



Use hand and power tools

RIISAM203D

- In this unit you will learn how to:
 - Plan and prepare for work;
 - Select and use hand tools;
 - Select and use power tools; and
 - Clean up after work.

- A vast range of hand and power tools are used in the civil construction industry.
- Many of them have been in use in one form or another for hundreds of years, whilst some traditional hand tools have been superseded by portable electrical or pneumatic powered tools.
- If you are to use a tool or piece of equipment for the first time, it is most important that you seek guidance in its safe and proper use.



- There are five (5) broad compliance requirements you need to know that apply to your work.
 - Government legislation or Acts and Regulations, as well as Codes of Practice.
 - Australian Standards.
 - Company policies and procedures.
 - Site management plans.
 - Operator's manuals, service guides and specifications issued by equipment manufacturers.

- You must make yourself aware of the site regulations before work commences.
 - Not doing so could halt work and incur penalties or additional costs.
 - Some worksites will have specific requirements relating to:
 - Start up times and hours of work;
 - Site disturbance and dust;
 - Service locations;
 - Site drainage;
 - Traffic control;
 - Hot work permits; and
 - Permission to dig permits.



- The task you have to carry out can be given to you in a number of ways.
 - A verbal direction given by a supervisor to carry out the work.
 - Being told what to do.
 - A company work order.
 - Written instructions.
 - A written instruction given to you by a supervisor, engineer or inspector.
 - A subcontract to perform the work.
 - Written specifications.
 - You should always consult your worksite supervisor to confirm the instructions or determine the scope of the work.

- An important part of job planning is to locate the worksite and clearly establish the boundaries that will surround your working area.
 - The area should be checked for:
 - Potential hazards and the risks to the public, the environment and the workers; and
 - Types of materials and equipment required to carry out the work.
 - The worksite and its boundaries may be:
 - Identified from work orders and plans and specifications.



- How do you get work instructions in your company?
- What method do you prefer?
- Have you ever known work instructions to go wrong?
 - How can this be fixed?



- A worksite safety plan will have been developed for the site to ensure the safety of all workers prior to the commencement of work.
 - The plan will cover matters relating to:
 - Site access;
 - Site emergency procedures;
 - Personal protective equipment (PPE);
 - Safe work procedures;
 - Site requirements and regulations; and
 - Site hazards and risk assessments.
- Safe Work Method Statements or SWMSs should be developed for each routine task involved with your project.



- Identify and become familiar with:
 - Worksite access – a planned area
 - Worksite emergencies – what to do
 - PPE – must wear
 - Hazards and risks – be aware of what they are
 - Utilities – underground and overhead
 - Records – accessible
 - Locating services on site – Dial Before You Dig
 - Underground services – potential to damage
 - Spotters – use in areas around services.



- Pipe and cable locating devices as shown should be used when working from old records and any inaccuracies in records should be notified to the relevant authority.

- Safety signage and barricades must be erected before work commences according to site procedures and the traffic management plan.
- These may include:
 - Mandatory signs (blue and white)
 - Prohibitory signs (red, black and white)
 - Warning signs (black and yellow)
 - Danger signs (red, black and white)
 - Emergency information signs (green and white)
 - Fire related signs (red and white)
 - Hazchem signs
 - Hazard/barrier demarcation tape.



- Once you have identified the services that may be affected by civil construction work it is important to make sure others working on the site are aware of their location.
 - **Warning Barricades**
 - These barricades call your attention to a hazard but offer no physical protection. They are usually barrier tape, mesh, stands or posts.
 - **Protective Barricades**
 - These barricades call your attention to a hazard and provide physical protection.
 - In all cases, signage must be erected on either side of the barrier stating the nature of the enclosed hazard.



- Each State or Territory has their own environmental protection legislation which requires all personnel on the worksite to take all reasonable and practicable measures to prevent or minimise any environmental damage resulting from their work.
 - It is important that all possible sources of risk for the worksite are identified and procedures followed to:
 - Minimise the environmental impact;
 - Comply with the Act; and
 - Avoid prosecution for the workers and the company.



Personnel have a duty to notify of any activity that could cause environmental harm involving:

Land contamination	Sediment control	Waste	Vibration
Oil, fuel and chemical handling, storing or transport	Acid sulphate soils	Vegetation	Lighting
Water	Air	Noise	

- Using hand and power tools requires the work to be well planned and safely carried out according to site procedures and State or Territory legislative requirements.
 - Safety is the responsibility of everyone on site with all safety requirements covered by the site safety plan which you need to be aware of.
 - If you observe a dangerous situation or procedure, you must report it immediately to your supervisor.
 - Implementing a traffic management plan will ensure you, your fellow workers and the general public remain safe while civil construction works are being carried out.
 - Workers must at all times during operations be aware of their responsibilities for worker safety and to protect the environment.

- | | |
|----|--|
| 1. | Using hand and power tools requires you to know and follow what is broadly referred to as:
a) Australian Standards
b) Legislation
c) Compliance documentation
d) Safe Work Method Statements |
| 2. | List three (3) ways in which the task you have to carry out can be given to you. |
| 3. | Hand and power tool operators should be alert to which of the following environmental problems at the worksite:
a) Dust
b) Noise
c) Acid sulphate soil
d) All of the above |
| 4. | Hand and power tool operators must ensure they obey all signage and traffic control measures which have been placed in and around the site.
a) True
b) False |

- The best tool for the job:
 - Is right for the job you want it to do;
 - Is the right size for the amount of room you have;
 - Allows you to use it with as little force as possible;
 - Fits comfortably in your hand; and
 - Feels right when you are in a comfortable position.
- The time you try to save by taking a shortcut might end up being time wasted if you have chosen the wrong tool and the job is not completed to the stated specifications.

