

National Certificate in Carpentry

Demonstrate Knowledge of Carpentry

Hand Tools

Unit Standard – 12998

Level 3, Credit 4





12998 – Demonstrate knowledge of carpentry hand tools

What you must do to achieve this unit

- Correctly describe hand tools in terms of work operations each can complete.
- Correctly describe care and maintenance of hand tools (including cutting edges) in accordance with manufacturer's recommendations.
- Correctly describe the use of hand tools in terms of safety requirements. Includes: work methods; plant; equipment; identification of hazards and controls.



Note: *The level of detail asked for in the worksheets shows the depth of knowledge you should have about all the hand tools covered.*



Contents

<i>Reference</i>	<i>Page</i>
Introduction	1
Setting-out Tools	2
Worksheet 1	9
Cutting Tools	10
Worksheet 2	20
Impelling Tools	21
Holding Tools	25
Worksheet 3	29
Grinding and Sharpening Tools	30
Grinding	32
Hand Tool Hazards and Controls	34
Care, Maintenance and Safety of Carpentry Hand Tools	35
Worksheet 4	37

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Level 6, 234 Wakefield Street
PO Box 2615
Wellington

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Introduction

There is a large range of carpentry hand tools available on the market. Trainees will need to become thoroughly familiar with the selection, maintenance and operation of these tools as they progress through their training. Expert advice should be obtained when planning and purchasing a basic tool kit. This basic tool kit will be added to as your training progresses and the need for new tools arises. (You will continue to purchase carpentry hand tools during your time in the trade, and, over time, your collection will grow.)



Note: Considerable savings can often be made by purchasing good-quality hand tools at second-hand shops and local garage sales. A small amount of maintenance may be all that is necessary for the tool to perform as well as a new one.

The skilled carpenter must have a thorough understanding of the tools they are using and the mechanical principles underlying their design and construction. They will also need to know how to care for, maintain and use them properly.

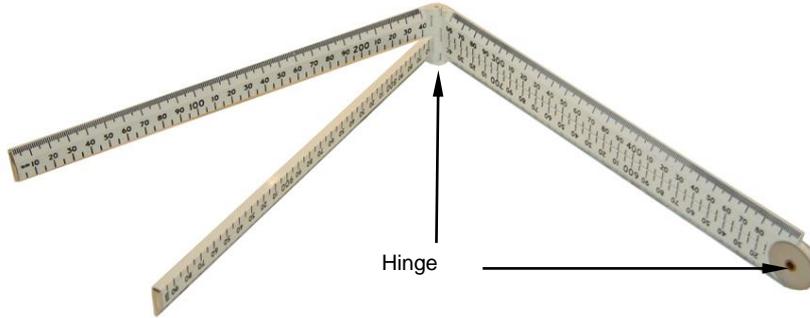
Hand tools can be classified into four areas according to their particular use:

<p>Setting-out Tools</p> <ul style="list-style-type: none"> Folding rule Measuring tape Carpenter's pencil Combination square Sliding bevel Spirit level Marking gauge 	<p>Cutting Tools</p> <ul style="list-style-type: none"> Crosscut saw Panel saw Rip saw Combination saw Wallboard saw Hack saw Coping saw Hole saw Chisels
<p>Impelling Tools</p> <ul style="list-style-type: none"> Hand drill Brace Hammers Nail punch set Pinch bar (wrecking bar) Screwdrivers 	<p>Holding Tools</p> <ul style="list-style-type: none"> Sanding block Apron Adjustable spanner Pliers Cramps and clamps Pop riveter Socket sets

You will learn about all these tools as you work your way through this resource.

Setting-out Tools

Folding Rule



Description

Folding rules are made from wood, metal or plastic and are designed with a hinge for folding. The standard length is 1m long and measurements are graduated in millimetres.

Use

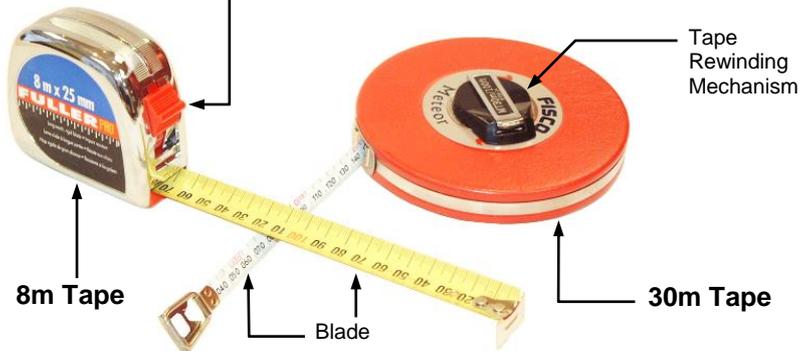
Used flat on the surface for an average reading and used on its edge for accuracy so the measurements can be marked exactly with a sharp pencil.

Care and Maintenance

Lubricate hinges and keep ruler clean. Always fold up when not in use.

Measuring Tape

Tape Lock and Retracting Mechanism



8m Tape

30m Tape

Blade

Description

A measuring tape is a flexible strip of steel divided into millimetres, centimetres and metres. Common lengths used by carpenters are 5m, 8m and 30m. Tapes are equipped with a power return spring that automatically returns the tape to the housing. The lock attached to the tape can hold the blade in an open position.

Use

Used for accurately measuring long lengths. When measuring, hold the tape taut and support it to prevent sagging. Rewind after use.

Care and Maintenance

Avoid loops in the tape as they may cause the tape to snap when pulled taut. Keep the tape dry and lightly oiled, free from grit, which may scratch the enamel surface and make reading and rewinding difficult.

Carpenter's Pencil



Description

The carpenter's pencil has a rectangular-shaped lead and comes in hard, medium or soft grades. They are colour coded for ease of lead identification.

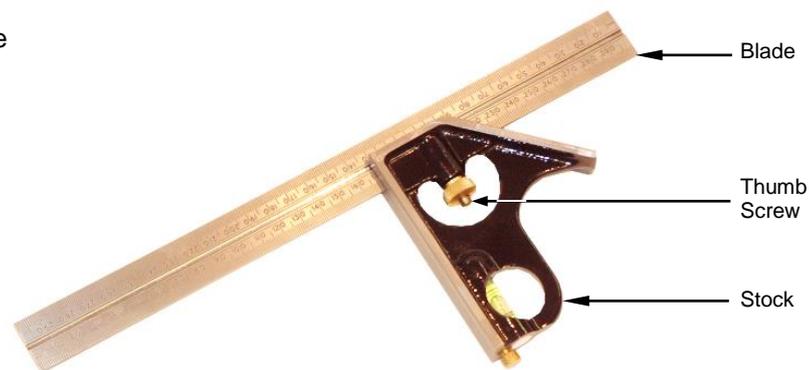
Use

Used for marking measurements on timber.

Care and Maintenance

Keep the lead sharp and to a chisel-shaped point. A fine accurate line can only be produced by using the correct grade of pencil for the material being marked.

Combination Square



Description

The combination square consists of two components – stock and blade. The stock fixes the blade in position and is held firmly by tightening the thumb screw.

Use

Used for marking angles of 45°, 90° and 135°. Can be set and used as a gauge for awkward places and for measuring the depths of rebates.

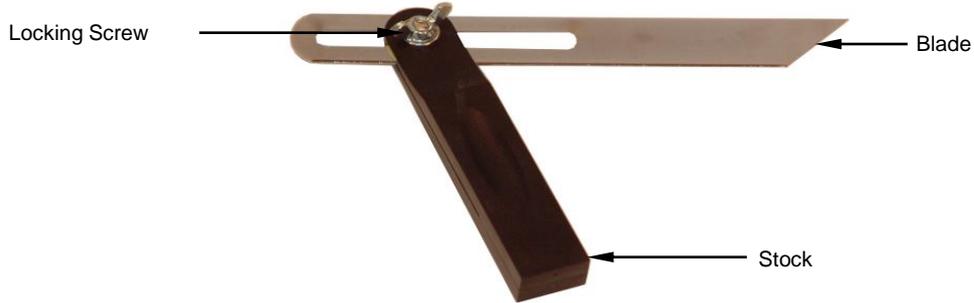
To check if a square is accurate, complete the following:

- Place the stock firmly against the edge of a dressed piece of timber and mark a pencil line across the face of the timber.
- Rotate the stock of the square 180° and check that the blade corresponds with the original marked line.
- If it does, the square is accurate.

Care and Maintenance

Keep clean and free of rust. For easy movement of the stock on the blade, lightly oil the thread screw.

Sliding Bevel



Description

The sliding bevel consists of two components – stock and blade. The blade of the bevel can be adjusted to any required angle. It can also be lengthened or shortened from the stock. The blade is held in position by a thumb screw.

