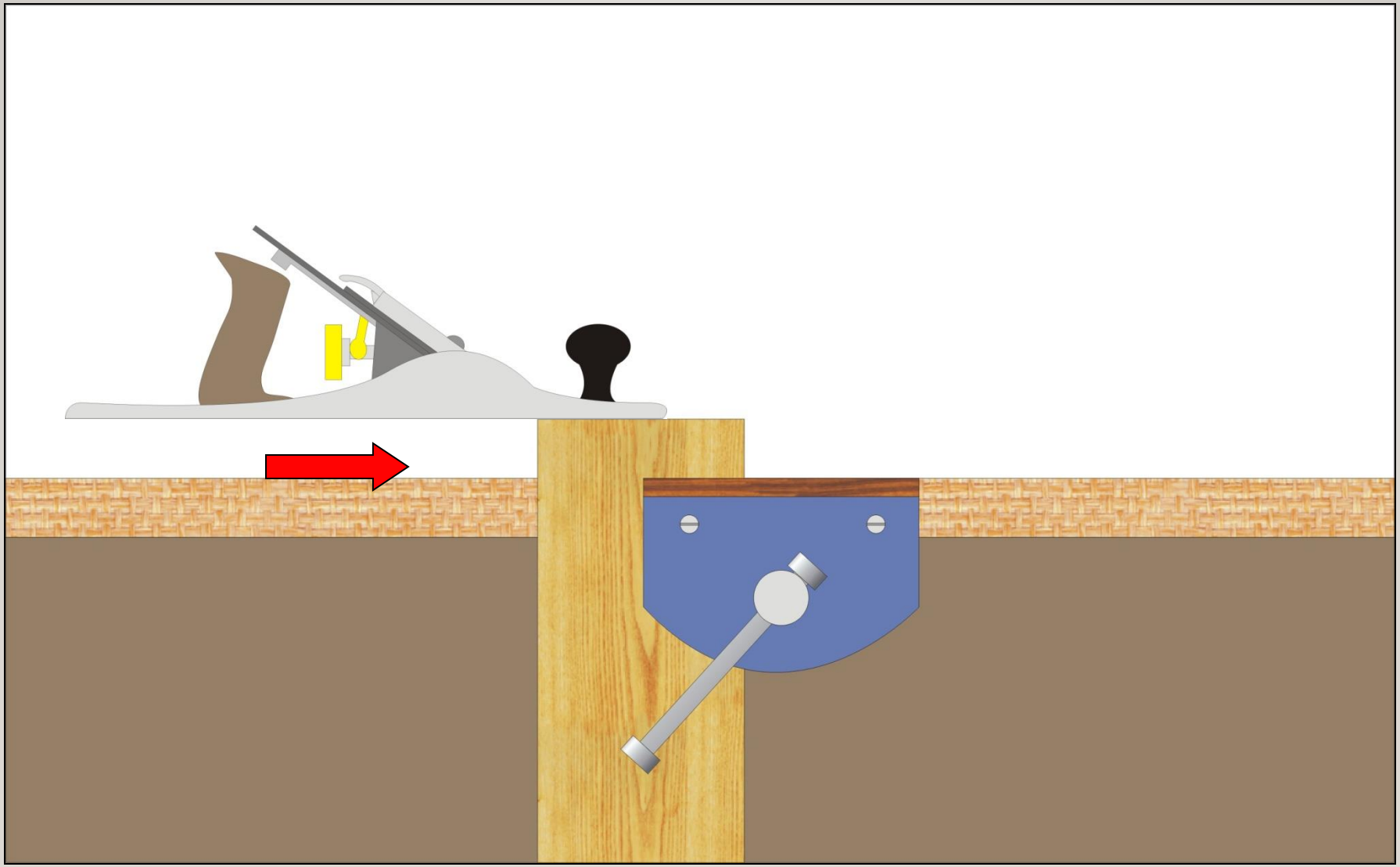
Always try to plane with the grain



Correct, always try to plane with the grain

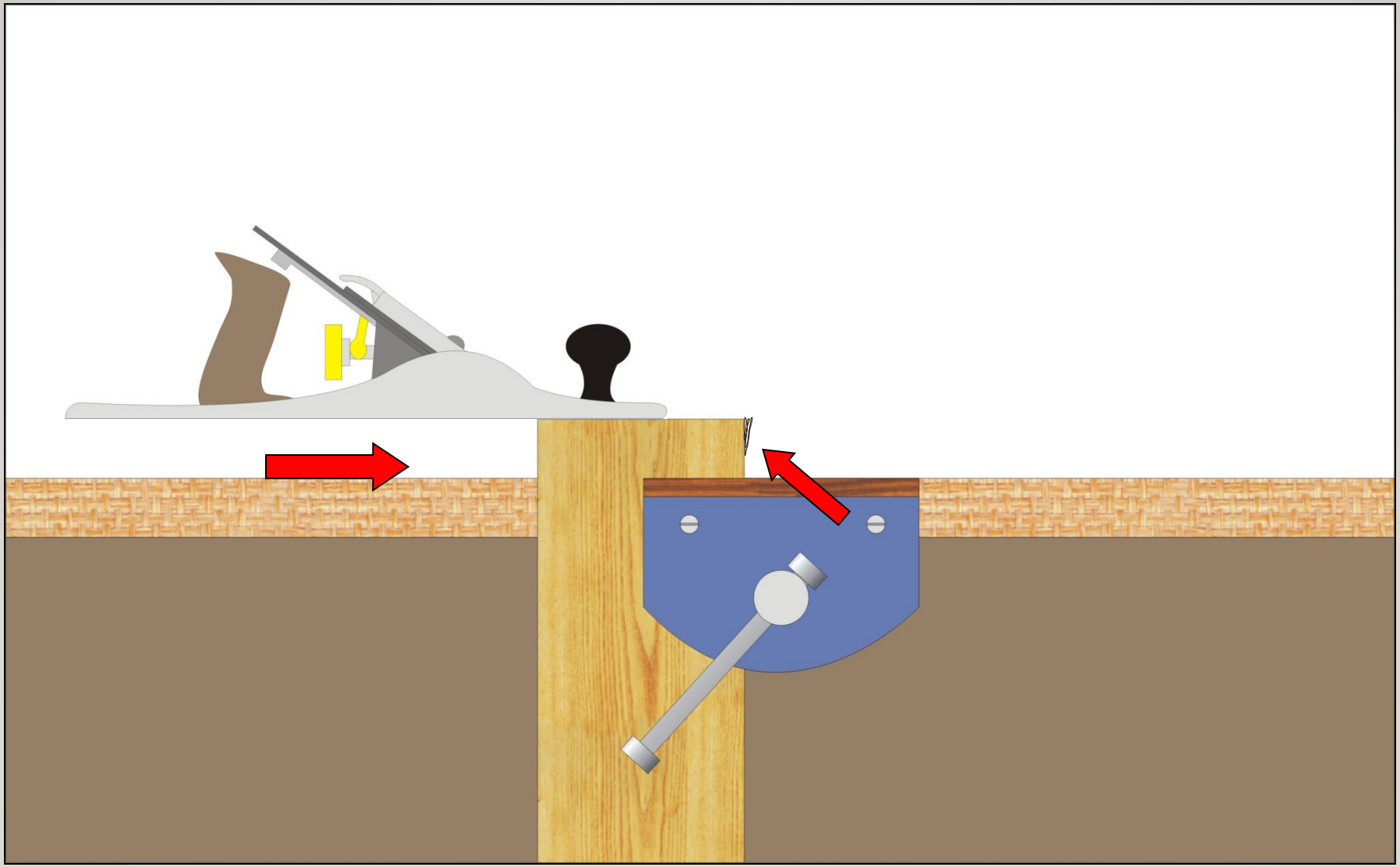


If you planed in this direction there is a good chance that the wood could break and splinter here.

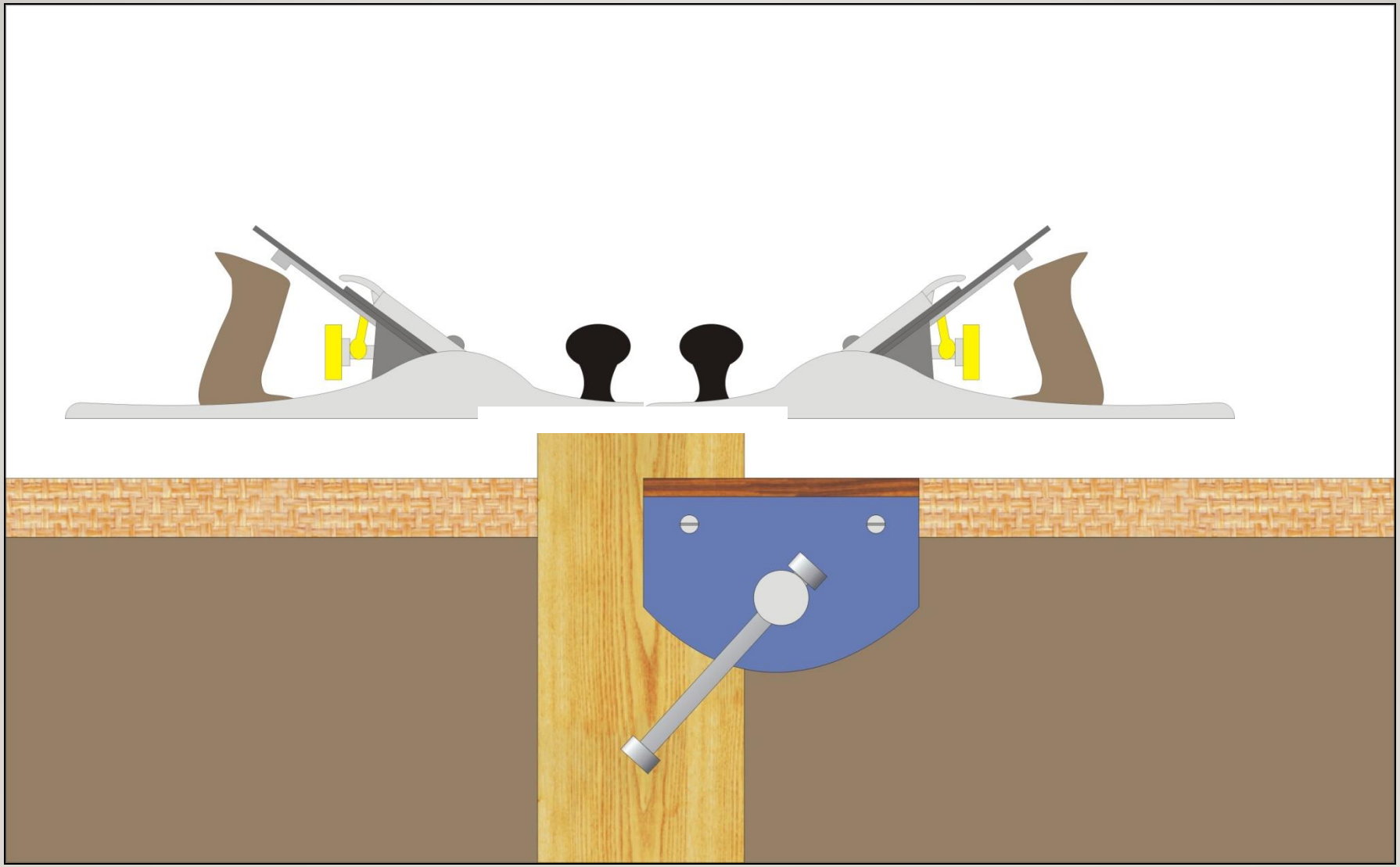


The Jack Plane can also be used to plane **end grain**. This process is a little more difficult and care must be taken not to split the end grain.

Q. What will happen if we plane in this direction?



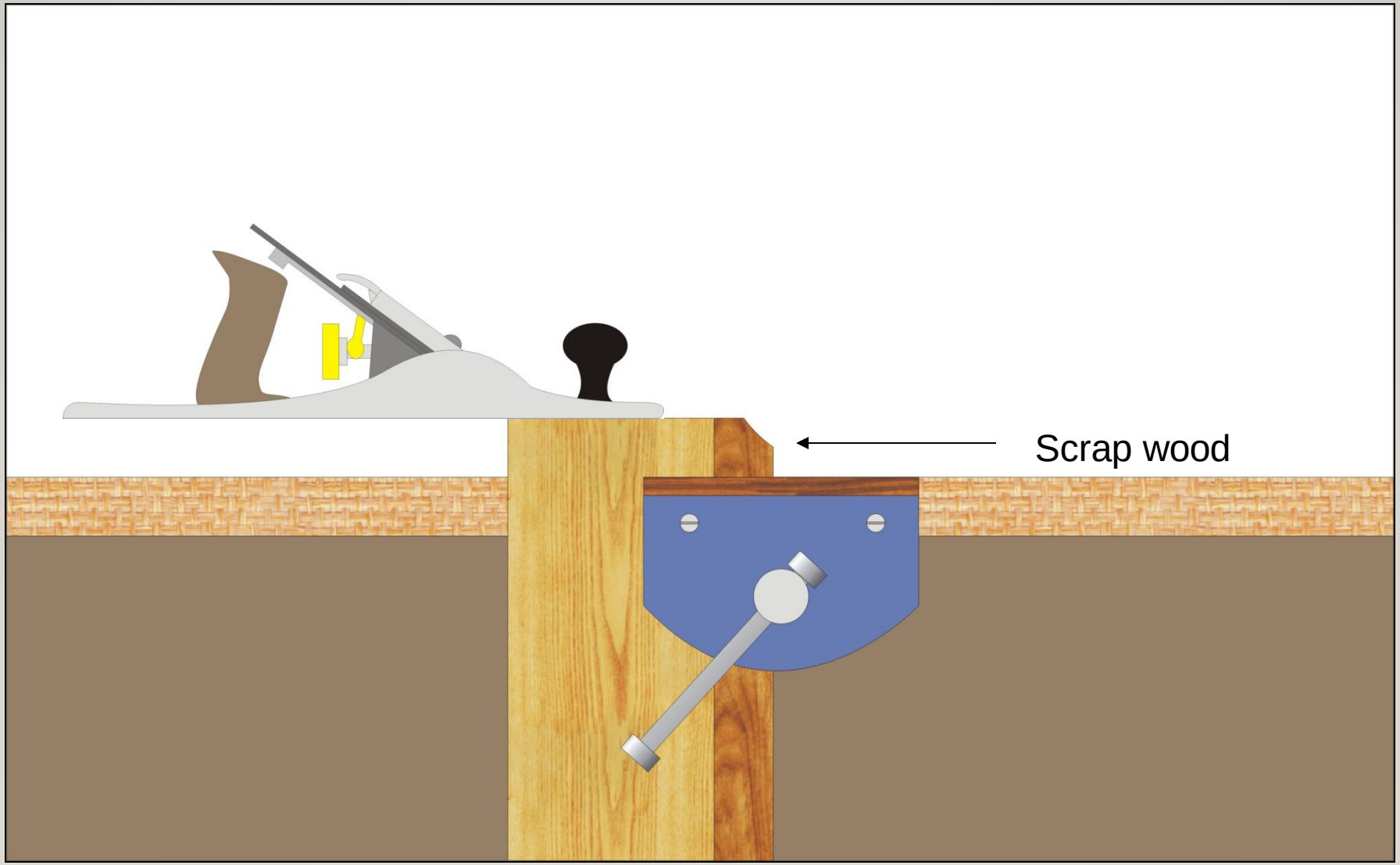
The **end grain** will Split



To avoid this problem you can

1) Only plane part of the end then turn the plane around

OR

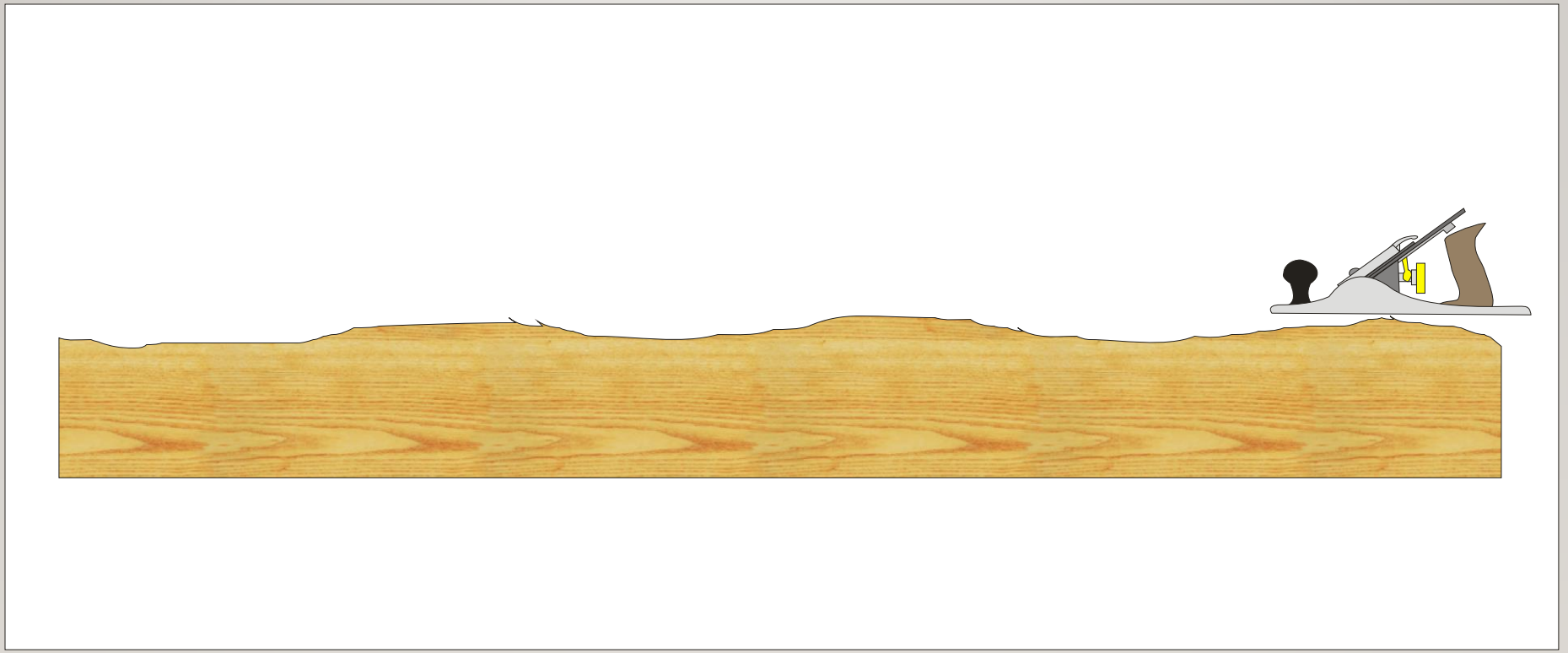


2) Put a piece of scrap wood behind the workpiece

TRY PLANE

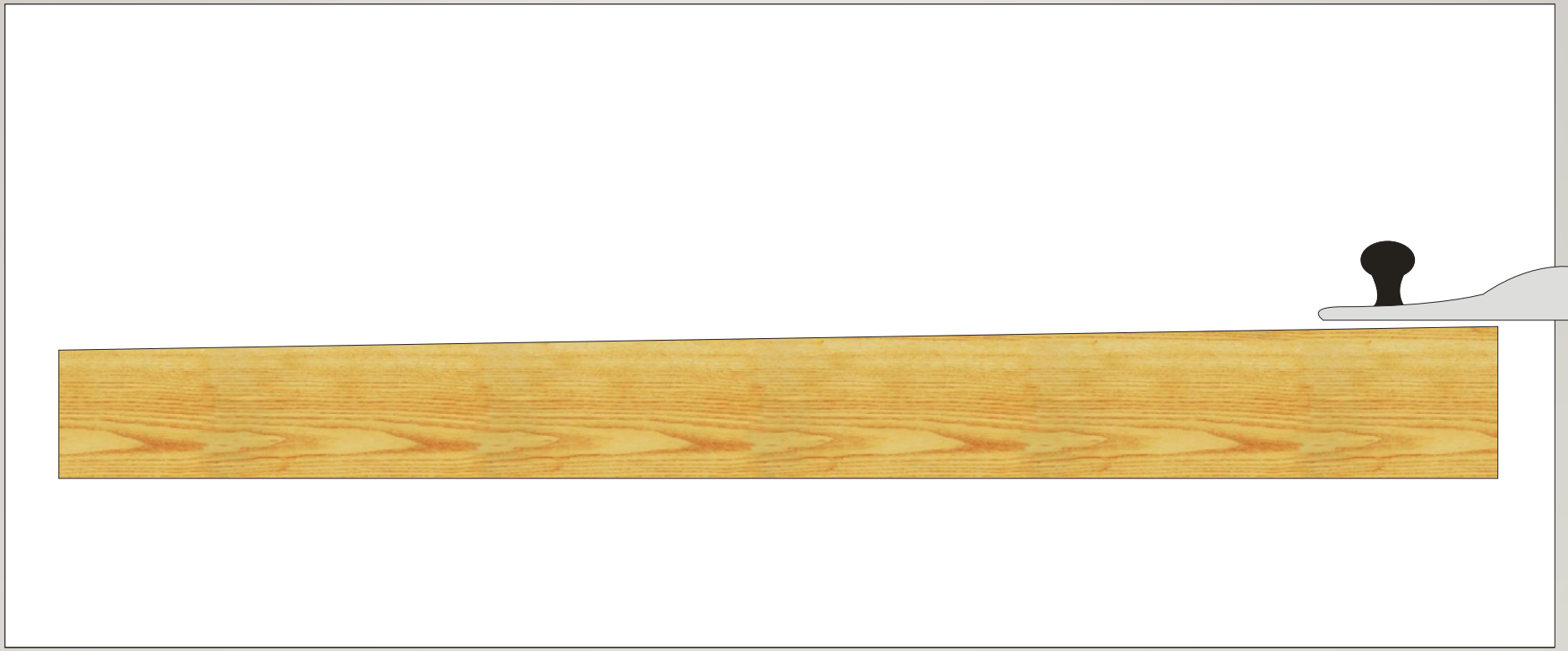
- The try plane (also known as the jointer plane or trying plane) is a type of hand plane used primarily to straighten the edges of boards in the operation known as jointing.A jointer plane may also be used to flatten the face of a board.

Smoothing Plane



While the smoothing plane can be used to plane the edges of long boards it is not the most effective tool as it tends to follow any curve on the board.

Try Plane



The correct tool for squaring the edge of such a board is the Try Plane. The extra length allows the plane to bridge the curves and produces a much better result

OPERATION TIPS FOR JACK, SMOOTHING AND TRY PLANES

- Setting depth: Turn the adjusting nut to push the cutting
- iron out(for a deeper cut) and pull it back (for a more
- shallow cut)
- Angle of cutting iron: Use the adjustment lever to set the
- cutting angle of the cutting iron.
- Planing with the grain
- Planing bevels or tapers at ends (planing off the wood not
- against the grain)

- Equipment checks
- Parts fit together with no loose components
- Adjustments lever/nut operate properly
- Sharpness/state of cutting iron (no chips and honed at
- correct angle)
- Sole of plane is smooth with no blemishes/cracks etc

PLOUGH PLANE

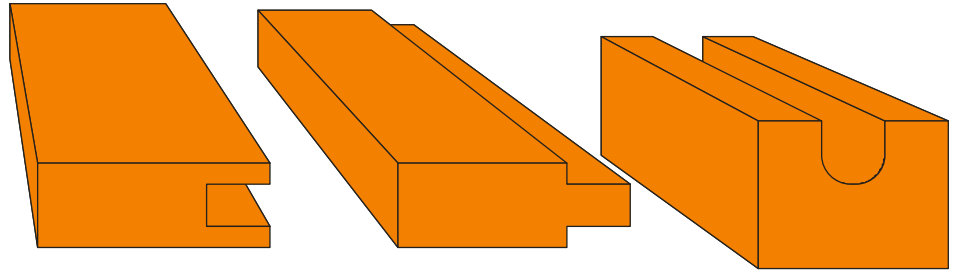
- A plough plane, grooving plane or plow plane is a plane to make grooves and (with some of the metal versions) small rabbets in wood. They are traditionally used for drawer bottoms or rear walls.

REBATE PLANE

- The rebate plane (also known as the rabbet plane) is designed to allow you to take a step or Rebate out of the edge of a piece of timber. (This might be to allow you to fit a base or back to a box)
- The size of the rebate can be adjusted by setting the Depth gauge and the Fence

COMBINATION PLANE

- The combination plane combines the functions of, rebate and grooving and moulding planes. It can be used for various tasks including grooving, rebating and cutting dados (housings) and tongue and groove joints.



OPERATION TIPS FOR REBATE, PLOUGH AND COMBINATION PLANES

- Setting depth of blade : Loosen lock nut, turn the adjusting nut to push
- the blade out(to remove more material) and pull it back (to remove
- less material), tighten lock nut
- Setting depth of cut: Loosen adjustment nut (depth gauge), set correct
- depth, tighten nut.
- Setting distance form an edge: Loosen adjustment nuts for fence, set
- distance between fence and blade, tighten nuts.

- Equipment checks
- Parts fit together with no loose components
- Adjustments nuts operate properly
- Sharpness/state of blade (no chips and honed at correct angle)
- Body/fence/skate of plane is smooth with no blemishes/cracks etc

BLOCK PLANE

- A **block plane** has many other **uses** in woodworking. Typically, it is used for cleaning up components by removing thin shavings of wood in order to make a component fit within fine tolerances. Chamfering (angling square edges) and removing glue lines are some of the other **uses** woodworkers find for the **block plane**.

BULL NOSE PLANE

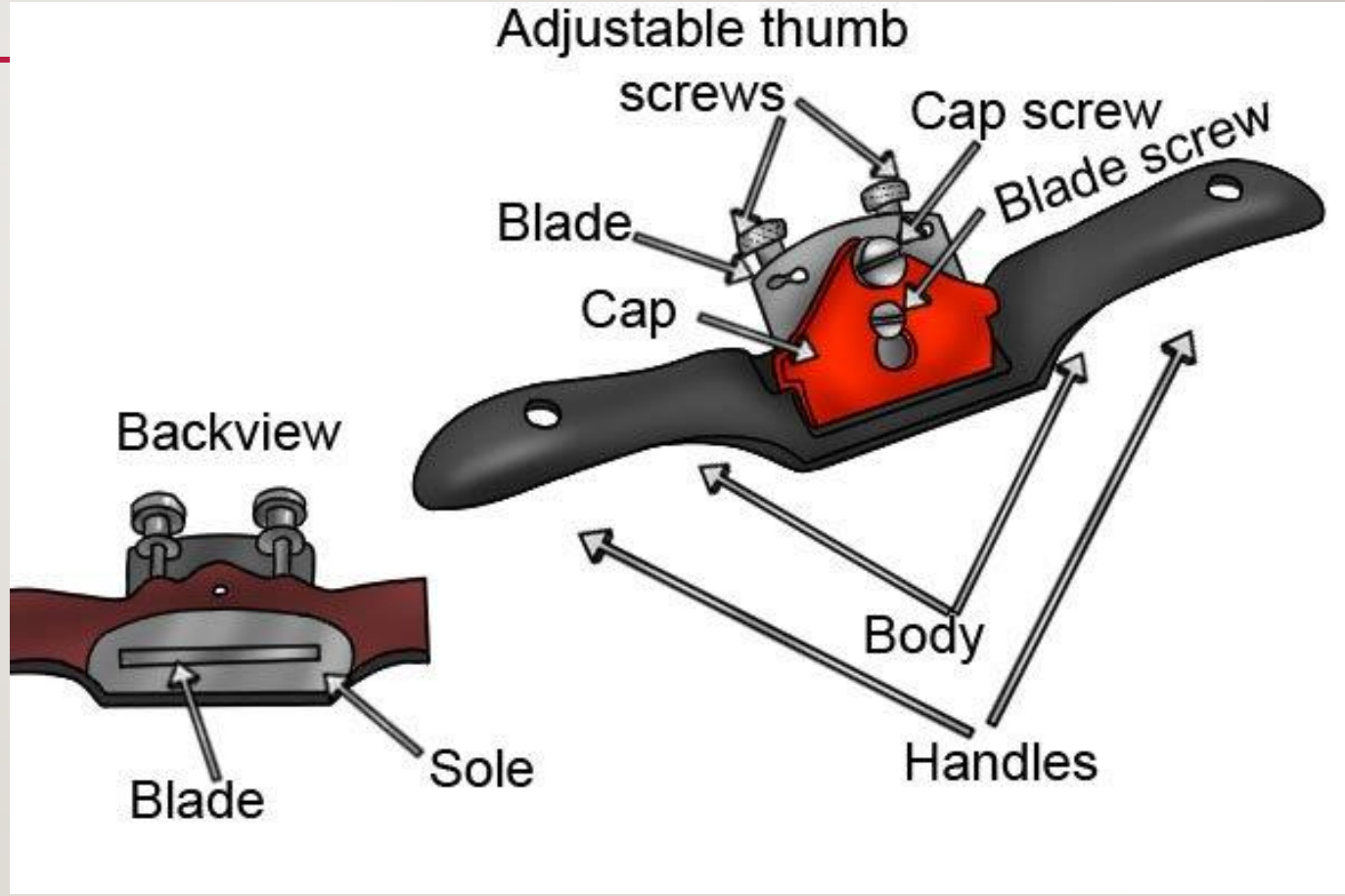
- The bullnose plane – so called because it has a front end that looks like a rounded nose – is a small plane with a very short leading edge to its body, so that it can be used in tight spaces. Most commonly, it is either a shoulder or rebate plane that can be used to plane almost right into corners.

