National Certificate in Building, Construction and Allied Trades Skills (BCATS)

Teacher Information & Resources

Identify, select, maintain, and use portable power tools for BCATS projects

Unit Standard – 24350

Level 2, Credit 6

Teaching and assessment tips

Intent – The intent of the unit standard is that the learner has a broad knowledge of portable power tools including;

- identifying, describing and selecting the right tool for the job and that
- they are able to use and maintain each tool correctly.

Learners are expected to have a broad theoretical knowledge of 8 portable power tools and be able to demonstrate safe and appropriate use of 4 of them while completing 2 construction projects.

Portable power tools include, but are not limited to: drills, portable planer, portable circular saw, jigsaw, reciprocating saw, sanders, router, biscuit jointer

Opportunities to learn about portable tools will arise throughout the year's project work. Your specific learning context and planned projects, however, will largely determine how you approach the topic.

This unit standard is best assessed over time. We would encourage you to use the practical projects that your student is completing to gather evidence of the use and maintenance of portable power tools.

An Assessment Record sheet has been provided for both the learner and yourself, as assessor, to record this evidence. This sheet is in Microsoft Word format so that you can adapt it to suit your programme and to give the students more room to write.

The topic of portable power tools could be introduced to the learners in a generic way using a range of resources, including the BConstructive resource on the website. The activity sheets in this resource are useful exercises to help prepare students for assessment.

For the purpose of this unit standard, the **knowledge of the portable planer, the portable circular saw and the reciprocating saw is intended to be theoretical only.** Candidates who are assessed against this unit standard in a school may set up these machines ready for operation but are not to use these machines unless the individual school has the appropriate documented permission to do so as specified in *Safety and Technology Education: A Guidance Manual for New Zealand Schools*, Learning Media, Ministry of Education, 2014.

Assessment

Assessment of this unit standard consists of:

- Completion of the worksheet and
- Completing 2 construction projects and
- Student entries on their Assessment Record sheet and
- Verification (by you) as to how they selected, used and maintained portable power tools.

Worksheet US 24350

Student Name:

1. Answer the following questions for the portable power tools in the picture.

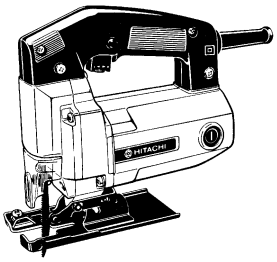
What is it called and what is it used for?

What are 4 safety precautions to be taken before and while using it?

What PPE should you wear when using it?

What regular maintenance and care does the tool need?

What is it called and what is it used for?



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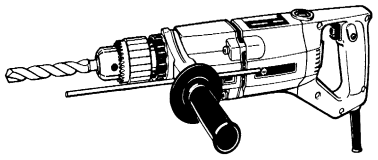

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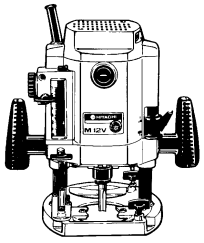

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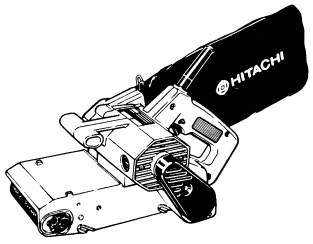

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What are 4 safety precautions to be taken before and while using it?

What PPE should you wear when using it?

What regular maintenance and care does the tool need?

2. What are the possible consequences of failing to disconnect a power tool from the power source before adjusting the tool?

3. The power lead that you are about to use has a kink inside the outer case. What does this indicate and is the lead safe to use?

4. You have been instructed to finish a solid timber bench top in preparation for the spraying of its finish coat. The selection of power tools that you have to choose from are listed below:

Orbital sander	**Belt sander**	**In-line sander**
Disc sander	**Palm sander**	

Which of these sanders will do the job in the least amount of time?

Which will give you the best finish?

5. Which of the above sanders would be least suited to the task? Explain why you would not use it for finishing work.

6. You are preparing a router for use. List 3 safety checks that you should carry out before plugging in the machine.

1)

2)

3)

7. You are ripping a length of timber down to width using the skill saw. What can you do to help prevent the timber jamming on the blade?

