



EON Foundation

# BUILDING A SHADE HOUSE





## Contents

- 1. Where should your shade house go? ..... 3
- 2. What do you need? ..... 4
- 3. Measure and mark materials ..... 9
- 4. Mark and measure the area (6 x 4m)..... 10
- 5. Getting corner posts square..... 11
- 6. Ground level ..... 14
- 7. Put in middle pickets ..... 14
- 8. Cementing the pickets..... 15
- 9. Poly Pipe hoops over steel pickets ..... 16
- 10. Fix ceiling batons to poly hoops ..... 16
- 11. Shade Cloth – 30% x 3.6m wide ..... 18
- 12. Numeracy activities ..... 21
- 13. Understanding units of measure..... 21
- 14. Literacy activities ..... 23
- 15. Developing your writing skills ..... 24
- 16. Glossary ..... 27



# Where should your shade house go?

It is important to choose a good location for your shade house

Go through checklist and ask some questions

How far to a secure water supply?		Near a tap or will you need lots of poly pipe that could be costly and get damaged
Where does water come from		River, windmill, turkey nest, tank or a mains tap
Does the water cost money?		Water bill, fuel, electricity or solar water pump
Is the ground level?		Pots could roll off potting benches, water will wash dirt out of pots, trip hazards like rocks, weeds and holes
Are there any big trees nearby?		They may drop limbs, shade area too much, their roots may take over
Is it secure from livestock?		Can bulls, horses, camels, donkeys, goats or kangaroos damage the shade house and plants
In the wet seasons does it have good drainage?		Not boggy, not going to get washed away?
What weeds are nearby?		Weed trees, creepers that might grow up and damage shade house. You will have to kill the weeds first.
Is it easy to get to?		Walk to, push a trolley, wheel barrow or drive a vehicle to?
Is there space for expansion		You may want to grow more plants and build another shade house



## What do you need?

Recycle where you can (go to rubbish tip, find star pickets, ceiling batons, mesh for benches, old pot plants)



Use what is local (coarse river sand is easy to find and is good to make ground level and improves drainage)

Then buy tools and equipment.

Refer to suggested shade house tools and equipment list

### Recycling

What	Where from

### To Buy

What	Where from	Cost \$
<b>Total Cost \$</b>		












# BUILDING A SHADE HOUSE - tools and equipment list

Quantity	Size	Type	Description	Purpose	Picture
19m	3.6m wide	Consumable	30% Shade cloth	Protect plants from heavy rain, hot sun, insect pests	
28.6m (4 x 7.15m)	2"	Consumable	2" Poly Pipe (Low Density, not blue line – to slide over steel pickets Used for water pipe	Provide frame for shadehouse	
9	6.05m	Consumable	Ceiling Baton (Top Hat) Used in making roofs	To strengthen shade house structure	
1		Consumable	Mesh Screen door – recycled with hinges	Provide access, keep pests out	
3	About 8m	Consumable	Timber (treated pine uprights)	Provide support for door	
100	300m m	Consumable	Packet of UV stable Cable ties	Tie shade cloth to top hat	
200	small	Consumable	Tec screws 3/8 or 5/16	To secure top hat to poly pipe, door hinges	
8	20kg bags	Consumable	Rapid set concrete	To strengthen steel pickets in ground	











# BUILDING A SHADE HOUSE - tools and equipment list

8	1.65m	Consumable	Star Pickets	To provide support for poly hoop structure	
1		Tool	Staple gun	Stapling shade cloth to poly pipe	
500+	To suit staple gun	Consumable	Staples to suit staple gun	To secure shadecloth to poly pipe	
1		Tool	Small sledge hammer	To bash star pickets in	
1	3/8 or 5/16	Tool	Tec head to suit Tec screws Used on roofs, fences	To hold tec screws in drill	
1		Tool	Cordless drill or tec screw gun	Tec screwing	
1		Tool	Crow bar	To dig holes and chip at uneven ground	
1		Tool	Post hole shovel	To dig holes and level ground	
1		Tool	Rake	To level ground, help push shade cloth up over batons	








# BUILDING A SHADE HOUSE - tools and equipment list

1	small	Tool	Flat head screwdriver	To lift up staples	
1		Tool	Pointy nosed pliers	To lift up staples	
1		Tool	Hack saw	Cut poly pipe, cut top hat	
1		Tool	Flat file	To file away any sharp edges after cutting	
1		Tool	Scissors or Utility knife	To cut shade cloth	
1		Tool	Marker Pen – White paint marker	Used to mark measurements	
1		Tool	Spirit level	To check pickets are upright and top hat level	
1	8m	Tool	Tape measure	To measure post spacing, shade house area, diagonal, poly pipe and shade cloth	