SHOULDER PLANE

- Like a **rebate plane**, the **shoulder plane's** blade extends, therefore cuts, to the full width of the tool. The **shoulder plane** is used to trim the **shoulders** and faces of tenons. It is used when it is necessary to trim right into the concave corner where two surfaces of the same piece of wood meet perpendicularly.

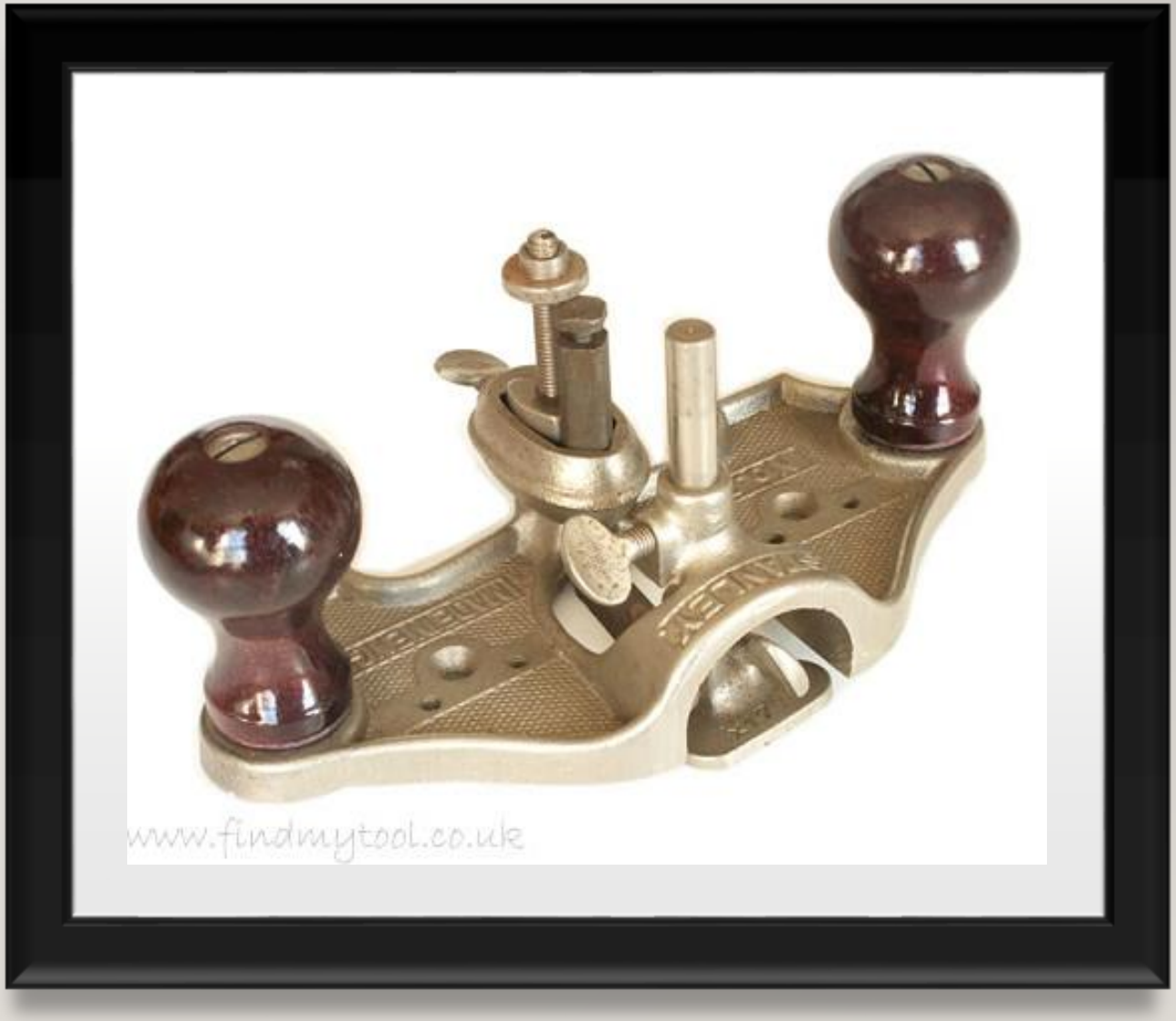
SPOKESHAVE

- A **spokeshave** is a tool used to shape and smooth woods in woodworking jobs such as making wheel cartwheel spokes, chair legs, paddles, bows, and arrows. Historically, a **spokeshave** was made with a wooden body and metal cutting blade.



HAND ROUTER

- A Hand Router, also known as a **Granny's Tooth,** Old Woman's **Tooth** Router, or a Depthing Router. The tool is **used** for routing out housing waste, cleaning the bottom of wide grooves below the surface of the wood, and for depthing a flat recess in a carved design

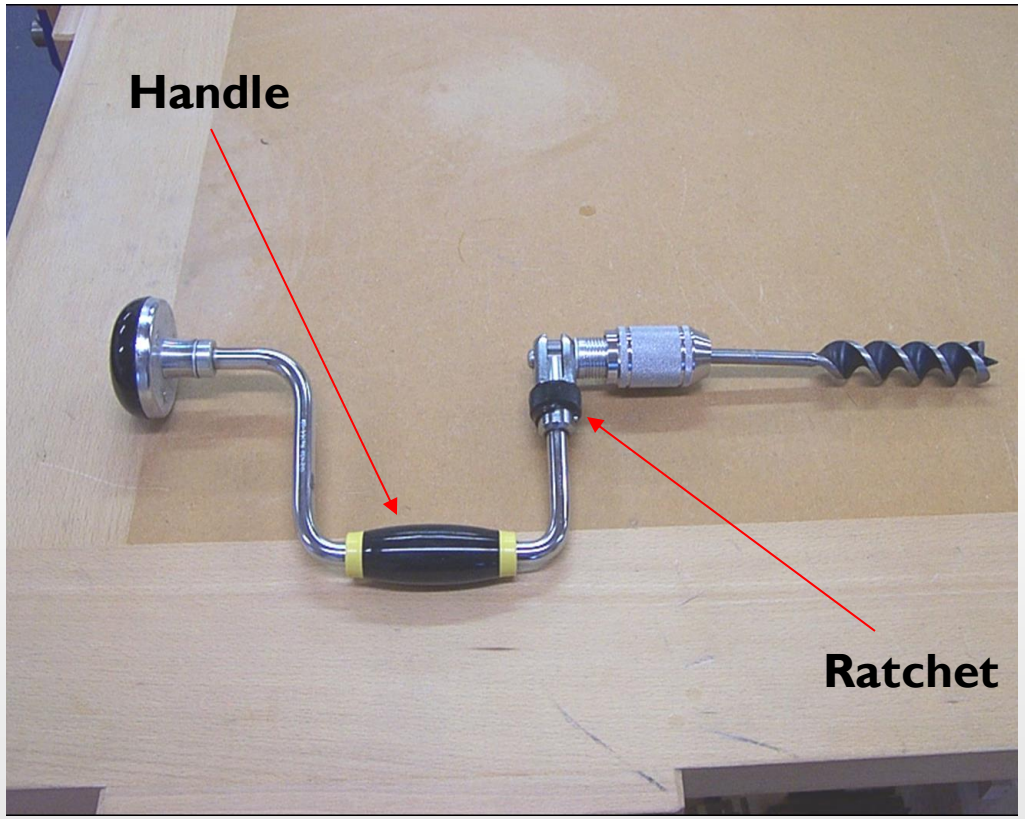


HAND DRILL

- The Hand Drill can be used to drill small holes (up to 8mm)
- It is useful for holding a countersink bit

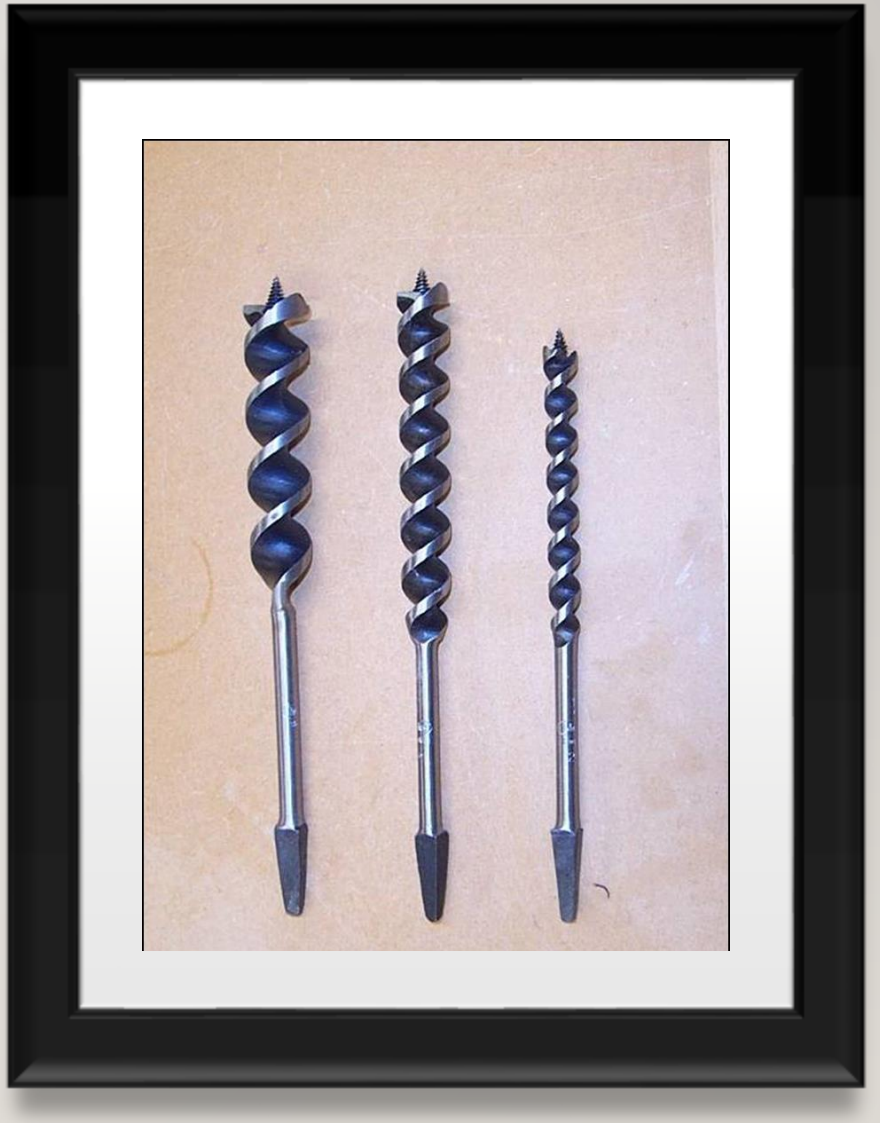
CARPENTERS BRACE & BIT

- The Carpenters Brace can be used to drill large diameter holes through wood. Auger Bits are available in a wide range of Lengths and Diameters
- The ratchet mechanism allows you to drill a hole where the sweep of the handle is otherwise restricted (in a corner or beside a wall)



AUGER BIT

- The Auger Bit has a square taper shank. This can only be fitted into a Carpenters Brace.




XR
CUTTING OUT
MACHINE AND POWER
TOOLS

CUTTING OUT MACHINE AND POWER TOOLS

LEARNING INTENTIONS

- To **name** the different cutting out machine and power tools we will be required to use during this course
- To **name** their different parts
- To **state** their uses
- To use them **correctly and safely**

SUCCESS CRITERIA

- I can **state** the name of **Some/Most/all** of the cutting out machine and power tools
- I can **name** the different parts to **Some/Most/All** of the cutting out machine and power tools
- I can **state** the uses of **Some/Most/All** of the cutting out machine and power tools
- I can use **Some/Most/All** of the cutting out machine and power tools **safely and correctly**

POWER TOOLS

DRILLS AND DRILLING

PILLAR DRILL

- The Pillar Drill can be used to drill wood, metal, and plastic. As a general rule the larger the hole you are trying to drill the slower the drill should rotate.
- When using this (or any other machine) it is important to read the safety notice on the wall to make sure you understand how to use the machine safely.
- When using the Pillar Drill you must
  - Wear Goggles
  - Tie any long hair back
  - Tuck in any loose clothing

ADDITIONAL PARTS

HEALTH AND SAFETY WITH THE PILLAR DRILL

- Safety checks before using the pillar drill:
- No damage to Cables etc…
- Speed of machine
- Drill bit inserted correctly and tightened
- Workpiece is secured properly
- Table height is set and secured
- Depth of cut is set
- Guards are in place and operational

- Health & Safety precautions during use:
- PPE equipment; Goggles, ear protection
- Dust extraction / dust mask
- No loose clothing/jewellery
- Long hair tied back etc….

POWER DRILLS

- There are 2 common types of portable power drill.
  - Corded drill - which needs to be connected to a power source.
  - Cordless drill - which operates using a rechargeable battery.
- Both types of drill could have either a key operated chuck or keyless chuck.
- Most power drills have a variety of drilling speeds and some offer 2 types of 'action'. The speed and action depend on the material being drilled and the size/type of drill bit. The 2 types of action are; drilling and hammer. Hammer action is often used when drilling into brick or concrete materials.

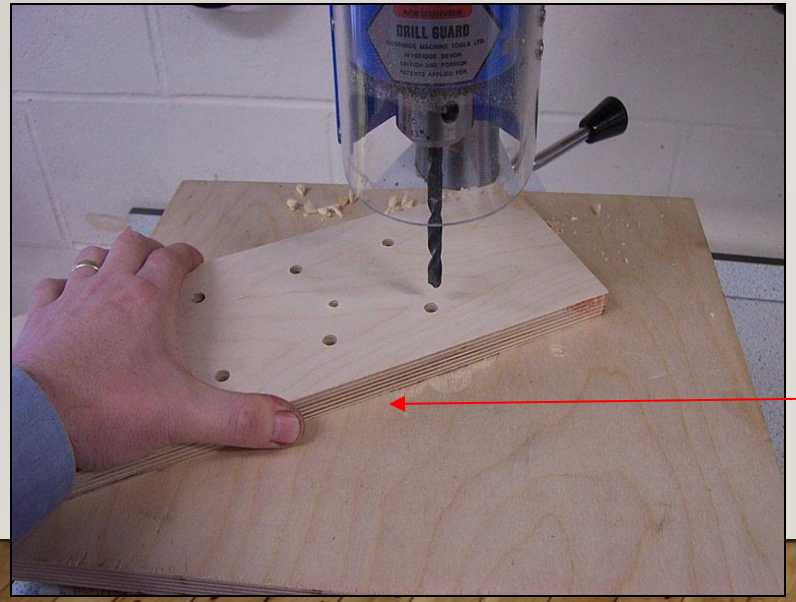
HEALTH AND SAFETY WITH THE POWER DRILLS

- Safety checks before connecting the drill to a power source:
- No damage to Cables, casing, transformer etc…
- Battery is charged as required (cordless only)
- Drill bit is inserted and tightened correctly
- Workpiece is secured properly
- For depth of cut, drill bit is marked or depth stop is set
- Speed and action are set

- Health & Safety precautions during use:
- PPE equipment; Goggles, ear protection
- Dust extraction / dust mask
- No loose clothing/jewellery
- Long hair tied back etc….
- Be aware of your workzone. Keep it clutter free and have awareness of other workers in your area

DRILLING WOOD

For drilling smaller pieces of wood you should use a machine vice



Machine Vice

When drilling larger pieces of wood it is safe to hold the wood securely with your hand

DRILL BITS

- Twist Drills
  - (Used for drilling wood, metal and plastic)
- Reduced Shank Twist Drill
  - (As above but reduced shank allows larger drill bits to be fitted in a chuck)
- Dowel bit
  - (Used to drill clean holes in wood for dowel joints)
- Spade Bit
  - (Used for drilling large holes in wood)
- Masonry Bit
  - (Used to drill holes in concrete)
- Forstner Bit
  - (Used to drill clean flat bottomed holes in wood. Available in a wide range of sizes 6 – 50mm)

TWIST DRILLS

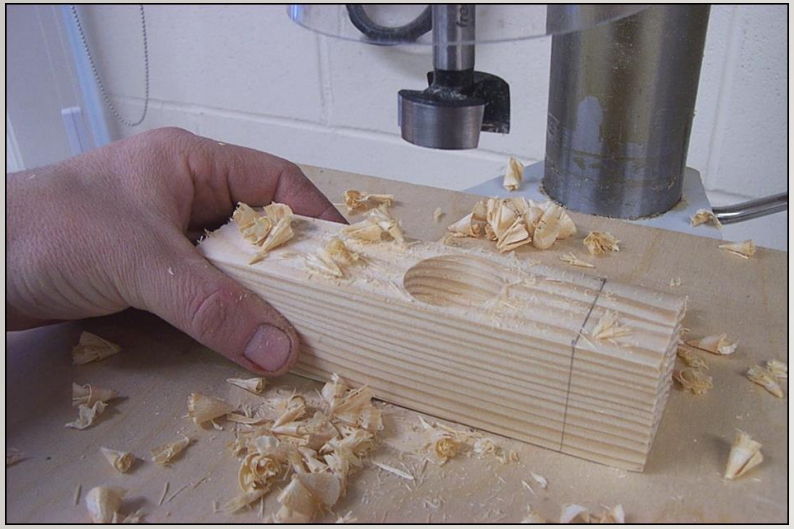
- Twist Drills are available in a wide range of sizes. In the school workshop they range from 1, 1.5, 2, 2.5, 3, …….12.5, 13mm
- They are used to drill wood, metal and plastic.

SPADE / FLAT BITS

- Flat bits are used for drilling holes in wood only.

The main advantage flat bits have over other types of drill are.

- They are easy to sharpen
- They cost less.
- Flat bits are available in a wide range of sizes.



FORSTNER BITS

- Forstner bits are used for drilling holes in wood only. The main advantages of this type of drill bit are.
- Forstner Bits produce a very smooth cut that requires little finishing.
- Forstner Bits produce a flat-bottomed hole.
- As shown below Forstner bits are available in a wide range of sizes.

HOLE SAWS

- Hole saws can be used to cut hole in thin sheet material. (Wood, Metal and Plastic) This tool is traditionally used by Plumbers to drill holes in water tanks etc. (When drilling metal oil must be used to help keep the blade cool and the work piece must be clamped to the table)
- As you can see from the shape of the scrap wood the hole saw can also be used to make wheels.

COUNTER SINK BIT

- The Countersink Bit is used to countersink holes for countersunk screws
- The Countersink bit can be used in a hand drill, pillar drill or Cordless drill

Masonry Bits

4kg SDS Hammer Drill

Masonry drills are used to drill holes in concrete. They are generally made from toughened steel with a Tungsten tip.

The picture above shows a powerful hammer drill suitable for drilling large holes in concrete.

MACHINE TOOLS FOR CUTTING OUT A MORTISE

- Mortise Machine
- The square chisel mortiser (also called hollow chisel mortiser) combines the cutting of a four-sided chisel with the action of a drill bit in the center. The bit clears out most of the material to be removed, and the chisel ensures the edges are straight and clean.

HEALTH AND SAFETY WITH THE MORTISE MACHINE

- Safety checks before using the mortising machine:
- No damage to Cables, Cutting Tool etc…
- Mortise bit inserted correctly and fit for purpose
- Workpiece is secured properly
- Depth of cut is set
- Guards are in place and operational

- Health & Safety precautions during use:
- PPE equipment; Goggles, ear protection
- Dust extraction / dust mask
- No loose clothing/jewellery
- Long hair tied back etc….

POWER TOOLS

SANDERS

BELT SANDER

- A **belt sander** or **strip sander** is a **sander** used in shaping and finishing wood and other materials. It consists of an electric motor that turns a pair of drums on which a continuous loop of sandpaper is mounted.

DISC SANDER

- The **Disk Sander** is used to smooth materials such as woods and plastics. It is also used to remove small amounts of waste material. It is a dangerous machine if safety is ignored.

HEALTH AND SAFETY WITH THE BELT AND DISC SANDERS

Safety checks using the sander:

- No damage to Cables etc…
- Sanding surfaces are in good working order.
- There should be a very small gap (nearly but not touching)
- between the table and sanding surfaces
- Guards should be set with minimum clearance of workpiece.
- Extraction is in good working order.

Health & Safety precautions during use:

- PPE equipment; Goggles, ear protection
- Dust extraction / dust mask
- No loose clothing/jewellery
- Long hair tied back etc….
- Workpiece is placed flat on the table.

ORBITAL SANDER

- Preparing a surface before and after painting. With the vibrations in tiny circles, the random **orbital sander** is **used** for ultra-smooth **sanding**.
- The Orbital Sander is used to sand wide flat boards
- And should not be used to sand edges (use a Jack Plane to finish an edge)

PORTABLE BELT SANDER

- A **portable belt sander** is a powerful and aggressive **sander**, designed to strip wood as fast as possible. They consist of a pair of drums that turn a loop of sandpaper that's been fitted around them. Sometimes, they're **used** as **handheld** tools and moved across the surface of the wood.

HEALTH AND SAFETY WITH THE POWER HAND SANDERS

Safety checks using the sander before connecting to a power source:

- No damage to Cables, casing, transformer etc…
- Sanding pad is correctly fitted with no rips or tears to the sand paper.
- Workpiece is secured properly
- Correct speed is set
- Dust bag is attached correctly

Health & Safety precautions during use:

- PPE equipment; Goggles, ear protection
- Dust extraction / dust mask
- No loose clothing/jewellery
- Long hair tied back etc….
- Be aware of your workzone. Keep it clutter free and have awareness of other workers in your area.

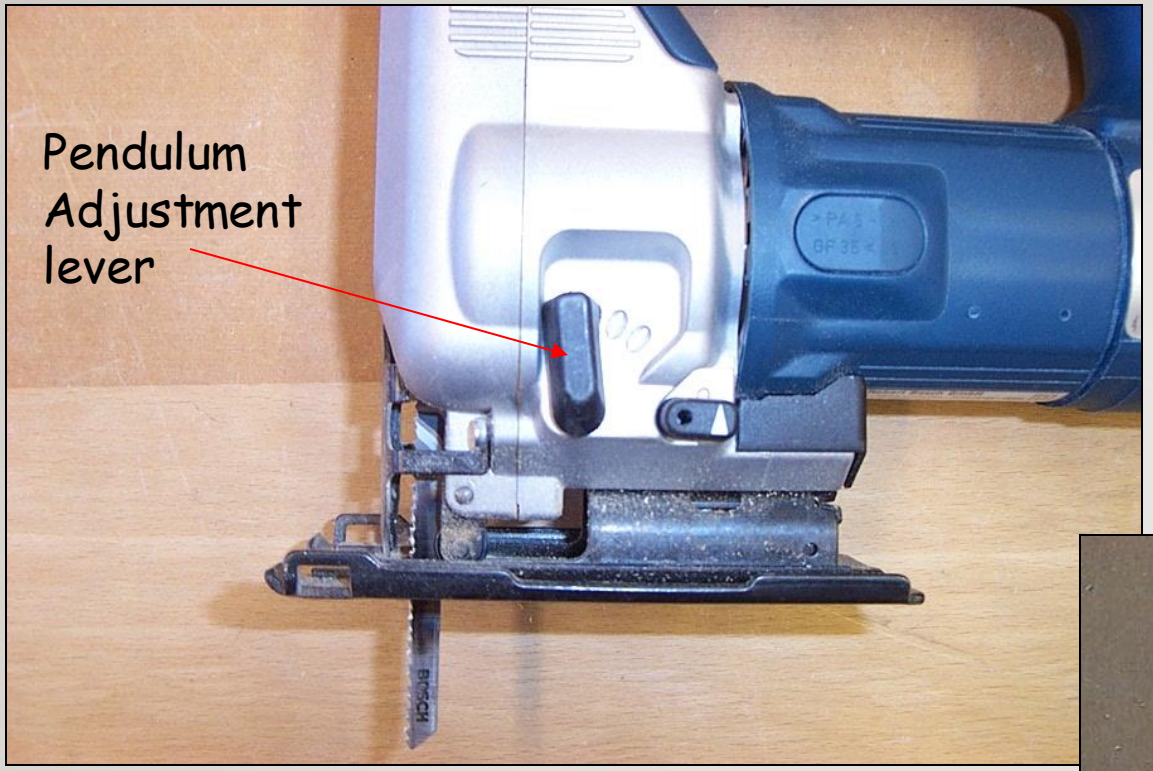
POWER TOOLS

JIG SAW

JIGSAW

- **Jigsaws** are ideal for cutting curves and complex shapes in wood.
- They also work well for making short crosscuts on a board and finishing inside corner cuts that you start with a circular saw.
- **Jigsaws** are not good for making fast, long, straight cuts.

Jig Saw



Blades are available for a wide range of materials- Hardwoods, softwoods, man made boards and even metal cutting blades.

When using the Jig saw first choose an appropriate blade for the material you are cutting.