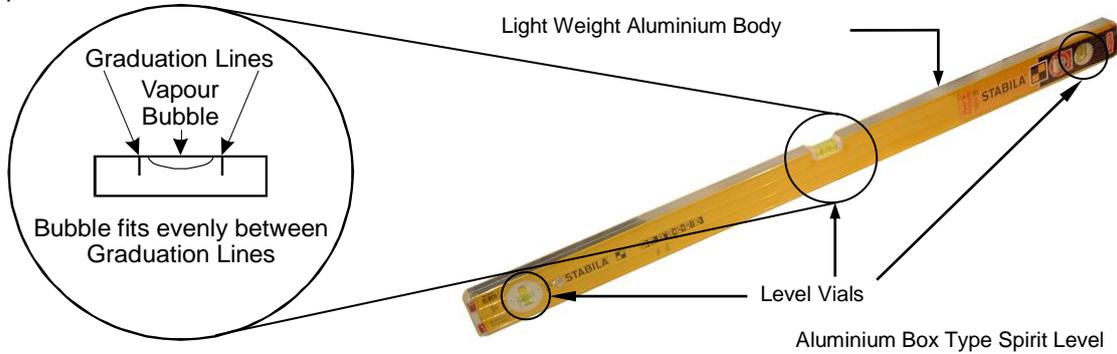
Use

Used for marking angles, testing bevel cuts and mitres.

Care and Maintenance

Keep clean. Lightly oil the thread at the thumb screw.

Spirit Level



Description

Spirit levels are made of either wood or metal and some have as many as six level tubes or vials contained within them. These levels are available in varying lengths. The most convenient length for carpentry use is between 900mm and 1200mm.

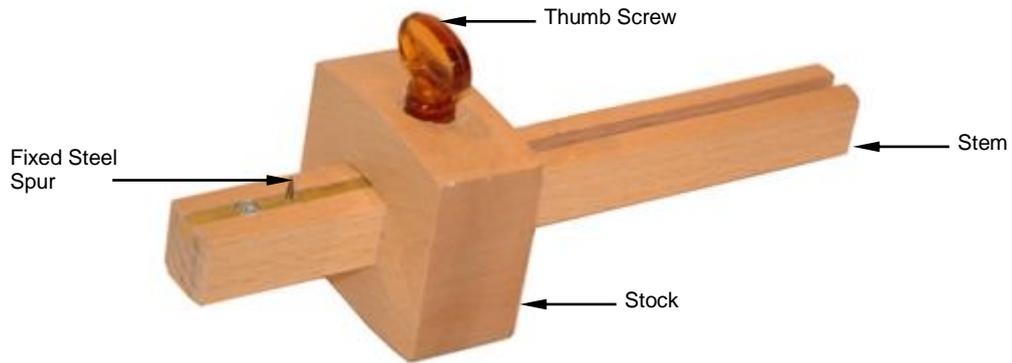
Use

Levels are used for testing horizontal and vertical surfaces for level and plumb. Levels are also available which digitally display degrees, to within 1\10th degree accuracy.

Care and Maintenance

Treat carefully. Do not drop or jar level. Regularly check the level's accuracy by placing on fixed points at each end and reading the level tube or vial. Turn level end for end. If the reading in the vial is the same on both occasions the level is accurate. If not, the level requires adjustment.

Marking Gauge



Description

The stem and stock are made of hardwood. The stock is held at the required setting by tightening the thumb screw. A fixed tempered steel spur scores a line.

A combination gauge has two tempered steel spurs on one side of the stem and a single spur on the other. Where there are two spurs, one is fixed and the other is movable. This allows parallel lines to be scribed at varying distances apart without having to adjust the gauge.

Use

Used to mark a line parallel to a face or edge of a piece of timber. Double spurs are often used for marking mortice and tenon joints.

Care and Maintenance

Keep clean and dry to allow easy sliding of the stock on the stem.

Straight Edge



Description

A straight edge can be made from either timber or metal and has one or both edges perfectly straight.

If the straight edge has two edges straight then the edges must also be parallel.

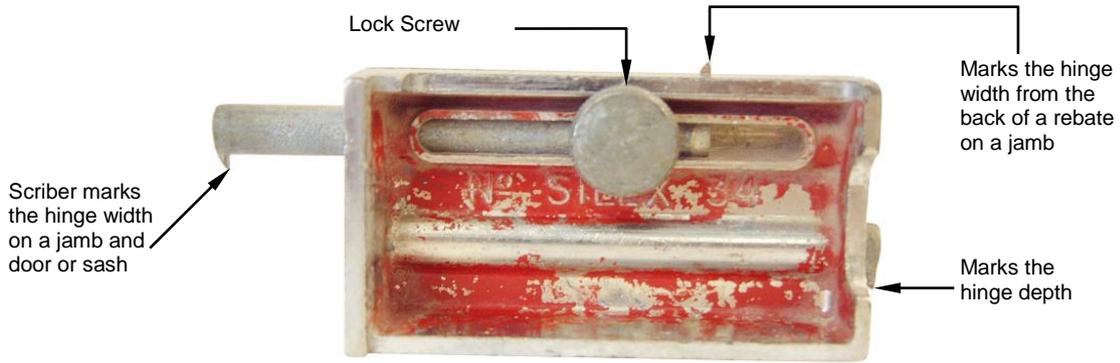
Use

Transferring level points from site datums together with a spirit level. Testing a surface for level by identifying high or low areas.

Care and Maintenance

Care must be taken not to damage the edges of the straight edge.

Butt Gauge



Description

The block and scribers are made of metal. They are fitted with two scriber bars and three scribers. These are arranged so that there is no need to change the settings when hanging doors or windows.

Use

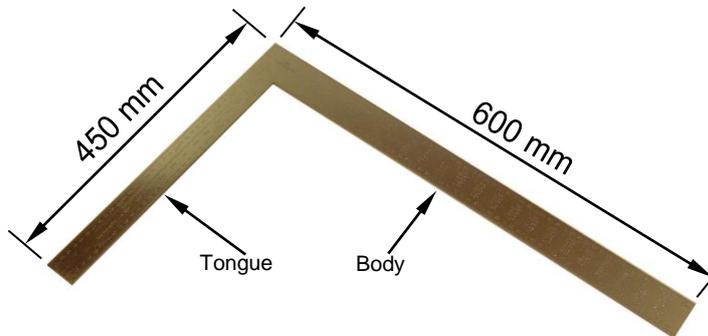
The main function of a butt gauge is for marking the width and depth of housing for butt hinges on doors, sashes and jambs. The butt gauge does the following:

- marks the hinge width on a jamb and door or sash; and
- marks the hinge width from the back of a rebate on a jamb.

Care and Maintenance

Keep clean and free of rust. Lightly oil moving parts to maintain free movement. Scribers are sharpened on one side only.

Steel Square



Description

Made from steel, the square consists of a body and tongue. The body is approximately 600mm long x 50mm wide and the tongue approximately 450mm long x 40mm wide. Unlike its smaller counterparts, the steel square is not adjustable.

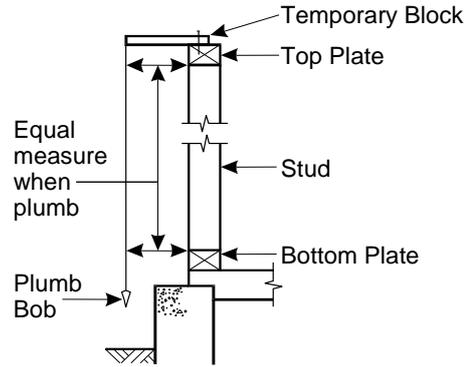
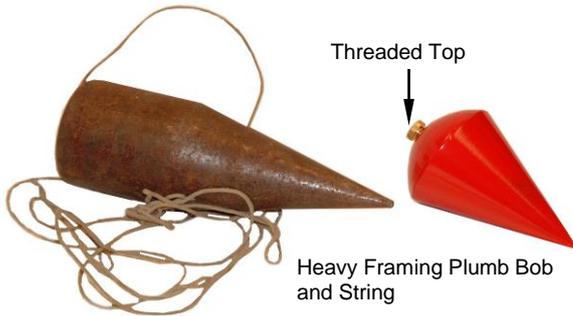
Use

Used for setting out roofs and stairs. It also can be used to mark a right-angled square.

Care and Maintenance

Keep clean and free of rust so that figures and tables can be easily read.

Plumb Bob



Description

A plumb bob is a metal weight suspended by a line. The plumb bob is available in various shapes, sizes and weights. Normally the plumb bob is cone shaped with a point at the lower end. Weights vary from 170 - 340 grams.

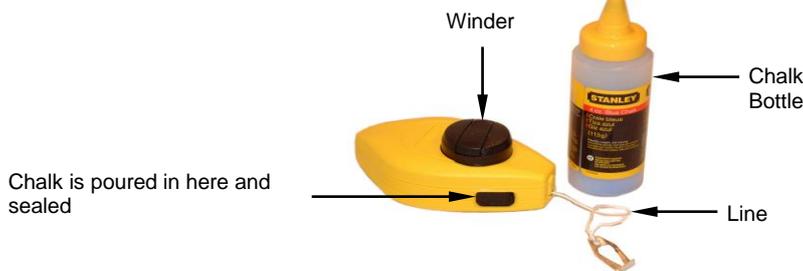
Use

Used for testing vertical surfaces for plumb (vertical), by hanging plumb bob out from surface being plumbed and checking that the measurement between the line and the surface at the bottom corresponds with the measurement at the top between the line and the surface. The accuracy of a vertical surface is particularly important in building work.