8. Describe the potential consequences of machining work that is not securely attached to the bench.

9. If your power tool starts to smoke, what should you do?

10. You have just finished sanding the top of a table with the orbital sander and the surface shows visible semicircular scratch marks. What could have caused these scratch marks?

11. How and where should power tools be stored?

Worksheet Model Answers

1. Answer the following questions for the portable power tools in the picture.

What is it called and what is it used for?

Portable circular saw

Used to cut a wide range of construction materials

What are 4 safety precautions to be taken before and while using it?

Check the cord, leads and 3 pin plugs for any damage.

A Residual Current Device (RCD) is plugged into the power source.

Do not stand in water or allow electrical leads to lie in it even when using an RCD.

Check that the lower retractable guard operates smoothly.

Check that the blade is appropriate for the material to be cut, is sharp and is fixed firmly in place.

Ensure that all electrical cords are out of the line of cut.

Wait until the saw is running at full speed before starting a cut.

Do not force the saw; let it progress at its own cutting rate.

What PPE should you wear when using it?

Safety glasses or face mask.

Appropriate grade of hearing protection, ear plugs or ear muffs.

Safety shoes or boots.

Dust mask

What regular maintenance and care does the tool need?

Clean and lubricate regularly

Keep air vents clear and free of dust.

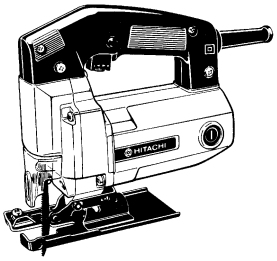
Replace dull or damaged blades.

Inspect carbon brushes regularly, replace if necessary.

Store in a clean, dry and secure place.

What is it called and what is it used for?

Jigsaw



Used to cut internal and external curves in a range of construction materials.

What are 4 safety precautions to be taken before and while using it?

Check the cord, leads and 3 pin plugs for any damage.

A Residual Current Device (RCD) is plugged into the power source.

Do not stand in water or allow electrical leads to lie in it even when using an RCD.

Ensure there are no obstructions below the length of the intended cut.

Do not force or twist the saw blade, let it progress at its own cutting rate.

Wait until the saw is running at full speed before starting a cut.

Ease the pressure off the saw towards the end of the cut.

What PPE should you wear when using it?

Safety glasses or face mask.

Appropriate grade of hearing protection, ear plugs or ear muffs.

Safety shoes or boots.

Dust mask

What regular maintenance and care does the tool need?

Clean and lubricate regularly

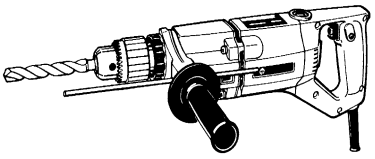
Keep air vents clear and free of dust.

Replace dull or damaged blades.

Inspect carbon brushes regularly, replace if necessary.

Store in a clean, dry and secure place.

What is it called and what is it used for?



Heavy duty drill.

Used for drilling larger diameter holes in a range of construction materials.

What are 4 safety precautions to be taken before and while using it?

Check the cord, leads and 3 pin plugs for any damage.

A Residual Current Device (RCD) is plugged into the power source.

Do not stand in water or allow electrical leads to lie in it even when using an RCD.

Make sure that the material is fixed firmly before starting to drill the hole.

Fix a piece of scrap wood behind where the bit is expected to exit to prevent splitting.

Use only sharp drill bits.

Wait until the drill is running at full speed before starting to drill the hole.

Do not put too much pressure on the drill bit, let it progress at its own cutting rate.

Clear waste material from the drill flutes by withdrawing the drill periodically.

Ease the pressure off the drill bit as it gets towards the end of the hole.

What PPE should you wear when using it?

Safety glasses or face mask.

Appropriate grade of hearing protection, ear plugs or ear muffs.

Safety shoes or boots.

Dust mask

What regular maintenance and care does the tool need?

Clean and lubricate regularly

Keep air vents clear and free of dust.

Replace dull or damaged blades.

Inspect carbon brushes regularly, replace if necessary.