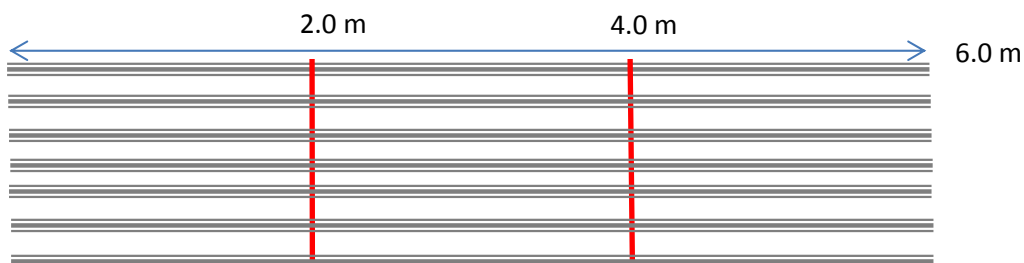


# BUILDING A SHADE HOUSE - tools and equipment list

1		Tool	Star picket rammer	To bash star pickets in	
2		Tool	Ladders (tressell type good)	To assist reaching when measuring, putting up batons and attaching shadecloth	
1		Tool	String line and spirit bubble	To check ground level, mark out post locations for shade house area.	
1		Tool	Shade cloth needle	To sew shade cloth edges together	
1	2.5 litre	Tool	Watering Can	To hold water used when mixing cement	



## Measure and mark materials



Lay 7 ceiling batons on ground (line up straight) then mark at 2m and 4m on all.

Pre-drill pilot holes for tec screwing on the flattest section of ceiling baton near the ends and at the 2m and 4m marks. To be used as a guide when tec-screwing the ceiling batons to the poly pipe hoops later.

It is easier to do it on the ground as no force will be required when tec-screwing whilst up on ladder.

**TIP** Use white paint marker, you can see it easier on the black pipe

You will need measure, mark and cut 4 lengths 7.15m long of poly pipe to make the poly hoops for the shadehouse.

Be gently - Don't kink pipe it will affect the shape of hoop. Walk pipe out to unroll, don't drag it. It will kink. Get a few people to help you. You walk the end away as two people support the roll whilst unrolling. Someone else to measure and mark, then cut with a hack saw. Repeat, walk more pipe out, whilst unrolling, remember you need to cut 4 hoops.

**TIP** Rural 2" Pipe has a thinner wall and will slide over the star pickets

50mm blue line has a thicker and wont slide over the pickets



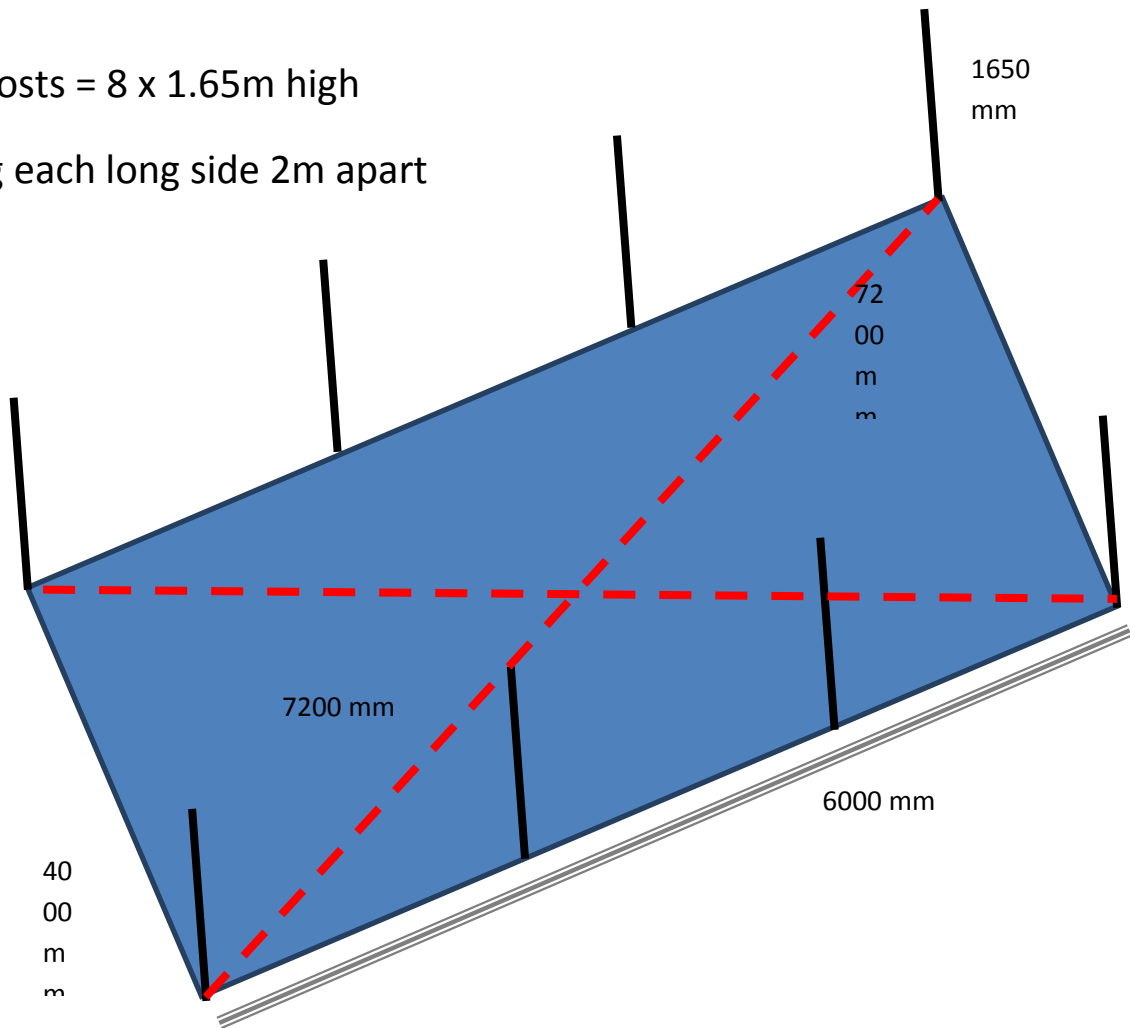
Lay 2 of the hoops together and measure and mark as a guide where the ceiling batons will go, these will become the end hoops.

