



Garden furniture

BCATS

BUILDING, CONSTRUCTION
AND ALLIED TRADE SKILLS



Unit Standard 12932 (v5), Level 2

Construct timber garden furniture
as BCATS projects. ⑧ CREDITS

BCITO
buildingpeople

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Introduction

This handbook uses two projects as examples of common processes and techniques for constructing timber garden furniture projects.

The examples are:

- a stepped planter box
- a picnic table with a bench seat.

Your teacher/tutor will guide you on which projects to construct. Your teacher/tutor could ask you to construct other timber projects or you may get the chance to personalise one or both of your projects. If you are given the opportunity to personalise either of them, remember to think about what your project(s) will be used for so they will be fit for purpose.

Remember:

Remember that the projects and construction methods detailed in this handbook are examples only. There are different processes, machinery, and tools that could achieve the same or similar outcomes. Your teacher/tutor will provide you with guidance on these for your particular projects.

How you will be assessed

You need to show your teacher/tutor that you can follow or adapt designs to construct two timber furniture projects. At least one of them must be a Cape Cod chair, picnic table, bench seat with garden tool storage, or an item of similar complexity.

Your teacher might give you a work diary to help you record how you make them. If you can, take photos of your project, including a photo of it completed.

For each project you will need to:

- complete a cutting list
- mark out, cut, and machine the required materials to an acceptable standard
- assemble the project components (parts) to an acceptable level of accuracy
- finish the project
- complete everything safely
- keep your work area, tools, and equipment clean and tidy.



Pictures of two completed items that would satisfy the project criteria for this unit standard

Glossary of terms

Term	Meaning
Bevel	A slanted surface cut at an angle other than a right angle. A tool used to measure and mark angles.
Cleat	A strip of timber fastened to act as a support or hold another piece of timber.
Component	Part or piece.
Corrosion	Rust, deterioration of metal.
Countersinking	To enlarge the top of a screw hole so that the conical head of a screw is set flush or below the surface of the work.
Galvanised	A zinc coating used to protect metal.
Mitre-cut	A diagonal joint formed between two pieces of material cut at an angle (usually 45 deg).
Plant	Fixed equipment.
Rebate	A recess cut along or near the edge of a piece of wood that allows another piece to fit into it to form a joint.
Skew	To drive nails into timber at an angle.
Template	A pattern or gauge for making a number of objects exactly the same shape.

Health and safety

The Health and Safety at Work Act 2015 is designed to:

- prevent harm to employees at work
- promote good practices in health and safety management.

The Act puts responsibilities on everyone to take all practical steps to ensure your own safety and the safety of others.

One way you can help ensure your own safety is to use personal protection equipment (PPE). For this project you will need to use:

- hearing protection
- safety boots or covered shoes
- dust masks
- safety glasses (even if you wear prescription glasses, you must still use safety glasses)
- apron or overalls.

The machinery and other equipment you use can cause serious injuries. You **must** use appropriate guards and safety devices. You **must not** use any machine without the safety guards fitted correctly. You **must** receive training in the use of machines and equipment and apply it when you use them.



Use the machine guards



Set your machines up before beginning work

Before using a machine or portable power tool, check to see if all cords are in good condition. Also check that the compliance tags are current.



If you not sure that a machine is safe to use, don't use it. Ask your teacher/tutor to check it out.

Projects overview

The examples in this handbook use solid timber as the main material for construction. Depending on the projects you end up doing, your teacher/tutor can help you adapt the processes to meet the needs of different timber materials.

To produce good workmanship, you should follow any plans and instructions carefully at every stage of your projects.

- Make sure you understand the drawings and specifications. If you aren't sure, ask your teacher/tutor.
- From the drawings and specifications, identify and select the correct materials.
- Create a cutting list. Make sure you use enough of the correct materials and plan any cuts so you don't waste materials.
- Cut and finish the components. They need to be accurate with any rough edges smoothed so they fit together well and will not splinter.
- Assemble and final finishing. The end products should look good, work well, and stand up to the conditions they're used in.