Care and Maintenance

Keep the plumb bob clean. Ensure the line is securely attached to the top of the plumb bob.

Chalk Line



Description

This is a line wound onto an enclosed spool containing coloured chalk powder. Replacement line and chalk powders are available.

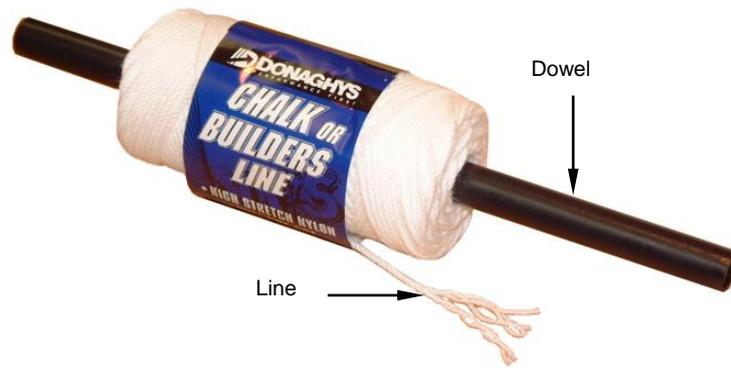
Use

When a straight line is required on a surface, the line is stretched taut between two points. At the midpoint, the line is raised and allowed to snap back, leaving a straight chalk marked line on the surface. The line is retrieved using a winder which folds away when not in use.

Care and Maintenance

Keep dry. Keep the container filled with chalk.

String Line



Description

This is a nylon line, wound on a timber or plastic dowel. String lines are available in various lengths and colours from 50m to 100m.

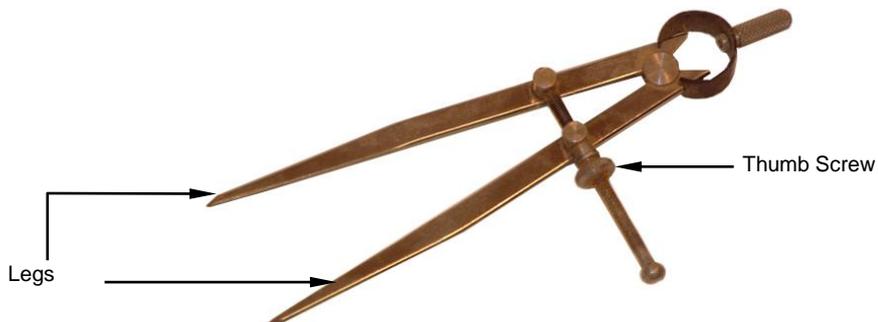
Use

Must be pulled taut to give accurate alignment. Used for setting out and checking straightness on such things as formwork, wall frames, fascia lines, etc.

Care and Maintenance

When not in use, the string line should be rewound onto the dowel. Continual use may cause deterioration of the first section of the line. (Remove the damaged section of line as required.)

Dividers



Description

Dividers consist of a pair of steel legs hinged at the top and held at the required setting by a thumb screw.

Use

Used for scribing a board to match an uneven surface. Also used for marking circles and arcs.

Care and Maintenance

Keep clean and free of rust. Lightly oil the top hinge. Maintain the points in sharp condition to provide for precise scribing.

Worksheet 1

Apprentice Name: _____

1. What steps should be taken to check a combination square for accuracy?

2. Select the most appropriate tool required to complete the following operations:

- a) Transfer the plumb cut to the bottom of a barge board.

- b) Check a vertical wall frame for plumb.

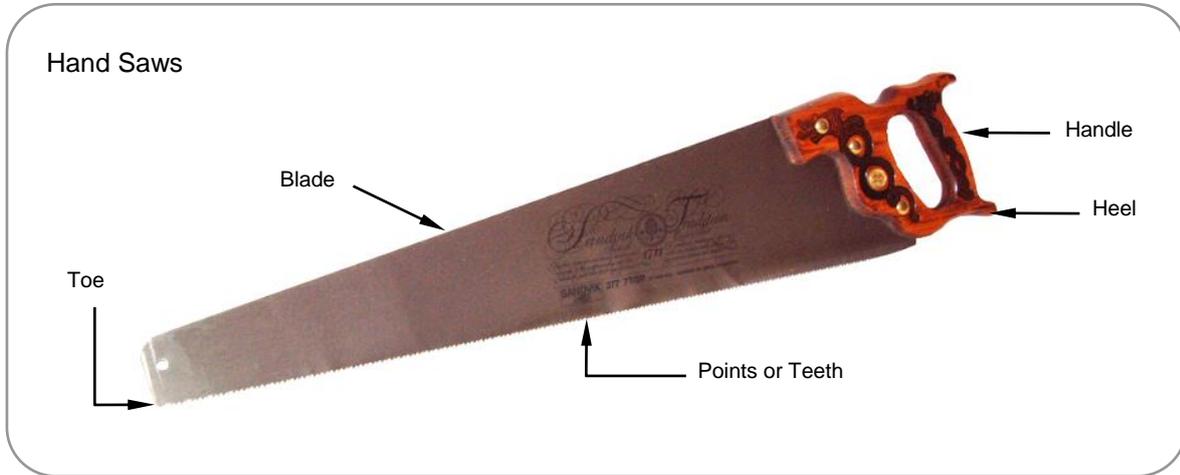
- c) Identify the building line between profiles.

- d) Check that a framing member is horizontal.

3. List the uses for a butt gauge.

WORKSHEET 1	Assessor Initials:	Date:
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Cutting Tools



Crosscut Saw

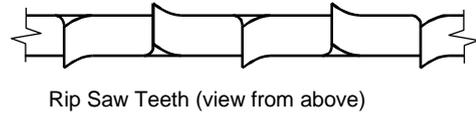
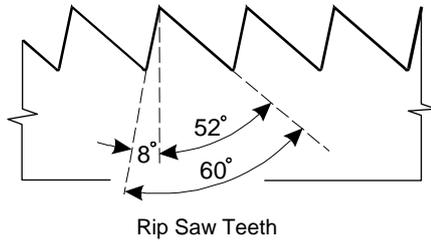
Two diagrams of crosscut saw teeth. The left diagram shows a side view with labels 'Gullet' and 'Point' and angles of 15°, 45°, and 60°. The right diagram is a top-down view labeled 'Cross Cut Saw Teeth (view from above)'.

<p>Description</p> <p>Crosscut saws are normally 500 – 700mm long with 6 – 9 points per 25mm of blade.</p>	<p>Use</p> <p>Used for general purpose cutting across the grain of timber (known as cross cutting). A six-point saw is considered to be the most suitable for general sitework.</p>	<p>Care and Maintenance</p> <p>Keep clean and free of rust. Send the saw to the saw doctor for sharpening and setting when required. Keep a blade guard over the teeth when not in use or place saw in saw bag.</p>
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Panel Saw

<p>Description</p> <p>The smallest of the hand saws is the panel saw. It is normally 450 - 600mm long with 10 - 12 points per 25mm of blade.</p>	<p>Use</p> <p>Used for fine cross cutting on finishing timber such as:</p> <ul style="list-style-type: none"> • skirtings; • architraves; <p>or any other timber requiring a fine finish such as panelling.</p>	<p>Care and Maintenance</p> <p>Keep clean and free of rust. Send the saw to the saw doctor for sharpening and setting when required. Keep a blade guard over the teeth when not in use or place saw in saw bag.</p>
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Rip Saw



Description

The rip saw is the largest in the range of hand saws with a blade length of 600mm to 700mm. It has large chisel-edged teeth (3 to 6 points per 25mm) with the cutting edge at right angles to the saw.

Use

The rip saw is used for cutting timber lengthwise along the grain (known as ripping).

Care and Maintenance

Keep clean, sharp and free of rust. Lightly oil the blade before storing. Send the saw to the saw doctor for sharpening and setting when required. Keep a blade guard over the teeth when not in use or place saw in saw bag.

Combination saw

Description

A combination saw has the teeth of both a cross cut and a rip saw.

Use

The combination saw can be used to cut with, or across the grain. It is a popular "all purpose" saw.

Care and Maintenance

Keep clean and free of rust. Send the saw to the saw doctor for sharpening and setting when required. Keep a blade guard over the teeth when not in use or place saw in saw bag.



Note: Hand saws are referred to by their point number. This is the number of teeth per 25mm of length. Today, many saws are purchased as inexpensive items and are considered a disposable item. When purchasing these saws their intended purpose (eg. for ripping or cross cutting) should still be considered.

Wallboard Saw



Description

These have a tapered blade with teeth designed to cut fast and prevent clogging. The blade length of 152mm is either epoxy bonded to the handle or detachable for easy replacement.