- One of the most important things you need to do before you start work is to carry out a pre-operational check on all of your hand tools and equipment.
 - Check for things like:
 - Wear and tear (smoothness, sharpness, tightness);
 - Safety (no splinters, no loose bits and so on); and
 - Condition (is the tool likely to break down or fall to pieces e.g. is the handle firmly attached to the shovel?).



If you notice any damage or a defect that would make the tool or piece of equipment unsafe to use, you need to tag it and report it immediately to your supervisor.

- Jaw clamps, C-clamps, and G-clamps are also often used in welding.
- Their heavy-duty metal construction and curved shape make them ideal for holding metal pieces that need to be welded together.
 - It is important to avoid welding the clamps as well.



• Jaw clamp



• C-clamp



• G-clamp

Eleven civil construction industry hand tools and equipment will be discussed including:

Gripping and turning tools	General use tools	Excavation tools	Levelling and aligning tools
Bricklaying tools	Cutting and demolition tools	Final finish tools	Concreting and plastering tools
Driving tools	Basic scaffolding equipment	Measuring tools	



- Spanners

- Used as a means of turning (loosening or tightening) metal studs, bolts or nuts.
 - The length of the handle provides the leverage.
 - Available in a variety of types and sizes.

- Shifting or adjustable wrench

- Consists of a forged steel handle and jaw, with another moveable jaw fixed in place by a pin, spring and knurled adjusting screw.



- A straight and a Phillips screwdriver



- Shifting or adjustable wrench

- Ratchet bar and socket

- Available in a variety of lengths from 100 mm to 375 mm with 12.5 mm square drive and a range of socket sizes.

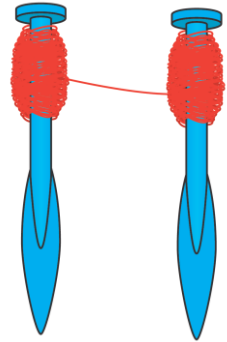
- Pliers

- Serrated jaws to grip rod, studs or bolts with or without shoulders.
- Pliers also have a thin wire cutting capability.

- Screwdrivers

- Used for any task requiring turning of screws, often for the care and maintenance of powered tools and plant.

- Brick trowel
 - Used to spread mortar.
- Line and pins
 - Brick courses are laid to a line which is stretched taut between a pair of steel pins driven into the mortar joints.
- Line blocks
 - Used instead of line and pins on the external corners of walls to prevent drainage to mortar joints.
- Raking tool
 - An adjustable pin or nail supported on two small wheels and used to rake out mortar joints to a specified depth.



• Line and pins



• Line blocks

- Gauge rod

- Used for checking and keeping brick courses at even multiples of brick plus a mortar joint.

- Jointer

- A tool usually made of steel with either a round or shaped facing for the finishing of joints.

- Bolster

- A flat broad chisel approximately 110 mm wide with a blunt edge used for cutting bricks and used in conjunction with a club or lump hammer.

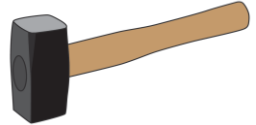
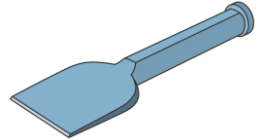
- Club or lump hammer

- Used with most cutting tools such as bolsters and chisels.

• Gauge rod

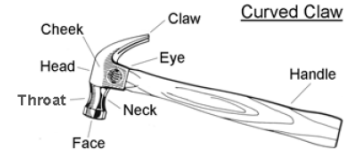


- Comb hammers
 - Used to rough cut or dress bricks to special shapes when constructing ornamental brickwork such as arches and fireplaces.
- Tools should be regularly cleaned and left ready for use.
- Mortar is easier to remove while still wet so ensure it is removed as soon as the mortaring job is complete.



- Claw hammer

- Has a head with a striking face and claw for removing nails.



- Ball pein hammer

- Has a ball in place of a claw on the head of the hammer, opposite to the striking face and is used generally in working metal.



- Club or lump hammers

- Are short handled, heavy headed hammers, used when controlled heavy impact is required.

- Ball pein hammer

- Cross pein hammers

- Are small and light with a cross pein in place of a claw which is used for finishing work.



- Cross pein hammer

- Sledge hammers

- Have a larger, heavier head and long wooden handles and are used for heavy work on site.

- Rubber or wooden mallet

- Used to strike materials that can be easily bruised or damaged with a normal hammer.



- Sledge hammer

- Brooms and brushes

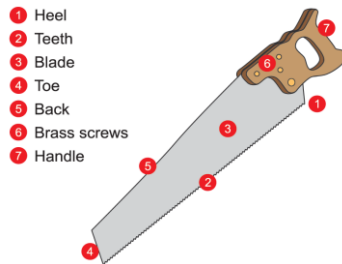
- Used to remove grit and soil from surfaces.

- Hoses

- Used to provide water for mixing mortar, mixing plaster and general cleaning of excavation, concreting and plastering tools and equipment.

- Handsaws

- Used for cutting timber with or across the grain.

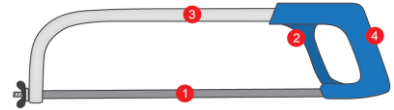


• Handsaw

- Hacksaw

- Used for cutting metal, plastic or similar materials.