For each construction job you carry out, it's also important to:

- choose and use appropriate personal protective equipment (PPE)
- use tools correctly and safely
- keep the work area clean and dispose of waste
- clean, store and maintain tools, plant and equipment correctly.

You will need to safely use a variety of hand tools and possibly a variety of portable power tools and fixed machinery. Make sure all the tools/machines are available and ready for use when required. Remember to put the battery on to charge after use if you use battery power tools.

Depending on your school's policy, you might not be able to use some fixed machinery on your own. If this is the case, you must still set up the machine for your teacher/tutor to use and be on hand to be talked through how to use the machine safely and to see the process completed.

Common resources

Getting started

The first step is to get the job specifications and a drawing from your teacher/tutor. These will include the size and design of the projects and the materials to be used.

You might instead be able to innovate upon an existing design or develop your own. If you follow this pathway you will need to develop your own working drawings first.

What tools/equipment will I need?

You will need to use a wide range of hand and portable power tools and fixed machinery. The actual range will depend on the approach taken and the machinery available.

LIST OF TOOLS AND EQUIPMENT USED FOR SHOWN EXAMPLE

Hand tools	Portable power tools	Fixed machinery
→ steel ruler	→ plunge router	→ table saw
→ set square	→ orbital sander	→ surface planer
→ combination set square	→ battery drill	→ thicknesser
→ hand screwdriver	→ impact driver	→ drum sander
→ F clamps	→ biscuit/plate jointer	→ compound saw
→ sash clamps		→ horizontal borer
→ mitre saw box		→ vertical drill press
→ sanding block		

Depending on your school's policy, you might not be able to use some fixed machinery on your own, such as a table saw. If this is the case, you must still set up the machine for your teacher/tutor to use and be on hand to be talked through how to use the machine safely as well as seeing the process completed.

Remember that the processes and machinery you use may be different from the ones used in these example projects.

Common resources

Prepare a cutting list

Developing a cutting list from drawings is an important step in the process as it provides us with accurate information including the total amount of material required. It can be extended to include cost of materials to estimate the cost of the project.

A cutting list can be quite extensive as it identifies every section required to complete the project. Hardware is also commonly included. Often a notes section is included on every line to record important points about the component, such as pre-finish requirements, 'drill prior to assembly', and rebate.

Note:

A template for developing your own cutting lists is available in the resources for your use. This resource may be downloaded and completed as an Excel document or printed off to complete by hand.

Common resources

Project cutting list

Client:	P. Smith	Job number:	0909/065
Date required:	30 September 2020	Finish:	water based stain or oil
Description:	3 tier planter box manufactured out of recycled wooden pallets. May be lined with polythene		

Planter box - manufactured from pallet (as per image)					
Component	No.	Length	Width	Th	Notes
End frames					
Back leg	2	0.7	40	25	
Front leg	2	0.8	80	25	Manufacture using template; ensure 3 pairs are manufactured
8g x 40 Galvanised screws	4				
Planter box ends	6	200	160	20	one end cut at 22.5 degrees; ensure 3 pairs are manufactured
inside back rails	6	160	30	20	add 5% for cuts
Inside front rails	6	160	30	20	cut 1 end at 22.5 degrees; add 10% for cutting; trim to suit
Planter box front	3	380	195	20	
Planter box back	3	380	160	20	
Planter box bottom	3	380	160	20	
Planter box assembly					
Galvanised clouts		40mm			Predrill outside panel to avoid splitting
Attaching planter box to frame					
8g x 40 Galvanised screws	12				2 screws per end
General					
Sand paper					remove all sharp edges when assembled
water based stain or oil					may use inside and then line with polythene (recommended)
Polythene inner liners					cut and fix with staple; drain holes req'd
Note: Thickness may vary from pallet to pallet; ensure consistency when selecting material; ensure all material is free of nails for machining purposes					

Project 1 - Basic garden furniture

furniture

This section provides an example of basic garden furniture, a stepped planter box. Other projects could be (but aren't limited to) free standing planter or wall mounted planter boxes, raised gardens, and stepladder-style plant ladders.