Measure from one end. Spacing is approximately 1m between batons (adjust as baton width may vary)

## Mark and measure the area (6 x 4m)

Steel posts = 8 x 1.65m high

4 along each long side 2m apart



Check Measurements

Width = 4 m	4000 mm	
Length = 6 m	6000 mm	same as ceiling baton and 2m between each post
Diagonal = 7.2 m	7200 mm	



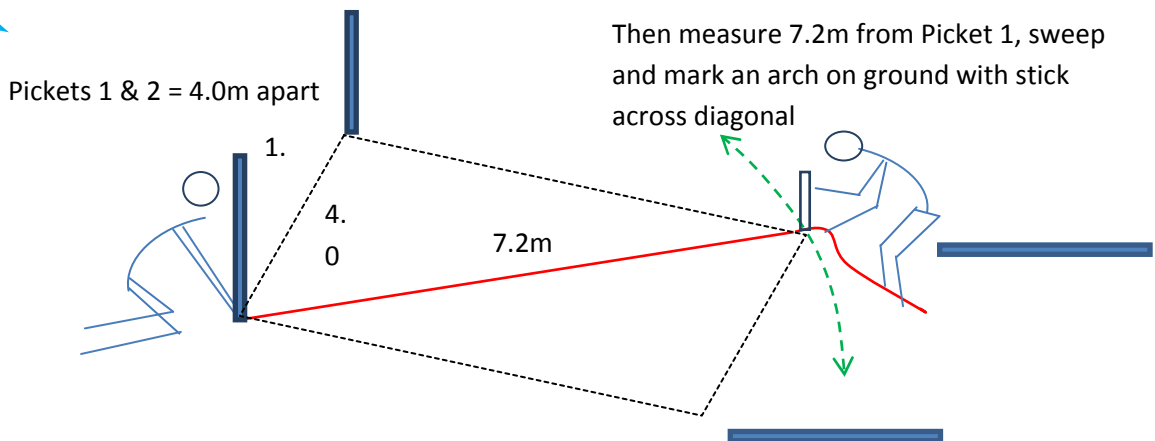
## Getting corner posts square

Estimate where the four corner steel pickets will go. Lay them on the ground. Bang in 1st end picket a little way with small sledge hammer.

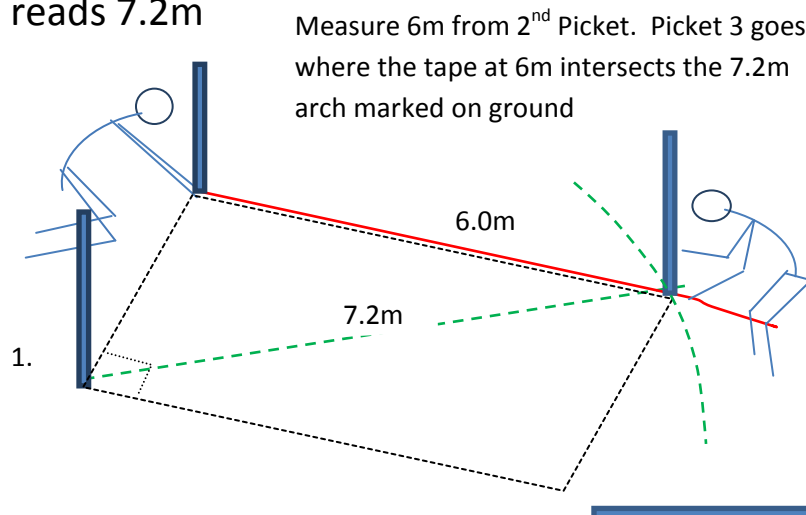
Two people are required for measuring, one person to hold the start of the tape in the same spot (on edge of picket at ground level) and the other to read the numbers off the tape measure. Measure 4m to next end post (these will be pickets 1 and 2). Bang in 2nd pickets also only a little way with small sledge hammer