- 1 Blade
- 2 Guard
- 3 Frame
- 4 Handle



- Hacksaw

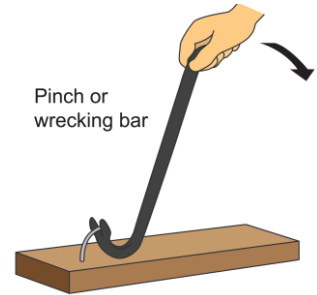
- Chisels

- To satisfy the broad range of uses, from fine cabinet work to heavy construction, chisels are available in a variety of shapes and sizes.

- Sealant guns

- Caulking guns or applicators are available in a variety of types, finishes and sizes.

- Pinch or wrecking bar
 - Used for the removal of nails and prising timbers apart.
- Pincers
 - Used for the removal of small nails.
- Bolt cutters
 - Scissors-like tool used for cutting heavy chains, bolts and wire mesh.



• Bolt cutters

- Snips

- Used to cut metal bracing straps and light sheet metal.

- Nippers

- Used for cutting soft tie wire or piano wire.

- Axes and hatchets

- Sharp chopping instruments.



- Hatchet



- Nippers



- Snips

- Ladders and trestles

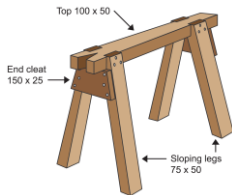
- Include aluminium, fibreglass or timber step ladders, single ladders, extension ladders and trestle ladders, as well as steel trestles.

- Scaffolding planks

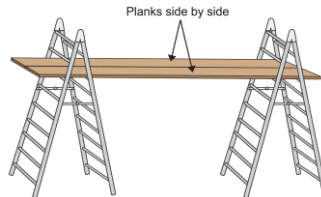
- Should be of uniform thickness and any working platform set up should not be less than 450 mm wide (2 planks wide).

- Saw stools

- An essential piece of equipment designed to hold and support material during working operations.



- Timber saw stool



- Trestle ladders and planks



- Fiberglass extension ladder

- Mattock

- Used for the excavation of foundations and trenches or the lessening of excess material.

- Picks

- Used for loosening of firm material in excavations and trenches.

- Spades and shovels

- Used to move dirt in open areas. Shovels are used to trim the sides of trenches and in the spreading of concrete and sand.



- Mattock



- D handle round mouth shovel

- Post hole digging tools

- Designed to be driven into loosened dirt and have a scissor like action for retaining dirt whilst removing the tool from the hole.



- Post hole digger

- Crowbar or spud bar

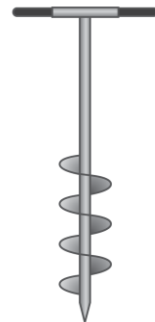
- Used to loosen material when digging holes for posts, excavations, removal or breaking of rocks and rolling of logs or posts.



- Crowbar

- Hand operated auger

- Used to excavate holes up to 1 m deep for pier and beam footings.



- Auger

- Rakes

- Used to spread and level excavated material, topsoil, spoil, aggregate and in hand spreading asphalt in the form of lutes.
- The equipment when not in use should be stacked and stored neatly out of the weather to prevent unnecessary wear and corrosion.



- Rake

- Shave hook

- Is used to scrape paint from mouldings and beading and is also used to cut out cracks in plaster surfaces prior to stopping or filling.



- Shave hook

- Cutting knife

- Is used for cutting or trimming soft materials or surface coverings eg wallpaper or vinyl sheeting.



- Cutting knife

- Putty knife

- Is used to force putty into small holes (nail holes) and cracks.

- Filling knife

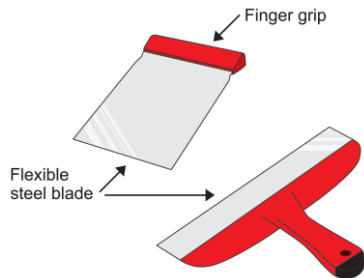
- Has a flexible thin gauge blade up to 150 mm wide and is used to apply filler to open grain timbers, small holes and shallow indentations in uneven surfaces.



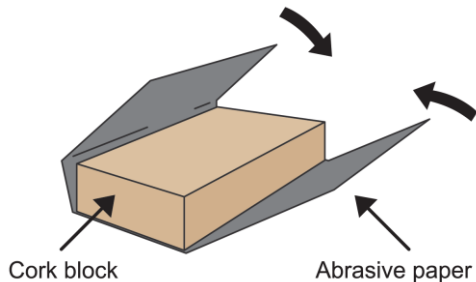
• Filling knife

- Flexible filling blades or broad knives

- Have a fine steel flexible blade fitted with a plastic or wooden finger grip.
- Their blade has greater flexibility than a filling knife.
- It is used for the same purpose as a filling knife and is available in sizes from 50 mm to 120 mm.



- Sanding block
 - Is used for hand sanding of surfaces in the preparation of applied coatings.
- Paint brush and paint roller
 - Are used to apply pigmented coatings.



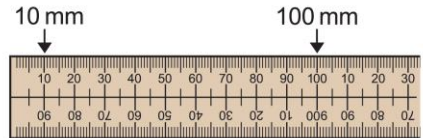
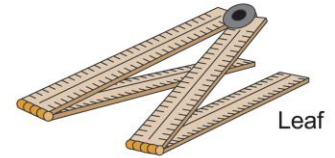
• Sanding block

- Brushes used in water based paints must be thoroughly cleaned with water after use, while those used in oil-based paints can be cleaned with turpentine or methylated spirits.
- To clean the roller after the job is finished use a wire loop to remove excess paint.

• Measuring tapes

- Long steel tapes are used for measuring on construction sites and for the setting out of large construction works.
- Short steel tapes can be carried by construction workers on belts or aprons.