While treated radiata pine is suitable for outdoor use, it is important to paint or stain any timber that comes into contact with the soil to prevent the leaching of chemicals used in the treatment process. Macrocarpa is another good timber for outdoor projects but is often more expensive. Unlike pine, it doesn't need painting or staining.

Using the correct fixings will help the item last as long as possible. Galvanised fixings resist corrosion but stainless steel fixings are best if you're near the sea.

This example uses wooden pallets that are upcycled. Timber from wooden pallets is an inexpensive material and reusing it adds to sustainability. It is best to paint or stain the finished product to increase its life-span. Fitting an inner liner will prevent the soil coming into contact with the timber, which will also help. Don't forget to drill some drainage holes if you are lining the bottom of planter boxes.

Definition of Sustainability:

While there are many definitions of sustainability, we use the Brundtland Report's one, which is considered the foundation document. Sustainability in this report is described as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.

<https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>

From this



... to this



This 'stepped planter box' was made from a single pallet. It could also be made from new timber such as treated radiata pine or macrocarpa, or other timber species suitable for outdoor use

Project 1

Dismantling the pallets

1. Take care when dismantling pallets. You need to not split the timber and not injure yourself. Remember to use the correct PPE when dismantling pallets and to keep the work area tidy as you proceed.

A full face polycarbonate shield offers the maximum protection from splinters or rouge nails. Note that the cord of this jig saw (right) is trailing behind the machine to prevent it being cut.



2. Full length sections are needed for this project. You will get the most amount of timber by cutting near the main outside rails with a jig saw, sabre saw, or hand saw. Keep the pallet secured by clamping to a bench or put it in a vice before you cut.

Cutting through the nails in the centre rail with a sabre saw will help you to dismantle the pallet without damaging or splitting the timber. It is best to not use a pinch or crow bar - the timber will more than likely split around the nail.

Use a hacksaw to cut through any nails the sabre saw blade is too short to reach.

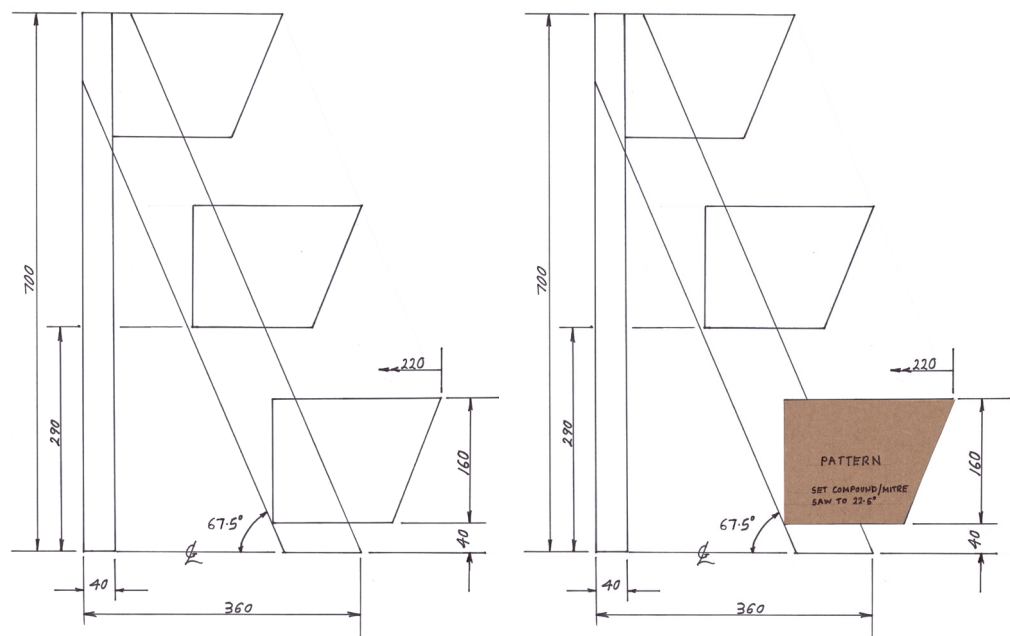


Careful use of sabre saw (left) and hacksaw (right) to cut through nails

Project 1

Preparing the components

3. You might be following a given plan provided to you by your teacher/ tutor. A way to develop your own is to create a full size drawing on a piece of MDF or cardboard. This helps to visualise how the product could be made out of one pallet. The nominated 380mm width of the planter box was determined by measuring the length of the panels that make up the pallet and divided by 3. This process also ensures maximum use of the available material.