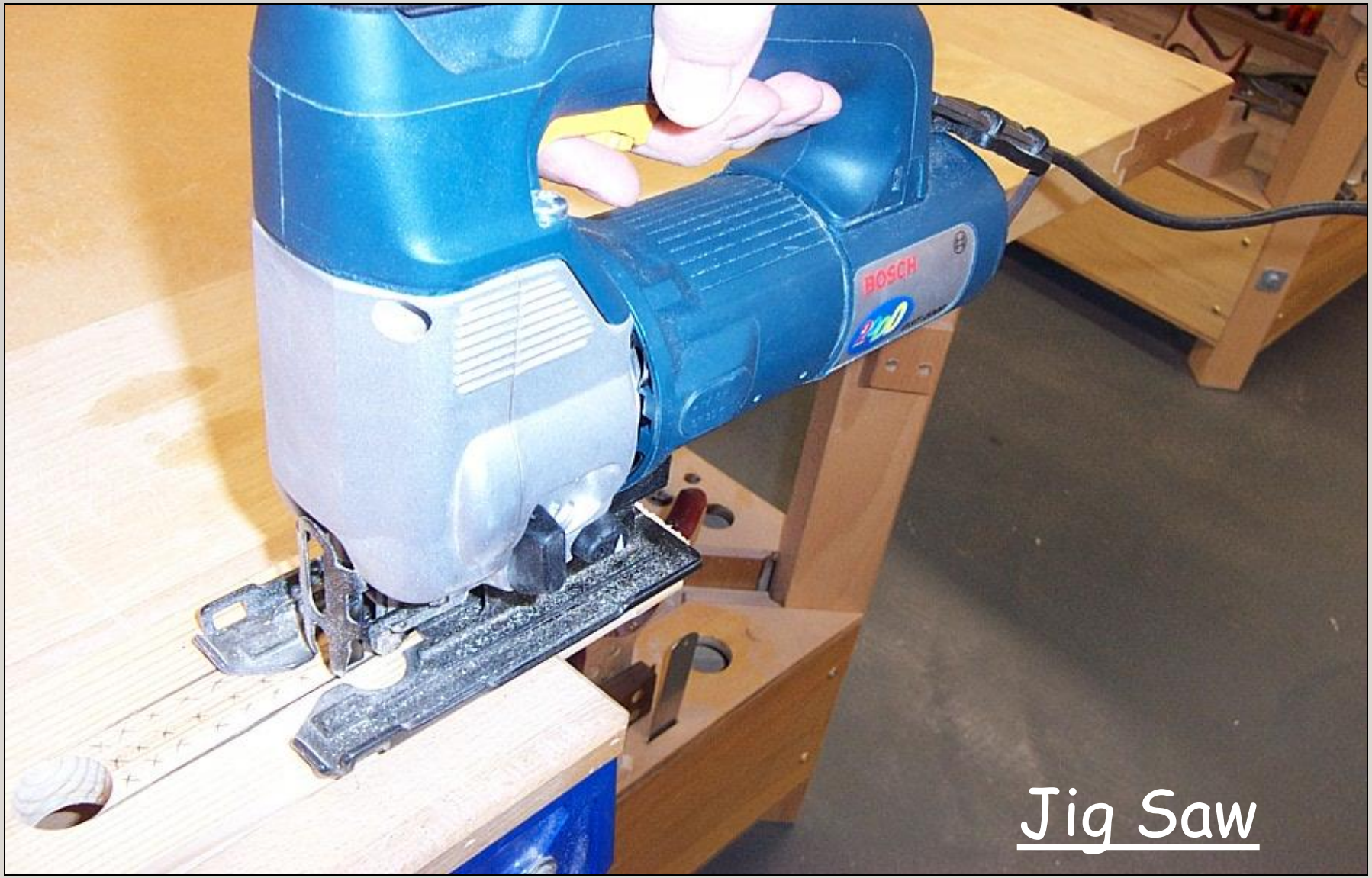
Next set the Pendulum adjustment lever

0 for a Slow fine finish

3 for a Fast rough finish

Jig Saw

The Jig saw can be used to cut simple curves in a variety of materials. When using this tool great care must be taken not to cut through the workpiece and into the desk



Jig Saw

After drilling some holes the Jig saw can also be used to cut out internal shapes

HEALTH AND SAFETY WITH THE JIGSAW

Safety checks using the sander before connecting to a power source:

- No damage to Cables, casing, transformer etc…
- Blade is correctly fitted with no damage to teeth etc.
- Workpiece is secured properly
- Speed set
- Adequate clearance space for the blade (at its extended length) below the workpiece.

Health & Safety precautions during use:

- PPE equipment; Goggles, ear protection
- Dust extraction / dust mask
- No loose clothing/jewellery
- Long hair tied back etc….
- Be aware of your workzone. Keep it clutter free and have awareness of other workers in your area.

WOOD TURNING LATHE

- **Woodturning** is the process of carving a block of **wood** into a symmetrical object, such as a **wood** spindle or **bowl**, while **using** a motor-driven **lathe** to spin the **wood** at high speed while cutting tools, including a variety of chisels and knives, gradually carve the piece into the desired shape.

WOOD TURNING LATHE

LEARNING INTENTIONS

- To **use** the lathe **safely and securely**
- To **identify** the parts of the lathe
- To **name** the tools used on the lathe
- To **recall** the steps in preparing a blank
- To **prepare** a blank and fit it in the lathe

SUCCESS CRITERIA

- I can **identify Some/Most/All** of the different parts of the lathe.
- I can **name Some/Most/All** of the tools used in turning.
- I can **identify Some/Most/All** of the safety checks to be made to the lathe before I start turning.
- I can **recall Some/Most/All** of the steps in preparing a blank

TURNING & THE WOODWORK LATHE

- A **lathe** is a machine tool that rotates a workpiece about an axis of rotation to perform various operations such as cutting, sanding, knurling, drilling, deformation, facing, and **turning**, with tools that are applied to the workpiece to create an object with symmetry about that axis.

TURNING & THE WOODWORK LATHE

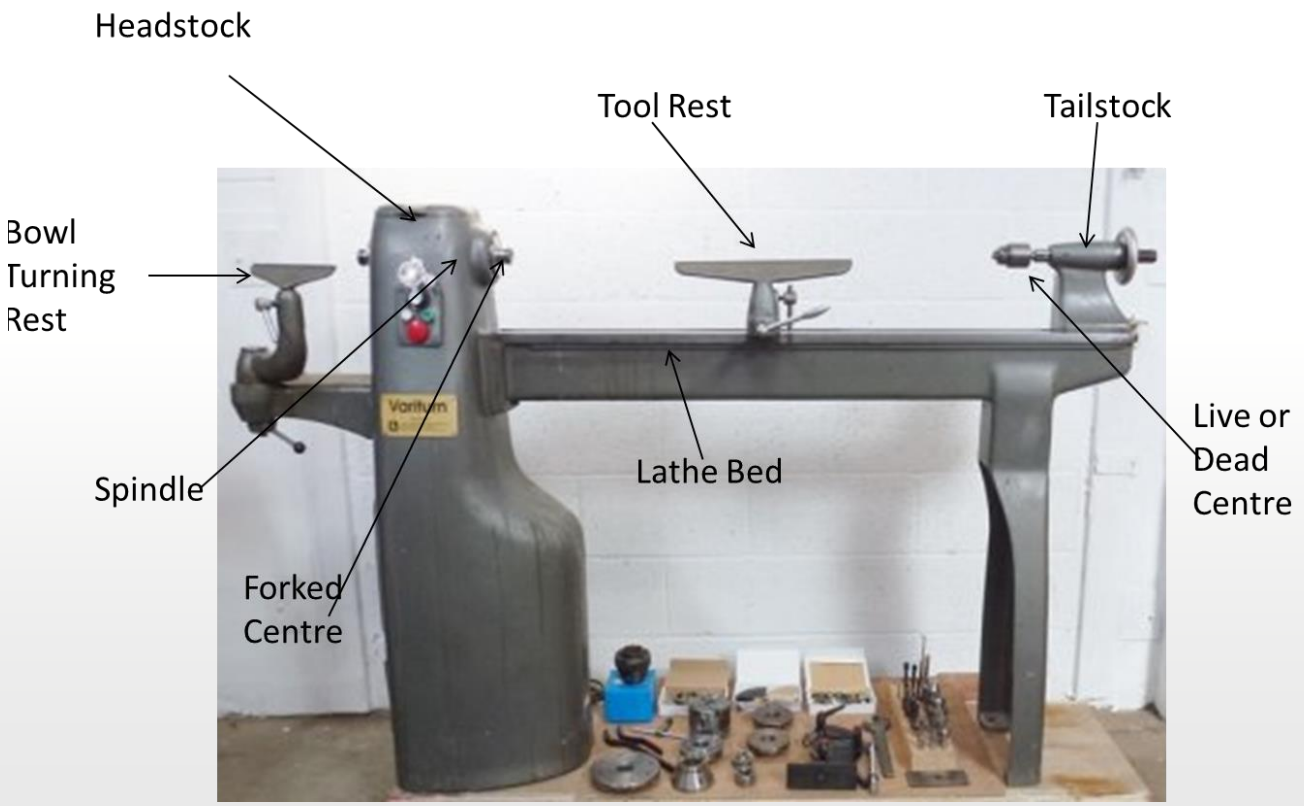
Safety checks using the wood lathe:

- No damage to Cables etc…
- Speed of machine
- Workpiece is secured properly
- Workpiece spins through central axis
- Small gap between Workpiece and tool rest (workpiece spins freely with no obstructions)
- Lathe tools/centres are sharp and fit for purpose

Health & Safety precautions during use:

- PPE equipment; Face mask, ear protection
- Dust extraction / dust mask
- No loose clothing/jewellery
- Long hair tied back etc….

PARTS OF THE LATHE



ADDITIONAL PARTS

Forked centre

Dead Centre

Revolving centre

Jacobs chuck (3 jaw chuck) and chuck key

WHEN TURNING BETWEEN CENTRES THE WORK PIECE IS HELD BETWEEN A FORKED CENTRE AND A REVOLVING OR DEAD CENTRE

Headstock

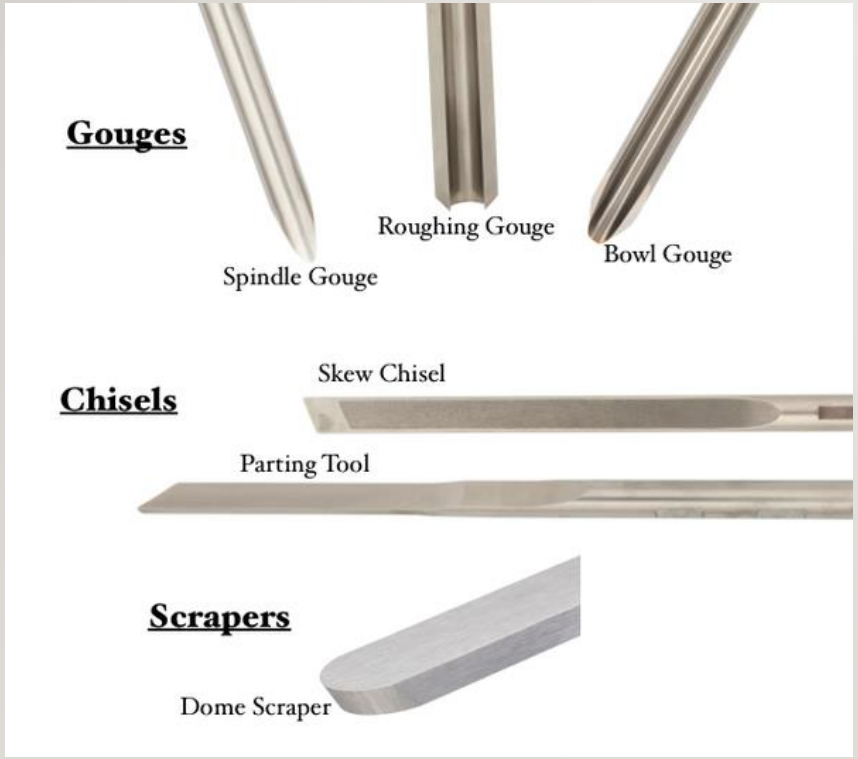
The headstock supports one end of the work piece. It contains the driveshaft as shown below.

The Headstock can be fitted with a Forked Centre to support one end of the work piece when turning between centres.

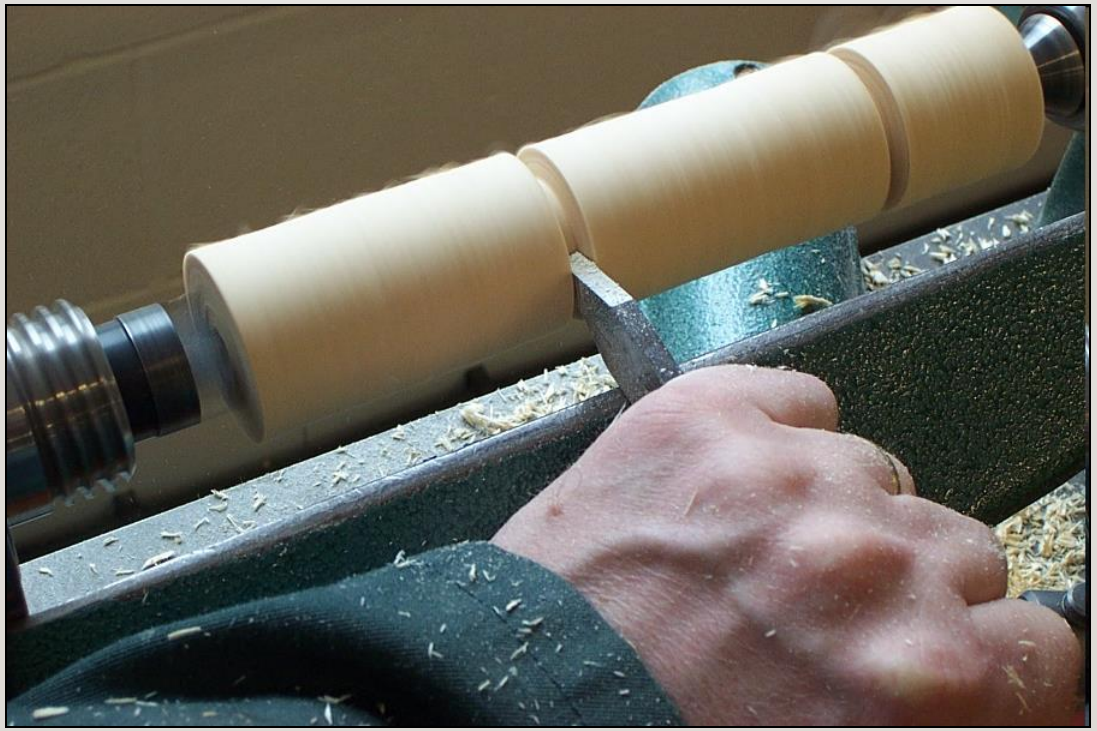

Tailstock Locking
Lever
Tailstock
The tailstock supports the other end of the work piece

TO SUPPORT THIS END A REVOLVING CENTRE OR DEAD CENTRE MUST BE FITTED IN THE TAILSTOCK.

TURNING TOOLS

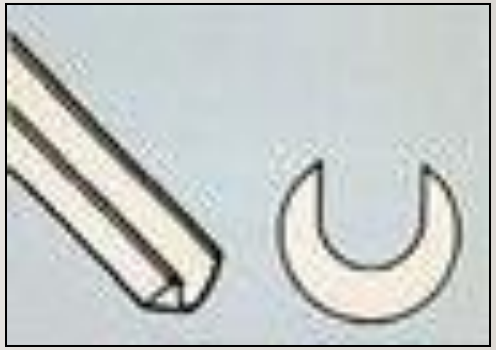


The Parting tool



The parting tool can be used to cut narrow slots in your work piece.

The Gouge



Cross Section

The Gouge utilises a slicing action and can be used for both roughing down and fine finishing

The Skew Chisel

The skew chisel can be used to produce a very smooth finish

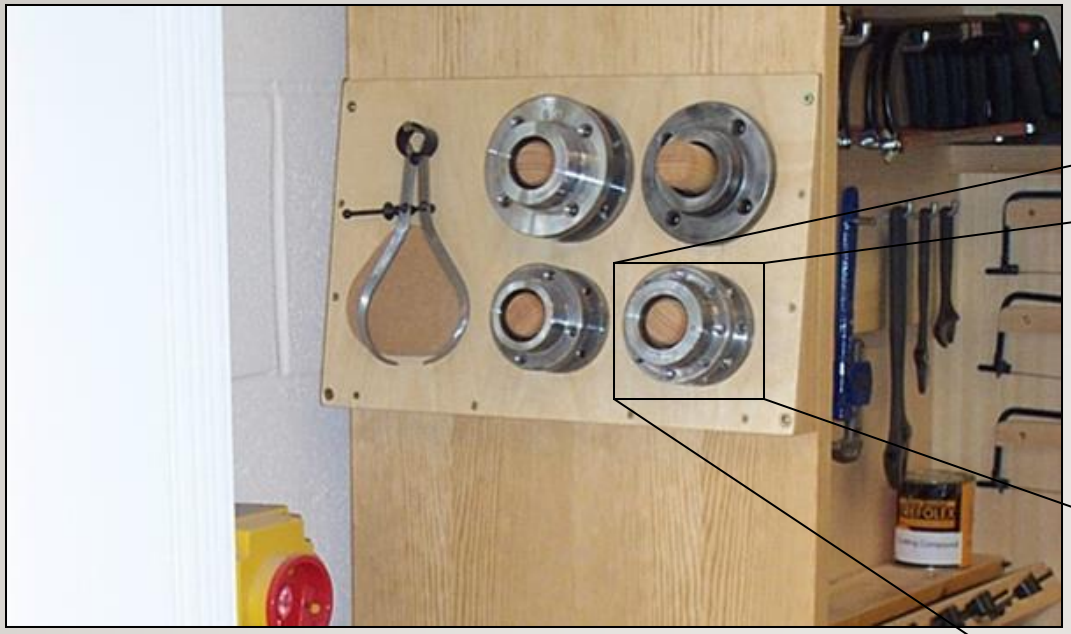
When using this tool remember only to use the bottom third of the blade

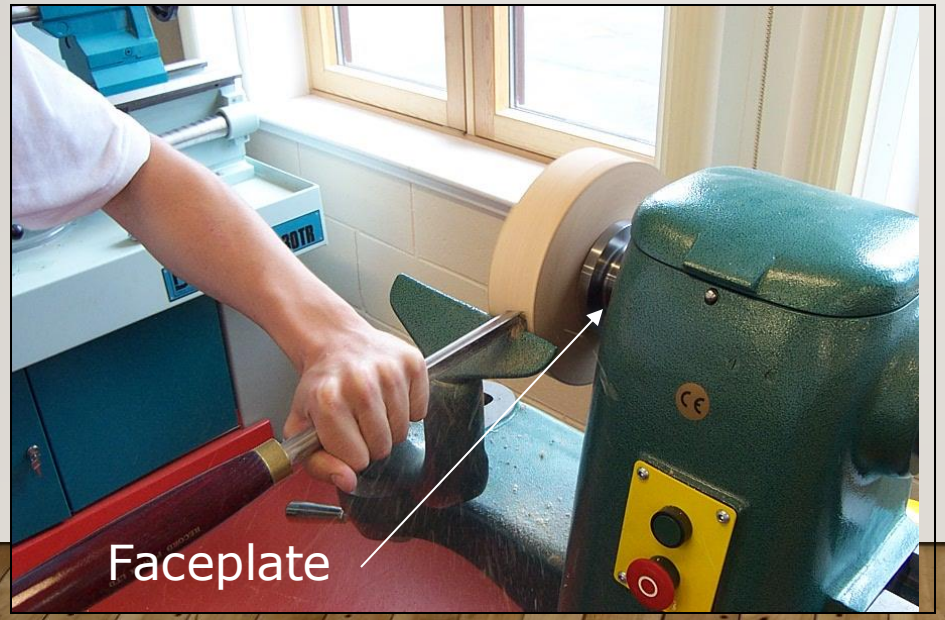
The Scraper

Scrapers are available in a wide range of shapes and sizes.

Scrapers are among the easiest lathe tools to use however as the name suggests the tool scrapes rather than cuts and can leave a rather rough finish.

The Faceplate



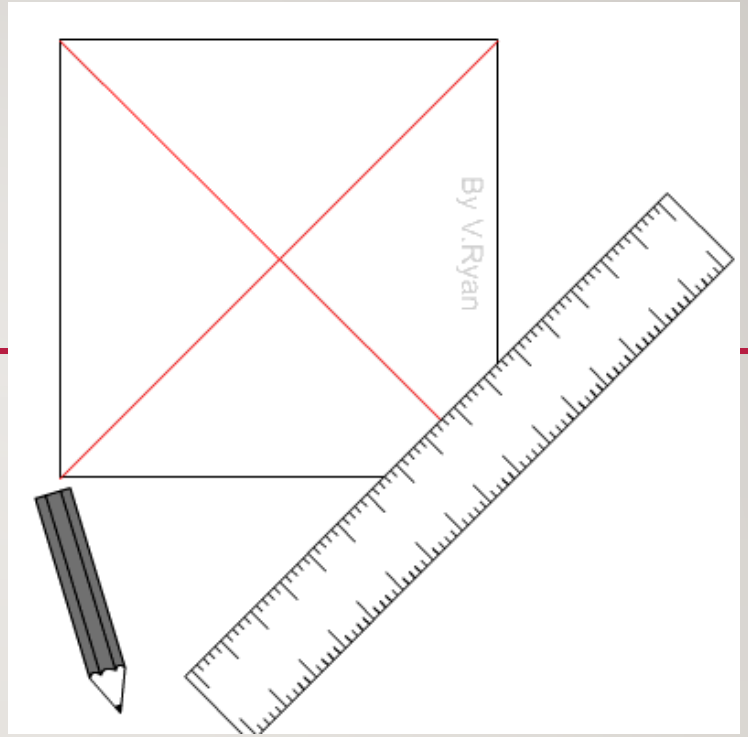


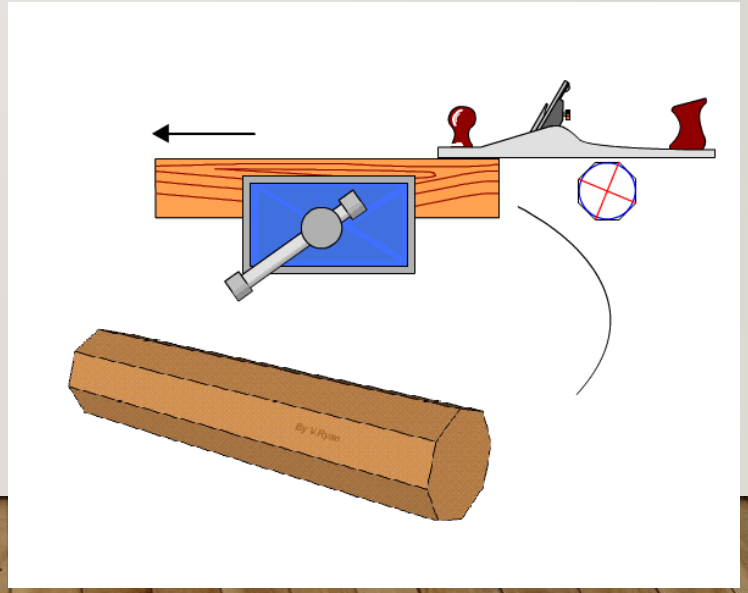
A Faceplate is used to attach a wood blank to the lathe when making a bowl

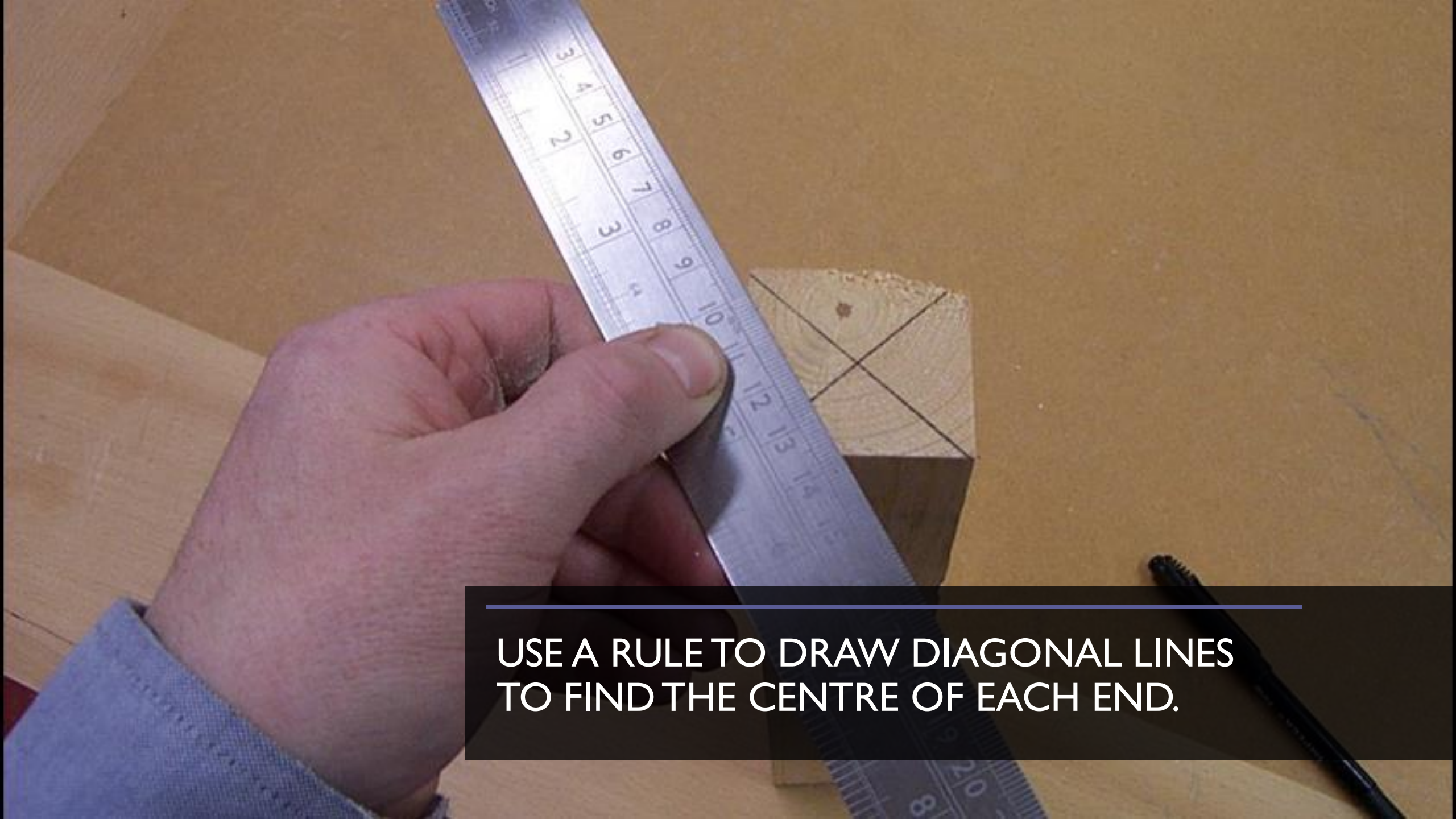
TURNING BETWEEN CENTRES

PREPARING THE BLANK

- Step 1. Mark the diagonals of both ends.
- Step 2. Use a Bradawl to make a small hole in the centre of one end.
- Step 3.Use a Tenon Saw to cut down the diagonal of the opposite end.
- Step 4. Use a marking gauge to mark in from the edge of all long faces of the blank.
- Step 5. Use a Jack Plane to remove the waste material and create an octagonal shape.