Lay the marked ceiling batons as a guide for a straight line



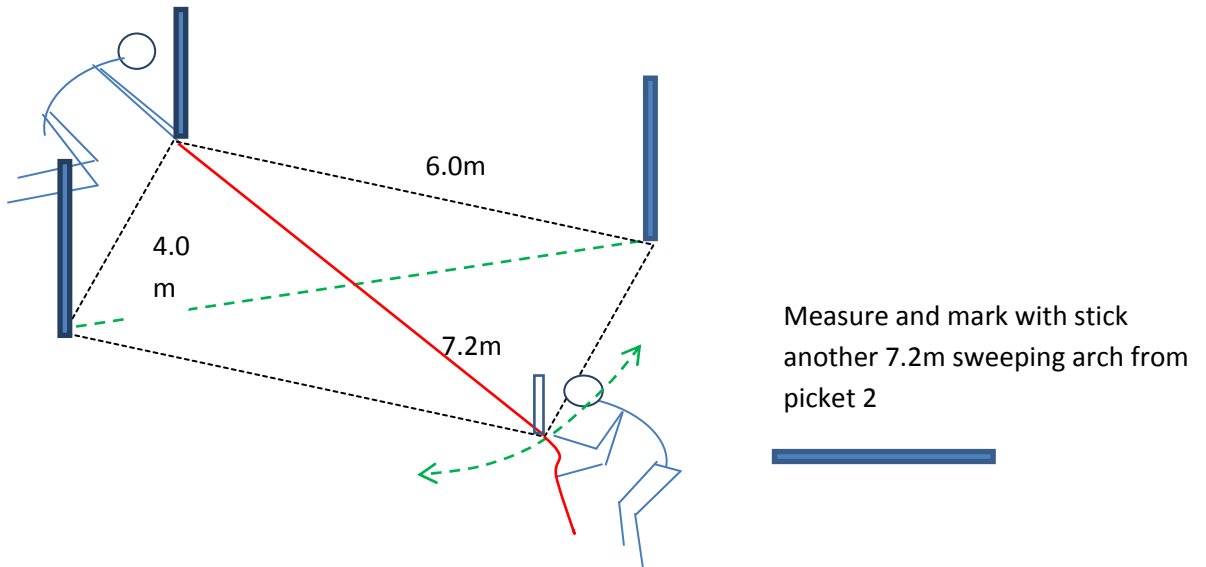
Use a tape measure to sweep an arc across the diagonal where picket 3 should go. One person will hold the tape at picket one. The other person marks the arch (part of a circle) on the ground with a stick by dragging it in the dirt where the tape reads 7.2m



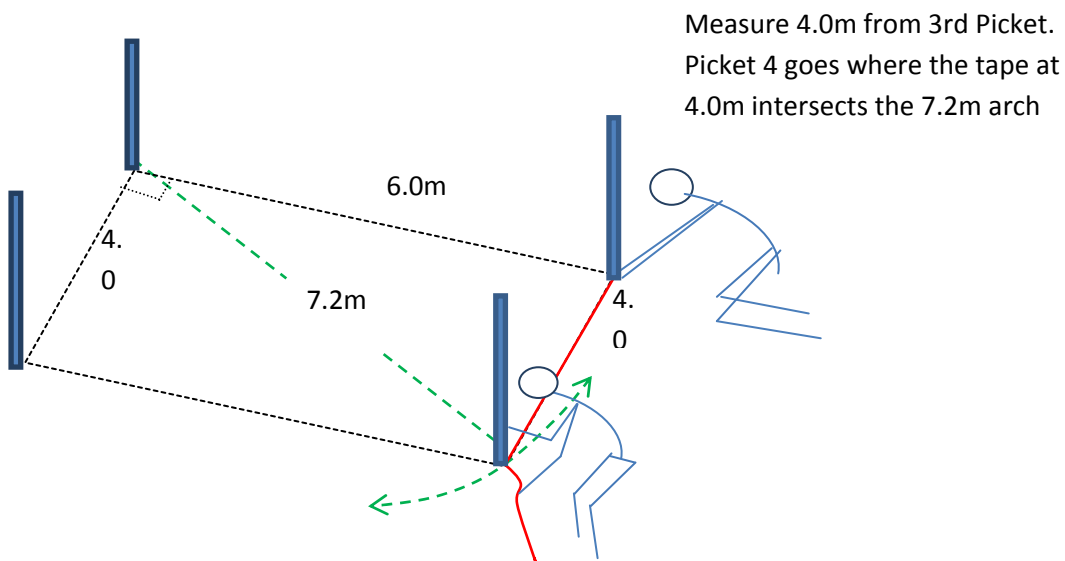


# BUILDING A SHADE HOUSE - tools and equipment list

The person at picket 1 (holding the start of the tape measure) will then move to picket 2 and the other person will read the tape now at 6m (the length of the shadehouse). Another person can place picket 3 where the 6m and the 7.2m intersect the arc in the dirt. Bang in picket just a little way for now.