In addition, the drawing allows you to check the stability of planter box by estimating the centre of gravity. It should be midway through the middle planter box.

4. A template of the end and front leg was then produced. It was used to double-check there was enough timber for all the parts.
5. Take extreme care when cutting the sections. Some nail heads will have been cut off, leaving the body of the nail embedded in the timber. These nails will damage the saw blades.

Produce pairs when making the planter box ends and the frame.

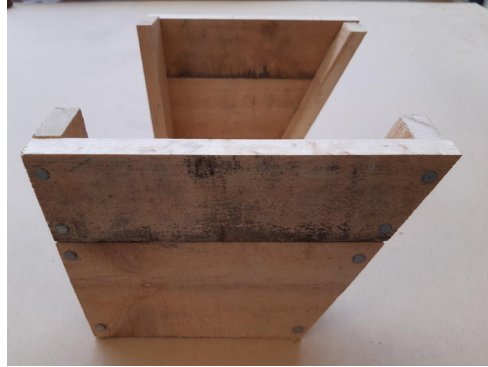
6. To reduce the likelihood of the timber splitting, predrill the panels using a 2.5mm drill.

Project 1

Assembly

7. You can assemble the frame and planter boxes once all the sections have been cut and predrilled.

8. Reverse nailing the planter box section from the interior face as you proceed to assemble each box will add additional strength to the finished product.



9. In this example the bottom and top planter boxes were positioned using galvanised screws. The centre box was then fitted after making sure the box was in alignment.



10. The edges are now ready to be knocked back with a coarse grade sand paper and either painted or stained to suit the intended environment.



Completed and ready for use.

Project 2 - Garden furniture

Your second project needs to be a Cape Cod chair, picnic table, bench seat with garden tool storage, or an item of similar complexity. Examples of the construction of a picnic table and bench seat are included in this resource.

There is a wide range of projects you could make that will meet the requirements for this unit standard. You may be provided with a project by your teacher/tutor or have the opportunity to develop your own.