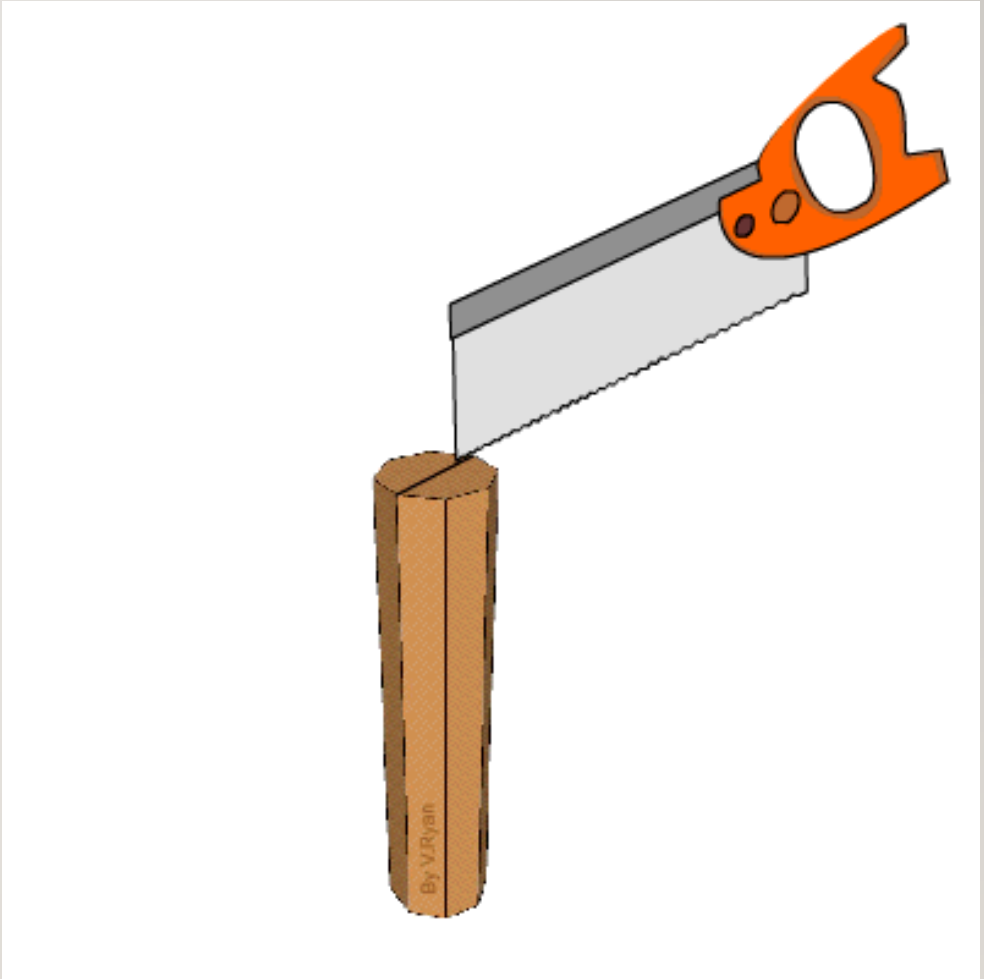






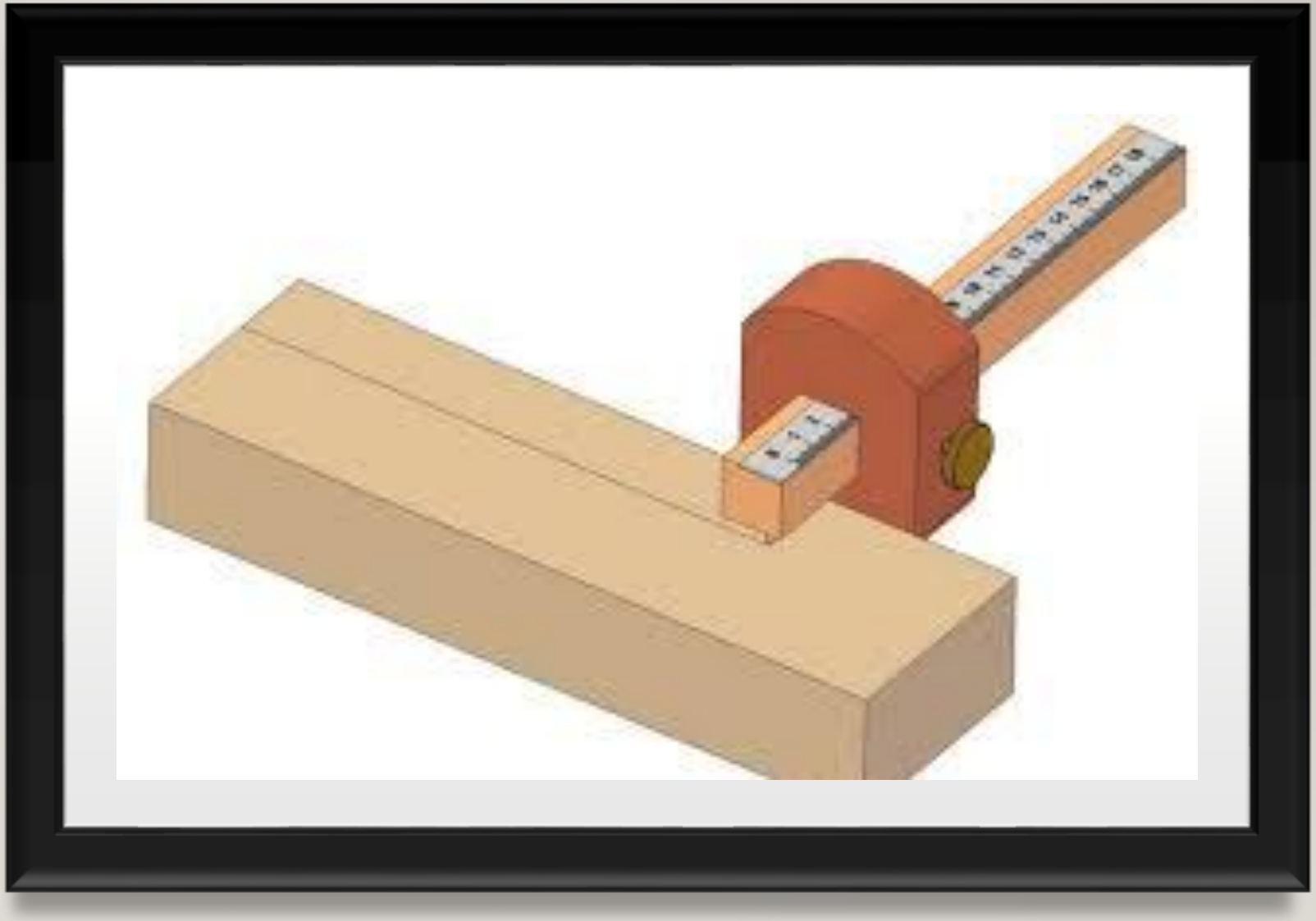
USE A RULE TO DRAW DIAGONAL LINES TO FIND THE CENTRE OF EACH END.

USE A TENON SAW TO CUT DOWN A DIAGONAL LINE ON ONE END

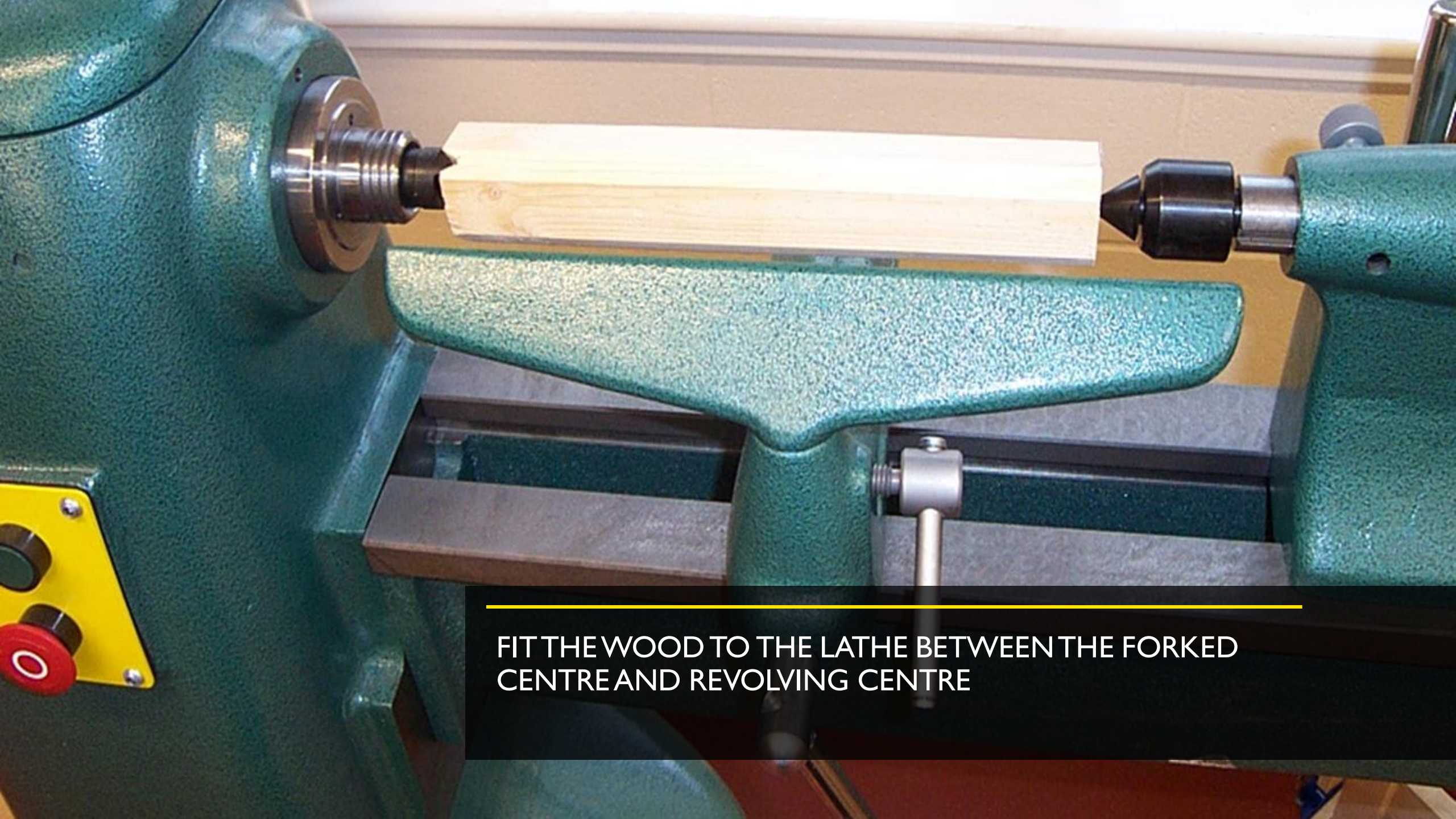


MAKE A LARGE HOLE IN ONE END WITH A BRADAWL

USE A MARKING GAUGE TO MARK IN FROM THE EDGE OF ALL LONG FACES OF THE BLANK.



USE A JACK PLANE TO REMOVE THE WASTE MATERIAL FROM ALL 4 CORNERS AND CREATE AN OCTAGONAL SHAPE.



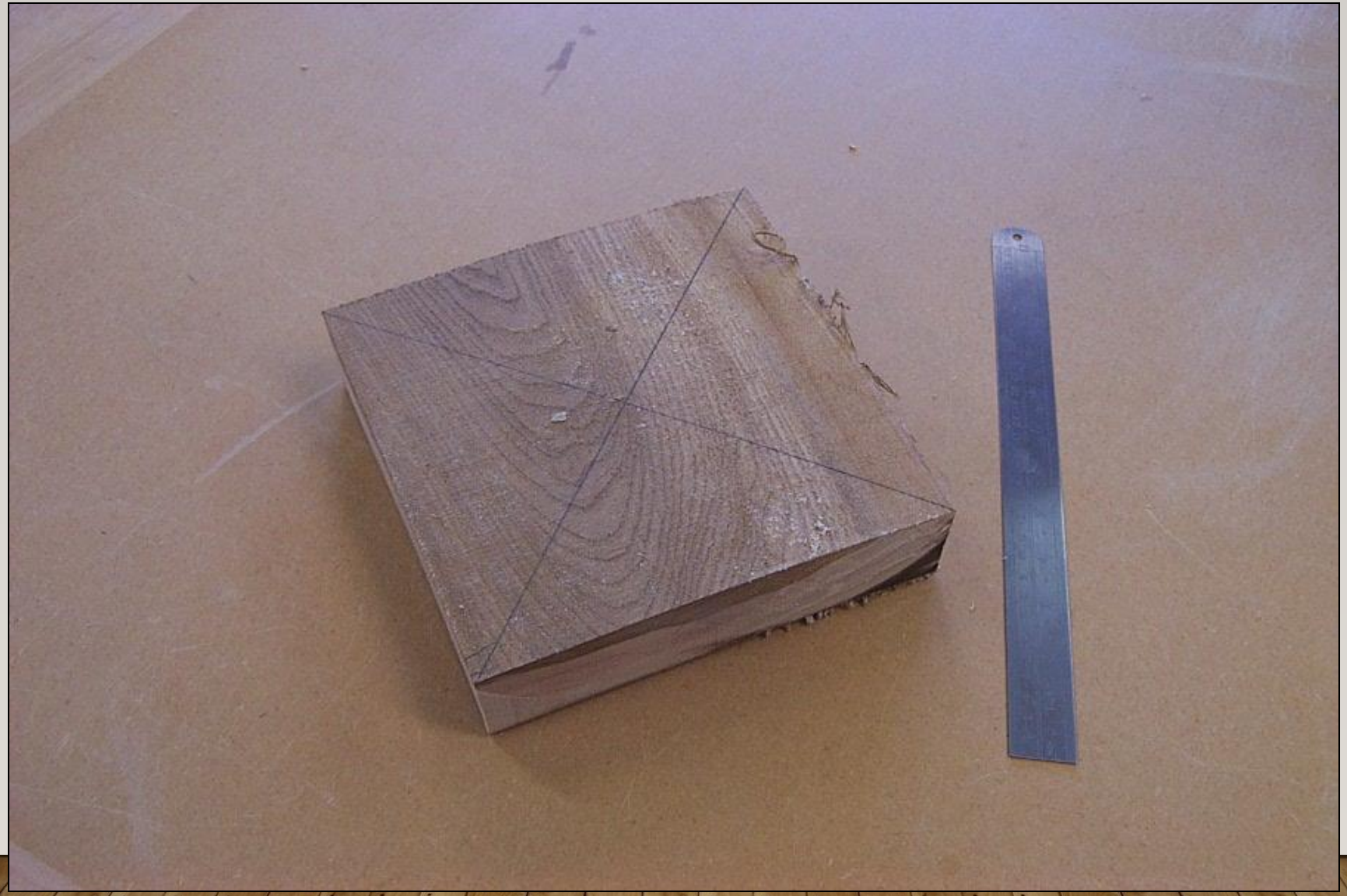
FIT THE WOOD TO THE LATHE BETWEEN THE FORKED CENTRE AND REVOLVING CENTRE

EXTRA SAFETY CHECKS AFTER FITTING THE BLANK BETWEEN CENTRES

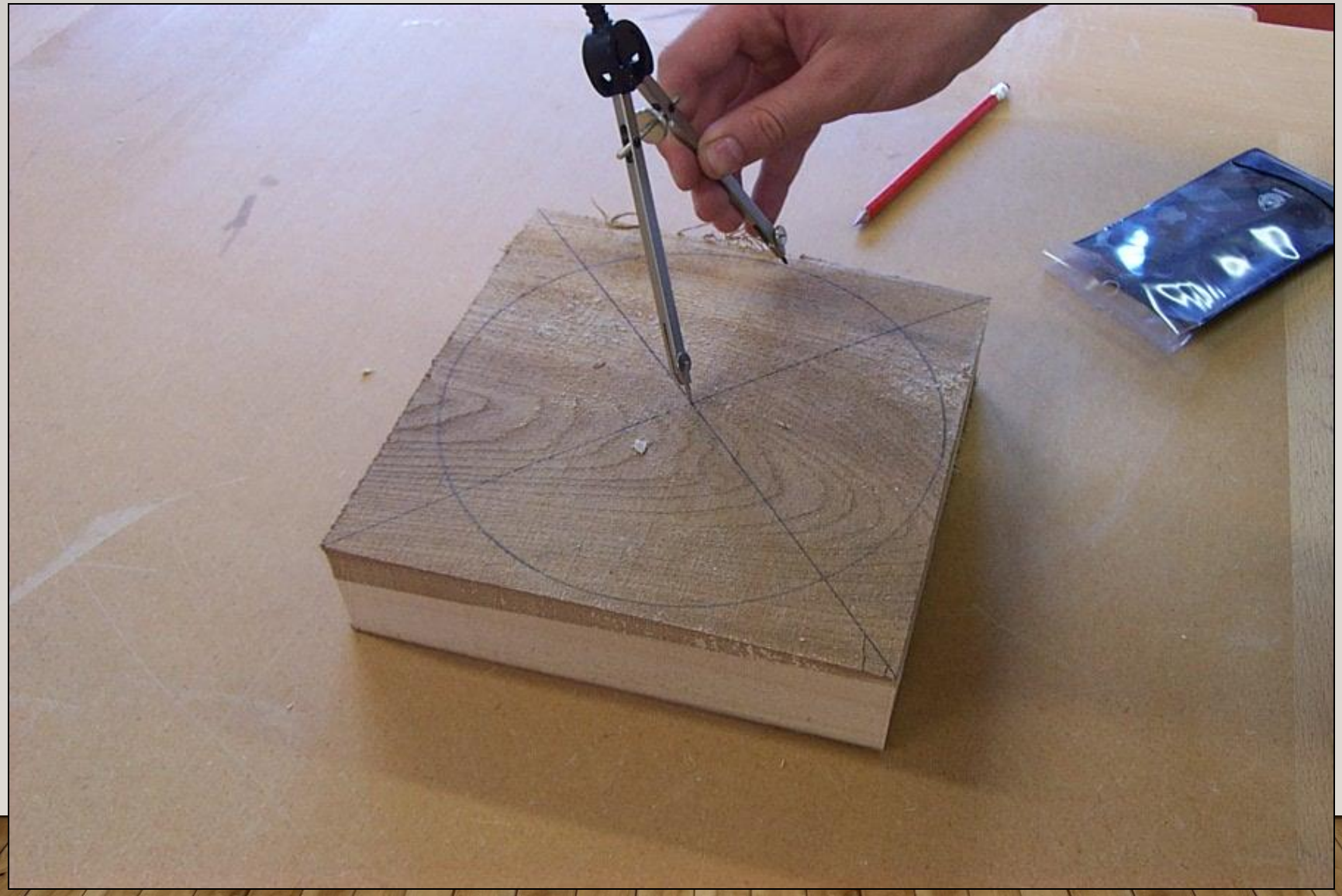
- Check that the Blank is securely fitted in the Lathe.
- Check that the tool rest is secured in the correct position and will not interfere with the turning blank. Do this by spinning the blank by hand to complete a couple of rotations without touching the tool rest.
- Check that the tools are sharp.
- Check that the extractor fan hood is secured in the correct position and will not interfere with the blank when it is spinning. Do this by spinning the blank by hand to complete a couple of rotations without touching the extractor fan hood.

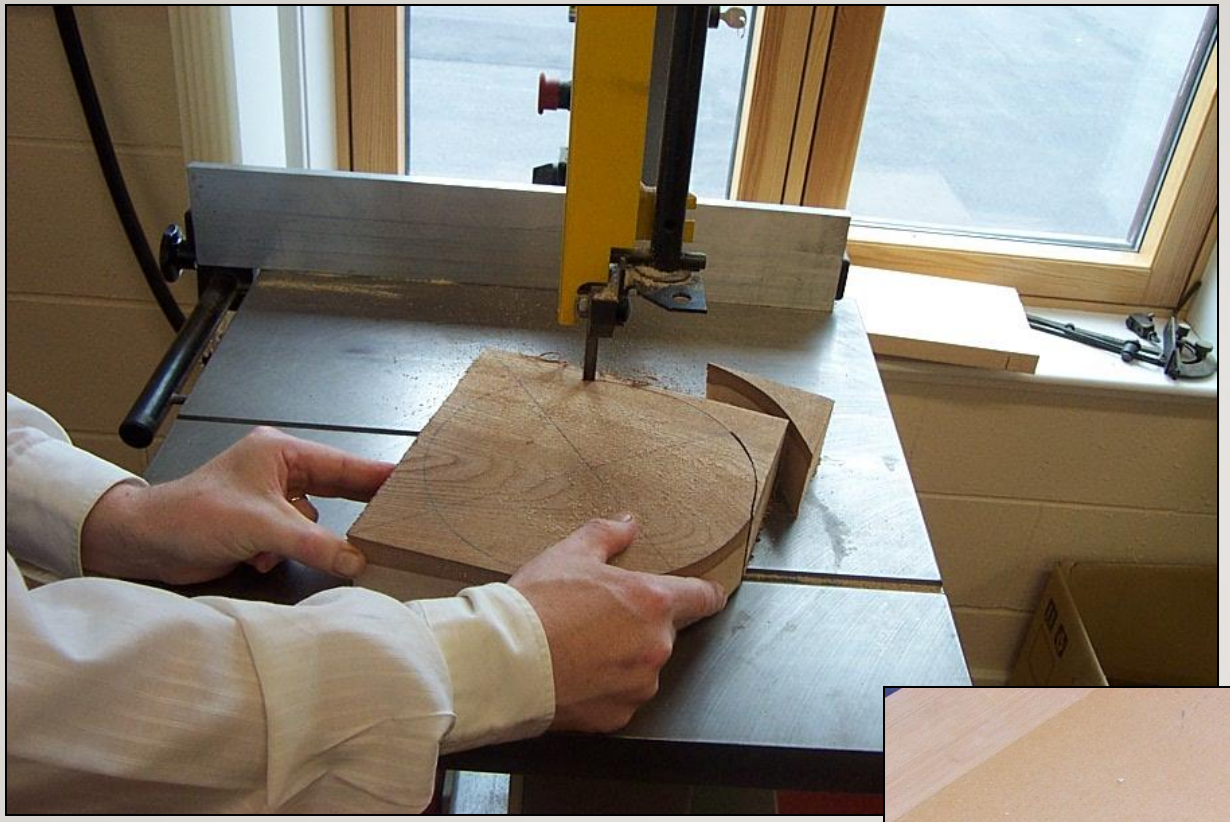
TURNING A BOWL

Use a rule to find the centre

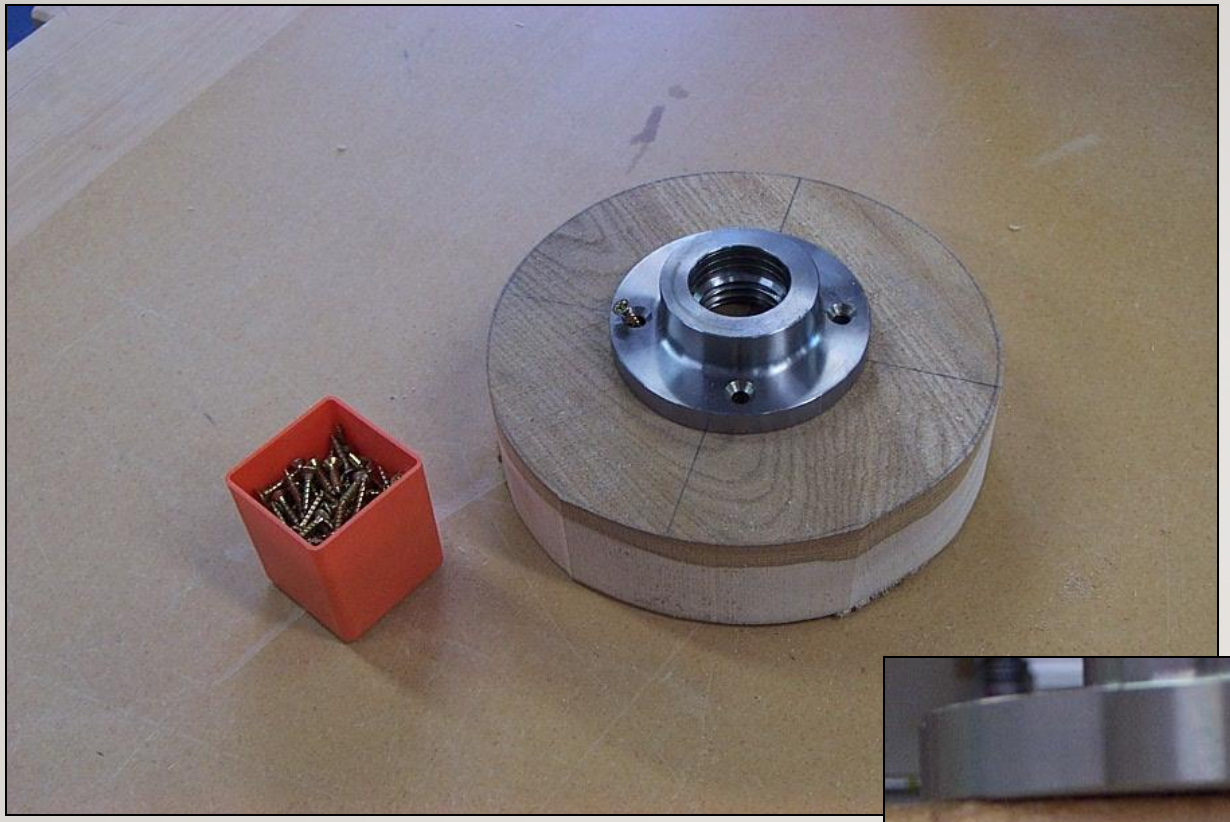


Mark out as big a circle as you can

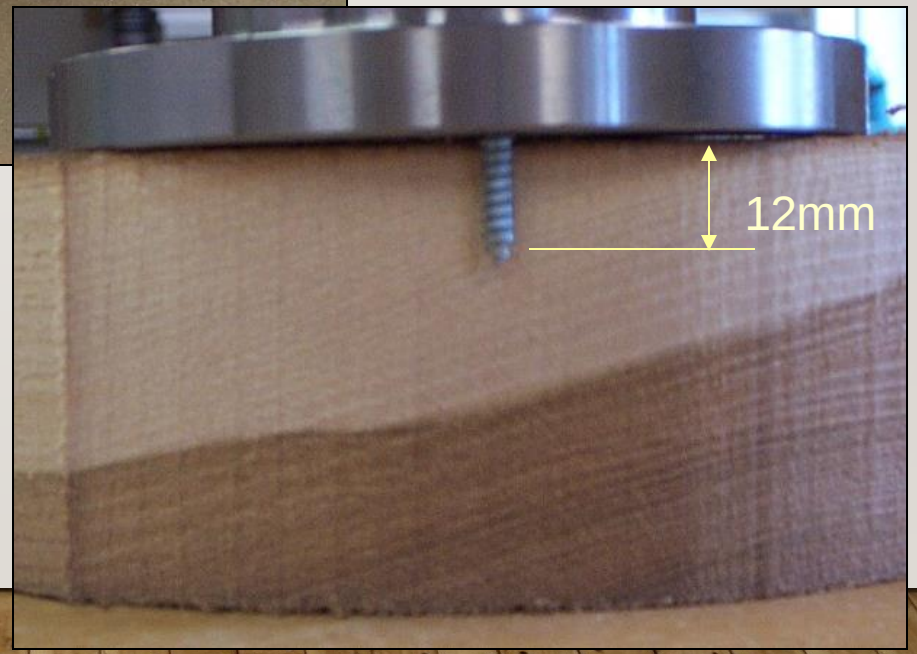




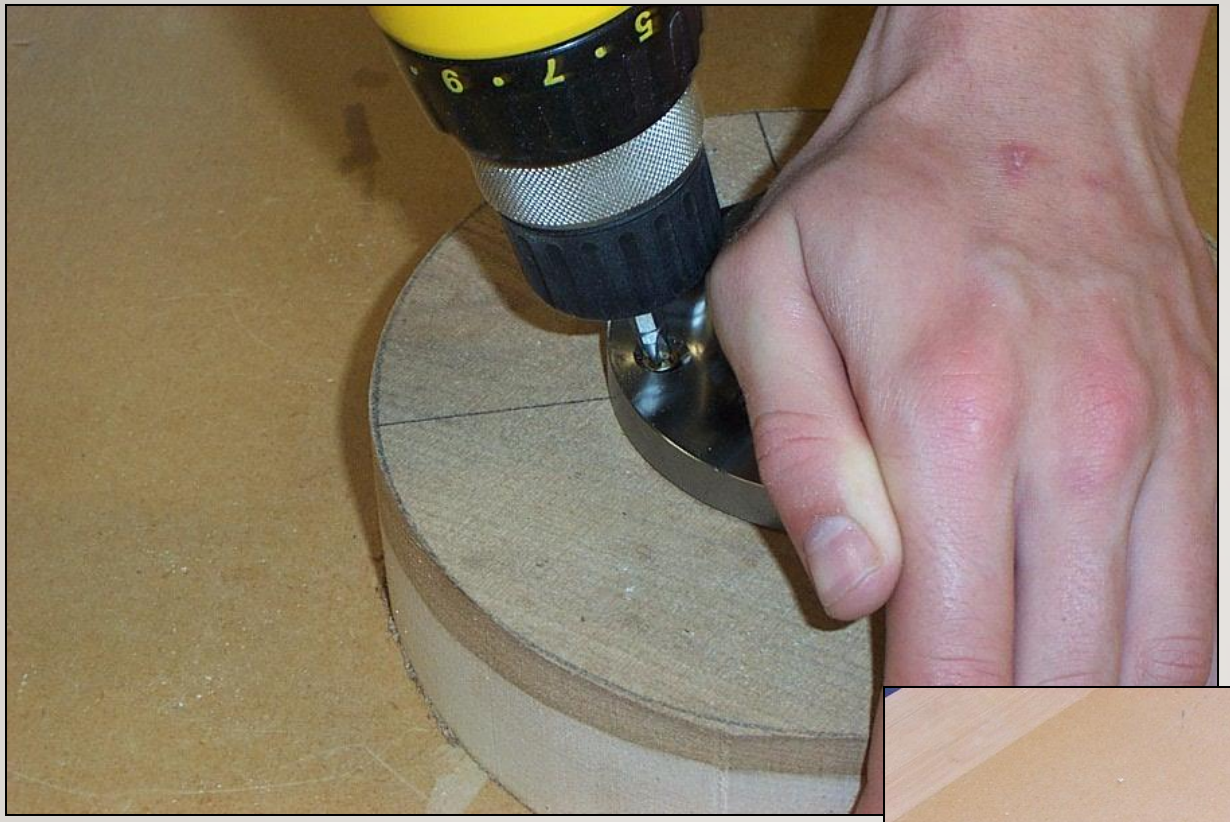
Cut the circle out.