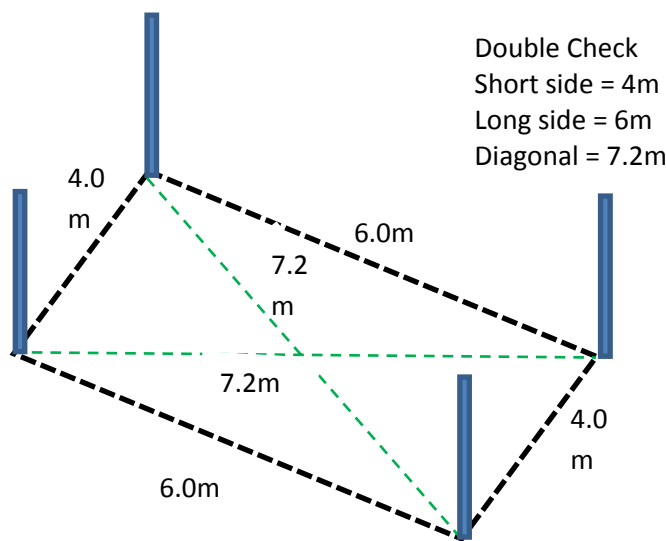


Next measure another arc from picket 2 across the diagonal to where picket 4 will go. Again two people are required. One person will hold the start of the tape at the bottom of picket two. The other person marks the arch (part of a circle) on the ground with a stick by dragging it in the dirt where the tape reads 7.2m



The person at picket 3 will now hold the start of the tape measure, the other person will measure 4m (width of shade house) while another person can place picket 4 where the 4m and the 7.2m intersect the arc in the dirt. Bang in picket just a little way for now.

Check all measurements between posts. Then the posts can be rammed in further so only 1m is out of ground, therefore 0.65 m is in the ground.



Check diagonals (this is a good way to check that your rectangle is square)

Measure the distance between opposite corner pickets (7.2m, if both = same distance the rectangle is square).  $a^2 + b^2 = c^2$

Adjust corner posts to get it right, take your time here.

Get it right now before you go any further.

Why is this important to get the measurements accurate?

If it's not square, other materials might not match. Check the ceiling baton is the same length as the distance between corner pickets on long side.

You will be screwing the ceiling baton to the poly pipe that will be over the steel pickets. You don't want the metal to stick out past the poly pipe. It may hurt people, cut shade cloth, you might not have enough shade cloth to staple neatly. So do it accurately.

## Ground level

Run a string line from the corner pickets to make sure the ground is level.

Wrap string around end posts, tightly, check the level by sliding string up or down one post until bubble is in middle.

If the ground is not level, make it level before you go any further.



Local river sand is cheap and provides good drainage

## Put in middle pickets

Once corner picket positions are correct and the site is level, you can measure and hammer in the two pickets between the corner pickets down the long side.

Distance between pickets will be 2m apart.



You can use the string line as a guide to keep the pickets in line. Also look down the long side and line up the corner pickets. Like sighting a fence line. Get someone to help you put the middle pickets while you sight from your corner pickets.

Now with a picket rammer, bash pickets in so that only 1m sticks of ground. That means 0.65m will be under the ground.

It is important to have the pickets at the same height. When the poly pipe is slid over the pickets the poly arches will be the same.



Now you are ready to cement your posts in.

## Cementing the pickets

Dig out around the posts a little (about 250mm, deep, the picket should be in the ground 650 mm) this is so you can tip a 20kg bag of dry – rapid set concrete in the hole.

Pre-wet the hole, it should be damp, with no water visible in hole. Now the ground will be softer so take care not to knock picket over.

The amount of water will depend on the type of soil. Clay soil will not need much water and will stay damp, if sandy it will drain away and dry quickly.

Measure out the correct amount of water into watering can or bucket (exactly 2.5 litres of water per 20kg bag of rapid set concrete)



**TIP**

Common bucket is about 5 litres, or use old drink bottles

Pour water into the hole. Pour half the bag of Rapid Set Concrete into the hole, making sure it is evenly distributed around the post or pole quickly.

Spear the concrete around the post using a rod to remove any air pockets so it mixes well.

Add the remaining half bag of product and spear again. Add small amounts of water only if needed make sure that the mix is completely moistened. Repeat for all 8 holes.

Now wash any concrete off tools before concrete is dry (crow bar, shovel, spirit level)

Check pickets with spirit level to see if straight.



Support if required. Supports may be removed after 1 hour, depending on temperature. Always test the stability of the post before removing the supports. Allow 24hrs to dry completely.

## Poly Pipe hoops over steel pickets

Slide poly pipe over the pickets. Get someone to help you.

Two tall people are ideal.