Four-fold one metre rule



Details of graduations and numerals



Rule extended

- Folding rule
 - The most common type of folding rule in use is the four-fold, one metre long rule.
- Scale ruler
 - Used for taking measurements to scale from plans and drawings.



• Short steel tape



• Long steel tape



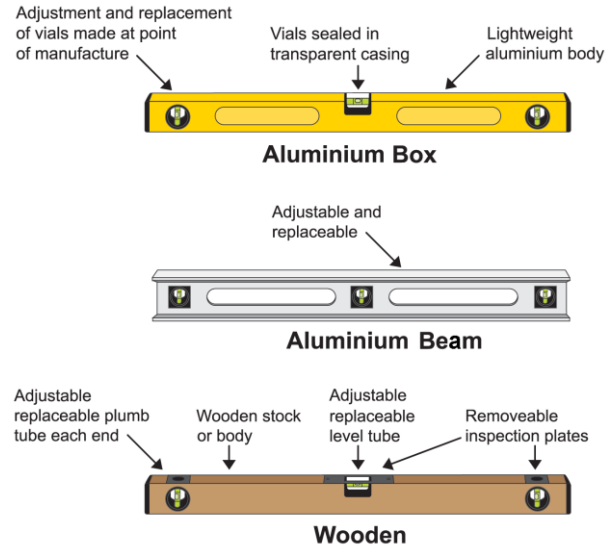
• Scale rule

• Spirit levels

- May be used for transferring invert and finished level information to offset pegs or for transferring any level information as required across short distances.

• Straight edges

- Are made from timber, aluminium or steel and have one or both edges perfectly straight.



- Different types of spirit level

- Stringline

- Is a tough, braided cotton or nylon line wound from a spool onto a stick or rod.
- The line is stretched between two points and used as a line from which to measure.

- Chalk line

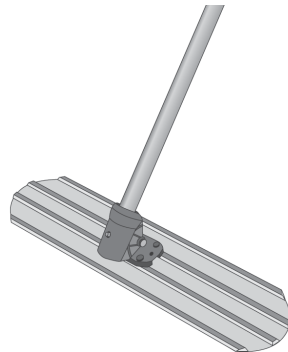
- Is a stringline loaded with soft chalk along its length and when the line is stretched between two points and snapped it will deposit a straight line of chalk.

- Wooden float

- Most commonly used by a concreter to rub-up concrete prior to finishing with a steel trowel.

- Steel float

- Used by concreters and solid plasterers to finish concrete and plaster to a flat, smooth hard surface.



- Bull float

- Bull float

- Used to obtain a smooth wet finish surface to large concrete floor areas.

- Pointed trowel
 - Used in concreting and plastering, available in a variety of shapes and sizes e.g. 365 mm x 120 mm, 405 mm x 115 mm.
- Coving trowel
 - Used in concreting and plastering, available in varying radii from 25 mm to 75 mm.
- Concrete screed
 - Used to spread and level wet concrete in slab and floor construction.



• Pointed trowel



• Concrete screed

- Using the correct hand tools and equipment means that you can carry out your civil construction tasks as effectively as possible to meet the job specifications.
 - As a hand tool operator you must be aware of your own safety and only lift loads that you can easily handle, making sure you are aware of correct handling techniques to avoid repetitive strain and back injuries.
 - Hand tools and equipment must be regularly inspected.
 - If any defects are detected the equipment must be immediately removed from use and repaired.
 - Tools and equipment when not in use should be stacked and stored neatly to prevent unnecessary wear and damage.

1.	Name four (4) different types of hammers.
2.	A hand-held tool used to cut bricks is a type of chisel called: a) Comb hammer b) Jointer c) Bolster d) Shave hook
3.	When set up a work platform should not be less than _____ wide.
4.	In what environment should shovels and scaffolding be stored when not in use?
5.	What are trowels and floats generally used for?

- It is important when using power tools to select the correct tools and equipment for the task.
 - When approaching a job that requires the use of hand-held power tools, here are a few things to think about before starting.
 - Which tool is best for the job?
 - For example, you may need to use a power grinder but have no mains power available.
 - Will you have to find another tool that will do the job or can you get a petrol generator to provide power or select a battery powered grinder keeping in mind you may need to recharge the batteries?
 - The size of the job - which tool or attachment is best suited to the task?
 - Access to the work area - can you get the tool to the required area and can you use it safely?
 - Are there any special conditions to consider?



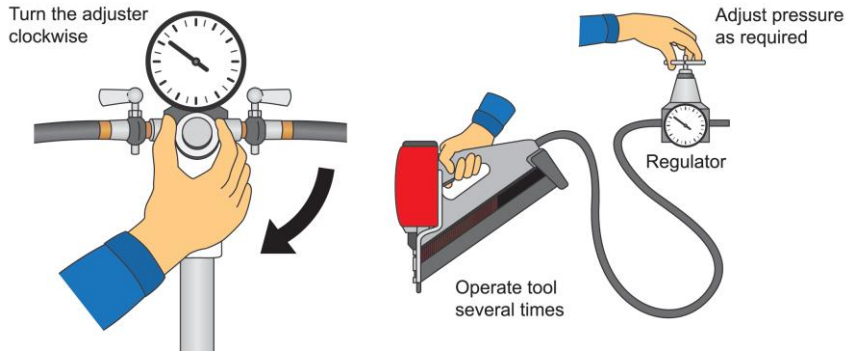
- One of the most important things you need to do before you start work is to carry out a pre-operational check on all of your power tools and equipment.