Choose suitable woodscrews to attach the face plate



Make sure the screw extends at least 12mm into the wood blank



Drive in all four screws.

Remember: If you use the power screwdriver for this make sure you don't over tighten the screws and strip the thread on the wood

Secure the bowl blank to the lathe

Move the Tool Rest into position. Rotate the blank to make sure the wood will not touch the Tool Rest when you switch the machine on.

You are now ready to start turning.

CRAMPING

CRAMPING

LEARNING INTENTIONS

- To **identify** a variety of different cramps
- To **state** their uses and purpose
- To **understand** the importance of "Dry Cramping"

SUCCESS CRITERIA

- I can **identify Some/Most/All** of the cramps required by the SQA
- I can **explain** how to use **Some/Most/All** the cramps correctly
- I can **understand** the importance of "Dry Cramping"

CRAMPING

- Cramping is the act of hold a model together whilst it is being work on or whilst glue is setting. There are several different tools that can be used to cramp a project together.

G-CRAMP

- **G Cramps** are an essential tool in the workshop and they come in a range of sizes and are generally used for clamping work securely to a surface/workbench top. They can also be used to hold parts together whilst glue is drying. The **clamp** is tightened by turning the small tommy bar which turns the threaded rod.

SASH CRAMP

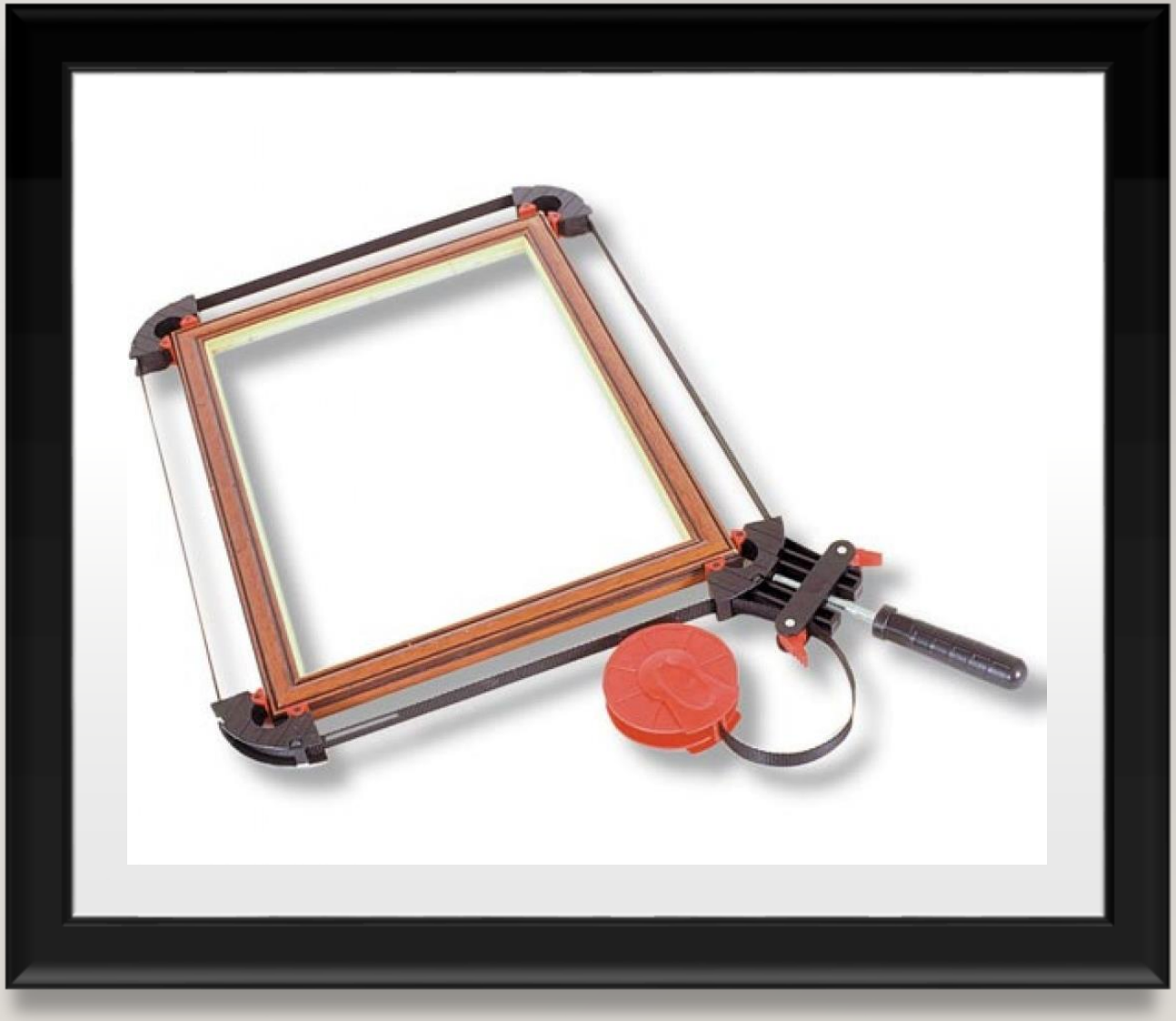
- **Sash clamps** are used to **clamp** work together when it is glued. They vary in size and are normally used in pairs. The lengths are normally from 460mm to 1370mm. The bar is made from cold drawn mild steel and the head and slides made from malleable iron.

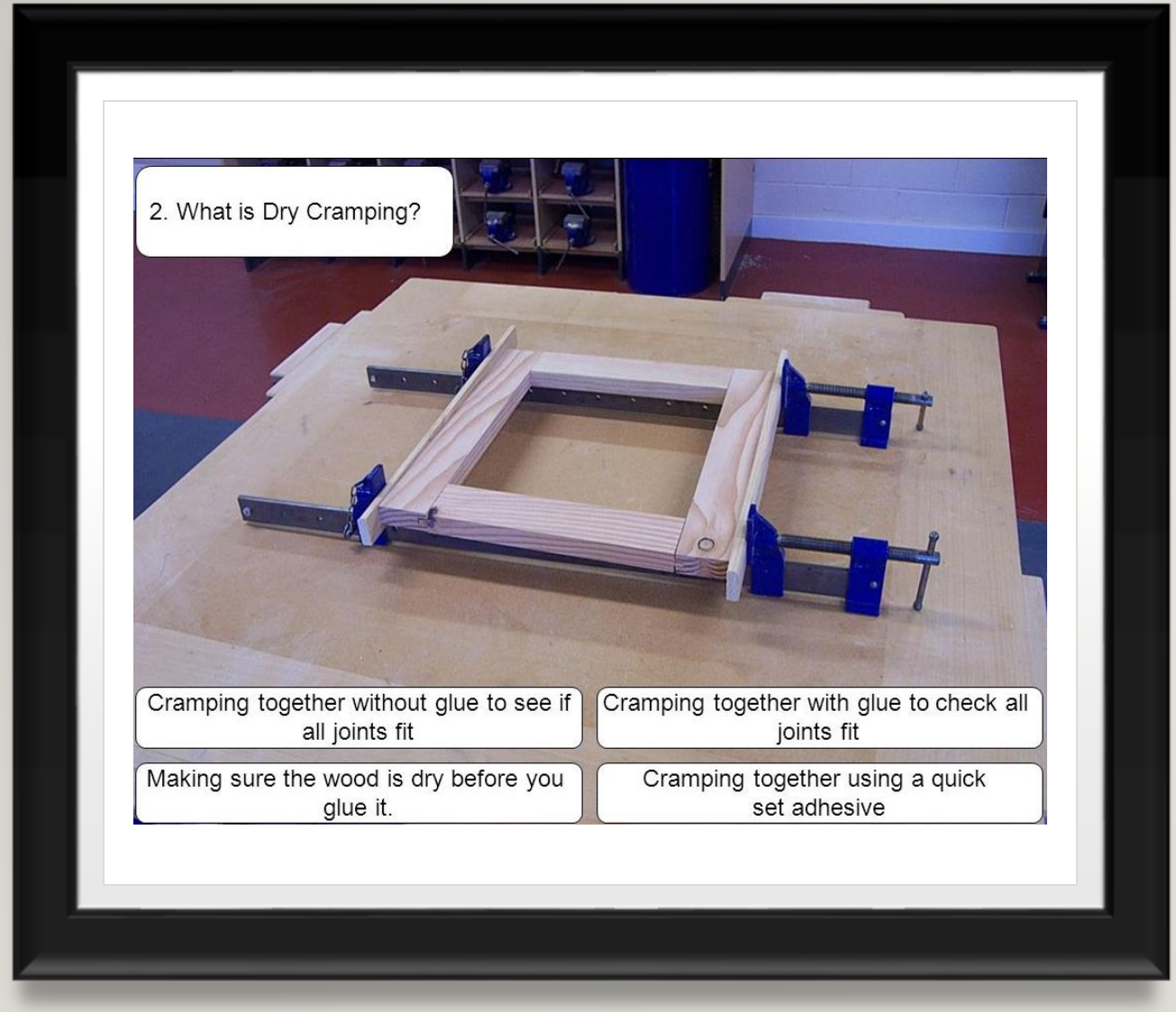
MITRE CRAMP

- Mitre cramps can be used to hold corners of flat frame models and to accurately saw corner mitre joints.

BAND CRAMPS

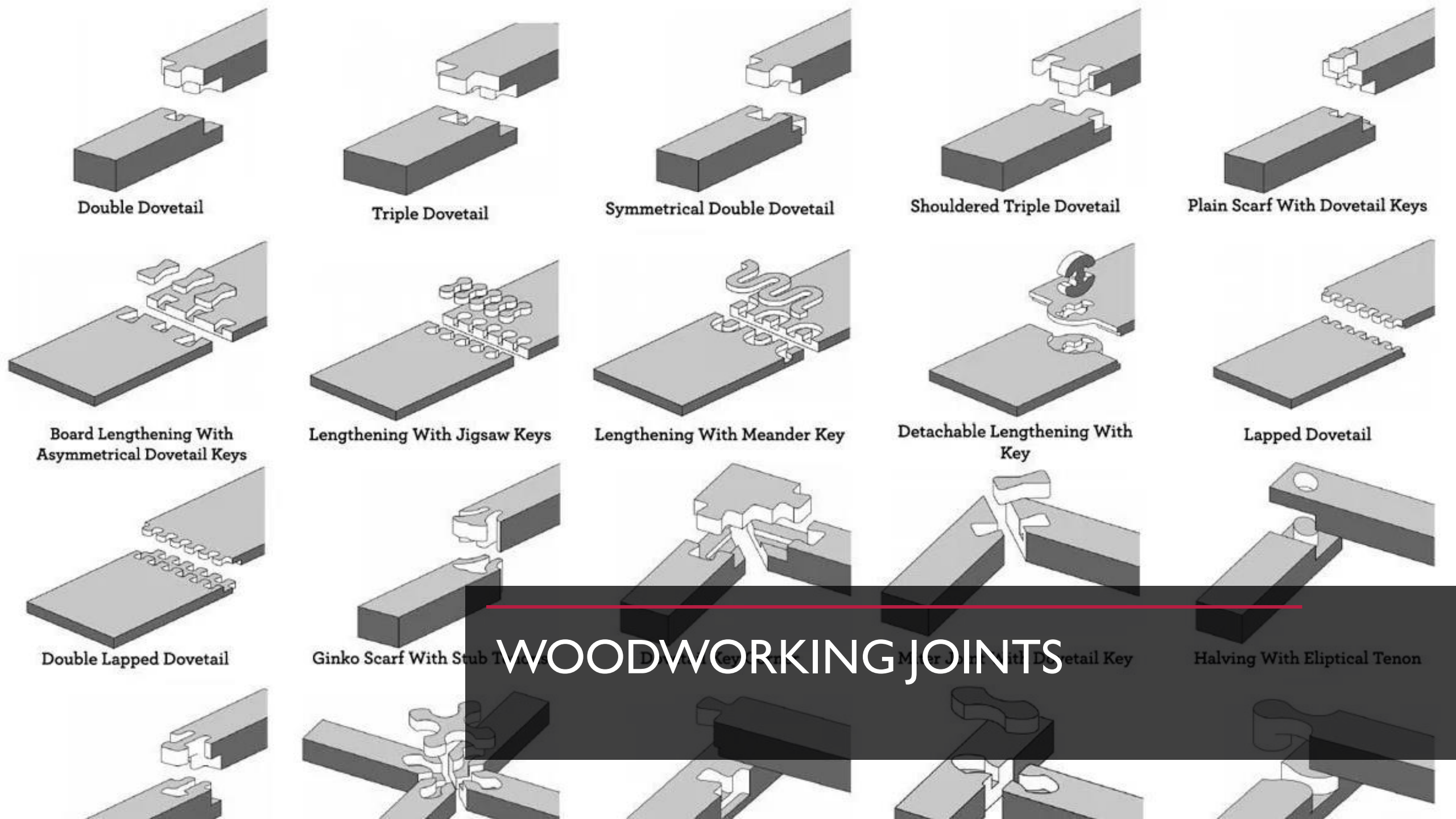
- A **band cramp uses** a long, flexible **strap** to hold a workpiece in place. It is ideal for **cramping** large or irregularly shaped workpieces, as the **strap** is designed to surround the whole workpiece, and its flexibility means it can accommodate many shapes and sizes.





DRY CRAMPING

- **Dry cramping** is used as part of the test fitting process to ensure all joints fit neatly prior to gluing. To familiarise yourself with the order and processes required for efficient gluing operations.
- Prior to gluing a project together it should be cramped without glue. This is to ensure that all parts in the assembly fit together as planned.



WOODWORKING JOINTS

WOODWORKING JOINTS

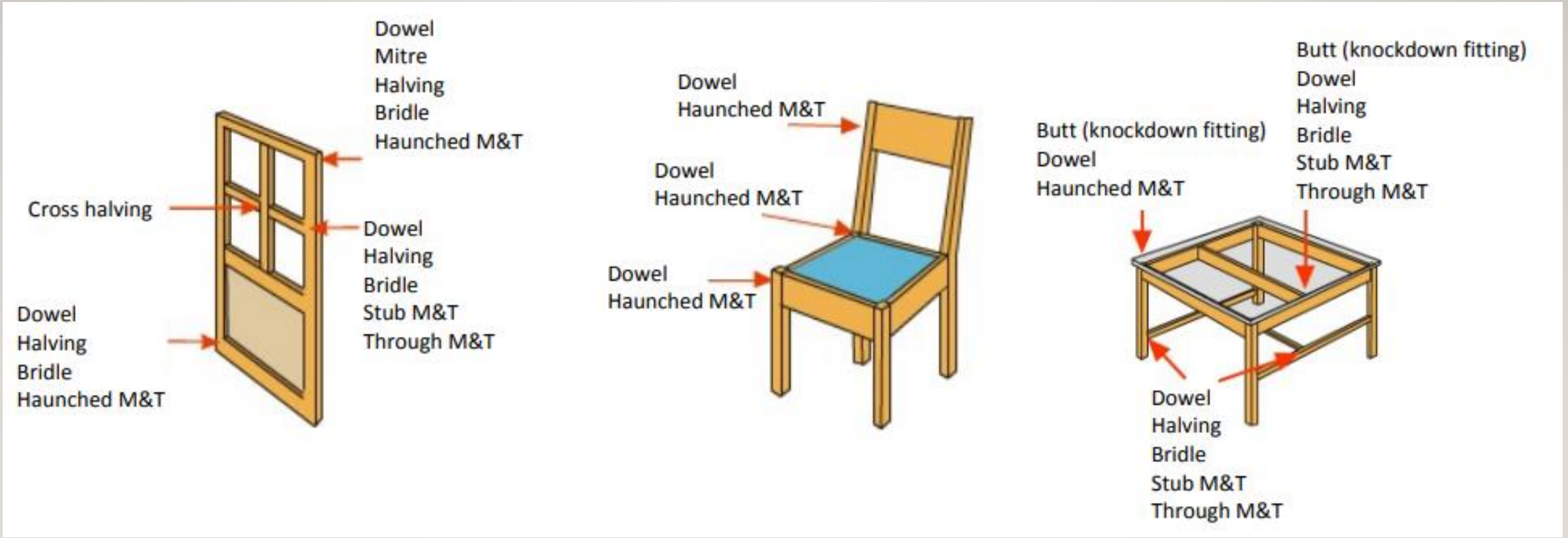
LEARNING INTENTIONS

- To **identify** the different types of woodworking joints.
- To mark out the different woodwork joints
- To cut out the different woodwork joints
- To understand the importance of accuracy in my work

SUCCESS CRITERIA

- I can **identify Some/Most/All** of the different types of woodworking joints
- I can **recall Some/Most/All** the steps in marking out different woodworking joints
- I can **recall** how to cut out **Some/Most/All** of the different joints
- I can **complete Some/Most/All** of my work to within the tolerances set by the SQA

FLAT FRAME JOINTS



FLAT FRAME JOINTS

LEARNING INTENTIONS

- To **identify** the different types of flat frame joints
- To **justify** the selection of one joint over another
- To **mark** out the different flat frame joints
- To **cut** out the different flat frame joints
- To **understand** the importance of accuracy in my work

SUCCESS CRITERIA

- I can **identify Some/Most/All** of the different types of flat frame joints
- I can **justify** my reasons for selecting a particular joint
- I can **recall** the steps in marking out **Some/Most/All** of the different flat frame joints
- I can **recall** how to cut out **Some/Most/All** of the different flat frame joints
- I can **complete Some/Most/All** of my work to within the tolerances set by the SQA

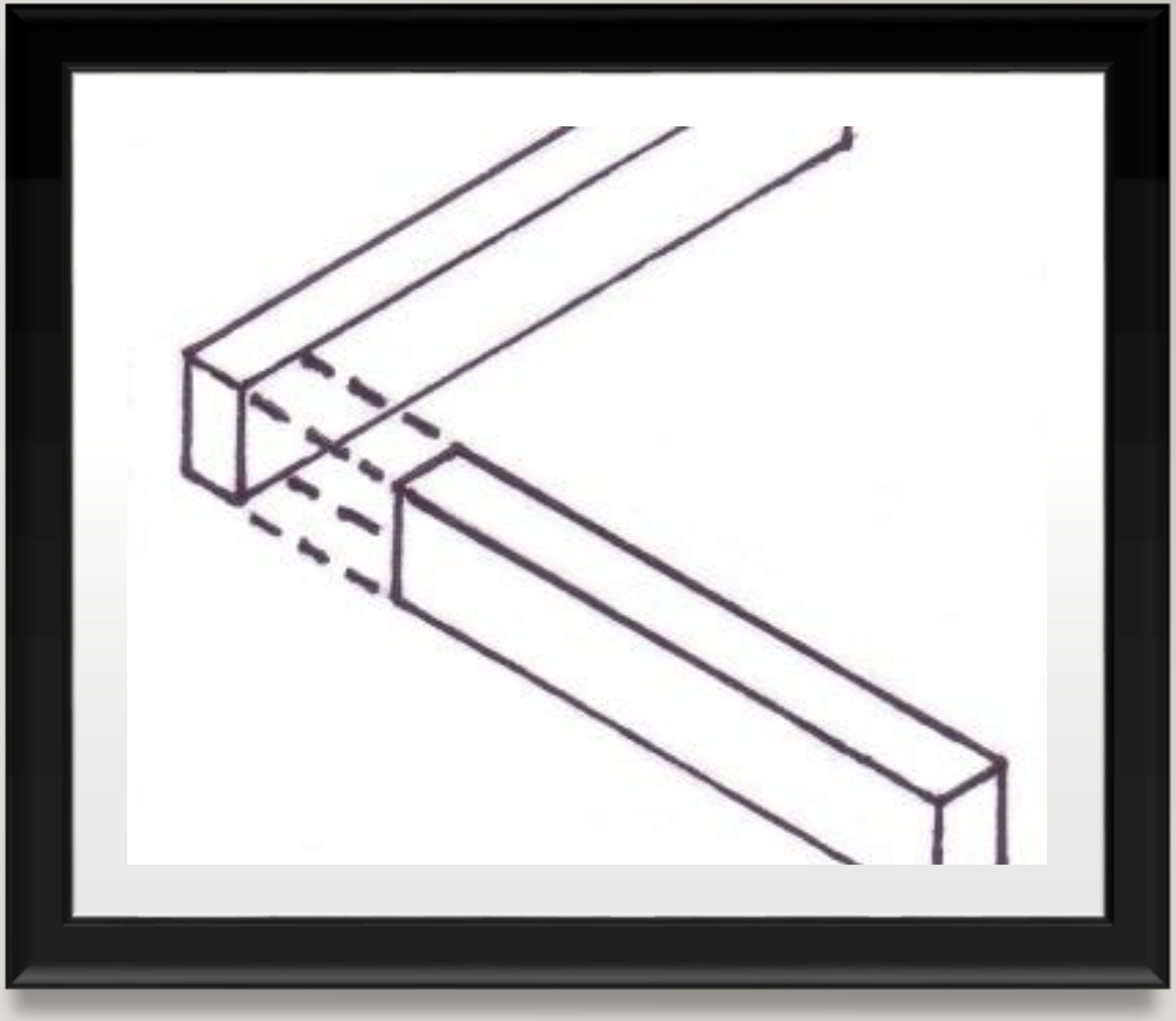
FLAT FRAME JOINTS

- Flat frame joints are very commonly used to construct; chairs, doors, tables and wooden frame buildings. The type of joint chosen depends on strength required and design aesthetics.

Corner Joints	'T' Joints	Other types
• Butt	Butt	Cross halving
• Mitre	Dowel	Dovetail Halving
• Dowel	Halving	
• Halving	Bridle	
• Bridle	Stub Mortise & Tenon	
• Haunched Mortise & Tenon	Through Mortise & Tenon	

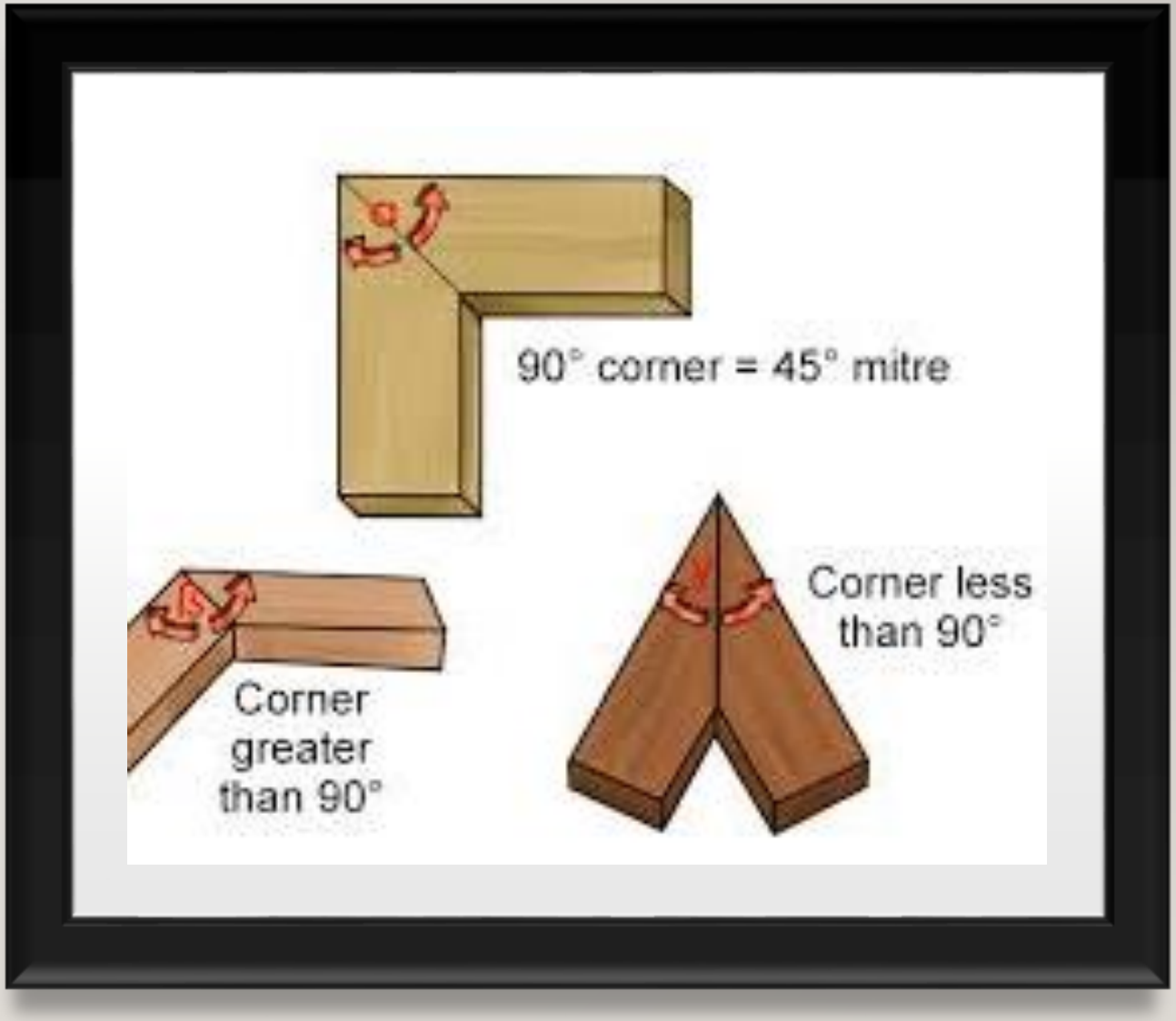
CORNER FLAT FRAME JOINTS

- Corner Butt joint
  - Quick, low strength wood joint. It is usually strengthened by adding knockdown fittings.
  - Marking out - Pencil, rule, try square.
  - Cutting - Tenon saw, bench hook.
  - Machining - Sanding m/c can be used to trim to size. Band saw can be used to cut to length if many are required.