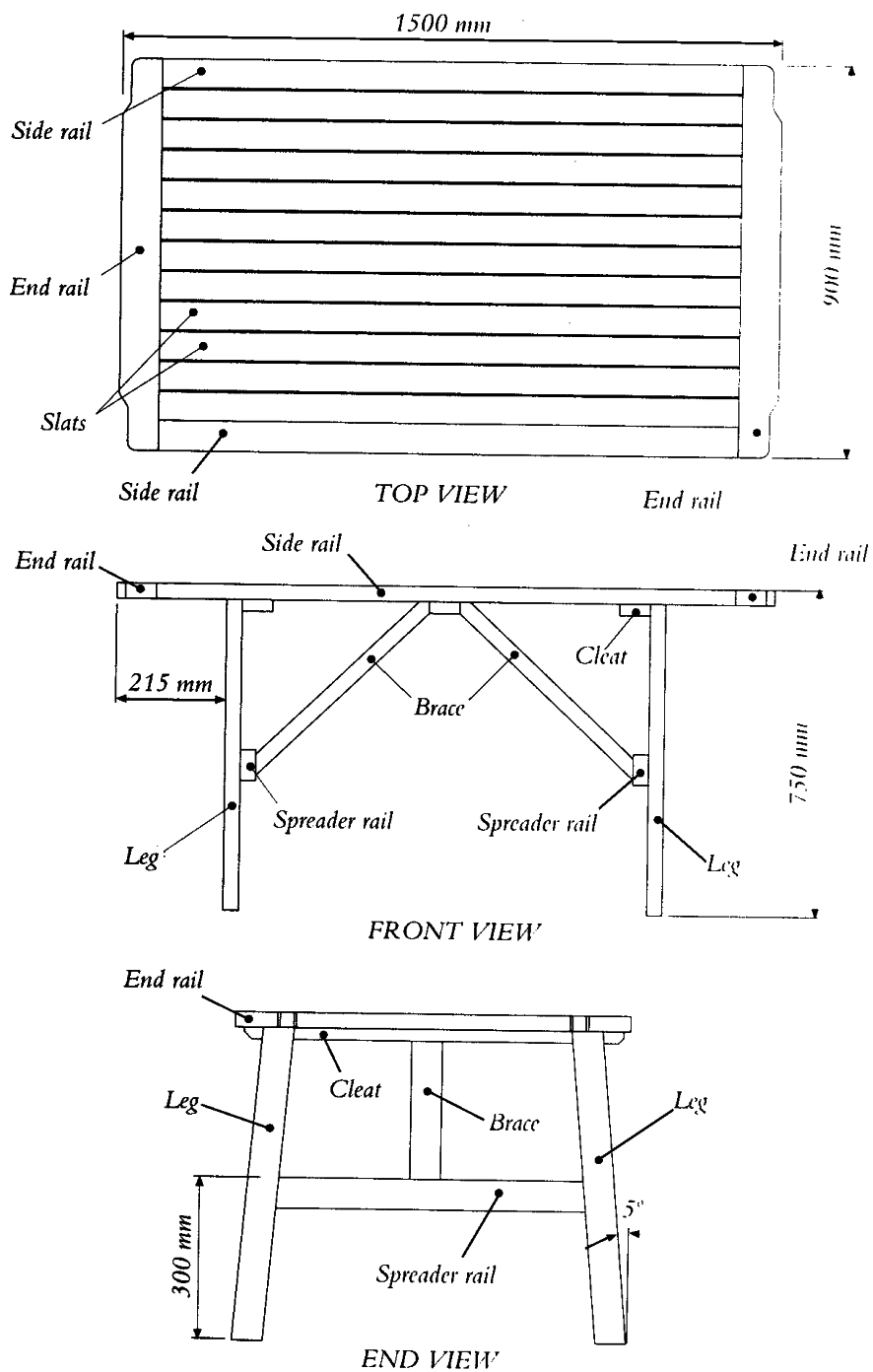
The photos below were entries in a BCATS photo competition.