Store in a clean, dry and secure place.

What is it called and what is it used for?

Light duty drill.

Suitable for drilling small diameter holes up to 6.5 mm.

What are 4 safety precautions to be taken before and while using it?

Check the cord, leads and 3 pin plugs for any damage.

A Residual Current Device (RCD) is plugged into the power source.

Do not stand in water or allow electrical leads to lie in it even when using an RCD.

Make sure that the material is fixed firmly before starting to drill the hole.

Fix a piece of scrap wood behind where the bit is expected to exit to prevent splitting.

Use only sharp drill bits.

Wait until the drill is running at full speed before starting to drill the hole.

Clear waste material from the drill flutes by withdrawing the drill periodically.

Do not put too much pressure on the drill bit, let it progress at its own cutting rate.

Ease the pressure off the drill bit as it gets towards the end of the hole.

What PPE should you wear when using it?

Safety glasses.

Appropriate grade of hearing protection, ear plugs or ear muffs.

Safety shoes or boots.

What regular maintenance and care does the tool need?

Clean and lubricate regularly

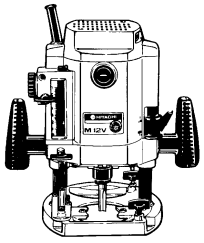
Keep air vents clear and free of dust.

Replace dull or damaged blades.

Inspect carbon brushes regularly, replace if necessary.

Store in a clean, dry and secure place.

What is it called and what is it used for?



Portable electric router.

Simplifies the task of making joints, cutting decorative edges, rebating and laminate trimming

What are 4 safety precautions to be taken before and while using it?

Check the cord, leads and 3 pin plugs for any damage.

A Residual Current Device (RCD) is plugged into the power source.

Before changing the cutters or making any adjustments to a router, ensure the on/off switch is in the off position and the power lead is disconnected from the power source.

When using a router do not stand in water or allow electrical leads to lie in it even when using an RCD.

Make sure that the material to be worked on is fixed firmly before starting the router.

Use only sharp cutters or bits.

Check that the router cutter is clear of the work before starting.

Use the appropriate PPE while operating the router.

Wait until the router is running at full speed before making a cut.

Do not put too much pressure on the router bit, let it progress at its own cutting rate.

Hold the router firmly in both hands at all times while operating it.

What PPE should you wear when using it?

Safety glasses or face mask.

Appropriate grade of hearing protection, ear plugs or ear muffs.

Overalls.

Safety shoes or boots.

Dust mask

What regular maintenance and care does the tool need?

Clean and lubricate regularly

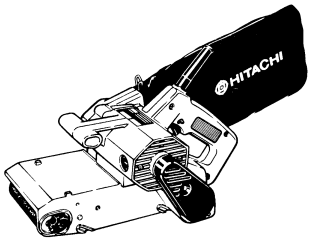
Keep air vents clear and free of dust.

Replace dull or damaged cutters and bits..

Inspect carbon brushes regularly, replace if necessary.

Store in a clean, dry and secure place.

What is it called and what is it used for?



Belt sander

Used to produce a smooth finish on timber surfaces by removing imperfections such as machine marks.

What are 4 safety precautions to be taken before and while using it?

Check the cord, leads and 3 pin plugs for any damage.

A Residual Current Device (RCD) is plugged into the power source.

Do not stand in water or allow electrical leads to lie in it even when using an RCD.

Make sure that the material is fixed firmly before starting the sander.

Use the appropriate PPE while operating the sander.

When operating the sander hold the sander firmly in both hands at all times.

Do not put too much down pressure on the sander as this can cause hollows in the finished surface.

What PPE should you wear when using it?

Safety glasses or face mask.

Appropriate grade of hearing protection, ear plugs or ear muffs.

Overalls

Safety shoes or boots.

Respirator.

What regular maintenance and care does the tool need?

Clean and lubricate regularly

Keep air vents clear and free of dust.

Replace clogged or damaged belts.

Inspect carbon brushes regularly, replace if necessary.

Store in a clean, dry and secure place.

What is it called and what is it used for?