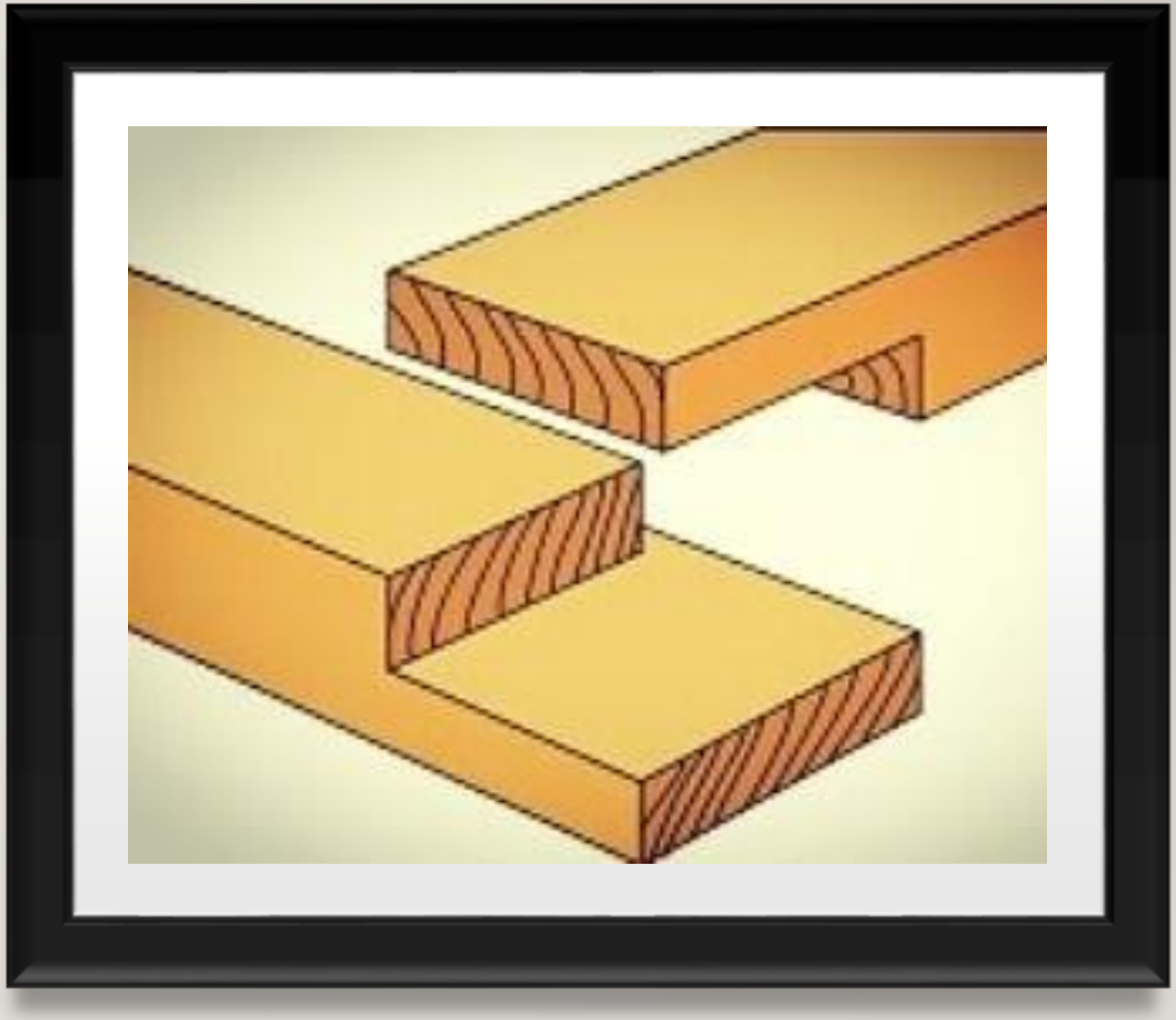
CORNER FLAT FRAME JOINTS

- Mitre Joint
  - Low strength wood joint. It is usually strengthened by adding splines or knockdown fittings.
  - Marking out - Pencil, rule, sliding bevel, protractor.
  - Cutting - Tenon saw and mitre jig.
  - Machining - Sanding m/c can be used to trim to size. Band saw can be used to cut if many are required.



CORNER FLAT FRAME JOINTS

- Corner Halving Joint
  - Medium strength wood joint.
  - Marking out - Pencil, rule, try square, marking gauge.
  - Cutting - Tenon saw, bench hook, bevel edged chisel.
  - Machining - Band saw can be used to cut if many are required.

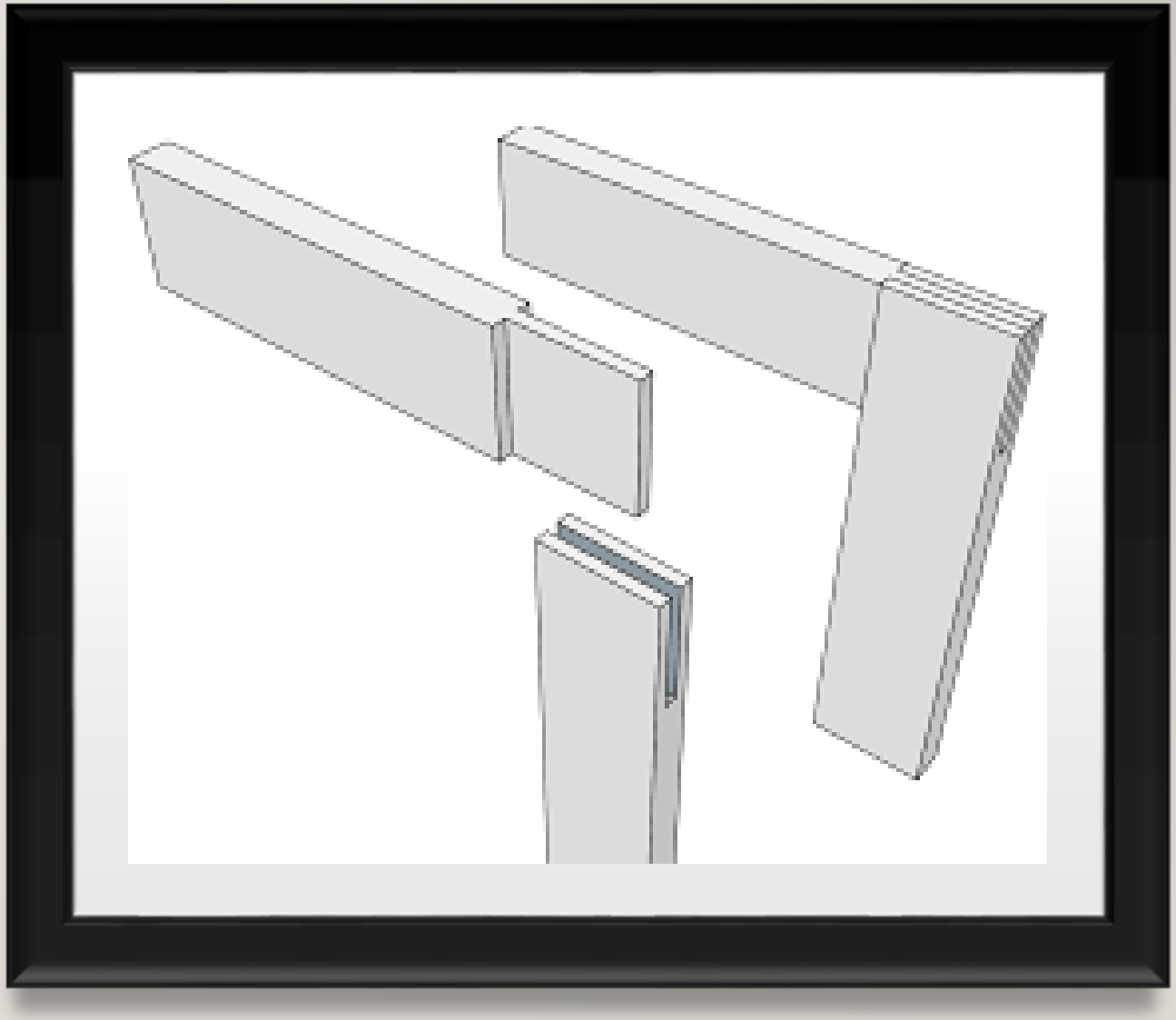


CORNER FLAT FRAME JOINTS

- Corner Dowel Joint
  - Medium to high strength wood joint (dependant on width and number of dowels).
  - Marking out - Pencil, rule, try square, marking gauge, bradawl.
  - Cutting - N/A.
  - Machining - Pillar Drill or Power Drill (dependant on size of material), dowel drill & collar.

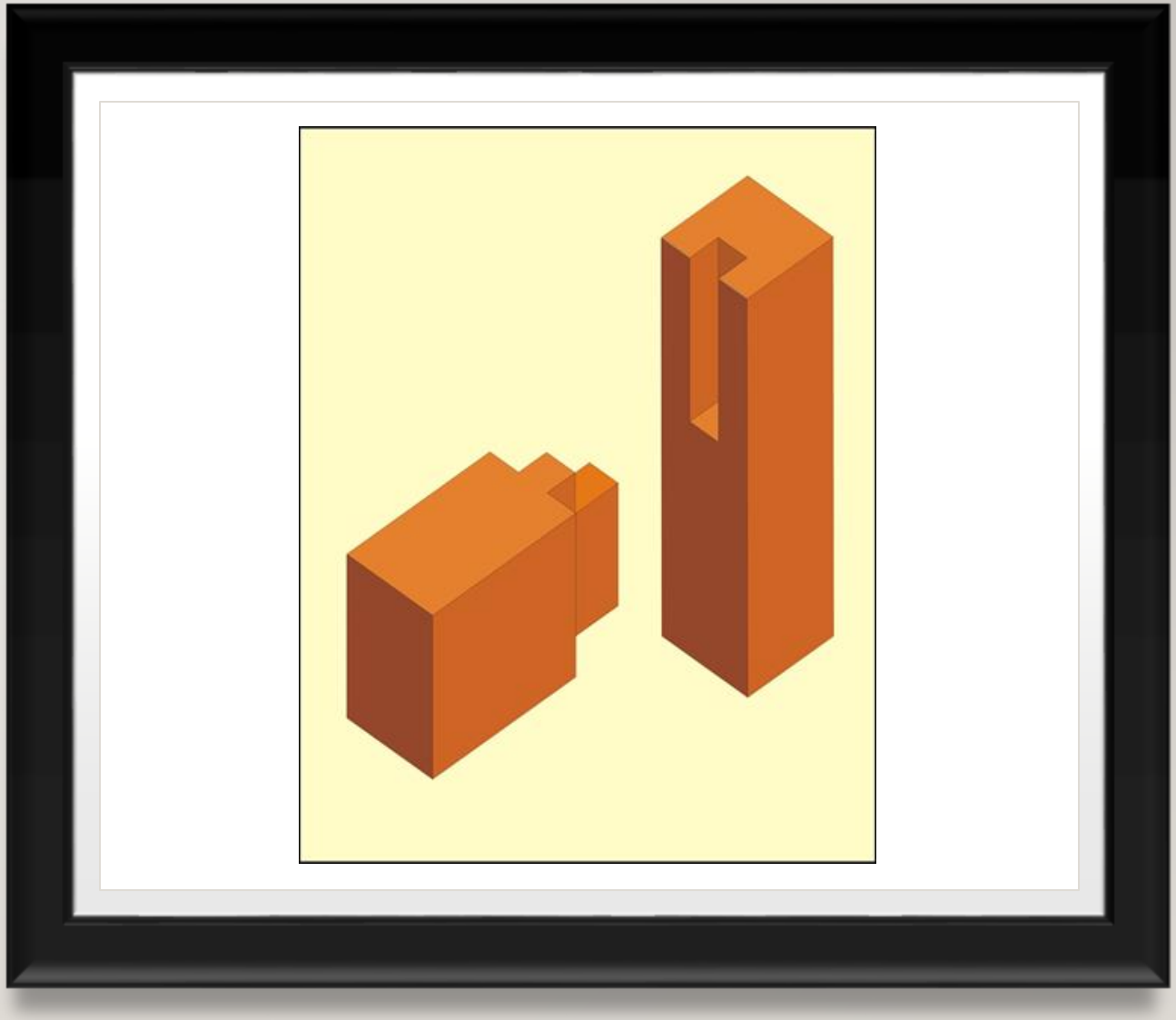
CORNER FLAT FRAME JOINTS

- Corner Bridal Joint
  - Medium to high strength wood joint (dependant on thickness of material).
  - Marking out - Pencil, rule, try square, mortise gauge.
  - Cutting - Tenon saw, bench hook, bench vice, coping saw, bevel edged chisel.
  - Machining - Band saw and Mortising m/c can be used to cut if many are required.



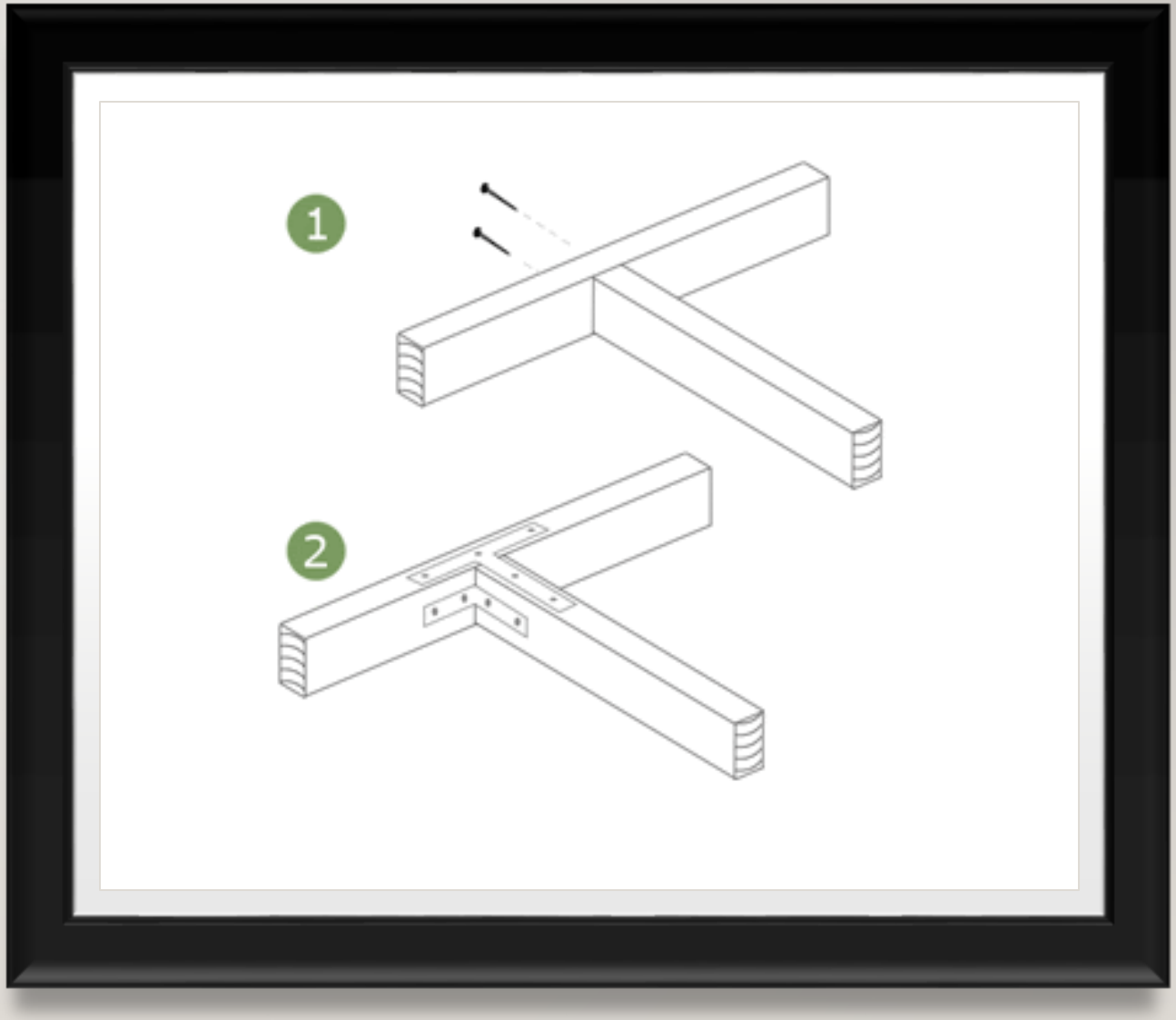
CORNER FLAT FRAME JOINTS

- Haunched Mortise & Tenon
  - High strength wood joint.
  - Marking out - Pencil, rule, try square, marking gauge, mortise gauge.
  - Cutting - Tenon saw, bench hook, bench vice, coping saw, bevel edged chisel, mortise chisel, mallet.
  - Machining - Band saw and Mortising m/c can be used to cut if many are required.



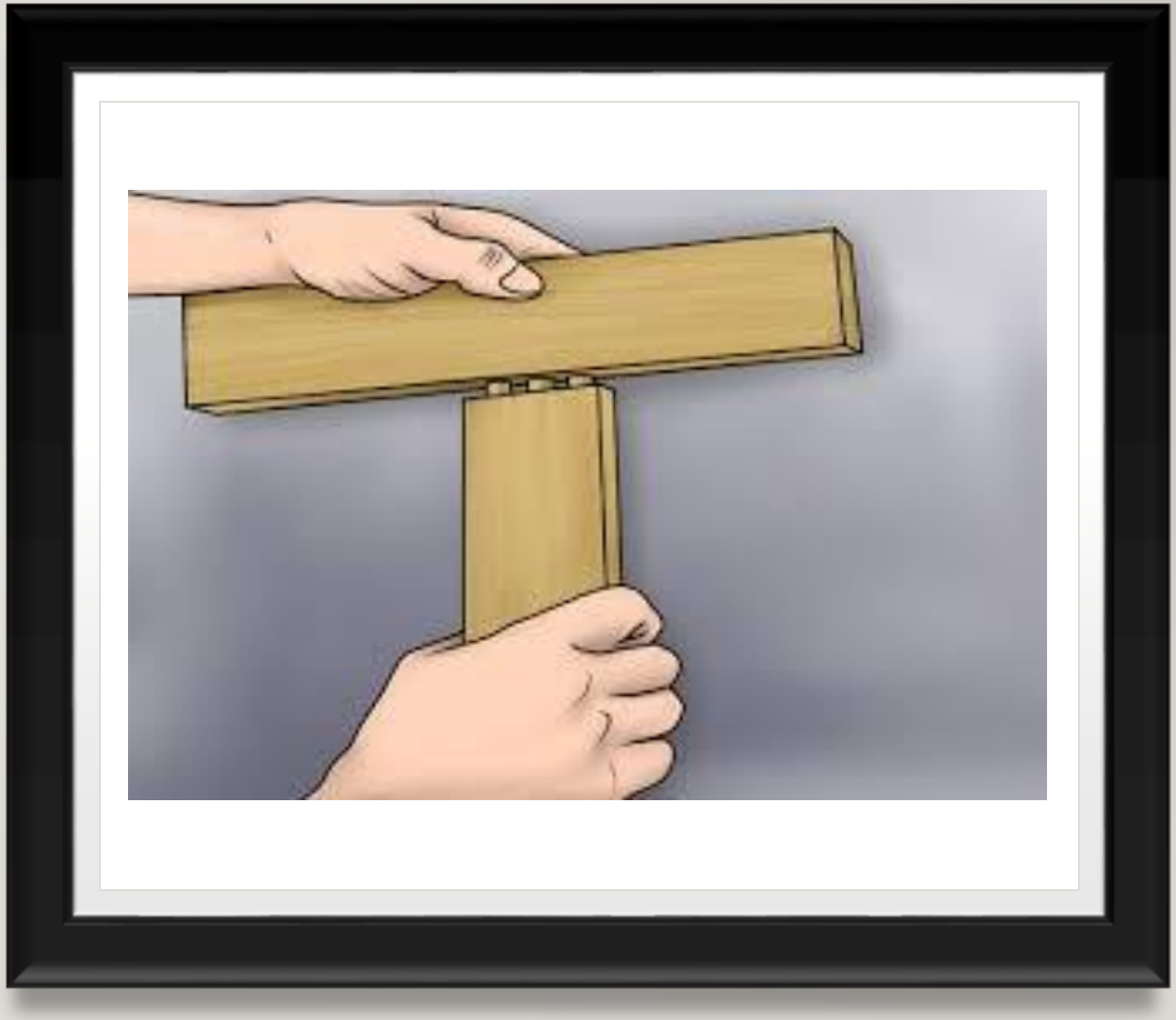
T FLAT FRAME JOINTS

- T Butt Joint
  - Quick, low strength wood joint. It is usually strengthened by adding knockdown
  - fittings.
  - Marking out - Pencil, rule, try square.
  - Cutting - Tenon saw, bench hook.
  - Machining - Sanding m/c can be used to trim to size. Band saw can be used to cut to length if many are required.



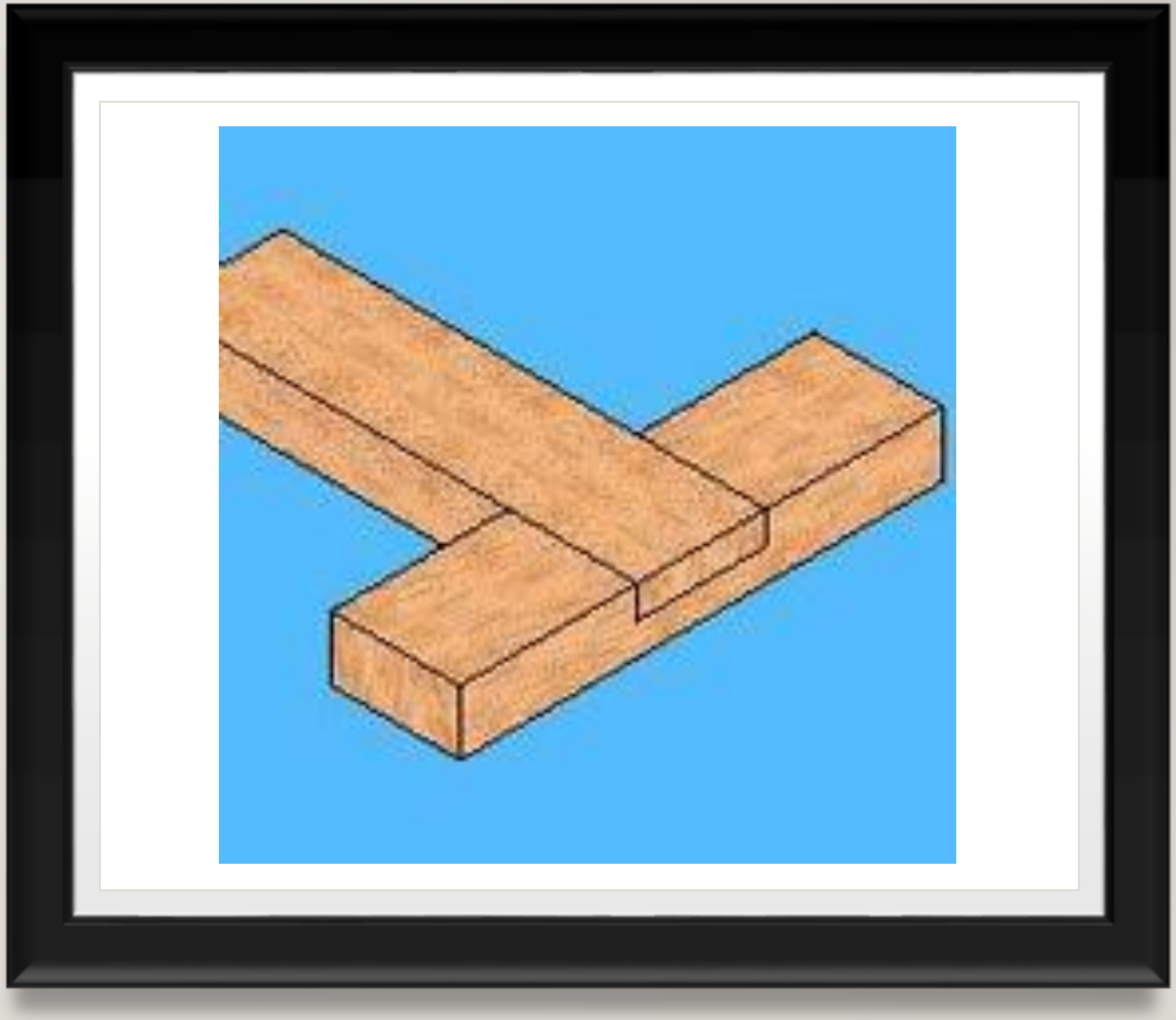
T FLAT FRAME JOINTS

- T Dowel Joint
  - Medium to high strength wood joint (dependant on width and number of dowels).
  - Marking out - Pencil, rule, try square, marking gauge, bradawl.
  - Cutting - N/A.
  - Machining - Pillar Drill or Power Drill (dependant on size of material), dowel drill & collar.



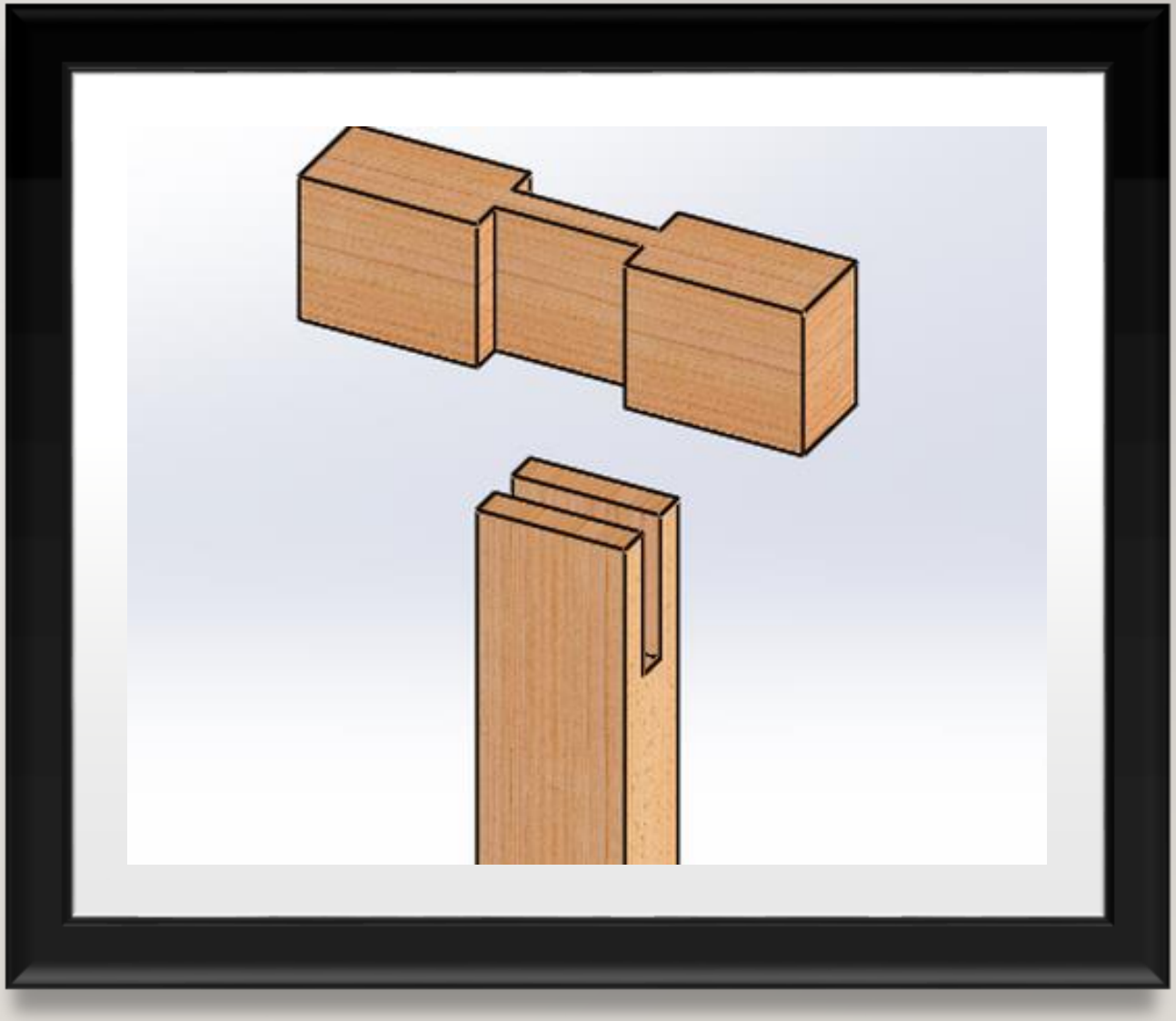
T FLAT FRAME JOINTS

- T Halving Joint
  - Medium to high strength wood joint (dependant on thickness of material).
  - Marking out - Pencil, rule, try square, marking gauge.
  - Cutting - Tenon saw, bench hook, bevel edged chisel.
  - Machining - Band saw can be used for some cuts if many are required.