Power tools and equipment you may use, include:

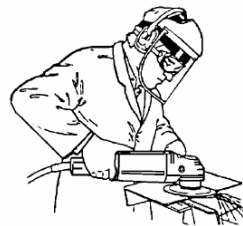
Jackhammers	Angle grinders	Rotary hammers or drills	Scalers
Cut-off saws	Pneumatic wrenches	Circular saws	Power leads
Drills	Impact hammers	Planers	Safety switches
Screwdrivers	Tampers	Sanders	Air hoses



- Air-powered tools are driven by compressed air. The tool is connected to an air compressor by a hose and the compressed air is used to power the tool.
- Air-powered tools may include nail guns, riveters, concrete breakers, cutters and grinders and belt sanders.

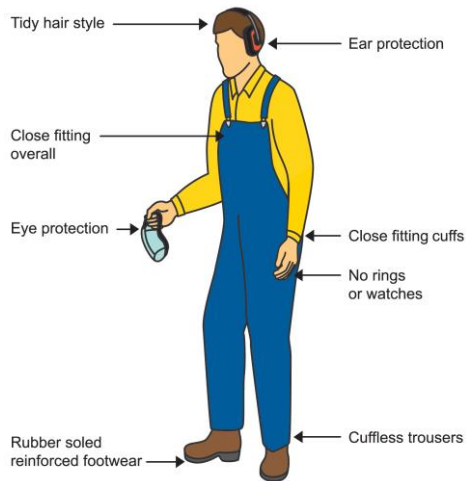


- The following are some specific safety procedures that must be adhered to when using compressed air.
 - Check the condition of air hoses and connections.
 - The compressed air pressure must be adjusted (by altering the regulator) to suit the tool being used.
 - Before making any adjustments or routine maintenance to any compressed air tool, ensure that the air is turned off or disconnect the hose from the tool.
 - You must wear the appropriate PPE.
 - Prevent air hoses from becoming tangled and getting caught up as you are using or unwinding them.

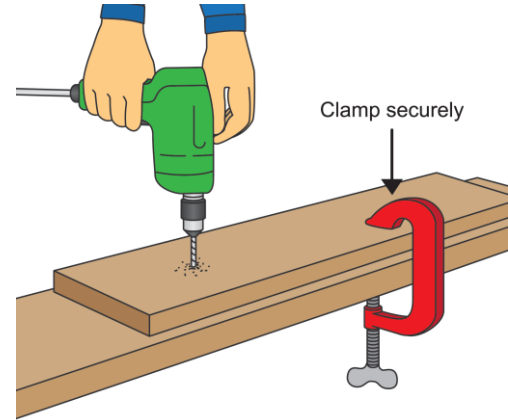


DO NOT blow anything off anyone's body or skin using compressed air. Death can result from air getting into the bloodstream, even through a small scratch on the skin.

- You must observe the following precautions when using portable power tools:
 - Select and use the correct tool for the job.
 - Check leads, hoses and connections before use.
 - Check all guards are working.
 - Check all cutting edges are sharp.
 - Disconnect the tool from the power supply before making any adjustments.
 - Make sure the work area around you is clear.
 - Do not over-reach.
 - Wear appropriate PPE.
 - Wear firm fitting clothing and tie back long hair.
 - Check the blade, bit nut or stud is locked tightly in position.
 - Disengage cutter from work piece before switching off the machine.



- Clamp materials firmly with a vice.
- Have both hands on the tool to maintain control.
- Set or adjust cutting depth with power supply disconnected.
- Keep your fingers and hands away from the cutters and/or blades.
- Keep the leads or hoses away from the tool and free from tangles.



- Start the tool with the cutter or blade clear of the stock to avoid kick-back.
- Never force the tool or tie back a switch to the ON position.
- Allow the tool's cutters or blade to stop before lifting the tool off the stock.
- To avoid damage, never lift or lower PPTs by their power leads.
- To avoid electrocution do NOT operate a PPT whilst standing in or touching water.
- Keep all PPT ventilation openings clear.

- All corded power tools must be checked and signed off as safe by a registered electrician at regular intervals.
- Cordless power tools comprise those tools powered by batteries in contrast to corded tools powered by mains supply.
- Efficient battery management usually requires a set of battery packs and a battery charger (requiring a mains power supply) so that continuity of work is maintained with recharged batteries while the discharged batteries are in turn recharging.



- The following slides of this section give you some general information about the following PPTs:
 - Portable drills;
 - Jackhammers or pneumatic hammers;
 - Sanders;
 - Circular saws;
 - Jigsaws;
 - Nailing guns (pneumatic nailer);
 - Scalers;
 - Angle grinders; and
 - Planers.



- Portable electric or pneumatic drills and drill bits are used for drilling (or boring) holes in a variety of materials such as timber, steel, plastic and masonry (brick and concrete).

- Some common types of portable drills include:

- Pistol grip drill

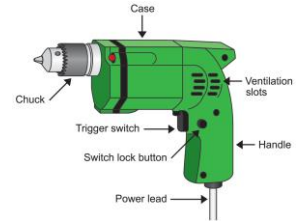
- Designed for one hand operation. It is mainly used for drilling small diameter holes in materials other than masonry.

- Angle drive drill

- Used in confined or awkward spaces for the same purpose as the pistol grip drill.

- Pistol grip with side handles

- Used for drilling larger holes. The side handle helps control the drill.