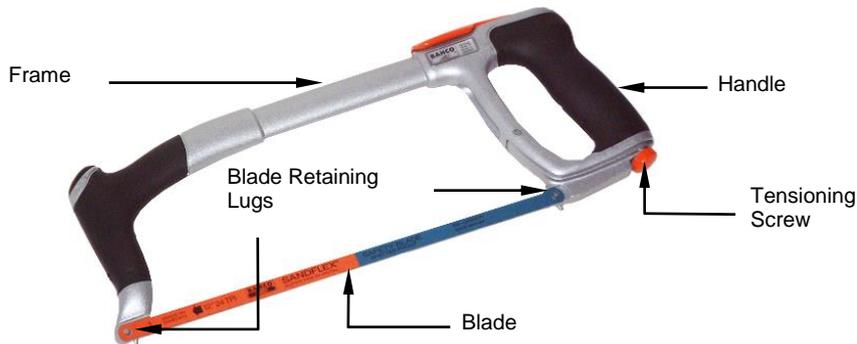
Use

Designed especially for plaster board for making cutouts for electric and other outlets. There is a self-starting point for plunge cuts.

Care and Maintenance

Keep clean and free of rust. Send the saw to the saw doctor for sharpening when required or replace the blade.

Hack Saw



Description

Hack saws have a heavy duty metal frame, which allows for the blade to be tensioned, to prevent it twisting and bending. The detachable blade is mounted on anchor pins. Blade lengths vary from 225mm to 305mm.

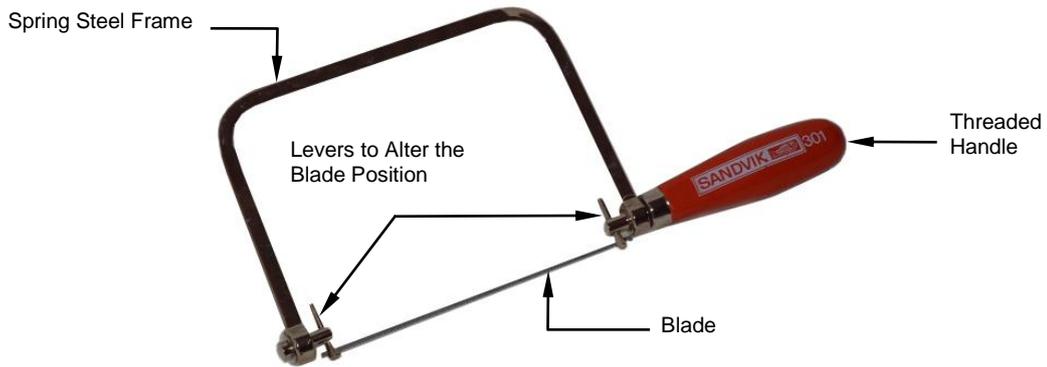
Use

Used for cutting metal or plastic.

Care and Maintenance

Keep clean and free of rust. Change blade as required.

Coping Saw



Description

These have a fine blade, held in tension in an adjustable frame. The replaceable blade length is 160mm long with up to 24 points to 25mm. The handle tensions the blade by screwing “on” to tighten and “off” to loosen. Two adjustable levers alter the blade position.

Use

Used for scribing the ends of mouldings and for cutting curves in thin timber. Maintain the correct tension on the blade. Keep the adjustable levers parallel.

Care and Maintenance

Keep clean and rust free. Change blade as required.

Hole Saw



Hole saw blades – 3 sizes

Arbour and pilot drill bits

Diagram of assembled saw, arbour and bit ready to use

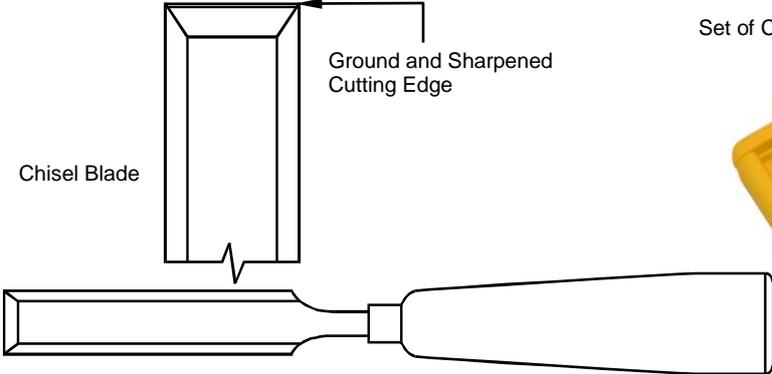
Description

Hole saws are essentially drill attachments. They are made up of three pieces: an arbour that attaches to a standard drill bit, a pilot bit and the circular cup-shaped cutting blade.

The pilot bit protrudes through the centre and beyond the teeth of the saw and stabilises and guides the saw during operation. While a hole saw will attach to most drills, care should be taken so that the power drill used operates with in the RPM range of the hole saw.

A common problem when using a hole saw is that it tends to tear out as the saw exits on the opposite side. To prevent this from happening, begin drilling from the first side as usual, but after the pilot bit breaks through (but before the saw goes all the way through) go around and finish the hole from the other side. The result is a clean hole on both sides.

Chisels



Chisel Blade

Ground and Sharpened Cutting Edge



Set of Chisels

<p>Description</p> <p>A chisel consists of a blade of tempered steel and a shaped plastic or wooden handle. One end of the blade is ground and sharpened to produce the cutting edge and the other has a sharpened tang to which the handle is fitted.</p> <p>Chisel blades are heat treated, bevelled and polished and available individually or as a set. The width identification is scribed on its shatter-resistant handle for quick selection.</p> <p>The width of the blade can vary from 6mm to 50mm whilst the overall length might be from 188mm to 228mm.</p>	<p>Use</p> <p>Chisels have a wide range of applications in building including checking out (hinges etc.), forming and levelling joints.</p>	<p>Care and Maintenance</p> <p>Keep clean and free from rust. Grind and hone to produce sharp edge. Store chisels in roll-up pouch or carrying case to shield cutting edge when not in use. Keep both hands back from the cutting edge at all times when using chisels. Never place a wood chisel in your pocket.</p>
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Note: There is a wide range of chisels, designed for different purposes. A set of the standard bevel-edged type is suitable for most carpentry work.

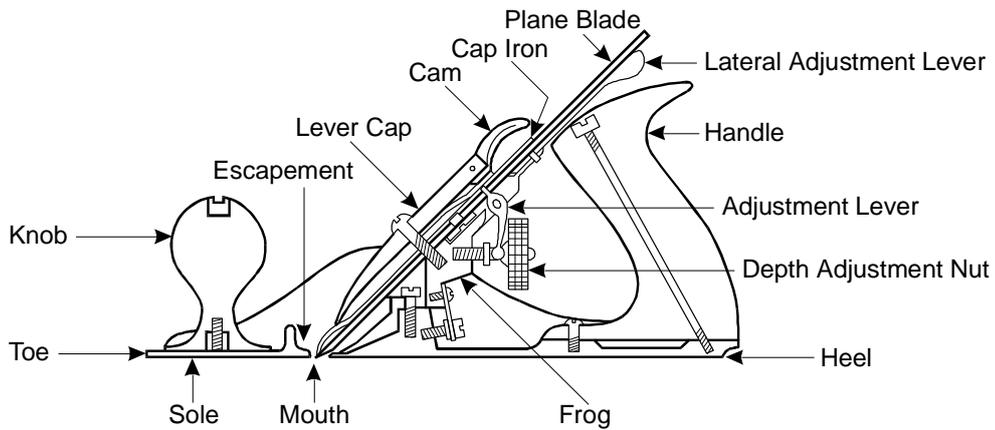
Common Types of Chisels

<p>Bevel Edged</p>  <p>The edges of the blade are ground away so that it can be used to cut into corners.</p>	<p>Firmer Chisel</p>  <p>A general purpose chisel with a square edge strong enough to withstand the force of being hit with a hammer.</p>	<p>Mortise Chisel</p>  <p>Mortise chisels are designed to remove waste wood from narrow trenches.</p>
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Planes

Smoothing Plane
No. 4

Jack Plane
No. 5 / 5½



Description

Planes have a cast steel body and an adjustable cutting blade or iron held at 45°.

There is a range of planes available which include:

- Smoothing plane - Number 4.
- Jack or bench plane - Number 5 or 5½ .
- Rebate plane - Number 10.
- Block plane.

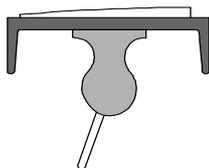
Adjustment can be made in depth using a thumb screw and laterally using the adjustment lever.

Use

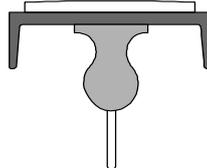
Planes are used to produce planed or flat surfaces, smooth timber surfaces, straighten timber and reduce timber to a required width.

Care and Maintenance

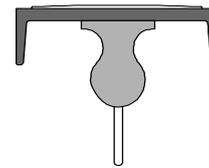
Keep clean and free from rust by applying a light oil. Do not drop. When not in use rest the plane on its side or retract the blade.



Too much of the blade is exposed. (The blade requires lateral adjustment.)



Correct lateral adjustment, but there is too much of the blade showing.



Correct adjustment of the plane blade.

Drill Bits (Standard)



Twist Bits



Flat Bits

Description

Standard drill bits are available in a range of types and sizes for use in portable power tools, including:

- twist; and
- flat.