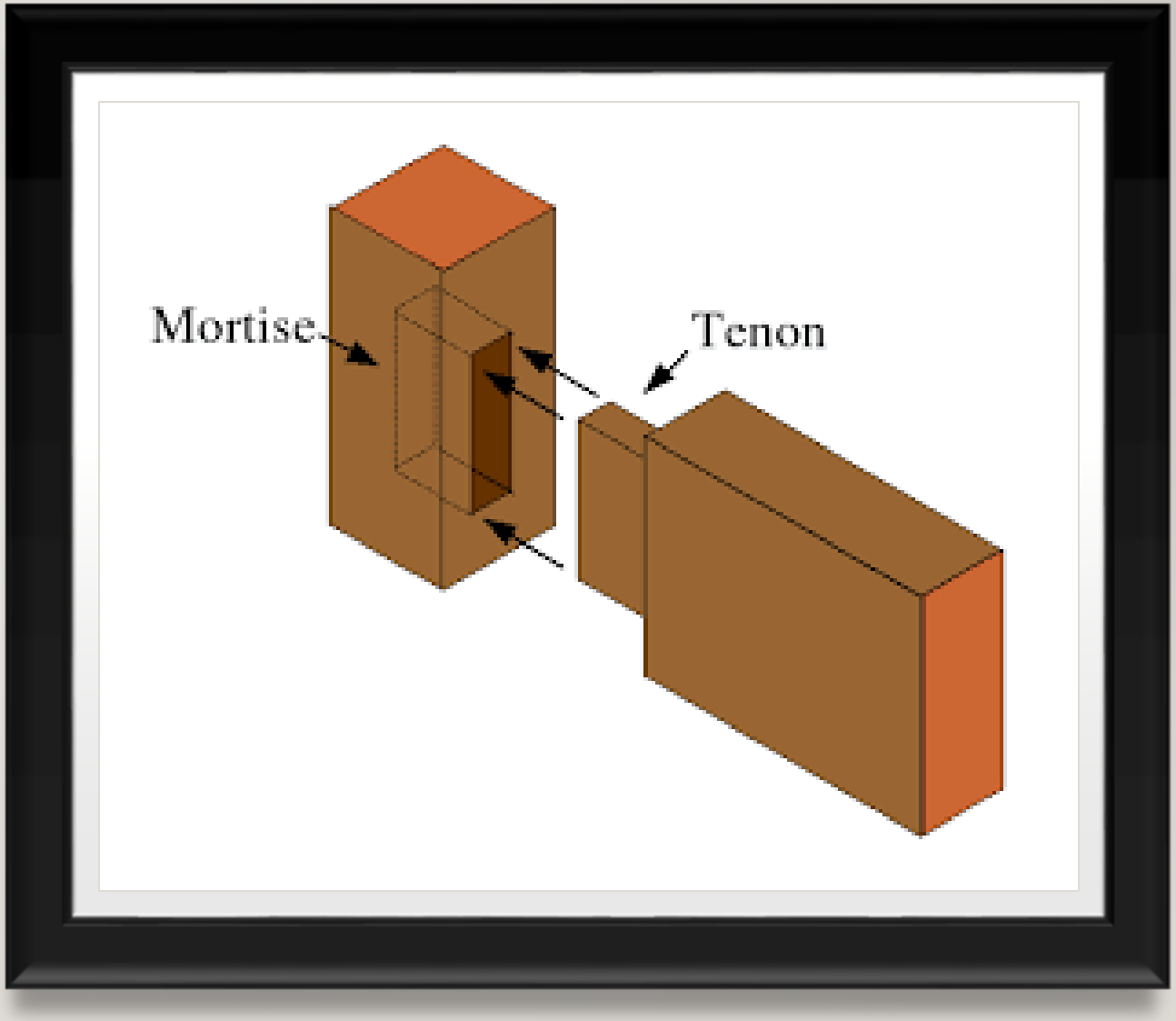
T FLAT FRAME JOINTS

- T Bridal Joint
  - Medium to high strength wood joint (dependant on thickness of material).
  - Marking out - Pencil, rule, try square, mortise gauge.
  - Cutting - Tenon saw, bench hook, bench vice, coping saw, bevel edged chisel.
  - Machining - Band saw and Mortising m/c can be used to cut if many are required.



T FLAT FRAME JOINTS

- Stub Mortise & Tenon
  - High strength wood joint. No parts of this joint are visible (looks like a butt joint when complete).
  - Marking out - Pencil, rule, try square, mortise gauge.
  - Cutting - Tenon saw, bench hook, bench vice, bevel edged chisel, mortise chisel, mallet.
  - Machining - Band saw and Mortising m/c can be used to cut if many are required.

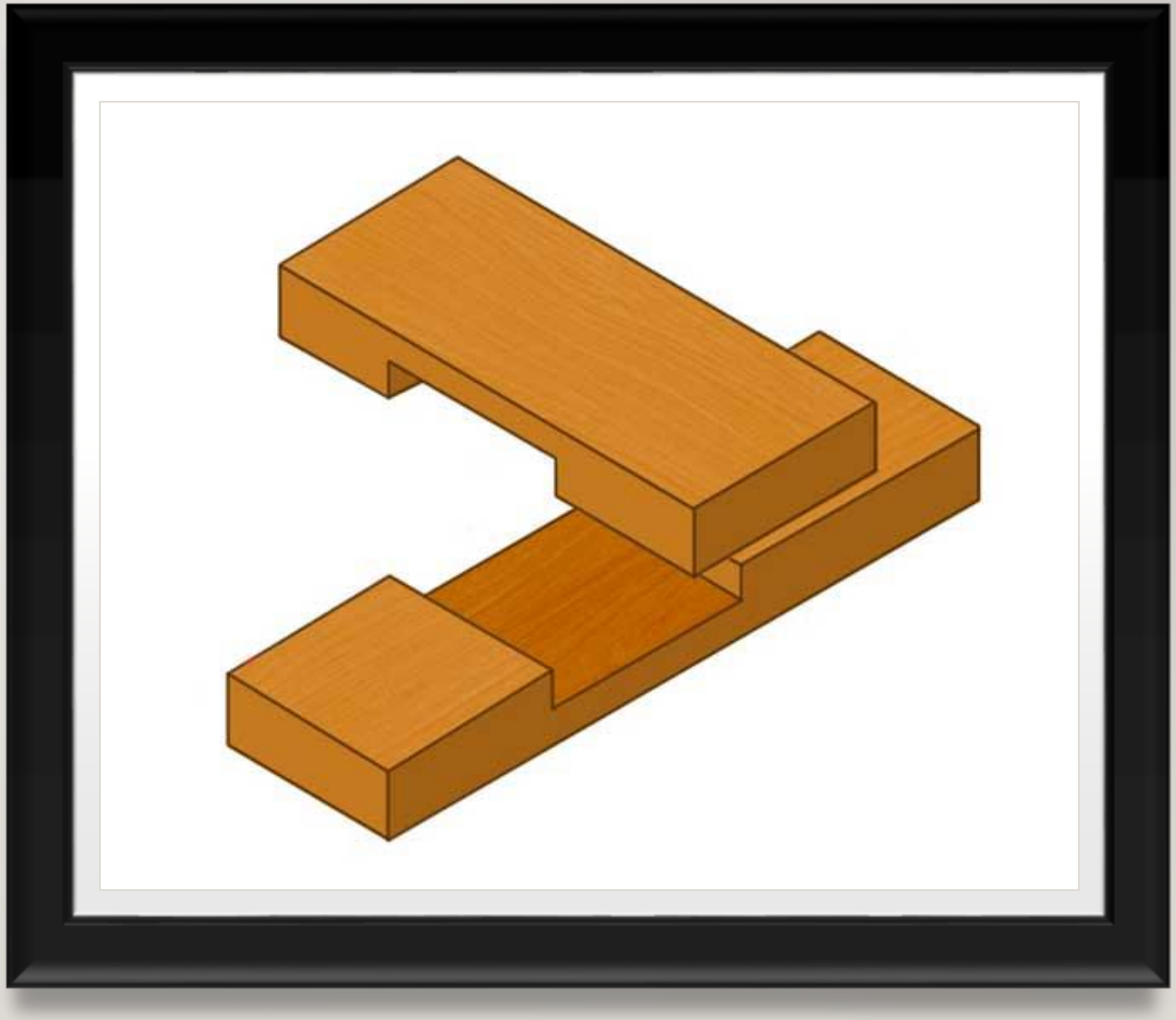


T FLAT FRAME JOINTS

- Through Mortise & Tenon
  - High strength wood joint.
  - Marking out - Pencil, rule, try square, mortise gauge.
  - Cutting - Tenon saw, bench hook, bench vice, bevel edged chisel, mortise chisel, mallet.
  - Machining - Band saw and Mortising m/c can be used to cut if many are required.

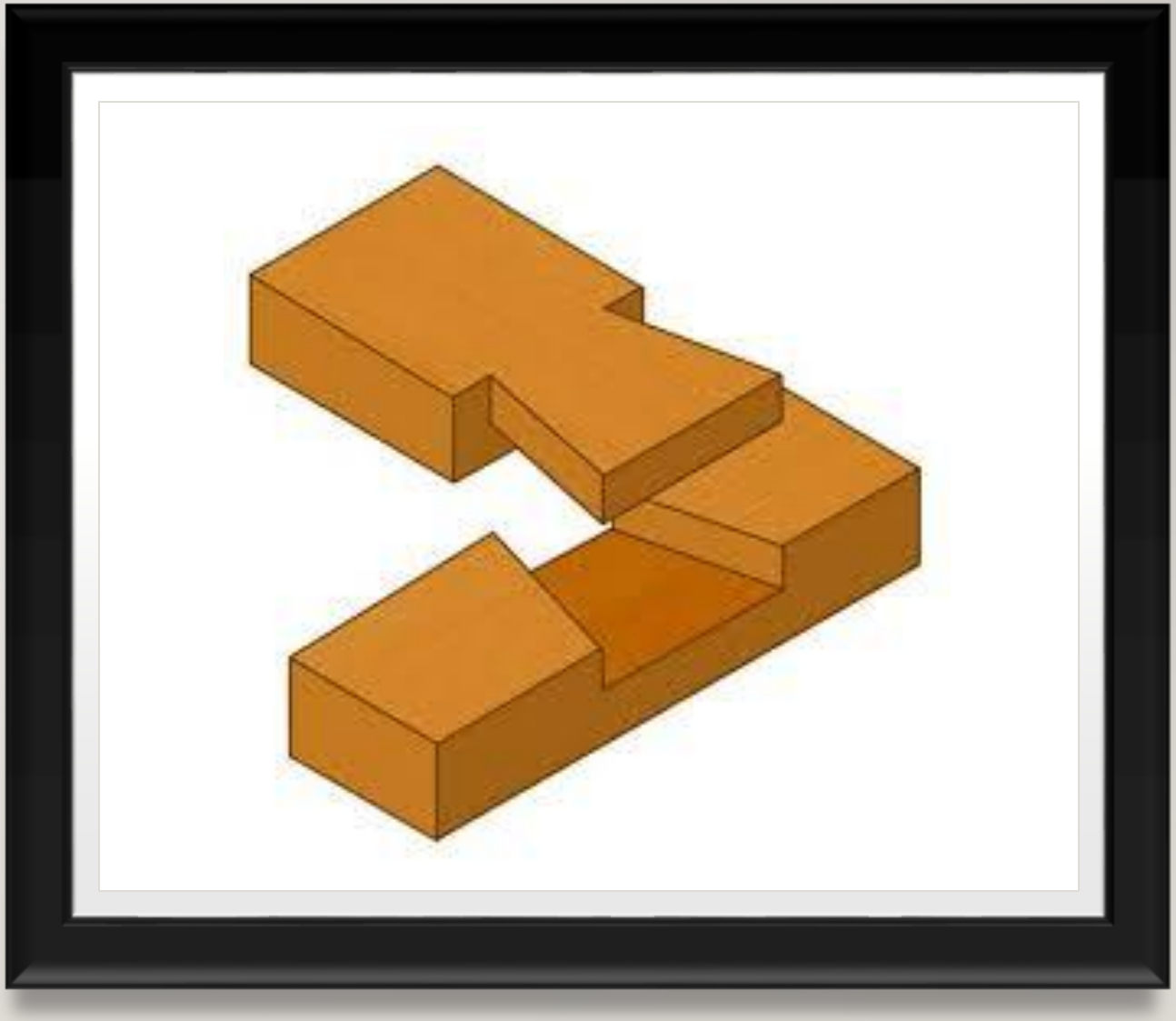
OTHER FLAT FRAME JOINTS

- Cross Halving Joint
  - Medium to high strength wood joint (dependant on thickness of material).
  - Marking out - Pencil, rule, try square, marking gauge.
  - Cutting - Tenon saw, bench hook, bench vice, bevel edged chisel.
  - Machining - Band saw can be used for some cuts if many are required.

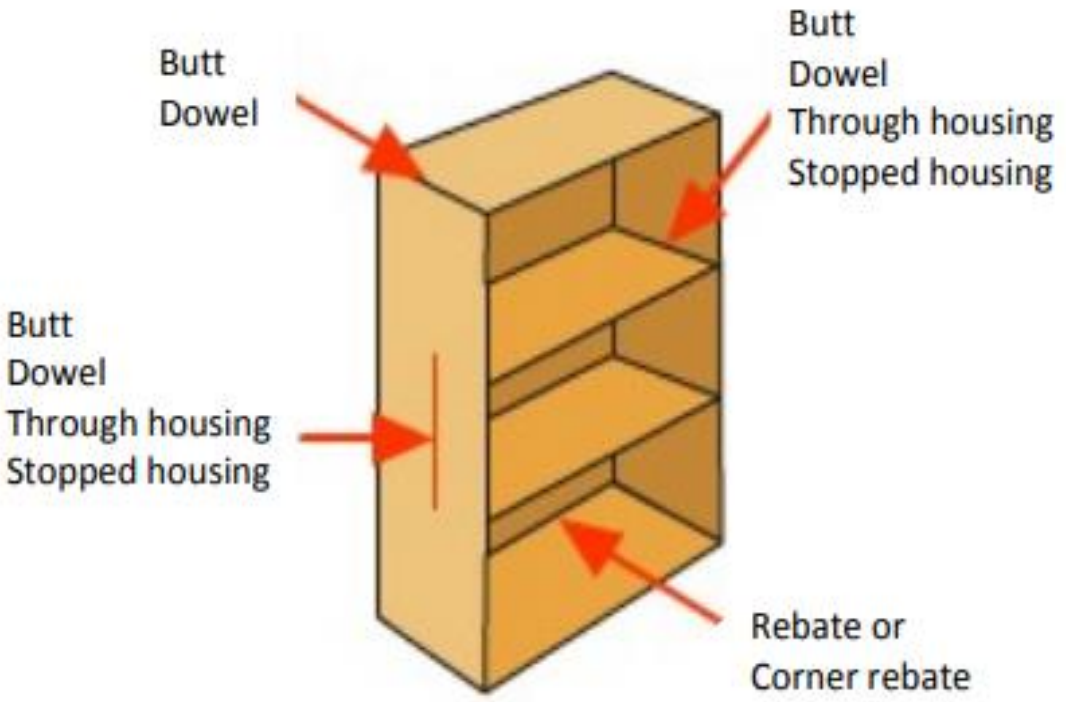


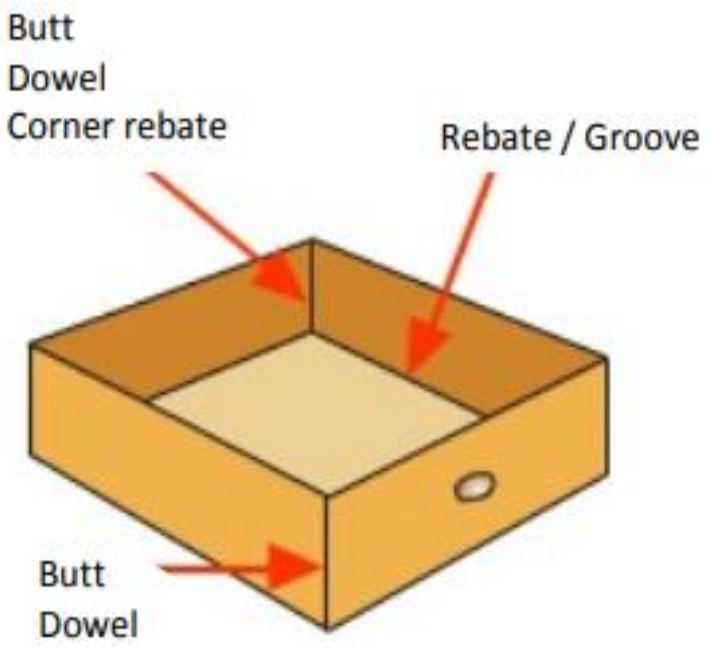
OTHER FLAT FRAME JOINTS

- Dovetail Halving Joint
  - Medium to high strength wood joint (dependant on thickness of material).
  - Marking out - Pencil, rule, try square, marking gauge, dovetail template.
  - Cutting - Tenon saw or dovetail saw, bench hook, bench vice, bevel edged chisel.
  - Machining - Band saw can be used for some cuts if many are required.



CARCASE JOINTS





CARCASE JOINTS

LEARNING INTENTIONS

- To **identify** the different types of carcase joints
- To **justify** the **selection** of one joint carcase over another
- To **mark out** the different carcase joints
- To **cut out** the different carcase joints
- To **understand** the importance of accuracy in my work

SUCCESS CRITERIA

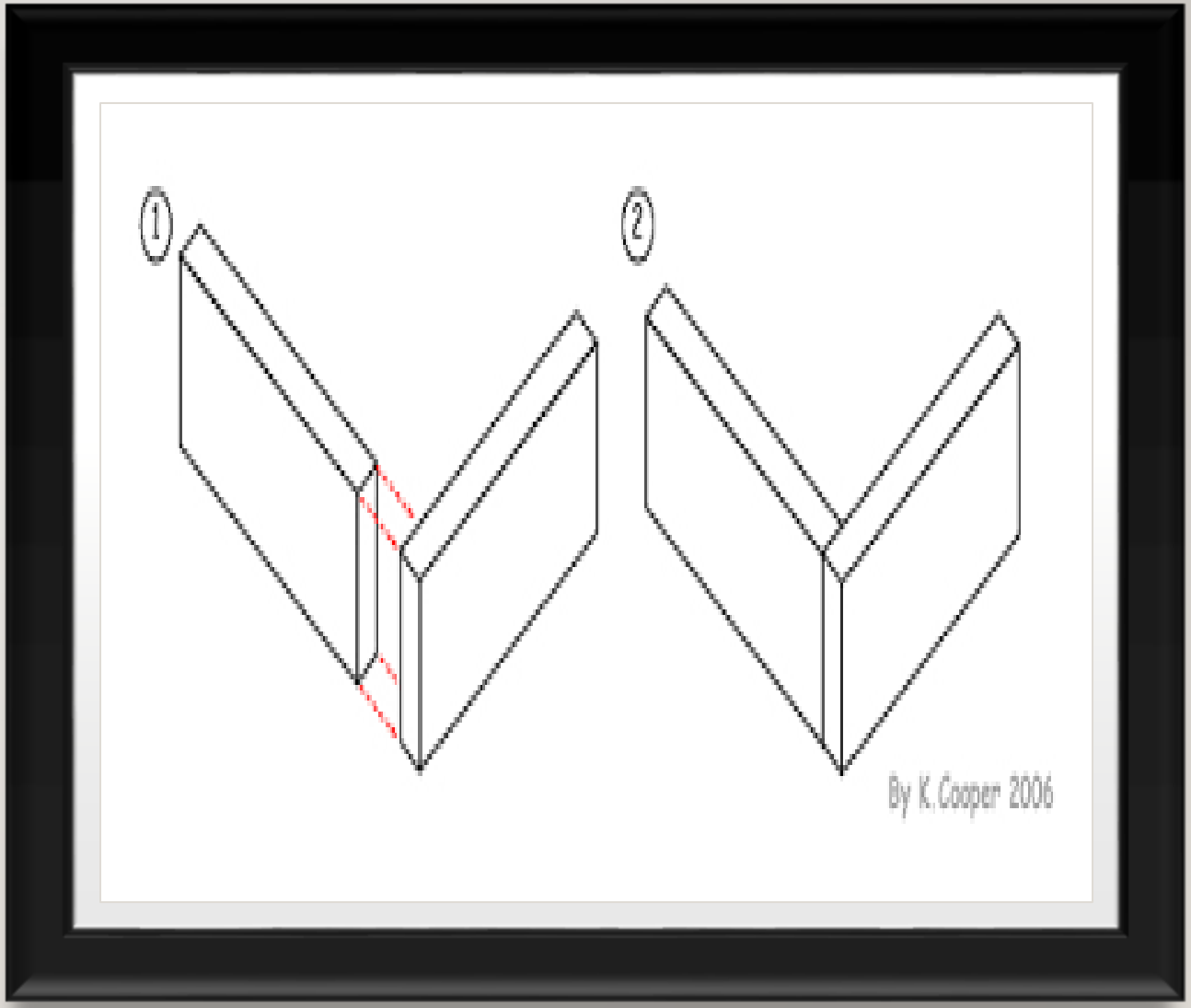
- I can **identify Some/Most/All** of the different types of carcase joints
- I can **justify** my **reasons for selecting** a particular carcase joint
- I can **recall** the **steps in marking out Some/Most/All** of the different carcase joints
- I can **recall** how to **cut out Some/Most/All** of the different carcase joints
- I can **complete Some/Most/All** of my work to within the tolerances set by the SQA

CARCASE JOINTS

- Carcase joints are commonly used to construct cabinets and boxes. The type of joint chosen depends on strength required and design aesthetics.
- Butt
- Corner rebate
- Dowel
- Through housing
- Stopped Housing

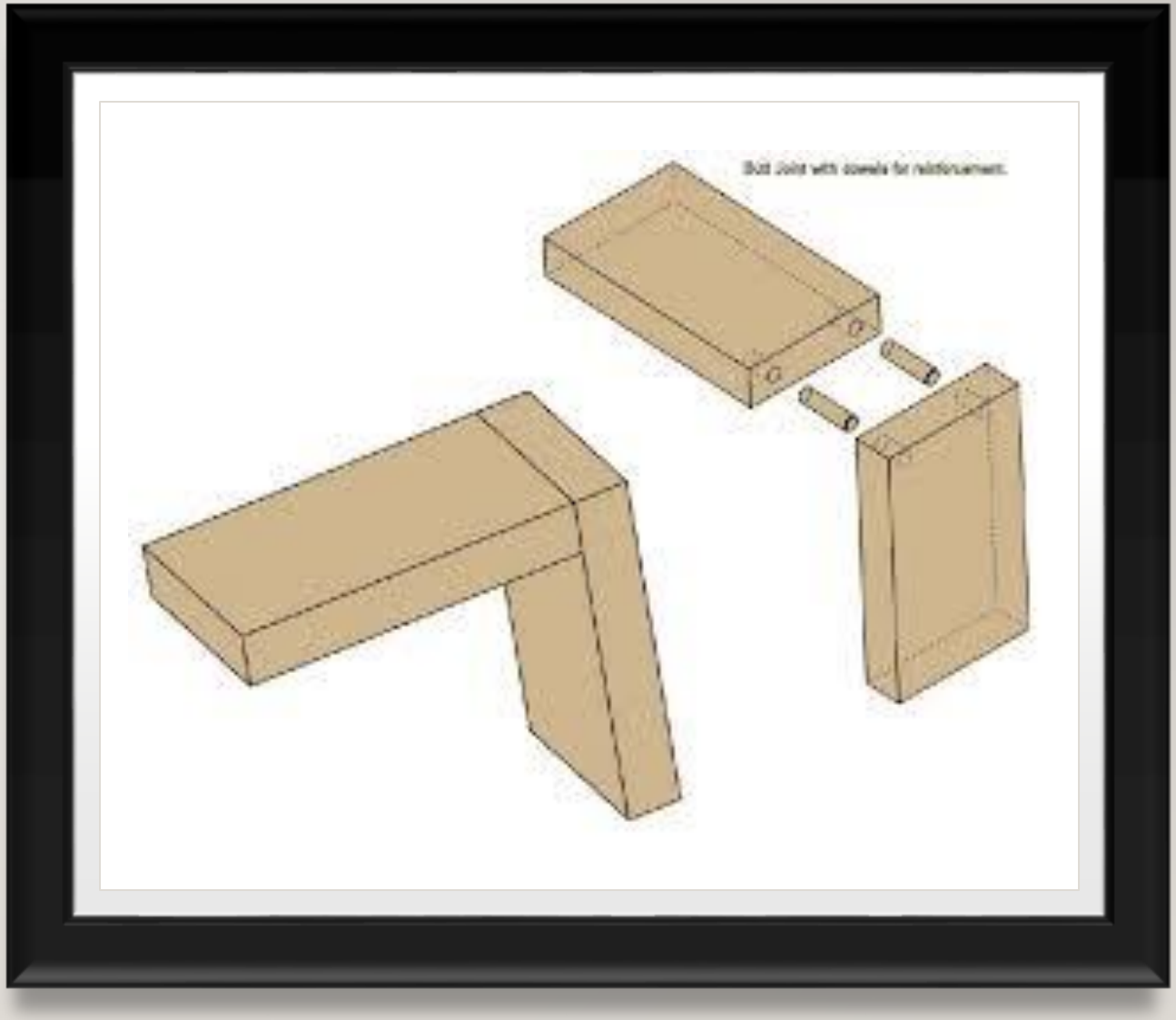
CARCASE JOINTS

- Corner Butt Joint
  - Quick, low strength wood joint. It is usually strengthened by adding knockdown fittings.
  - Marking out - Pencil, rule, try square.
  - Cutting - Saw (Crosscut, Panel or tenon), bench hook or appropriate cramps.
  - Machining - Band saw can be used to cut to length if many are required.



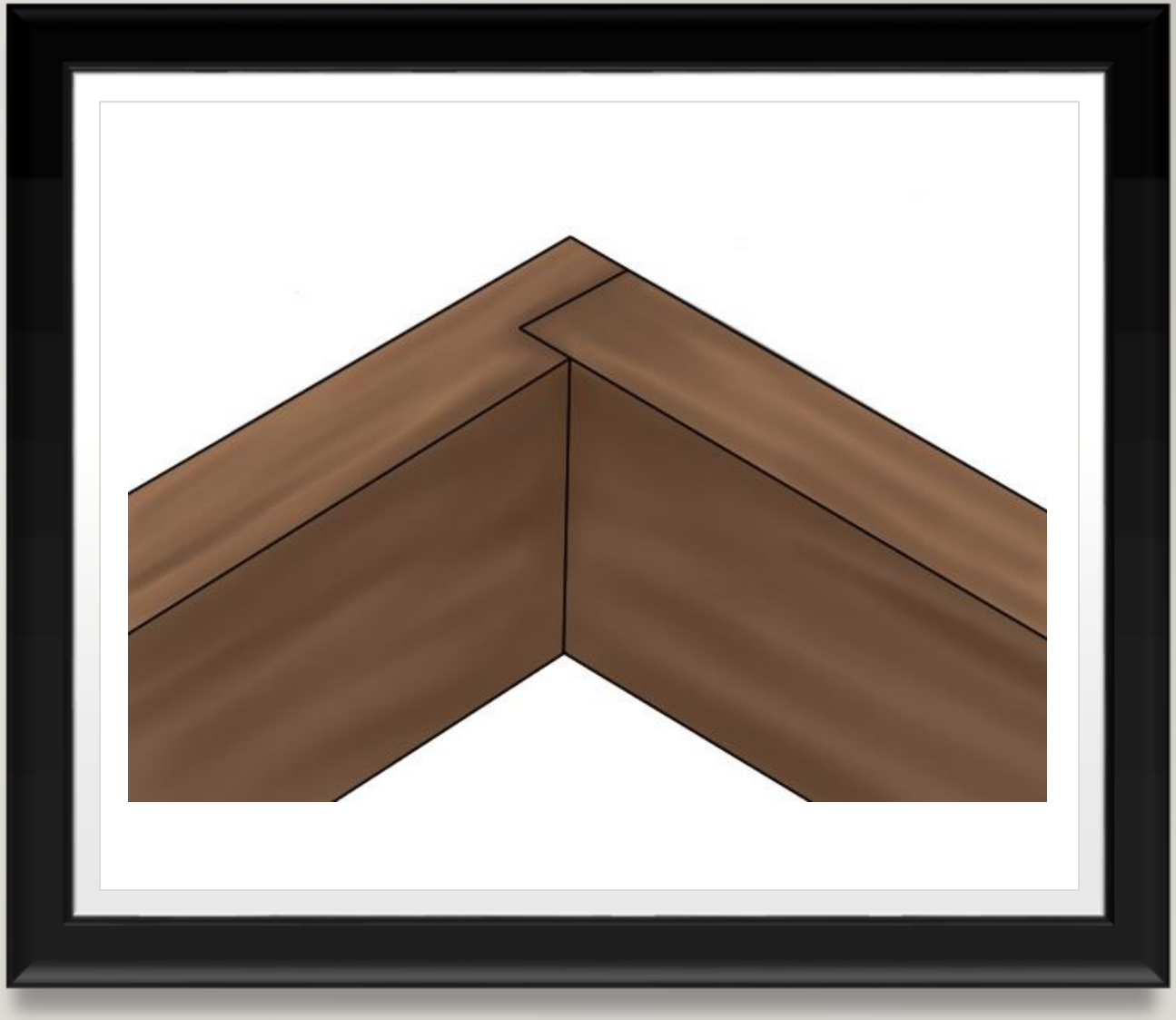
CARCASE JOINTS

- Dowel Joint
  - Medium to high strength wood joint (dependant on width and number of dowels).
  - Marking out - Pencil, rule, try square, marking gauge, bradawl.
  - Cutting - N/A.
  - Machining - Pillar Drill or Power Drill (dependant on size of material), dowel drill & collar.