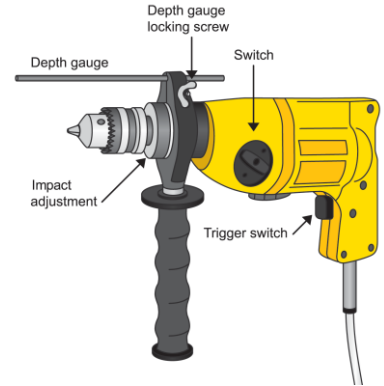


• Pistol grip drill



• Angle drive drill

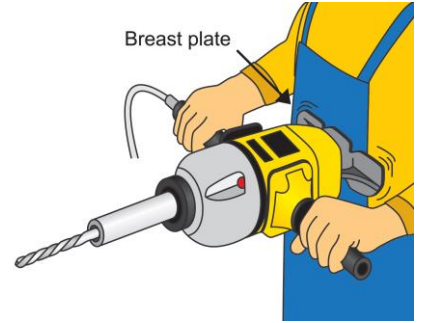
- Heavy duty with 2 side handles
 - Used for drilling steel or large diameter holes in other materials.
- Impact drill
 - A combination drill.
 - It can be used as a pistol grip with side handle drill or also used to drill an occasional hole in masonry (using masonry bits).



• Impact drill

- Hammer drill

- A heavy duty drill for drilling masonry. It is much more efficient than the impact drill when drilling into concrete.



- Hammer drill

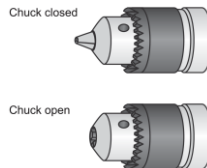
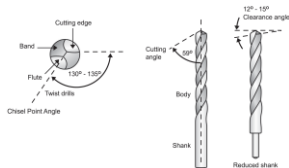
- Cordless drills are powered by rechargeable batteries fitted into the handle of the drill.
- An essential accessory is a fast charger which plugs into a 240 volt outlet and is capable of recharging the battery in as little as one hour.

- To operate the drill, proceed as follows:

- Select the appropriate drill bit.
- Check chuck for debris (drilling waste) and insert the drill bit.
- Select and set correct speed and drilling action if required.
- Centre punch the drilling mark for hard materials.
- Secure the work (stock).
- Connect power.
- Place the drill point on the drilling mark (centre punch mark).
- Switch on the drill and drill the hole.
- Use a backing block to prevent splitting out as the drill bit bores through to the other side of the stock.
- To return the drill to its normal temperature, run it for several minutes with NO load (not drilling).



- For your portable drill to be efficient and long lasting it must be maintained in good working order.
 - Frequent checks and cleaning are important.
 - Keep ventilation openings clean.
 - Fully open the chuck and clean out all debris.
 - Inspect the chuck, power lead and plug for wear or damage.
 - Drill bits when not in use are usually contained in metal or plastic containers in order of size and should be kept sharp and well maintained.



- Jackhammers and pavement breakers are available both electrically and pneumatically driven.
 - These tools have a wide range of uses in the demolition and general excavation areas of construction, the most common being:
 - Concrete breaking;
 - Scabbling or hacking (the roughening) of concrete surfaces to provide a key for concrete, render or tiles;
 - Demolition of brickwork or masonry and general excavation; and
 - Tamping (repeated pounding of fill to consolidate it).
 - A variety of chisels or cutting tools are available for use with all types of jackhammers or breaker equipment.



- Make sure that bits are sharpened regularly.
- Close the locking mechanism and you are ready to go.
- Before your breaker is ready for work, you need to check the following:
 - Pre-start checks have been completed on the power source;
 - Lines or cables have been laid out without kinks; and
 - There are no power or other services near the work area.
- Start by placing the end of the bit on the place you want to start, hold it lightly by the handle while maintaining control, pull the trigger and guide the bit as it hammers the material.
- Operate the breaker only after positioning the tool on your work surface.
- When the material starts to break, stop the hammer immediately and move to the next section.



- For a smoother, neater finish to concrete, we use a scabbler.
 - Scabbling the concrete is a way of cleaning it without removing significant portions as a jackhammer tends to do.
 - Scabbling concrete is also a lot kinder to steel reinforcing and leaves a cleaner surface area for new concrete to bond to.
 - When using scabblers you need to keep in mind that they are not jackhammers and they only remove small amounts of concrete at any one time.
 - They can be very hard to hold so you must concentrate and wear all relevant PPE as you would with any power tool.

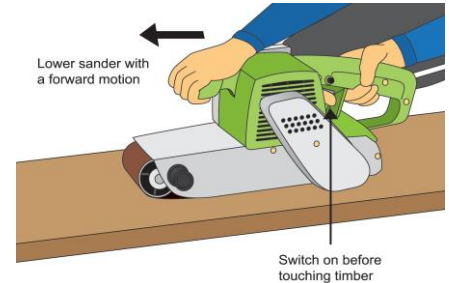
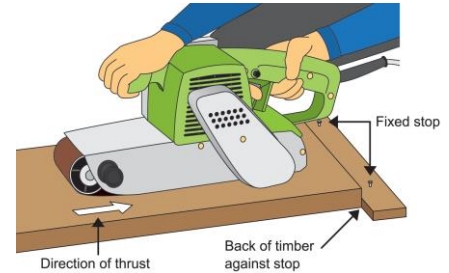
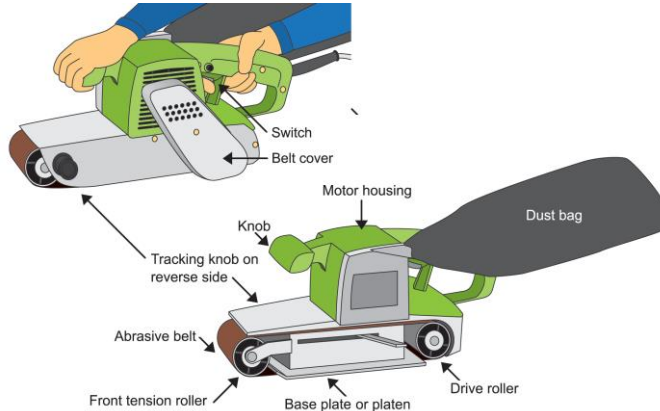