Picnic table and bench seat

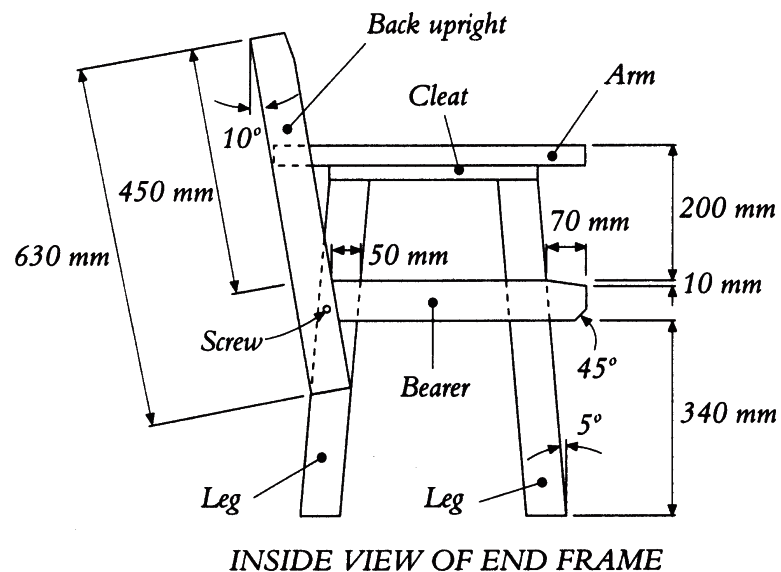
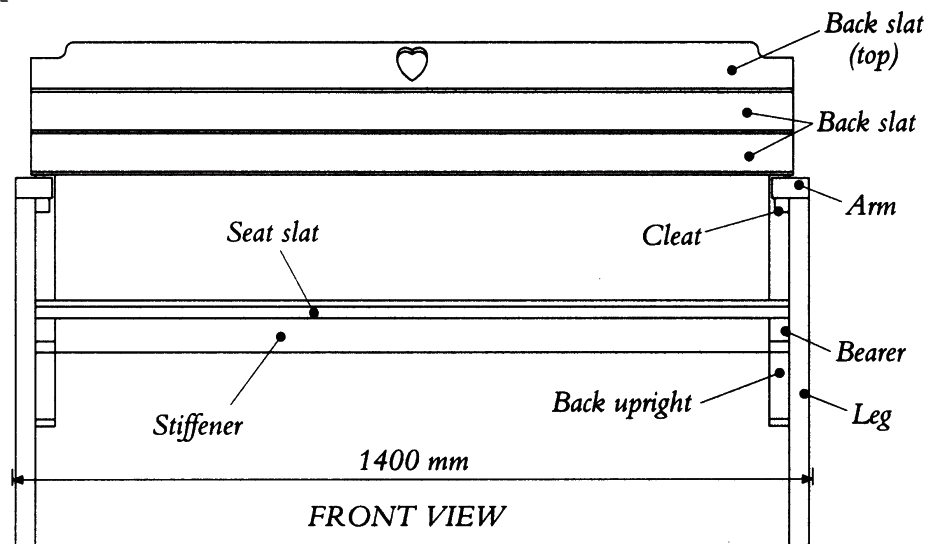
This picnic table can be made from treated radiata pine, macrocarpa, or other suitable timber for outdoor use. The finished table measures as shown 1500 x 900 x 750mm.

Table



Project 2

Seat



LIST OF TOOLS AND EQUIPMENT USED FOR BENCH AND SEAT

→ Rule or tape	→ Electric drill	→ Bevel (sometimes called a sliding bevel)
→ Pencil	→ Drill bits – 3mm, 4.5mm twist bit, 10mm dowelling bit	→ Combination square
→ Jigsaw	→ 10mm dowel centre points	→ Builder's square
→ Tenon saw	→ Sash cramps	→ Hammer
→ Mitre saw	→ Screwdriver	→ Chisel – 25mm
→ Router with 20mm straight bit		
→ Marking gauge		

Project 2

Prepare a cutting list

Cutting lists are used to record the selected material, dimensions, and the number of each part or item required to complete a given project. Cutting lists can be extended to include a costing component.

You can determine the most economical way to cut the timber by using the cutting list. Your teacher/tutor can demonstrate this if needed.

Cutting list for the example table				
Part	Material	Length (millimetres)	Number of	Total length required
Side rail	70 x 35 radiata pine	1360	2	2.72
End rail	70 x 35 radiata pine	900	2	1.8
Slat	70 x 35 radiata pine	1360	11	14.96
Cleat	70 x 35 radiata pine	760	3	1.52
Spreader rail	70 x 35 radiata pine	600	2	1.2
Brace	70 x 35 radiata pine	600	2	1.2
Leg	70 x 35 radiata pine	730	4	1.46
			Total	24.86m

Note:

Templates for developing a cutting list are available in the resources for your use. Your teacher will tell you which one to use. They may be downloaded and completed as an Excel document or printed off to complete by hand.

Project 2

Make the table top

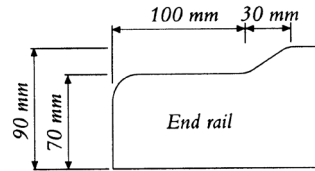
Refer to the cutting list for your project to ensure you cut enough components to the correct length using the correct timber.

The following are the steps for cutting and assembling this table top.