**TIP**

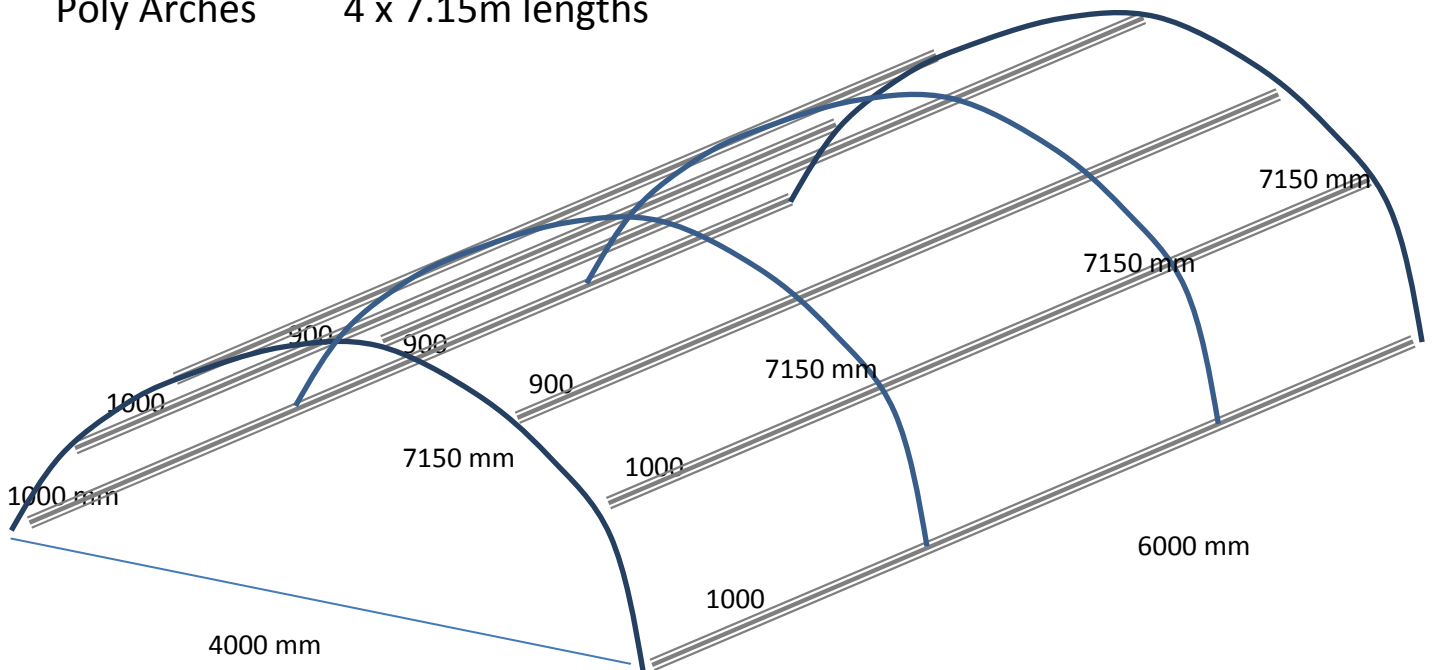
Slide a little bit on both sides at the same time, gently pull the pipe so it is straighter where it slides over the pickets and does not scrap the poly pipe. It will slide easier.

Check that the bottom of the poly pipe hoops are sitting at ground level, level with your string line. Shift if you need.

## Fix ceiling batons to poly hoops

Ceiling Batons 9 x 6m lengths

Poly Arches 4 x 7.15m lengths







Check you have the correct size tec head to match the tec screws. There are different sizes, 3/8 or 5/16.

Also most drills will have forward and reverse, righty (tighty) = in, lefty (loosey) = out.

The pre-marked and pre-drilled ceiling baton should line up with (steel picket / poly hoops).

Remove the string line and tec screw 2 screws on flattest section of ceiling baton into poly pipe hoop at ground level.

Check all marks line up and take care not to twist the ceiling baton, it will bend over the 6m distance. Get other people to hold it in the middle while you are tec screwing. Tec-screw the ends first, make sure the ceiling baton does not stick out past the poly hoops.

Repeat the process for the other ceiling batons. The distances are not all the same, check the marks line up.

You will need to use a ladder to reach the three across the middle. Take care when working on the ladder. Get someone to hold the ladder and pass to you the equipment you need i.e. drill and tec screws.

Check that the ladder is secure every time after you move it, before climbing up. Ideal if some holds the ladder as well.

Measurements and marks. Check before your tec screw. Does your shade house measure up? Check with picture.

The end without the door can now have a length of ceiling baton tec screwed along the bottom of the corner posts as well.

Mark and measure the ceiling baton 4m = same distance between end posts.



Cut ceiling baton with hack saw. File edge to remove any sharp edges. The shade cloth has to wrap over the end.

The other end will depend on the type of door you have chosen.