• Concrete after it has been scabbled

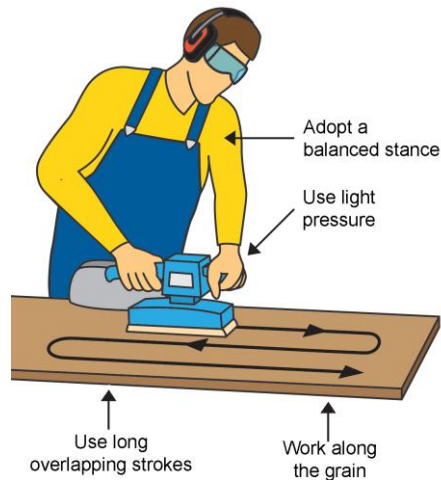
- Sanders are abrading tools. They are used to wear away a surface by rubbing or using an abrasive action.
 - Portable sanders are used by carpenters and painters to obtain a smooth surface for all types of finishes.
 - The main types of portable sanders are:
 - Belt sanders - used to produce flat, smooth surfaces on timber;
 - Orbital or reciprocating sanders - used for a much finer finish than the belt sander; and
 - Disc sanders - rotate (spin) the abrasive paper.
 - The abrasive paper is fitted to a disc shaped rubber back-up pad for support.



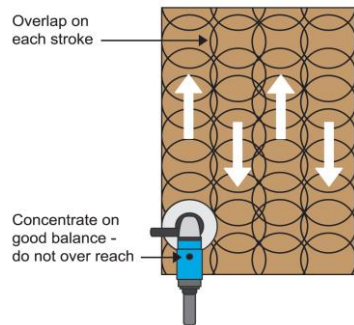
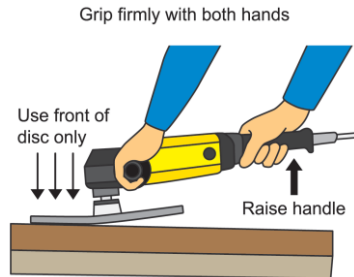
- Secure the stock
 - Conduct pre-start checks
 - Sand the stock



- The orbital and reciprocating sanders can be separate tools or can be separate functions on the one tool.
 - To operate the orbital (or reciprocating) sander, proceed as follows:
 - Conduct pre-start checks.
 - Connect the power source.
 - Fit appropriate PPE.
 - Secure the stock.
 - Sand the stock.
 - Lift the sander clear of the work and switch off the power.



- Disc sanders are useful for removing a large amount of bulk material quickly e.g. stripping paint.
 - There are two main types of disc sanders.
 - In-line drive – the disc is rotated in line with the motor shaft. Useful for sanding horizontal surfaces.
 - Right-angled drive – the disc rotates at right angles (90°) to the motor.
 - Useful for sanding in places where the working clearance is limited and can also be used as an angle grinder with the appropriate guard.
 - To operate follow the same procedure as orbital sanders.

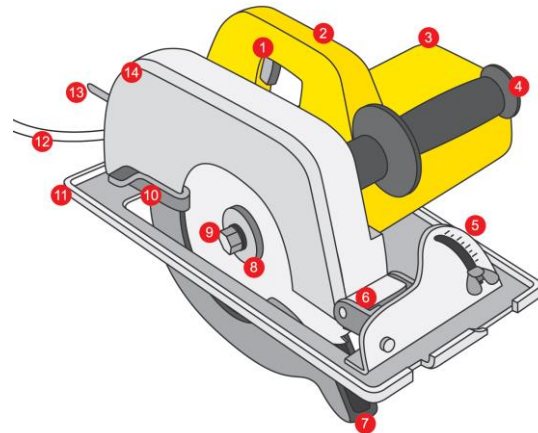


- Circular saws are mostly used to straight cut timber either across it (cross-cut sawing) or along its length (rip sawing).

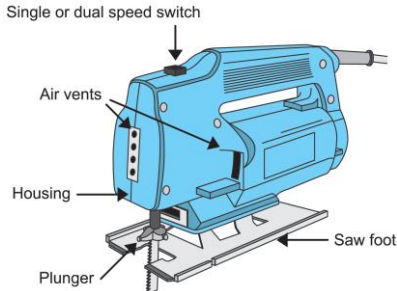
- **To operate:**

- Conduct pre-start checks.
- Select appropriate saw blade.
- Change the saw blade (if necessary).
- Mark and secure the stock (timber).
- Set depth of cut.
- Adjust blade tilt (for bevel cutting only).
- Re-connect power supply.
- Check personal safety.
- Make the cut.

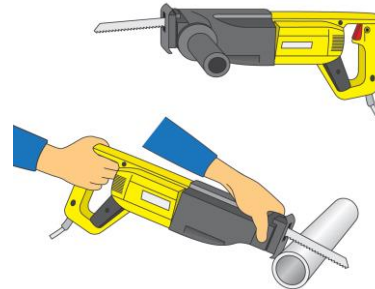
- | | |
|-----------------------------------|----------------------------------|
| 1 Switch | 8 Outer blade washer |
| 2 Handle | 9 Blade or shaft stud |
| 3 Motor housing | 10 Lower guard retracting handle |
| 4 Front handle | 11 Base plate |
| 5 Quadrant for tilting adjustment | 12 Power cord |
| 6 Hinge | 13 Depth of cut adjustment |
| 7 Lower guard | 14 Upper guard |



- The portable jigsaw is used mainly for internal cut outs and for on-site curved work where bandsaws are unavailable.
- Portable jigsaws come in two main shapes or categories, namely for:
 - Single hand operation: cutting on the up stroke only; and
 - Two hand operation: heavy duty, usually pulled towards the operator to operate.