The chuck size will determine the maximum diameter drill that can be used.

The bit sizes used by carpenters generally range from 1mm to 13mm. Drill bits go up in size in 1mm increments.

Range includes:

- masonry;
- metal; and
- timber.

Use

Used for drilling holes in a range of materials including timber, metal and concrete.

Care and Maintenance

Keep in drill set case when not in use.

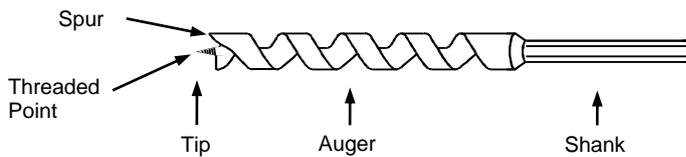
Sharpen when required.

Grinding angle from centre point is:

- Wood drill bits 40°.
- Metal drill bits 59°.

Use the correct drill cutting speed to suit the drill bit and the material being drilled.

Drill Bits (Auger)



Description

Auger bits have a threaded point to draw the bit into the timber and a twisted shank that ejects the waste wood and keeps the hole aligned.

The bit for soft textured woods has spurs or scribes at the outer ends of the cutting edges. The size range varies from 6mm to 30mm.

Use

Auger bits are used for boring clean-cut holes in timber and wood-based sheet materials.

Care and Maintenance

Keep bit clean and free from rust. For easy, clean cutting keep the spurs and cutting edges sharp.

When not in use store bits in a roll-up pouch or specially designed container.

Drill Bits (Countersink)



Countersink Bit



Counterborer Bit

Description

Countersink bits are available in two types:

- countersink for wood and metal; and
- counterborers for when the screw head is to be seated flush or below the surface of the timber.

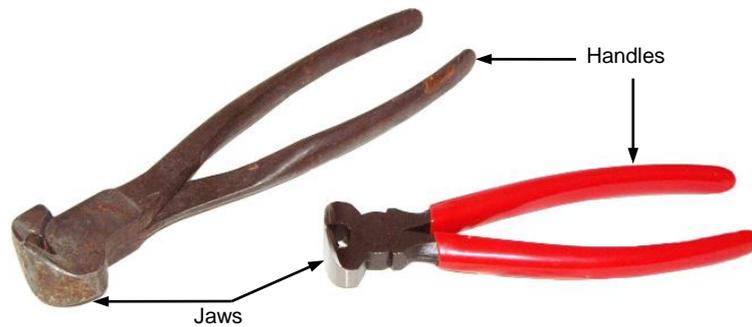
Use

Countersinks are used to enlarge the top of the screw hole so that the head of a wood screw can be recessed.
Counterborers are used to drill the hole and countersink the screw hole so that the screw head can be recessed.

Care and Maintenance

Keep clean and free from rust.

End Cutting Nippers



Description

End cutting nippers are available in varying sizes for different applications:

- nail pulling;
- cutting and tying; and
- reinforcing tie wires (102mm to 245mm).

Use

Used for tying and cutting reinforcing ties, cutting wire and cutting and withdrawing nails. The bevelled cutting edges are machined smooth to protect surface when extracting nails. (Use a wooden block to increase leverage and protect the timber surface when extracting nails.)

Care and Maintenance

Keep clean and free of rust, lightly oil scissor joint.

Tinsnips



Description

Tinsnips are available in varying styles such as:

- straight cutting;
- curved cutting;
- offset handles;
- spring open action;
- straight cuts;
- left and straight cuts;
- right and straight cuts;
- left curve; and
- right curve.

Use

Used for cutting thin sheet metal such as:

- roofing iron; and
- flashings.

For ease of work and quality of finish always select and use the appropriate pair of snips for the job.

Care and Maintenance

Keep clean and free of rust.
Lightly oil scissor joint.

Cutting Knife



Description

Cutting knives are available in many:

- sizes;
- colours;
- handle and blade shapes; and
- fixed or retractable blades.

Accessories available:

- knife holster; and
- insulation cutting shield.

Replacement blades are stored in the handle and are easily replaced.

Use

Used for cutting building papers, surface paper on plaster board and insulation.

Always pull the knife towards the body when making a cut on a flat surface. A pulling motion is stronger and more positive than pushing the knife away from you, and the knife is less likely to slip.

When using a straight edge to guide a cut, either clamp it down or keep your free hand well away from the cutting path of the knife. Be sure the straight edge is thick enough to prevent the knife from "riding up" over the edge.

Don't bend or apply side loads to blades by using them to open cans or pry loose objects. Blades are brittle and can snap easily.

When using a knife to cut through thick material, make several passes – cutting a little deeper into the material each time.

Retract the blade back into the handle when it is not in use.

Care and Maintenance

Ensure that blades are properly seated in position and that knives are properly closed when not in use.

Never leave the knife with the blade exposed.

Always use sharp blades. A dull blade requires more force and is more likely to slip.

Change the blade when it starts to tear the material.

Caution: The cutting blades used in these knives are extremely sharp. They should always be handled with care. They have the potential to cause serious injury if not handled and used correctly.

Worksheet 2

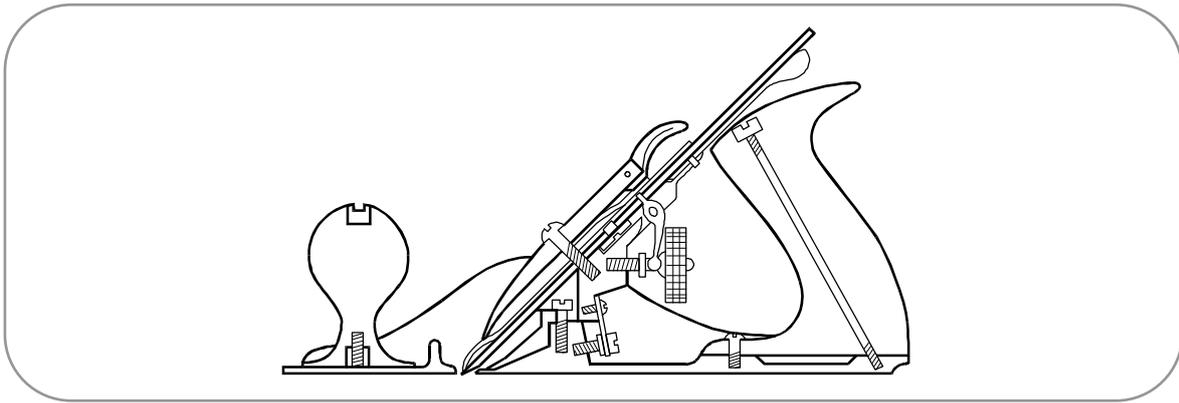
Apprentice Name: _____

1. List the care and maintenance requirements for a hand saw.



2. On the drawing below identify and label the following parts of a smoothing plane:

- Toe.
- Lever cap.
- Cap iron.
- Depth adjustment nut.



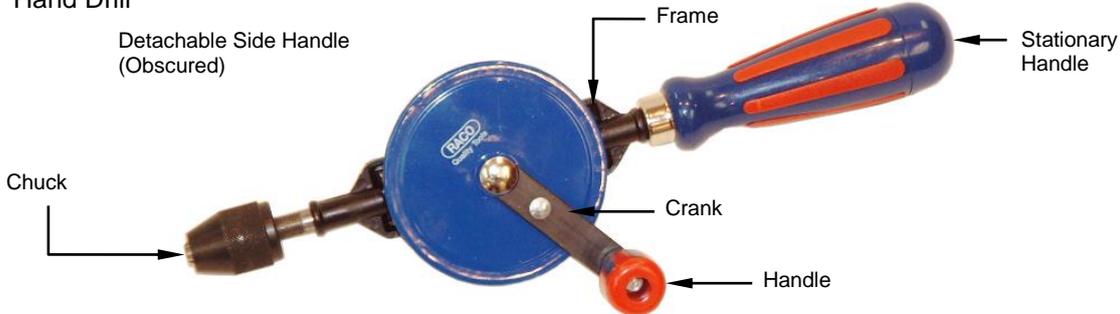
3. List three (3) safety precautions to be observed when using a cutting knife.