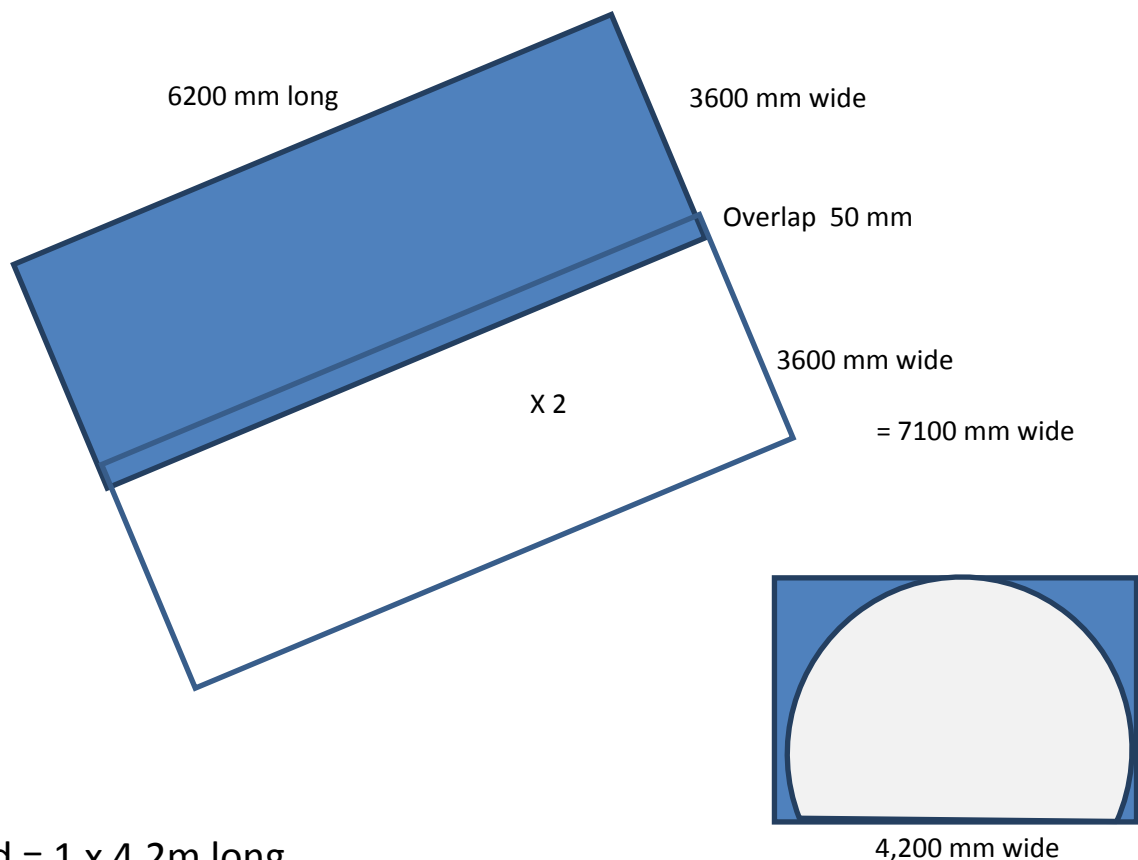
If a fixed door is built then the ceiling baton will have to be cut allowing for the door size.

A quick and easy way is to just have at one end some shade cloth overlapping in the middle. When access is required, one side or both can just be folded back, allowing access for benches, plants, wheelbarrows and people.

## Shade Cloth – 30% x 3.6m wide

Sides = 2 x 6.2m long

(width when joined  $3.6 + 3.6 \text{ m} = 7.2\text{m} - 0.5 \text{ overlap} = 7.15 = \text{poly length}$ )

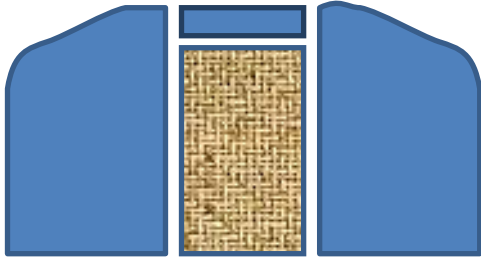


One End = 1 x 4.2m long



## BUILDING A SHADE HOUSE - tools and equipment list

Width of shadehouse 4m, 0.1m to wrap around end without door



Rest of shade cloth to fit around door (Approximately 2 x 1.5m)

Adjust to suit size of door

Roll out shade cloth on flat surface, (suggest concrete floor of shed or workshop in the shade)

Measure and mark and cut with scissors 2 x 6.2m lengths of the 3.6m shade cloth

Use spare ceiling baton as a ruler to mark straight line



Overlap 50mm two together.

You can now sew the two edges together with a lacing needle (a large, bent plastic needle that can be purchased from hardware stores) and fishing line or lacing cord. This makes a permanent join in the middle between the ceiling batons. It will stop the shade cloth flapping in the wind and eventually ripping.

Slide shade cloth up over structure. Use a rake to stop it getting hooked on ceiling batons. Lift gently over.