Finishing sander

Used to produce a smooth finish on timber, metal and fibreglass.

What are 4 safety precautions to be taken before and while using it?

Check the cord, leads and 3 pin plugs for any damage.

A Residual Current Device (RCD) is plugged into the power source.

Do not stand in water or allow electrical leads to lie in it even when using an RCD.

Make sure that the material is fixed firmly before starting the sander.

Check the sander pads are fixed firmly to the base plate.

Use the appropriate PPE while operating the sander.

When operating the sander hold the sander firmly in both hands at all times.

Do not put too much down pressure on the sander as this can cause imperfections in the finished surface.

What PPE should you wear when using it?

Safety glasses or face mask.

Appropriate grade of hearing protection, ear plugs or ear muffs.

Overalls

Safety shoes or boots.

Dust mask or respirator

What regular maintenance and care does the tool need?

Clean and lubricate regularly

Keep air vents clear and free of dust.

Replace clogged or damaged sander pads.

Inspect carbon brushes regularly, replace if necessary.

Store in a clean, dry and secure place.

What is it called and what is it used for?

Power planer

Used for planning operations to remove timber that would otherwise be done with a hand plane.

What are 4 safety precautions to be taken before and while using it?

Check the cord, leads and 3 pin plugs for any damage.

A Residual Current Device (RCD) is plugged into the power source.

Do not stand in water while using it or allow electrical leads to lie in it even when connected through an RCD.

Make sure that the material is fixed firmly before starting planing operations.

Wait until the plane is running at full speed before starting the cut.

Use a steady rate of feed and where possible plane with the grain.

Do not place any part of your hand under the sole of the plane while the cutting head is rotating.

After switching off, let the cutter head come to a full stop before placing the planer on the workbench.

What PPE should you wear when using it?

Safety glasses or face mask.

Appropriate grade of hearing protection, ear plugs or ear muffs.

Overalls

Safety shoes or boots.

Dust mask

What regular maintenance and care does the tool need?

Clean and lubricate regularly

Keep air vents clear and free of dust.

Replace dull or damaged cutter blades.

Inspect carbon brushes regularly, replace if necessary.

Store in a clean, dry and secure place.

What is it called and what is it used for?

Reciprocating or sabre saw.

Used to cut a wide range of construction materials and spaces for doors and windows.

What are 4 safety precautions to be taken before and while using it?

Check the cord, leads and 3 pin plugs for any damage.

A Residual Current Device (RCD) is plugged into the power source.

Do not stand in water or allow electrical leads to lie in it even when using an RCD.

Make sure that the material to be cut is fixed firmly before starting the saw.

Ensure there are no obstructions or services such as electrical wiring behind the length of the intended cut.

Use only sharp saw blades.

Wait until the saw is running at full speed before starting the cut.

Do not force or twist the saw blade, maintain a steady, even pressure on the saw blade and let it progress at its own cutting rate.

What PPE should you wear when using it?

Safety glasses or face mask.

Appropriate grade of hearing protection, ear plugs or ear muffs.

Safety shoes or boots.

Dust mask

What regular maintenance and care does the tool need?

Clean and lubricate regularly

Keep air vents clear and free of dust.

Replace dull or damaged blades.

Inspect carbon brushes regularly, replace if necessary.

Store in a clean, dry and secure place.

What is it called and what is it used for?

Biscuit or plate jointer

Used to strengthen a range of woodworking joints.

What are 4 safety precautions to be taken before and while using it?

Check the cord, leads and 3 pin plugs for any damage.

A Residual Current Device (RCD) is plugged into the power source.

Do not stand in water or allow electrical leads to lie in it even when using an RCD.

Make sure that the material is fixed firmly before starting the biscuit cutter.

Use only sharp cutter blades.

Wait until the cutter blade is running at full speed before starting the cut

What PPE should you wear when using it?

Safety glasses or face mask.

Appropriate grade of hearing protection, ear plugs or ear muffs.

Safety shoes or boots.

Dust mask

What regular maintenance and care does the tool need?

Clean and lubricate regularly

Keep air vents clear and free of dust.

Replace dull or damaged cutters.