1. Use a mitre saw to cut two side rails and two end rails to length.
2. Use a router to cut a 20mm x 20mm rebate along one edge of each end rail.
3. Measure in 70mm from each end and square a line across the rebated side and edge.
4. Set a marking gauge to 20mm (the width of the rebate), turn over the rail and, working from the rebated edge, mark a line from the end to the 70mm line. This part will be removed to create a flat section for the dowelled joint.
5. Use a tenon saw to cut across the rebate and then a jigsaw to cut along the line. Round over the edge with sand paper.
6. Mark the dowel set-out on each end of the side rails.
7. Use a 10mm dowelling bit in an electric drill and bore the holes 26mm deep.
8. Place dowel centre point in the holes and position the end rails at right angles to the side rails to mark the corresponding holes. Drill these holes 26mm deep.
9. Place adhesive in the holes and on the end of the rails.
10. Insert the dowels and place the frame in sash cramps. Use scrap timber between cramps and frame to protect the surface.
11. Tighten the cramps and remove excess adhesive. Measure the diagonals for square and then leave to dry.
12. Cut eleven 1360mm long slats. Round over the ends and edges on the top surface with 120 grit sand paper.
13. Lay the slats out upside down and fit the frame over the slats, allowing a gap of 3 to 5mm between each board. (A nail placed between the boards makes a useful spacer.)
14. For each slat, drill one or two 4.5mm clearance holes through the end rail, then 3mm pilot holes into the underside of the slats.
15. Hold each slat in position and fix from beneath with 30mm x 8 gauge countersunk screws.

Project 2

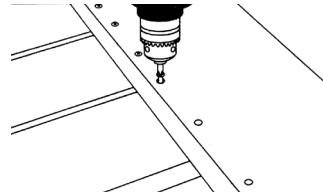
16. Make a cardboard template to shape each end rail. Draw the shape onto the rails in pencil then cut the shape with a jigsaw.



END RAIL SET-OUT

17. Clean the edge and round over with 120 grit sand paper.
18. Turn the top upside down and measure in 250mm from each end. Square this mark across the bottom of the slats.
19. Cut two 70 x 35mm cleats to fit between the side rails. Bevel cut the ends to 15mm thick and round the edges over.

20. Position the cleats on the inside of the marked lines and drill a 4.5mm clearance hole followed by a 3mm pilot hole into each slat.



21. Screw the cleats to each slat with a 40mm x 8 gauge countersunk screw.
22. Fix a third cleat across the centre of the slats.
23. Screw a 50mm galvanised screw into the side rails from each side of the cleats.

Project 2

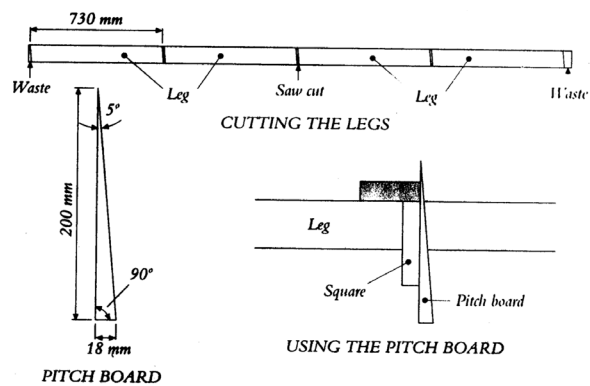
Add the table legs

To minimise waste, we cut the legs from one length of timber.

The process below is for cutting and attaching the table legs.

1. This table's legs are cut with a 5 degree parallel bevel on each end. Set the angle on a mitre saw, or you can set a sliding bevel or create a pitch board. Bevel cut one end at 5 degrees.

2. Measure 730mm, mark and cut parallel to the first cut. Mark and cut the other legs. The angle on the waste side is the same angle required for the next leg.