CARCASE JOINTS

- Corner Rebate Joint
  - Low strength wood joint. It can strengthened by adding knockdown fittings.
  - Marking out - Pencil, rule, try square, cutting gauge, marking gauge
  - Cutting - Rebate plane.
  - Machining - Band saw can be used to cut to length if many are required. Machine router can be used if many are required.

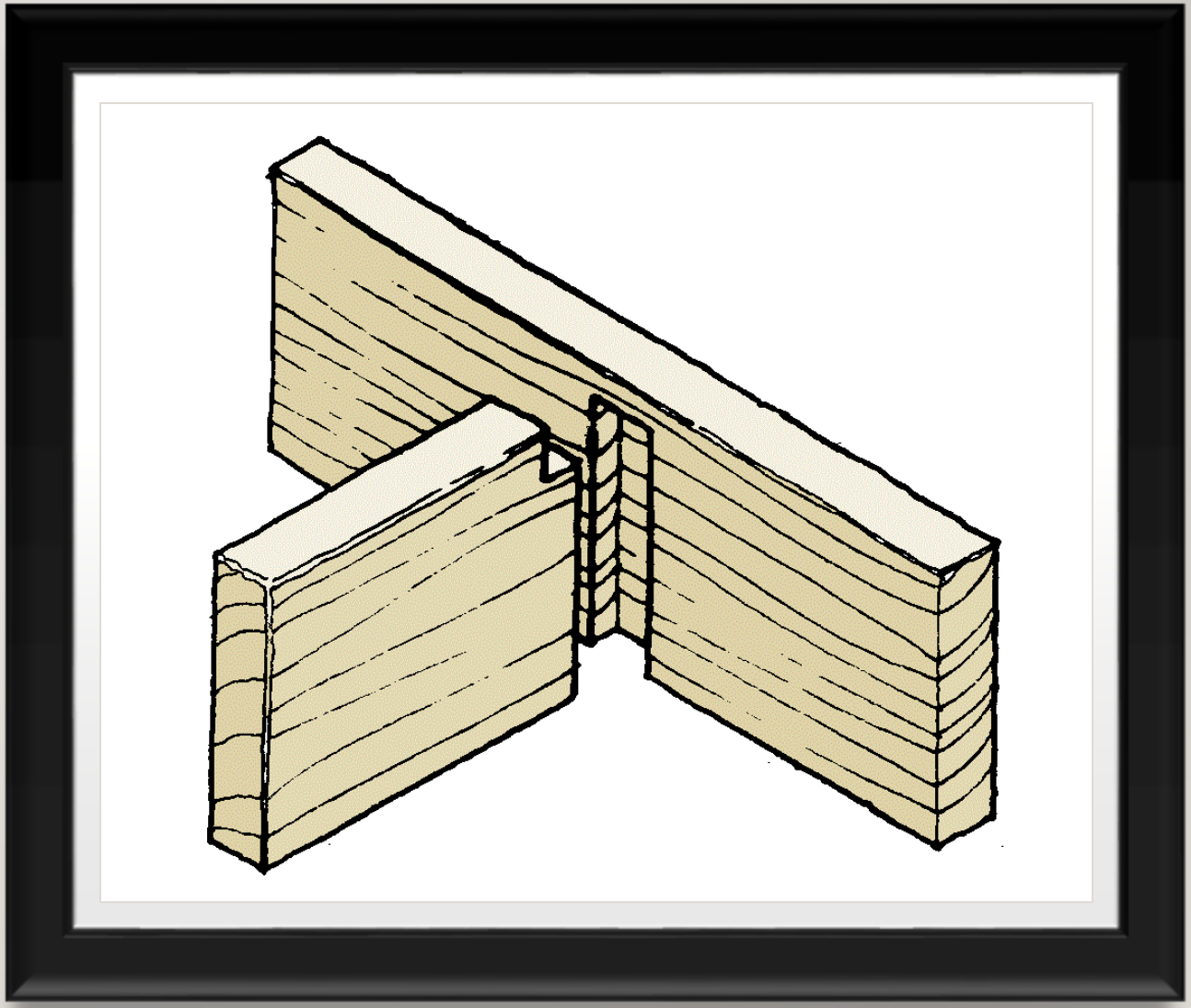


CARCASE JOINTS

- Through Housing Joint
  - Medium to high strength wood joint (dependant on material thickness).
  - Marking out - Pencil, rule, try square, marking gauge, marking knife.
  - Cutting - Tenon saw, appropriate cramps, Bevel edged chisel, Hand router.
  - Machining - Band saw can be used to cut to length if many are required. Machine router can be used if many are required.

CARCASE JOINTS

- Stopped Housing Joint
  - Medium to high strength wood joint (dependent on material thickness). No parts of this joint are visible from the front facing (looks like a butt joint when complete).
  - Marking out - Pencil, rule, try square, marking gauge, marking knife.
  - Cutting - Firmer or Mortise chisel, Mallet, Tenon saw, appropriate cramps, Bevel edged chisel, Hand router.
  - Machining - Band saw can be used to cut to length if many are required. Machine router can be used if many are required.



CARCASE JOINTS

- Rebate / Groove Joint
  - Medium strength wood joint used for bases in drawers/boxes and sometimes used for backing to cabinets.
  - Marking out - Pencil, rule, try square.
  - Cutting – Rebate/Plough/Combination plane.
  - Machining - Machine router if many are required.

MECHANICAL FIXINGS AND ADHESIVES

LEARNING INTENTIONS

- To **identify** the various types of mechanical fixings and adhesives
- To **recall** the benefits of using a particular mechanical fixing over another

SUCCESS CRITERIA

- I can **identify Some/Most/All** of various types of mechanical fixings and adhesives
- I can **state** the **benefits** of using a particular mechanical fixing and **justify** my reason for choosing it.

NAILS

- **Round wire nail**. These large **round** head **nails** are mostly used for rough carpentry where appearance is not important but strength is essential. They are inclined to split a piece of wood.

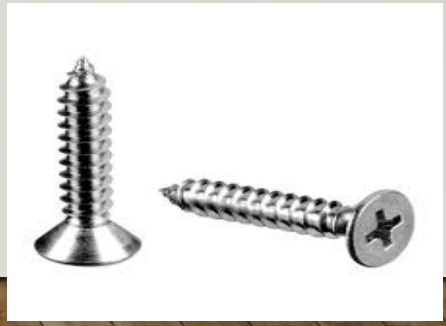
- **Oval Nail.** This is a long nail and care must be taken when it is hammered into the wood. It is unlikely to split the wood.

- **Panel Pins.** Are the ideal fixing for use on the back of cupboards and wardrobes. **Panel pins** are a lightweight and slender nail that provide extra strength when fastened in place. They are generally used to attach skirting or back boards to cabinets, wardrobes and joinery work.

- **Brad Nails.** A traditional nail used for fixing floor boards.

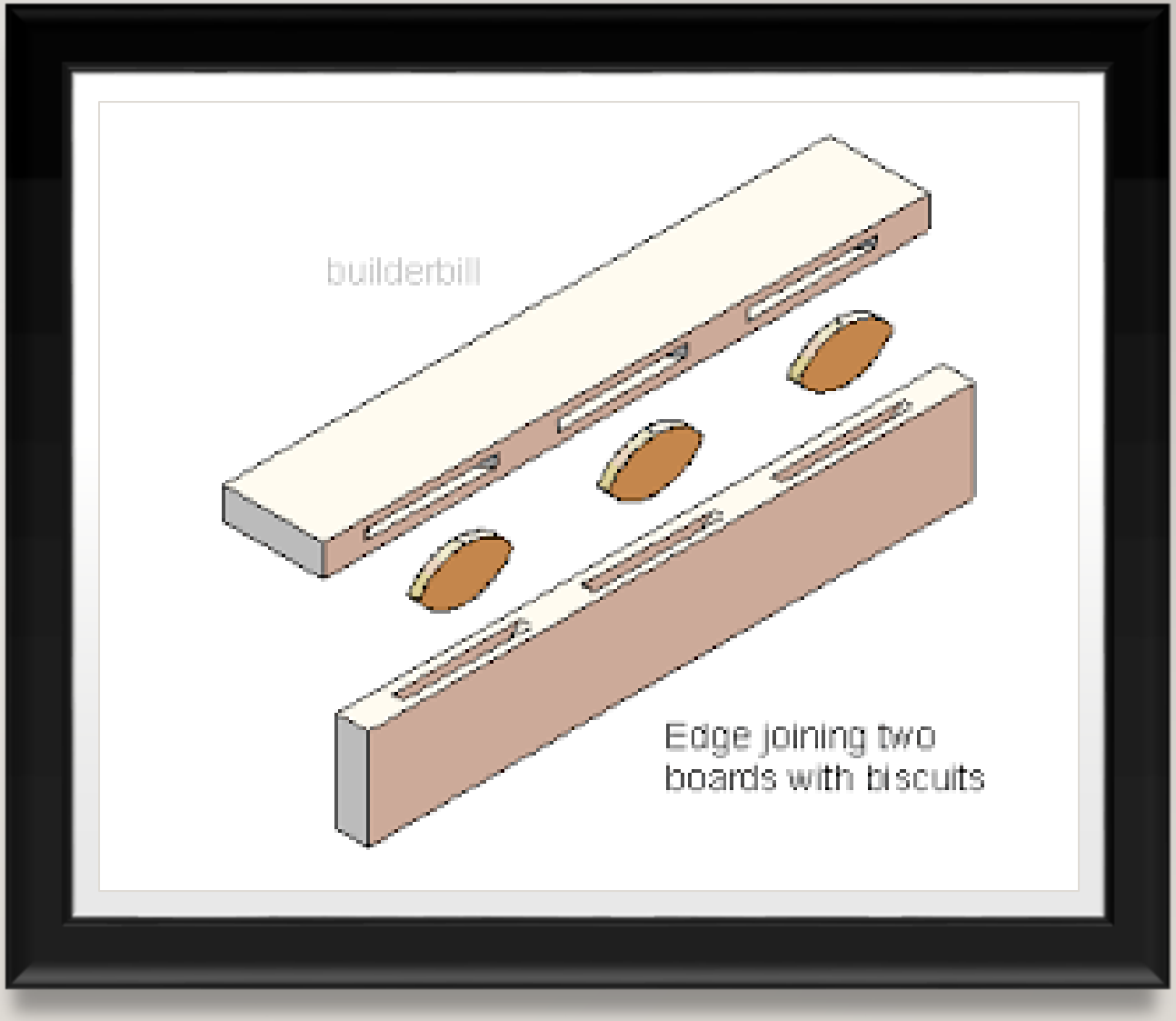
SCREWS

- **Round Head Screw**: These are used for fixing pieces of material together where countersunk holes are not being used. **Round head screws** can look quite decorative especially if they are made of brass.
- **Countersunk Screw:** is a type of fastening that sits flush with the surface of the material it occupies. These **screws** typically are used so that you can cover them easily with either a **screw** cap or piece of wood.
- **Slotted Screw:** has been around the longest. This is the traditional screw head in which used to be the only head type available. The slotted head is basically one line through the middle of the head in which the screwdriver would fit. Once the edges of the slot is burred, the screw then becomes unusable.
- **Cross Head Screw:** was brought in to improve the quality of the overall performance when in contact with the screwdriver. This head type has four points of contact instead of two. This means that either a Slotted head screw driver or Philips head screw driver can be used. However, this type of head also does tend to burr.



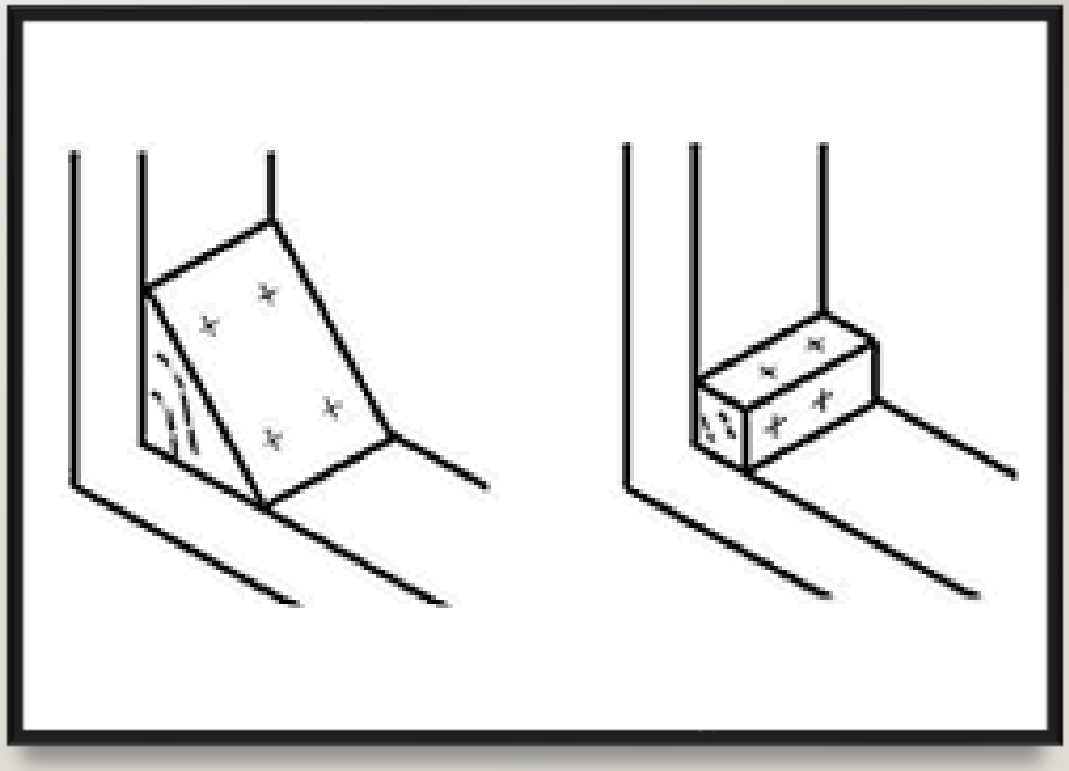
BISCUIT JOINT

- As its name suggests **biscuit joints** are secured with pieces of timber that are in the shape of a **biscuit** and these pieces of timber help to prevent movement and add strength. To construct these **joints** you need to use a tool called a **biscuit** joiner which is used to cut the **biscuit** shaped holes in the wood.



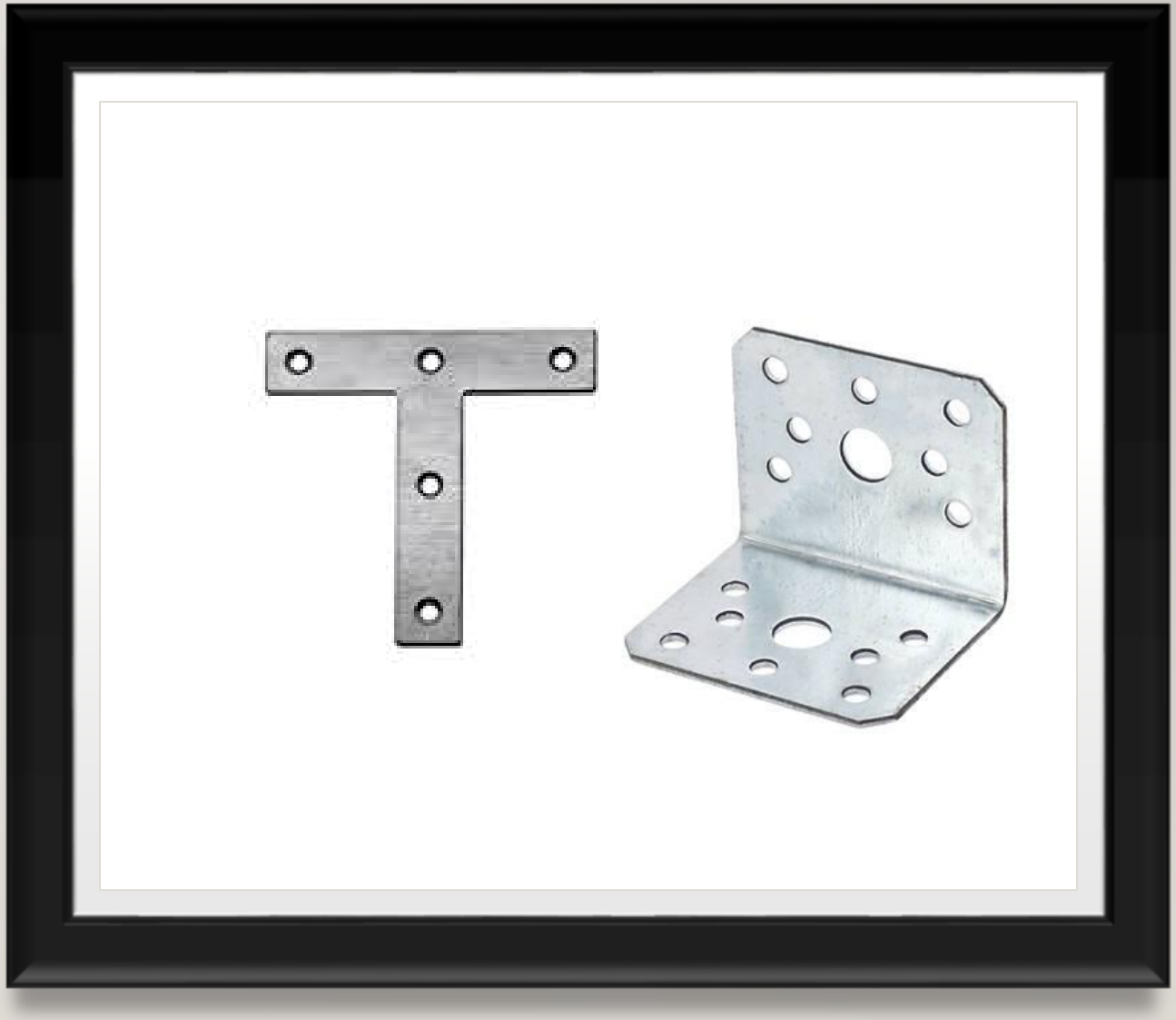
CORNER BLOCKS

- **Corner block joints** are intermediaries. Instead of connecting two boards directly together, each board is connected to the **corner block** instead. This block can be square or triangular in shape.



ANGLE BRACKETS

- An **angle bracket** is designed as a general-purpose connector where members cross each other at right **angles**. Common applications include purlins to rafters, bracing etc. They are particularly useful as additional means fixing truss to the wall plates where hoop irons have been misaligned.



KNOCK DOWN FITTINGS

- **Knock-down fittings** are those that can be put together easily, normally using only a screwdriver, a drill, a mallet/hammer and other basic tools. They are temporary joints although many are used to permanently join together items such as cabinets and other pieces of furniture that are purchased in a flat pack.

HINGES

- **Hinges** are simple mechanical bearing devices which are used to connect two parts and allow them to rotate relative to each other about a fixed axis. Depending on the type employed, the components can move (most commonly) within a limited arc or with 360° freedom.

ADHESIVES

- Gluing: There are many types of glue available to buy and use. The 3 main categories are.
  - Internal Gluing
  - Impact Adhesive
  - External Gluing

INTERNAL GLUING

- Polyvinyl Acetate (PVA) is a general-purpose glue mainly used for internal work and projects which are designed for indoor use. Although it is coloured, this is just so you can see where you have added the glue. When it is dry/cured it has no colour.

IMPACT ADHESIVE

- This glue cures very quickly. It sticks parts together almost instantly. There are external as well as internal versions of this type of glue.

EXTERNAL GLUING

CASCAMITE IS ONE OF MANY TYPES OF GLUE WHICH IS NOT AFFECTED BY WEATHER AFTER IT HAS CURED.

FINISHING

LEARNING INTENTIONS

- To **recall** the steps involved in finishing a piece of work
- To **identify** the various types of finish and state their different properties

SUCCESS CRITERIA

- I can **recall Some/Most/All** of the steps in finishing a piece of work
- I can **identify Some/Most/All** of the types of finish
- I can **recall Some/Most/All** of the **properties** of the different finishes and select the correct one of for a required finish

FINISHING

- Equipment checks and operation tips:
  - When sanding use a sanding cork/block and check sanding direction (with the grain)
  - Abrasive paper: Glass, Garnet
  - Abrasive grades: Fine, Medium, Coarse
  - Ensure you have correct tools for application of the finish. (E.g. There are different types of brush with bristles suited to specific finishes)
  - Tools for removing excess finish and cleaning brushes etc.
  - Use of any PPE equipment (plastic gloves, apron etc)
  - Read and follow specific instructions before using the finish.
  - When applying a finish ensure the room is 'dust free'. Otherwise the finish will feel gritty.

Common Surface finishes for wood are:

- Varnish
- Stain
- Wax
- Oil: Danish, Linseed, Vegetable
- Paint: Gloss, Satin, Eggshell

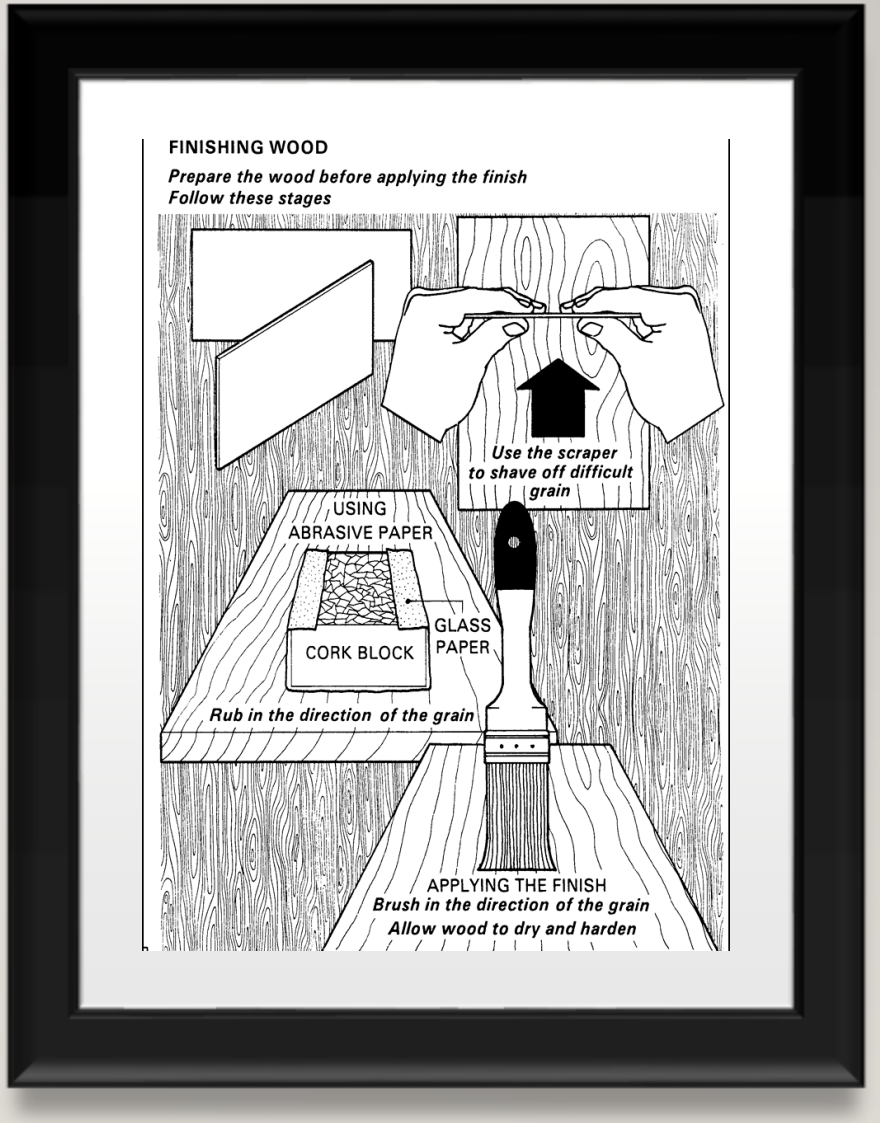
PREPARING A SURFACE FOR FINISHING

- **Surface Marks:** There are three main categories of marks on a surface.
- **Deep marks & gouges** - These can only be removed using a Smoothing plane, Spokeshave or a Scraper.
- **Joint gaps/chips** - These can only be repaired using Stopping or Filing.
- **Pencil marks** - These can be removed using coarse/medium grade abrasive paper (NB using ink on wood can stain the wood permanently as it is absorbed into the wood.)

- **Finishing**
- **Wetting -** Before applying a first coat wipe the project down with a damp clothe. This removes any left over dust and 'opens' up the grain allowing the finish to penetrate better.
- **Finishing between coats** - Using abrasive paper, working through the grades from medium to fine.

STEPS IN FINISHING A WORK PIECE

- Remove all pencil marks, saw marks and scratches
- Fill large gaps
- Sand with coarse grade glass paper
- Wet the wood to raise the grain
- Sand with fine grade glass paper
- Wipe down with a damp cloth
- Apply the finish in thin coats



TYPES OF FINISHES

- Common Surface finishes for wood are:
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  - Stain
  - Wax
  - Oil: Danish, Linseed, Vegetable
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  - Read and follow specific instructions before using the finish.
  - When applying a finish ensure the room is 'dust free'. Otherwise the finish will feel gritty.

VARNISH

- **Varnish** is a clear transparent hard protective finish or film. **Varnish** has little or no colour and has no added pigment as opposed to paint or wood stain which contains pigment. However, some **varnish** products are marketed as a combined stain and **varnish**.

WOOD STAIN

- **Stain** may be loosely defined as any transparent or translucent agent used to color **wood**. Unlike paint, which has pigment suspended in a binder, the coloring agent in **stain** is a dye that is dissolved in liquid. Thus, the color penetrates the **wood** fibers, rather than resting in a surface film like paint.

WAX

- When given a light coating of **wood wax**, the entire surface of **wooden** objects is protected from moisture, and it holds the colour of the **wood** for a long time. **Wood wax** will produce a deep shine, which is sometimes hard to attain with other products. **Wood wax** can be used on painted or non-painted **wood**

OIL: DANISH, LINSEED, VEGETABLE

- **Wood oils** are **used** to finish and protect **wooden** furniture, whilst still captivating the **wood** grain effect. Made from natural products, they are micro-porous which enables them to become part of the **wood** grain. There are many different **oils** for **wood**, each specifically designed for a particular **use**.

PAINT: GLOSS, SATIN, EGGSHELL

- **Paint** is **used** to protect all sorts of buildings and structures from the effects of water and sun. Wooden buildings such as houses are usually **painted** because a coat of **paint** prevents water seeping into the wood and making it rot. The **paint** also helps to prevent the wood from drying out in the hot sun.