Inspect carbon brushes regularly, replace if necessary.

Store in a clean, dry and secure place.

2. What are the possible consequences of failing to disconnect a power tool from the power source before adjusting the tool?

The tool may accidentally be started while the operator is handling the blade or cutter head. This may result in a severe injury to the hand.

3. The power lead that you are about to use has a kink inside the outer case. What does this indicate and is the lead safe to use?

The internal wires are possibly damaged or broken. The lead is not safe to use and needs to be inspected.

4. You have been instructed to finish a solid timber bench top in preparation for the spraying of its finish coat. The selection of power tools that you have to choose from are listed below:

Orbital sander	**Belt sander**	**In-line sander**
Disc sander	**Palm sander**	

Which of these sanders will do the job in the least amount of time?

Belt sander.

Which will give you the best finish?

In-line sander.

5. Which of the above sanders would be least suited to the task? Explain why you would not use it for finishing work.

Disc sander. The spinning disc would tend to scour the surface of the work.

A smooth, level surface would be extremely difficult to obtain.

6. You are preparing a router for use. List 3 safety checks that you should carry out before plugging in the machine.

*Any **three** of the following points or other valid answers may be accepted.*

The power tool is isolated from the power source when setting up or making adjustments.

Safety checks relating to the setting of the trigger/switch to the off position must be identified.

Guards must be securely set and fastened in the correct position.

Guides must be securely set and fastened in the correct position.

Ensure that all cutter heads are sharp and in good working order.

Ensure that the router bit is securely fitted to the router.

Ensure that the router is in good working order - inspect the power lead and the body of the router for damage.

Ensure that the work that is about to be machined is firmly clamped down in position.

Inspect the work to ensure that it is free from nails, stones and other foreign objects that may damage the cutter heads.

7. You are ripping a length of timber down to width using the skill saw. What can you do to help prevent the timber jamming on the blade?

Place a small wedge in the cut to prevent the timber from closing in and jamming on the blade.

8. Describe the potential consequences of machining work that is not securely attached to the bench.

Evidence required - At least ***one*** *point being identified relating to the effect of the above statement.*

It is important to ensure that the work does not move at all during the cutting process if an accurate cut is to be obtained.

Both of the operator's hands should remain on the power tool at all times to maintain control of the power tool. Unsecured work is a safety hazard, especially if the operator has to let go of the power tool to try to stabilise the work, while completing the cut.

The operator may lose fingers or be badly cut while trying to stabilise the work.

The work may kick back or fly off the blade

9. If your power tool starts to smoke, what should you do?

Immediately turn off the power and unplug the machine. Notify your supervisor.

10. You have just finished sanding the top of a table with the orbital sander and the surface shows visible semicircular scratch marks. What could have caused these scratch marks?

You have been placing too much pressure down on the sander during the sanding process. This slows the sander down and also causes the grit to scour the work.

11. How and where should power tools be stored?

Place power tools in a clean and dry secure environment, ideally a storage cupboard, when they are not being used.

Examples of oral assessment questions

1. Identify two power sources that are used to drive portable power tools

Any two of:

Mains 230/240 Volts.

Battery.

Compressed air.

2. What is the hazard of laying an extension lead directly on the ground?

The lead will be exposed to dirt, moisture and a will have a greater chance of being damaged. E.g., standing on the lead may cause stones and other particles to penetrate the outer casing.

3. List 4 personal safety precautions that must be observed when operating any portable power tool.

Wear personal protective equipment.

Keep work area clean.

Wear close fitting clothing.

Long hair must be tied back or wear a hair net.

Circular saws

4. Identify 2 safety checks that should be carried out by the operator of a portable circular saw before commencing the cut.

Two of:

Check that the work is securely fastened down.

Check that the work is clean and free from nails and stones that could damage the blade.

Check that the saw is correctly set up and that the blade is suitable for the task.

Check that the guards are operating.

Personal protective equipment must be worn.

Ensure that the saw is running at full speed before commencing the cut.

5. Why should you always hold a portable circular saw with two hands when in use?

To maintain control of the saw throughout the cutting operation.