3. Cut two spreader rails 600mm long with 5 degree bevels (angled in opposite directions, not parallel as for the legs) at each end.
4. Measure up 300mm from the bottom of each leg and square a line across the outside edge.
5. Place the legs flat with the spreader rail on top. Line up the top edge of the rail with the squared lines. Keep the ends flush with the outside edge of the legs. Fix in position with two 50mm x 8 gauge countersunk screws on each leg. Use the pitch board or sliding bevel to ensure the rail is at the correct angle.
6. Stand the assembled leg frame upside down against the outside edge of an end cleat. Centre it against the cleat. Fix each leg with two 65mm x 8 gauge screws into the edge of the cleat. Repeat at the other end for the other leg frame.
7. Cut a brace for each leg. This will stabilise the table. Measure from the lower edge of the spreader rail to the centre cleat. Cut two braces to this length. Fix them with two 50mm x 8 gauge screws into the centre of the cleat and to the spreader.
8. Turn the table right side up and lightly sand with 120 grit sand paper.
9. Finish with stain, paint, or varnish if required or desired.

Project 2

Make the bench seat

Some picnic tables have seats that are attached. The table and bench seat in this example are separate because when the whole family is around the client wants the table to be used only for food. Having the seats separate also means they can be moved to where the aunties and uncles want to sit.

The process below is for cutting and assembling the bench seats.

1. Cut the four legs 580mm long. Bevel both ends of each leg at 5 degrees.
2. Cut two bearers 450mm long.
3. Cut an 80 degree angle on one end of each bearer. Measure and mark 70mm in from the opposite end of the bearer and square a line across the top edge.
4. Square a second line across the same end 10mm down from the top. Join these points on the face and cut the bevel. On the lower edge, cut a 45 degree bevel.
5. Cut two 630mm back uprights, bevelling the top of each as you did with the bearers.
6. The arms fit around the back uprights and sit on top of the legs. Square cut one end of an arm. Measure 70mm from the end and use a square and pencil to mark a line from the inside edge across the face.
7. Place a bearer on the edge of the arm and use it as a template to mark an 80 degree angle. Square the bevelled mark across the bottom of the arm. Use a gauge to mark 35mm from the line to the squared end on each face. Remove this corner with a saw by cutting on the waste side of the line. Make the second arm in the same way so you have one left and one right arm.
8. Round the ends of the arms with sand paper.
9. Cut the back slats. Shape the ends of the top slat with a jigsaw to match the table top. Round the edges with sand paper. You are now ready to start assembling the seat.
10. Square a line 10mm in from both ends across the back of the back slats. Position the top slat on the bevelled end of one back upright.
11. Line up the squared line with the outside face of the upright and fix with adhesive and two decking nails. Check for square with a builder's square.
12. Fix the other end of the slat to the other upright.
13. Nail the other two back slats in place with a 10mm overhang and a 4mm gap between each.
14. Cut two cleats from off-cuts, turn the frame over and fix them across the back of the slats, 10mm from the top.

Project 2

15. Cut the seat slats. The long slat goes at the front and overhangs the bearers by 10mm at each end. The others sit flush on the bearers. Fix them in place as you did with the back slats.
16. Turn the seat over and cut the stiffener. It fits between the bearers, in line with the second slat. Fix it through the bearers with two 65mm x 8 gauge screws at each end.
17. Fix a 40 x 20mm rail across the centre of the slats.
18. Measure up 340mm from the bottom of each leg on the inside face and mark a line across the face of the leg, parallel to the end. Position each leg against the bearer, lining up the set-out with the bottom edge. The front legs sit against the edge of the front slat. The back legs are fixed 50mm in from the bevelled end and secured with two 50mm x 8 gauge screws.
19. The back is positioned so its top is 450mm above the top of the bearer. Hold the upright against the end of the bearer and fix it in place with two 50mm screws into the leg.
20. Cut two 450mm cleats to fit against the inside of the legs at the top. Cut the ends at a 5 degree angle to match the outside of the legs. Fix in place, flush on the top and ends, with two 50mm screws into each leg.
21. Place the arm on top of the legs, against the back. Fix with 50mm screws through the upright and cleat.
22. Sand the bench with 120 grit sand paper, and apply a finish to match the table.