4. List three (3) types of chisels.

WORKSHEET 2	Assessor Initials:	Date:
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Impelling Tools

Hand Drill



Detachable Side Handle (Obscured)

Stationary Handle

Frame

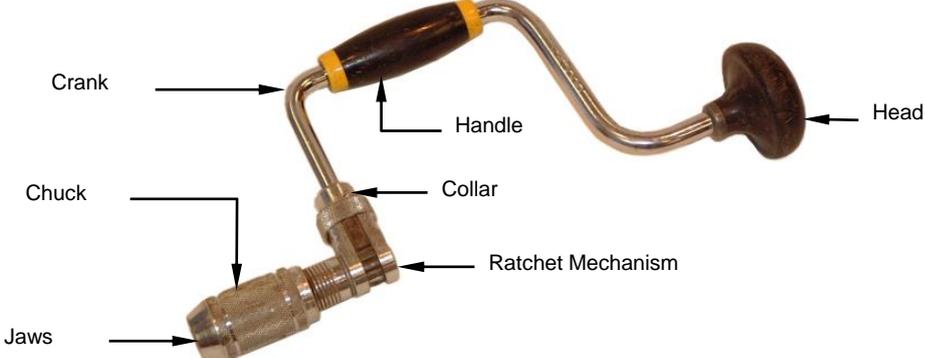
Crank

Handle

Chuck

<p>Description</p> <p>Hand drills can have the following features:</p> <ul style="list-style-type: none"> • double pinion gears; • three jaw self-centring chuck up to 6mm diameter capacity; • steel frame; and • wooden handles. 	<p>Use</p> <p>The hand drill is used to hold a range of metal wood and countersink bits.</p>	<p>Care and Maintenance</p> <p>Keep clean and free of rust. Lightly oil crank, gear wheel and pinion with thin oil.</p>
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Brace and bit



Crank

Handle

Head

Chuck

Collar

Ratchet Mechanism

Jaws

<p>Description</p> <p>The hand brace is used to hold bits providing leverage in a continuous rotary motion to the bit.</p> <p>A ratchet is fitted, which enables the handle of the brace to be moved in a small arc as well as in a full circle.</p>	<p>Use</p> <p>Used to hold bits in alligator jaws for the purpose of drilling holes.</p>	<p>Care and Maintenance</p> <p>Keep clean and free of rust. Lightly oil moving parts at:</p> <ul style="list-style-type: none"> • head bearing; • handle; and • ratchet wheel. <p>For ease of use ensure bits are sharp.</p>
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Hammers



Description

A hammer is a driving tool that consists of a steel head which is fitted to either a wooden, steel or fibreglass shaft. A rubber grip handle is fitted to the shaft.

One end of the head has a striking face and the other a claw to withdraw nails.

Available in various:

- head styles; and
- claw shapes.

Features also include:

- the weights varying from 200gms to 937gms or from 7ozs to 33ozs. Most commonly used is a 20oz hammer (560 gm); and
- handles of different design and length (varying from 290mm to 460mm).

Use

Used for driving and withdrawing nails, driving chisels and set punches. Always strike securely and avoid glancing blows.

Select the appropriate hammer considering:

- head design;
- claw design;
- weight;
- handle length; and
- the job being undertaken.

Care and Maintenance

Always discard hammer when face shows excessive wear, mushrooming, chipping or dents. Never strike with the side of the hammer.

Never strike one hammer head with another hammer head.

Never use a hammer with a loose or damaged handle.

Do not use for driving masonry nails, cold chisels and other hardened metal tools.

Nail Punch Set



Description

A nail punch is a hardened piece of steel with a knurled body for grip, designed to drive nail heads below the surface of the timber.

Nail punches have the following features:

- the tip sizes are between 0.08mm and 3.2mm;
- an overall length of 100mm or 127mm;
- the size is stamped on the head and / or colour coded for easy selection; and
- the tips are cupped and chamfered for ease of alignment. (The tip shape is designed to reduce slipping on nail head.)

Use

Used with a hammer to drive the heads of nails below the surface of the timber.

Ensure the correct size punch is used.

The nail punch point should be slightly smaller than the nail head being punched.

Keep the nail punch in line with the direction of the nail.

Care and Maintenance

Remove burrs.

Discard if the point becomes chipped or when the cupped point wears.

Pinch Bar or Wrecking Bar



Description

Wrecking bars are made in many sizes and shapes with a slotted claw at one end and a sharpened bevel chisel at the other.

Lengths vary from 180mm to 915mm.

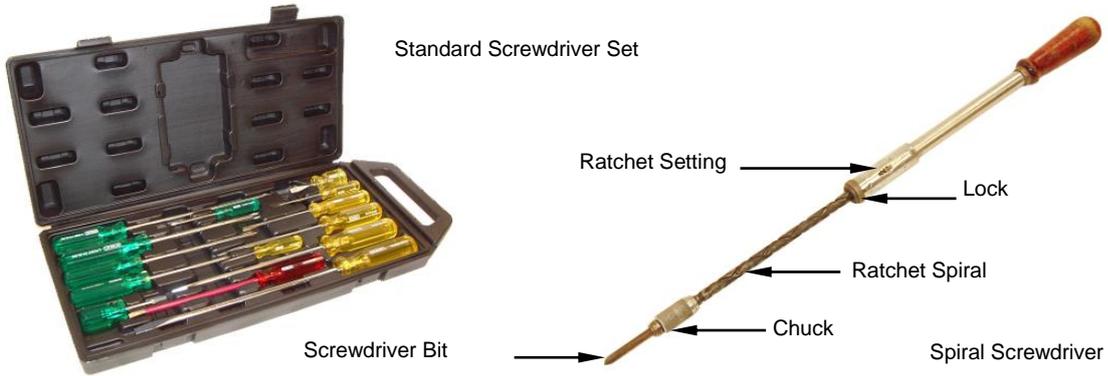
Use

Used for withdrawing nails from timber, levering and moving heavy objects.

Care and Maintenance

Always choose the correct size for the job to be completed.

Screwdrivers



Description

Screwdrivers are available in various sizes to suit screw head configurations. Ratchet screwdrivers work in the forward, reverse and fixed blade positions. The spirals are spring loaded to keep the blade in the screw slot and automatically return the handle into the driving position after each stroke.

Use

Used for driving or withdrawing screws. Select the appropriate size screwdriver to suit screw head width and configuration.

Care and Maintenance

Lightly oil ratchet mechanism. Screwdriver safety tips:

- Never use a screwdriver as a cold chisel, or for prying, punching, chiselling, scoring or scraping.
- Make sure the tip fits the slot of the screw; not too loose or tight.
- Never expose a screwdriver to excessive heat or cold.
- Always discard a screwdriver with a worn or broken handle.
- Never use a screwdriver on a work piece held in your hand. A slip could cause serious injury.
- Never depend on a screwdriver's handle or covered blade to insulate from electricity. Vinyl covered blades are intended only as a protective measure against shorting out.

Common Types of Screw Head



Slotted



Pozidriv



Square



Phillips



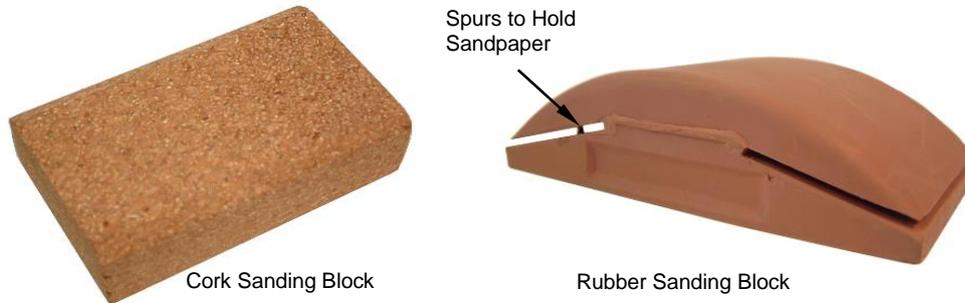
Clutch head



Torx

Holding Tools

Sanding Block



Description

Sanding blocks vary in size but are usually 85mm long, 65mm wide and 40mm thick. They are generally made from cork, rubber or a similar soft material. This extends the usable life of the abrasive paper.

Use

Used to hold abrasive papers when hand sanding timber.

Care and Maintenance

Discard worn sanding blocks.

Apron



Description

Aprons are made from leather or nylon with a varying number of stitched and riveted pockets, including nail set and tool carrying pockets. Accessories can be added to the belt such as:

- cordless drill holder;
- hammer holster; and
- cutting knife holster.

Use

Used for:

- protection when carrying items;
- carrying nails; and
- carrying tools.

Only carry items needed for the task being undertaken.

Care and Maintenance

Keep the apron clean on the exterior and in the pockets. Have any repairs that may be required carried out as early as possible.

Adjustable Spanner



Description

Adjustable spanners are made from strong tempered steel and have a precision machined screw for jaw adjustment. These are available in varying sizes from 100mm to 300mm.

Use

Used for fastening or holding nuts and bolts. Use the correct size spanner for the job so that the right amount of torque can be applied. Always locate an adjustable spanner with the solid section taking the majority of force being applied.

Care and Maintenance

Keep the spanner clean and free of rust. Lightly oil the screw mechanism.

Pliers



Description

Pliers are manufactured from tempered alloy steel with a serrated jaw providing grip and leverage. Pliers also have a finely honed cutting edge used to cut most types of wire. Usually pliers are fitted with a bonded vinyl grip attached to the handles.