Drills

6. What material is hammer action or impact drills especially suited for drilling through?

Concrete.

7. You always clamp small items down before drilling through them. What are the possible consequences of trying to hold small objects in your hands when drilling?

The drill may 'bite' or grip the material as it bores through it, causing the work to spin in your hand. This may lead on to lacerations and associated hand injuries.

Router

8. The router you are using produces a cut that has a charred or burnt finish. What does this indicate and what can be done to remedy it?

You are cutting too slowly. The bit is overheating and is burning the work. Increase the rate of feed.

Sander

9. Why should you place the sander down on its side once the sanding operation is completed?

The sander must be placed on its side to prevent grit from becoming attached to the abrasive pad. This in turn will be transferred to the work during the sanding process.

Assessment Schedule

US 24350 Identify, select, maintain, and use portable power tools for BCATS projects (Level 2, Credit 6)

Outcome 1	Identify, describe and select portable power tools for construction projects. *Range:* eight portable power tools used for BCATS projects	**Assessment evidence and judgement** *Portable power tools include:* drills, portable planer, portable circular saw, jigsaw, reciprocating saw, sanders, router, biscuit jointer
ER 1.1	The capabilities and limitations of portable power tools are identified in terms of the manufacturers' instructions for use.	Evidence gathered from the worksheet Q1 showing; • Correct capabilities of portable power tools and their limitations.
ER 1.2	Use of tools is described in terms of work operations to be completed.	Evidence gathered from the worksheet Q1, Q4, Q5 showing; • Accurate description of portable power tools required to complete a job.
ER 1.3	Safe use of each tool is described in accordance with manufacturer's instructions and workplace safety requirements.	Evidence gathered from the worksheet Q1, Q6, showing; • Accurate description of safe use of power tools.
ER 1.4	Power tools are selected to meet identified job requirements.	Evidence gathered from the worksheet Q1, Q4, Q9 showing; • Correct tool is selected for the job.
ER 1.5	The description identifies methods of safeguarding selected portable power tools in accordance with the manufacturers' instructions.	Evidence gathered from the worksheet Q1, Q6 showing; • Correct methods of safe guarding portable power tools.
ER 1.6	Items of personal protective equipment for each tool are identified and described in terms of workplace safety requirements.	Evidence gathered from the worksheet Q1, Q7 showing; • Correct use of PPE when using portable power tools (PPE may include: hearing protection, eye protection, respiratory protection, body and foot protection.
Outcome 2	Use portable power tools for the construction of BCATS projects. *Range*: four portable power tools used for BCATS projects.	**Assessment evidence and judgement** *Portable power tools include:* drills, portable planer, portable circular saw, jigsaw, reciprocating saw, sanders, router, biscuit jointer
ER 2.1	All electrical cords and connections are inspected, set up and used in accordance with manufacturer's instructions and workplace practice.	Evidence gathered from the worksheet Q2, Q3 showing; • Electrical cords are inspected and set up correctly.
ER 2.2	Tools are used to complete work to meet job requirements.	Evidence gathered from assessment record sheet showing; • Correct tools are used to complete a job.
ER 2.3	Use of tools and personal protective equipment is in accordance with manufacturers' instructions for use, materials, and workplace safety requirements.	Evidence gathered from assessment record sheet showing; • Correct use of tools and PPE required to complete a job.
Outcome 3	Maintain portable power tools.	**Assessment evidence and judgement**
ER 3.1	Maintenance procedures are demonstrated in accordance with manufacturers' instructions and workplace practice.	Evidence gathered from the worksheet Q1, Q2, Q3 and assessment record sheet showing; • Blades of tools are replaced. • Belt sander paper replaced. • Compliance tags of tools are checked.
ER 3.2	Tools are kept free of rust and dirt, and are stored and maintained in accordance with manufacturers' instructions and workplace practice.	Evidence gathered from the worksheet Q10 and assessment record sheet showing; • Tools are stored and maintained correctly.
ER 3.3	Damaged or faulty tools are reported to supervisor in accordance with workplace practice.	Evidence gathered from the worksheet Q8, Q9 and assessment record sheet showing; • Damaged or faulty tools are reported.