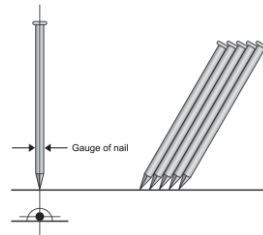


- Single hand operation



- Cutting steel pipe: two-hand operation

- Nail guns are used for wood to wood fastening e.g. framing, formwork.
 - They use compressed air to fire a piston which drives the nail into the wood.
 - Nails are held in a magazine that you refill and most types allow rapid firing meaning their main advantage is their speed.
 - Nails for nailing guns come in a variety of sizes.
 - Common sizes range from 50 mm to 100 mm in length.
 - Normally you will have two options when firing the nail gun: rapid fire or single shot.



- Hand-held angle grinders are widely used for smoothing or cutting off material. Operation:
 - Newly mounted discs should run free for one minute before cutting or grinding.
 - Never apply pressure to stop a disc spinning.
 - The work item should be rigidly supported.
 - Eye/face and hearing protection appropriate to the task must be worn.
 - Flange and flange nuts must suit the disc and be in good condition.
 - Discs should be stored and handled carefully to avoid damage.



- An electric powered planer is a hand-held power tool that shapes timber by shaving layers of the material with blades mounted on a rotating barrel.
 - Electric planers may be corded (mains power) or cordless (battery power).
 - Make sure the material to be planed is firmly held down and hold the planer in both hands.
 - Rest the planer's front base flat upon the stock surface without the blades making any contact.
 - Switch on and wait until the blades attain full speed.
 - Then move the planer gently forward.
 - Apply pressure on the front of the planer at the start of planing and at the back at the end of planing.
 - Keep the planer moving forward so it is not cutting in one place for too long.



- CAUTION: Always be sure that the planer is switched off and unplugged before attempting to perform inspection or maintenance.
 - The tool and its air vents have to be kept clean.
 - Inspect the blades and sharpen or replace if necessary according to the manufacturer's operator's manual.
 - You may need to replace the carbon brushes of the electric motor.
 - Planer accessories may include:
 - Commutator;
 - Insulating tip;
 - Carbon brush;
 - Brush holder cap; and
 - High-speed steel planer blade.

- Do not stress the tool's components through overuse and allow enough air to pass through the tool to cool it as it works.
 - Signs of a tool being over-worked include:
 - Over-heating;
 - Slowing down;
 - Smoke; and
 - Unusual noises.
- Recognising the signs of a power tool at the limit of its working load and rectifying the situation will prolong the productive life of the tool, make your job easier and safer and help your company bring its work in on budget.



- The power tool operator must at all times ensure the safety of not only themselves but others working around them by using the correct operating procedures.
 - You will operate power tools according to the compliance requirements such as safety and environmental.
 - You will also operate power tools according to the manufacturer's operator's manual and design specifications.
 - The operator has to operate under varying conditions and materials so must use the correct techniques to ensure optimum output of the equipment and safety of all workers.

1.	Where should drill bits be stored when not in use?
2.	List the two (2) main types of power source that jackhammers use.
3.	The portable jigsaw is used mainly for on-site straight line work where bandsaws are unavailable. a) True b) False

- Remove all waste products from site and store unused and reusable materials.

The final operation at the worksite is restoration of:		Clean up also involves removal of (according to project environmental management plan):	
Road surfaces	Drainage and watercourses	Machinery and amenities sheds	Barricading
Utilities	Sodding, grassing and trees	Temporary sediment controls	
Contaminated areas	Private property	Traffic control	



- Roadway clean up involves using a vacuum street cleaner, broom and shovel to remove excess dirt and dust.

- On completion of the operation, tools and equipment must be thoroughly checked, cleaned, and oiled and greased if required before packing and storing.
- Regular care and maintenance will enhance the life of the equipment and maintain its accuracy.
- Damaged or worn equipment must be reported and the necessary servicing or repairs carried out to ensure safe equipment is available for the next operation.



- It's the end of the job, the end of the project, let's get on with the next one.
- Understandable, but discuss as a group why it is important to clear up a worksite and clean up plant and equipment.
- Come up with 5 good reasons.



- Conducting the clean-up operation of the site is the last stage of the construction schedule.
- It is important to ensure that all rubbish is removed and equipment and consumables are accounted for and correctly stored for removal and future use.
- The cleanup is an important part of finishing operations as it ensures:
 - Tools and equipment are made ready for the next operation; and
 - The site is environmentally safe and acceptable for use by others.
 - Tools and equipment must be thoroughly checked and cleaned before storing in readiness for the next job.

- Damaged or worn equipment must be reported and the necessary servicing or repairs carried out to ensure safe equipment on the worksite.
- Worksite restoration ensures that:
 - All unnecessary materials, signage, environmental controls are removed;
 - The worksite is returned for use; and
 - The worksite meets all environmental requirements and standards.

1.	Name two (2) types of safety measures or environmental control that must be removed from the worksite at the completion of operations.
2.	Before leaving the site all equipment and tools should be checked for any losses, damage and defects. a) True b) False
3.	Any soil, dirt or dust left on the roadway can be removed by hosing it down the drainage system to make the road safer. a) True b) False
4.	The work area should be cleaned up according to: a) The user manual for excavating tools b) Australian Standard 1407 c) The project environmental management plan d) Australian Standard 1684?