Cable tie corners loosely and check its square. Gradually tighten cable ties to secure shade cloth to ceiling batons.



## BUILDING A SHADE HOUSE - tools and equipment list

Check and pull the extra length 100 mm so that it wraps nicely around the end of the poly pipe hoops.

Secure along one side with many (about 12) cable ties then pull shade cloth tight and secure on other side.

Use staple gun to secure the shade cloth to the end poly pipe hoops.



**TIPS**

Get someone to pull gently and fold shade cloth back neatly while someone else uses the staple gun.

If staples are in wrong place lever out with flat headed screw driver and or pull out with pointy nosed pliers. Don't rip shade cloth.

Take care when using staple gun. Keep it flat with surface and make sure fingers are out of the way.



## Numeracy activities

- Understanding units of measure meters, centimetres, millimetres
- How to read tape measure
- Let's Practice measuring
- Quantities (how many required, multiples)
- Measuring accurately and then cutting material (measure twice, cut once!)
- Double checking work (adding up measurements, check spacing of picket, batons and diagonals to see if a rectangle is square - Pythagoras)  
 $a^2 + b^2 = c^2$

## Understanding units of measure

kilometre = km, meter = m, centimetre = cm, millimetre = mm

1 km = 1,000 m or 100,000 cm or 1,000,000 mm

1 m = 100 cm or 1000 mm

1 cm = 10 mm

Practice measuring, use ruler, tape measure and rolling wheel

Activity measuring seeds and plants

Activity weekly graph of bean or corn plants

Activity – height of kids in class, measure every month and graph over the year.

## Let's practice measuring

- (metres, centimetres and millimetres)
- 1 metre = 100 cm = 1000 mm



Items	Your measurements	Millimetres (mm)	Centimetre (cm)	Metres (m)
Height of steel pickets				1.65 m
Width between the 4 steel pickets in a row			200 cm	
Length of shade house		6000 mm		
Width of shade house			400 cm	
Length of poly pipe hoops		7150 mm		
Width of shade cloth on roll				3.60 m
Length of shade cloth required		19000 mm		
Width between two batons in middle of shade cloth				0.85 m
Width between first two batons from the ground			900 cm	
Biggest Barramundi I have caught	1.0 m	1000 mm	100 cm	1.0 m
Biggest Bream I have caught	40 cm	400 mm	40 cm	0.4 m



## Literacy activities

- Recognising tools and equipment, picture and names can use cards
- Reading instructions
- Understanding what purpose the tools will be used for when building shade house.
- Developing your writing skills
- Writing example where else the tools and equipment can be used for.
- Writing and drawing about being safe when building
- Write and draw about why we are building a shade house



# Developing your writing skills

Write out the key words breaking them into syllables.

Example: h a z / a r d (2)

Reliable	___ / ___ / _____ (3)
Measure	_____ / _____ (2)
Diagonal	___ / ___ / _____ (3)
Width	_____ / ___ (2)
Length	_____ / ___ (2)
Equipment	___ / _____ / _____ (3)
Secure	___ / _____ (2)
Recycle	___ / ___ / _____ (3)
Drainage	_____ / _____ (2)
Level	___ / _____ (2)
Consumable	_____ / _____ / _____ (3)
Overlap	___ / _____ / _____
Accurately	___ ___ / ___ / _____ / ___ (4)
Quantity	_____ / ___ / ___ (3)





# BUILDING A SHADE HOUSE - tools and equipment list

Write out the key words breaking them into syllables.

Your turn to put the breaks in

Purpose	_____ ( 2 )
Available	_____ ( 4 )
Square	_____ (1)
Approximately	_____ ( 5 )
Hazard	_____ ( 2 )

Write out any new words and break them into syllables




## BUILDING A SHADE HOUSE - tools and equipment list

How many more words can you find that belong to the same word family?

Example: shade .... (shaded, shading, shades, shade cloth, shade house)

Overlap

Recycle

Drain

Measure

Consume

Level



# Glossary

Word	Meaning	Your words
Check	Test if ok, looks ok	
Reliable	Can trust it	
Distance	How far apart things are	
Measure	Using a ruler to read how far things are apart	
Diagonal	The distance across an object, from corner to opposite corner	
Width	Measurement of short side	
Length	Measurement of long side	
Equipment	Things you will use like tape measure, star picket hammer, tec screw gun, scissors, staple gun	
Secure	To make things safe	
Recycle	To reuse something, save it from the rubbish tip	
Drainage	How water goes away from a place	
Level	Something that is flat, not up or down hill	



# BUILDING A SHADE HOUSE - tools and equipment list

Consumable	Something that is used up, can't use again	
Overlap	When two edges cross over each other	
Accurately	Doing something right with care	
Quantity	The amount of something	
Purpose	What is it used for	
Available	Able to be used	
Square	Not crooked, if measured corners will be 90 degree,	
Approximately	A guess, guide, an estimate, not accurate	
Hazard	Something that could harm people or the environment	