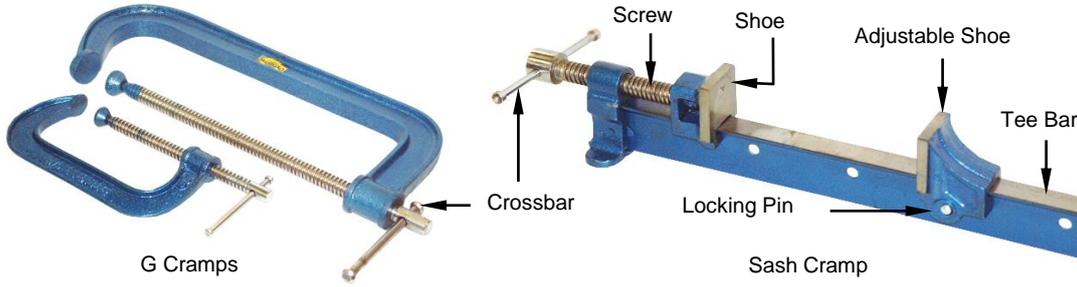
Use

Used for holding, cutting wire and bending metal.

Care and Maintenance

Keep pliers clean and free from rust. Lightly oil the scissor joint. Do not depend on the vinyl grip handle to insulate from electricity. These coverings are intended to improve grip only.

Cramps



Description

There is a wide range of holding tools for use on construction sites. Each has a specific use in a variety of situations which require materials to be held in position until they can be fixed permanently.

A **G cramp** consists of a G shaped section with a long screw which can be adjusted to hold material.

A **Sash cramp** consists of a T section bar with an adjustable shoe which can be fixed at positions along the bar. An adjustable screw with a fixed shoe can be tightened to hold or draw work together.

Use

To hold materials together until they can be permanently fixed.

Care and Maintenance

Keep clean and free from glue and other residue.
Keep the screw lightly oiled.

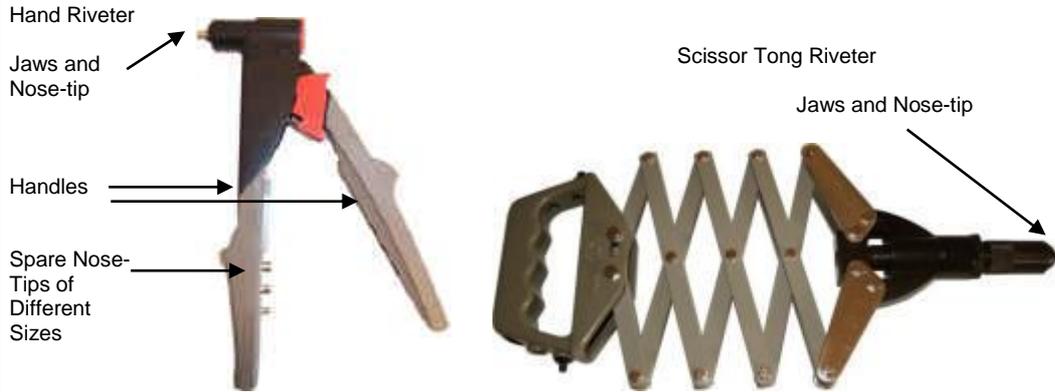
Quick Release Clamp



Description

There are a number of styles, models and sizes on the market. Their common factors are a handle arrangement that you squeeze to make the tool grip and hold onto the material you are working on and a quick release lever to allow the tool to be released and moved easily.

Pop riveter



Description

The pop riveter pulls on the shaft of a “blind rivet” making the sleeve expand and lock into the hole. The shaft then snaps off leaving the rivet in place.

Use

It is used to secure (mainly) sheet metal, flashings, guttering, etc. A hole (the same size as the rivet) is drilled first. Rivets come in various lengths, diameters and materials (stainless steel, aluminum, etc.) for different jobs.

Care and Maintenance

Keep clean and be sure that the nose-tips are tightly locked in place. A stuck rivet shaft can be removed by pushing another shaft into the tip.

Socket set



Description

A socket set contains a range of hexagonal sockets to fit various nut sizes. The set will also contain a driver to turn the sockets and extension bars. A ratchet driver enables the handle to be moved in a small arc as well as in a full circle.

Use

A socket set is used to tighten and loosen nuts and bolts, eg: dyna-bolts, coach bolts, fittings and attachments. A ½ inch drive set will be tougher (but more expensive) than the smaller ¼ inch drive sets available. Metric sets are more useful than the older “imperial” type sets.

Care and Maintenance

Keep clean and be sure to put each part back in its correct space after use. Do not use the ratchet for final tightening or initial loosening – it is not as tough as the other, solid bars.

Worksheet 3

Apprentice Name: _____

1. Why is the tip of a nail punch cupped?

2. Give two (2) uses for a pinch bar or wrecking bar.

3. In the space below, draw the screw heads to match the named screwdrivers.

			
Slotted	Phillip	Pozidriv	Squar

4. List three (3) safety precautions which should be observed when using a hammer.

WORKSHEET 3	Assessor Initials:	Date:
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Grinding and Sharpening Tools

Grindstone



Description

Grindstones are available in a variety of different sizes and motor powers.

They generally have a coarse grinding wheel on one end of the spindle and a fine grinding wheel on the other.

Use

Used for grinding a sharp edge on to:

- chisels; and
- plane blades.

Care and Maintenance

Ensure guards and tool rests are in the correct position prior to use.

Always wear suitable Personal Protective Equipment and clothing.

Check the condition of the grinding wheels prior to operation.



Note: Grindstones are covered in more detail in the module for Unit Standard 13000 (Demonstrate knowledge of portable power tools used on construction sites).

Oilstone



Description

Oilstones are available in coarse, medium and fine grades. There are also combination stones that are usually fine on one side and medium or coarse on the other. The usual size required for carpentry tools is 200mm x 50mm x 25mm.

Use

Used for honing a sharp edge on to:

- chisels;
- plane blades; and
- knives.

Tools should be sharpened over the whole surface of the stone to prevent uneven wear.

To obtain a razor-like edge quickly:

- the oilstone must be clean and of fine grain;
- the surface of the oilstone should be kept lubricated with a light oil-based lubricant while sharpening;
- pressure must be even and applied over the full length of the stone;
- use a coarse stone first if rubbing is likely to be prolonged; and
- use a fine stone if rubbing is likely to be brief.

The use of a honing guide will produce the correct bevel for a sharp cutting edge.

Care and Maintenance

Care is required in the use of oilstones in order to:

- retain the life and sharpness of grit;
- keep the surface flat and even; and
- prevent the surface of the stone from glazing.

Oilstones should be kept moist and clean in a box with a cover. After use, a few drops of fresh, clean oil should be applied to the surface of the stone.

The use of the correct oil prevents a stone from glazing. Oil is used to float away the particles of steel from the tool being sharpened, thus preventing them from filling the spaces between the crystals. To prevent further glazing, dirty oil should be wiped off the stone after use. A dirty or clogged oilstone can be cleaned with kerosene to restore its cutting qualities.

Grinding

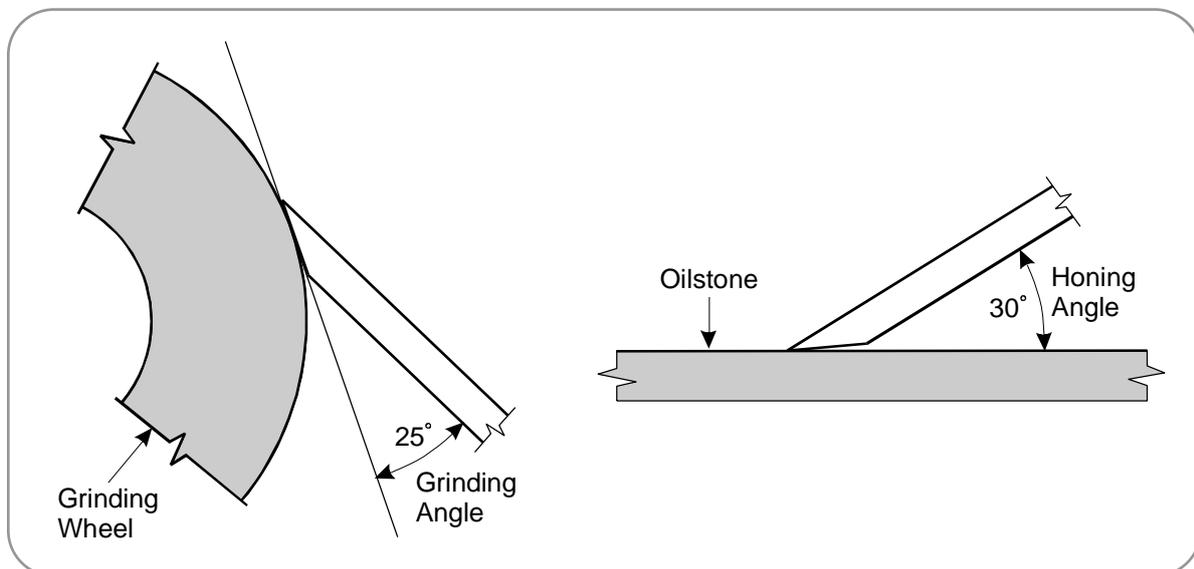
A keen cutting edge is produced on a plane iron or chisel by first grinding the edge to shape on a grindstone and then producing the cutting edge by sharpening or honing it on an oilstone.

After a cutting edge has been resharpened several times, it becomes rounded and the edge must be reground. Unless the edge is damaged, it will only need grinding until approximately 1mm of the old sharpening bevel remains. This avoids damage to the cutting edge and excessive wear on the blade. If the cutting edge is damaged, it must be reground so that any “gaps” are entirely eliminated.

Grinding on a grindstone will produce the correct bevel, but the edge will not be sharp enough for use. The grinding bevel of plane irons and chisels is usually between 20° and 25° . Before the tool is ground, the cutting edge should be squared to the side of the blade.

When grinding the bevel, the blade of the tool is held to the grinding wheel at the required angle and moved lightly across the face of the wheel. An angled tool rest can be used to hold the tool at the correct angle. Care is necessary to prevent the edge from overheating, indicated by a bluish colour, which “draws the temper” of the steel and softens it. The blade should be kept cool by regularly dipping it in water.

Manufacturer’s instructions state to never use the side of the wheel for grinding.



Note: Always use appropriate PPE when grinding.

Sharpening or Honing

A tool must have a sharp edge if it is to produce a smooth, true surface quickly and easily. Grinding does not produce the fine edge required, so the finished ground edge must be done on an oilstone. Sharpening or honing is done more frequently than grinding – in fact, whenever the edge needs to be “touched up”.

The surface of the oilstone needs to be kept wet with light non-drying oil during sharpening. The correct pitch for sharpening may be obtained by bedding the ground bevel of the blade on the oilstone and then slightly raising the back edge of the bevel. The usual practice is to make the sharpening bevel about 5° greater than the grinding bevel. (If the grinding angle is 25° then the honing angle will be 30° .) With an even pressure and using a sliding rotary motion, the blade is rubbed back and forth along the full length of the stone and should be continued until no line of reflected light is visible on the cutting edge. When examining the blade for the “white edge”, it is best to tilt it backwards and forwards to catch the light.

If the sharpening is continued, the “white edge” will disappear, and a burr, or “wire edge” will form on the flat side of the blade. This must be removed. To do this, the blade is turned over and held absolutely flat on the oilstone, and then rubbed backwards and forwards two or three times. At no stage should the blade be raised when the back face is on the oilstone.

Finally, the blade can be stropped on a piece of leather.

Test the Sharpness

The cutting edge of a tool is sharp when it cuts a piece of timber cleanly and with very little effort.

Hand Tool Hazards and Controls

The use of any hand tool has its own hazards, and every hazard has a control. As users of hand tools we need to be aware of the hazards and use the appropriate controls. This example may help to make the process clearer.

Before I use the table saw, I think about the hazards and make sure I control each. The process is:

1. I think about what might happen.
2. I take action to ensure that it doesn't happen (or if it does happen, I make sure no one will get hurt).

What might happen? ↓ Hazards	What do I need to do? ↓ Controls
Damage to hearing from noise	Wear ear muffs
Electric shock from water, cutting the cord, faulty saw, etc.	Use an isolating transformer or cut-out switch
Damage to eyes from flying chips and dust	Wear goggles, check that guard is in place and operating properly
Cutting hands/fingers	Keep hands clear of blade, use a push stick
Timber kicking back, flying off	Do not cut shorts, see that wood is placed firmly against the back plate

Every tool has hazards. You could probably come up with a dozen hazards for the hammer alone! This manual cannot hope to list every possible hazard associated with every possible hand tool, and if it did, it would make for some pretty boring reading.

Common sense tells you what might go wrong, and common sense also tells you what to do to protect yourself and others. If in doubt, ask a more experienced workmate.

Work Methods, Plant and Equipment

There is a saying in America about the dangers of guns, the saying goes: "Guns don't kill people, people kill people." The same can be said of our hand tools. A nail gun won't kill you, but someone operating it improperly might.

When you are thinking about hazards (and you should be thinking about them all the time), don't just think about the tools themselves – remember a hammer sitting on the bench isn't dangerous. The hazards arise from our **work methods** – **how** we use the tools and **what** we use them for.

Remember too, that all **plant** and **equipment** also provide hazards, and these need to be controlled the same way, by thinking about the hazards, and acting to make sure no one gets hurt.

Care, Maintenance and Safety of Carpentry Hand Tools

Good-quality work is impossible to achieve with blunt or badly sharpened tools. Tools with broken handles also impede the quality of work and are dangerous. Careless use of sharp tools can result in serious accidents. Methods that promote safety should be adopted at all times.

It is important to keep tools sharpened and in good condition at all times as this allows for good-quality work as well as easy and safe use of the tool. Any timber that has soil, sand or concrete adhering to it should be thoroughly cleaned before any tools are used on it.

Cutting tools can lose their edge when they are in contact with metal, so care must be taken when handling, packing or transporting tools. When tools are being packed away, plane irons should be withdrawn from the cutting position. The cutting edges of chisels and saws should be kept away from other metal tools; bits should be kept in a roll or container and not left loose. At all times, tools should be kept free of moisture and from time to time rubbed over with light machine oil to prevent rust. When transporting tools store them carefully in a kit bag or tool box.

Apprentices should regularly inspect their tool kit and check that all tools are accounted for and any maintenance required is carried out promptly.

The Dos and Don'ts of Carpentry Hand Tools

Hand tools should always be kept in good working order. Use them correctly, carry them carefully and store them safely.

Always:

- select the right tool for the job;
- use a hammer for driving punches and similar tools;
- start hand saws on the back stroke, guiding the saw with the thumb of the other hand slightly raised;
- carry sharp-edged or pointed tools carefully, hold firmly, close to the body and point downward;
- pass sharp or pointed tools handle first;
- store dangerous tools carefully and considerately;
- follow manufacturers' instructions carefully; and
- select and use the appropriate Personal Protective Equipment (PPE) for the job.

Never:

- use hammers with loose heads or damaged or chipped faces;
- use tools with damaged handles;
- use cold chisels or punches with mushroom ferruls or ends;
- check the depth of cut of a plane with the hand; or
- use a tool for a job that it is not designed for.

Carrying and Storing Hand Tools

You must carry and store these hand tools in the correct manner.

- Don't carry too many tools at once.
- Don't carry sharp-edged or pointed tools in a nail pouch or apron pockets unless the pockets are specifically designed for that purpose.
- When carrying sharp-edged or pointed tools such as chisels and bits, hold them firmly and close to the body. Point them down to the floor and keep them pointed downward.
- When passing sharp-edged or pointed tools to a fellow worker, pass them handle first.

Manufacturers' Instructions

Whenever you purchase a hand tool, read the manufacturer's literature to get a clear understanding of the tool's:

- intended use;
- limitations;
- safe use; and
- maintenance requirements.

Reference

For more detailed information on safety when using tools, refer to the following module:



12997 (Demonstrate knowledge of safe working practices on construction sites).

Worksheet 4

Apprentice Name: _____

1. List three (3) things that the manufacturer's instructions will clarify about a tool.

2. Why is it important that the cutting edges of tools are maintained in a sharp condition?

3. What are the recommended grinding angles and honing for plane blades and chisels?

- a) Grinding angle.

- b) Honing angle.

4. What steps should be taken to obtain the best results from an oilstone?



5. List the steps required to check the accuracy of a spirit level.



6. Different tools are used for different tasks. Complete the table below to match a task (work operation) to the correct tool. In some cases the tool name is missing, in other cases it is the task that is missing.

Tool	Task	Tool	Task
Folding rule			Attaching flashings with blind rivets
	Measuring lengths over one metre	Pliers	
Carpenter's pencil		Adjustable spanner	
Combination square			Worn around the waist to hold hand tools and fixings
	Marking angles and testing bevel cuts	Sanding block	
Spirit level		Screwdriver	
Marking gauge		Pinch bar	
Butt gauge		Nail punch	
Steel square			Driving in and pulling out nails

Tool	Task	Tool	Task
Plumb bob		Brace and bit	
Chalk line			Sharpening chisels
String line		Tinsnips	
Dividers			Cutting reinforcing ties, wire, nails
Panel saw		Plane	
Cross cut saw		Chisel	
Wall board saw		Rip saw	
Combination saw		Hand drill	
Hack saw		Coping saw	
	Holding items while glue dries	Straight edge	
Drill bits		Cutting knife	
Socket set		Hole saw	



WORKSHEET 4	Assessor Initials:	Date:
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Assessor's comments:

Sign off check

The apprentice has successfully completed all the worksheets and answered all the questions correctly.

Checklist:

Worksheet 1 Worksheet 2 Worksheet 3 Worksheet 4

Where reassessment of certain questions has occurred, the correct answers were:

Re-written by the apprentice

Confirmed through oral questioning and noted next to the answer

The apprentice has correctly answered a selection of oral questions

1 2 3 4 5

6 7 8 9 10

Other (specify):

In signing off this unit standard, the apprentice can:

- correctly describe hand tools in terms of work operations each can complete;
- correctly describe care and maintenance of hand tools (including cutting edges) in accordance with manufacturer's recommendations; and
- correctly describe the use of hand tools in terms of safety requirements. Includes: work methods; plant; equipment; identification of hazards and controls.

UNIT STANDARD 12998 COMPLETED	Assessor Signature:	Date:
	Moderator Signature:	Date: