

## Section C: **KNOTS AND GADGETS**

- BY MING BERKA

### KNOTS

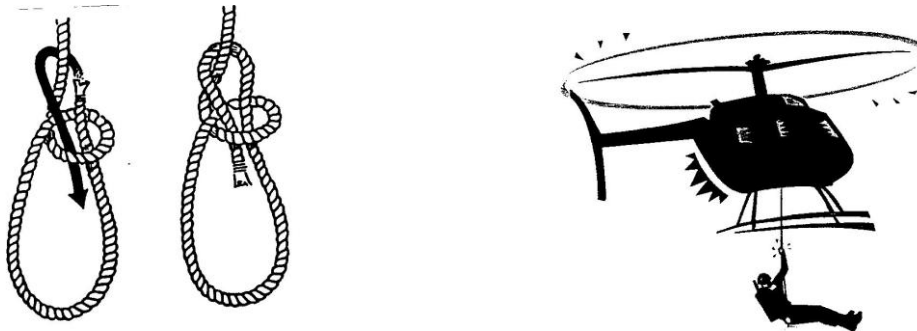
If a knot is mentioned anywhere in this manual, it will appear in boldface so that you can refer to this section on how to tie the knot. There are many resources on the internet that provide animated instructions on how to tie knots. Check the resources at the end of this Section or on YouTube.

#### Terminology

- **Standing end** is the piece of rope which stays still.
- **Working end** is the end of the rope you are moving to tie the knot.

#### 1. **BOWLINE**

While the bowline is secure and won't slip when tied, it can still be untied easily. The bowline is sometimes called a "life-line" because it can be used in rescue situations. The instructions below are for you to tie the bowline using both hands, but you can actually tie this knot with just one hand, so that you can use your other hand to cling onto something. If you use a double layer of rope, you can "sit" in the loop of the bowline while being hoisted to safety. If a series of bowline knots were made along a rope, the loops could be used as footholds and handholds when climbing up or down.

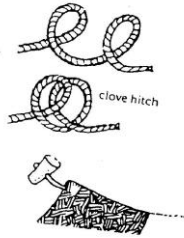


1. Hold the standing end of the rope upright. (the tree)
2. Make a loop from right to left like drawing the number 6 with the working end crossing over the standing end (tree).
3. Pinch the loop with your left hand. (Make a rabbit hole.)
4. Bring the working end out of the loop. (The rabbit comes out of the hole.)
5. Wrap the working end around the standing end of the rope – go from the right then behind the standing end of rope. (The rabbit comes out of its hole; runs around to the back - from the right to the left.)
6. Put the working end of the rope back into the loop. (The rabbit goes back into its hole.)
7. Make sure the loop is the right size and then tighten the knot.

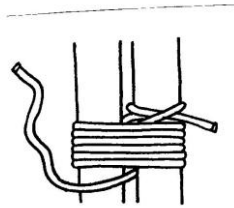
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### 2. CLOVE HITCH

A clove hitch has many uses. Some of the most frequent uses for clove hitches are:



Tying the toggle on the flag to the halyard (on the flagpole)



To begin a lashing.

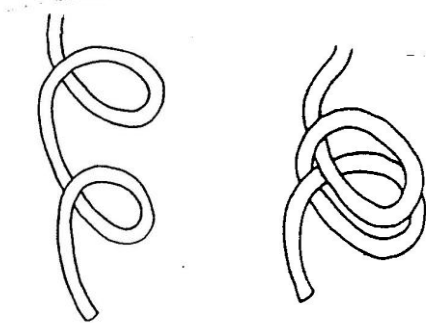


Securing one end of a clothes line

### Two Ways to Make a Clove Hitch

#### Method A:

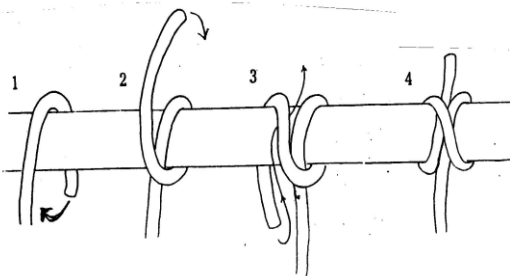
If the clove hitch can be made first and then slipped over the top of a stick or a toggle, use Method A.



1. Hold the standing end of the rope upright with your left hand.
2. With your right hand, make a loop with the working end of the rope as if you're drawing the number 6.
3. Pinch the first loop with your left hand, and make a second number 6 loop.
4. Place the second loop behind the first loop.
5. Slip the clove hitch over the stick and tighten.

#### Method B:

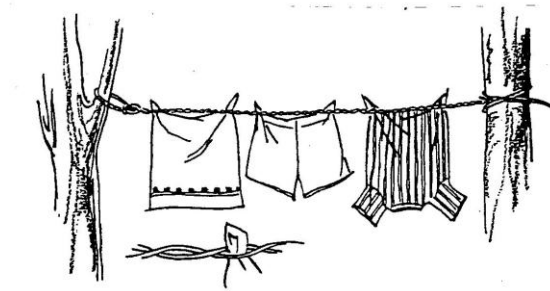
When you can't slip a clove hitch over the object (like a tree), use Method B to make the clove hitch.



1. Wrap the short working end of the rope around the tree.
2. When it comes around, make sure the working end of the rope crosses over the first loop you have made.
3. Wrap the rope around the tree again, and tuck the working end of the rope under the X.

Since a clove hitch is very easy to undo, it may come undone if constant pressure is not applied. Therefore you might want to reinforce it with two half hitches on either side of the knot.

## How to Make a Clothes Line that Doesn't Need Clothes Pins



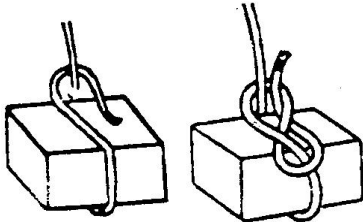
1. Use a piece of rope that is at least  $2\frac{1}{2}$  times the distance between the 2 trees plus extra to wrap around the trees.
2. Fold the rope in 2, and tie a knot at either end.
3. Have one person hold the tied end, while the other person twists the rope. Each twist needs to be far apart enough so that a piece of clothing (e.g. the corner of a shirt or a sock) can be inserted.
4. When all twisted, tie a knot in the other end.
5. Both people should hold onto the tied rope to prevent the rope from untwisting. One person then should tie the twisted rope to two trees, using a clove hitch around one tree, and a Round Turn and 2 Half Hitches on the other end.

### 3. HALF HITCH

When you cross your laces and tie the first knot on your shoes, this is a half hitch. (Right over left and tie.) A half hitch is a component of many other knots, like a **Reef Knot**.

### 4. PACKER'S KNOT

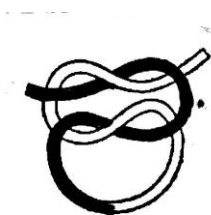
The packer's knot is used whenever you want to tighten the rope around something like a bedroll, or parcel.



1. Take the short working end of the rope, and loop it behind the longer standing piece.
2. Make a figure 8 with the working end— over and then tuck it under the first loop.
3. Pull the longer standing end to tighten.

### 5. REEF KNOT

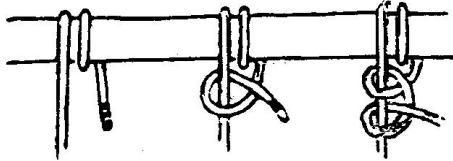
The reef knot is used to join 2 ropes that are the same thickness such as the ends of the same rope or a triangular bandage. It is fairly easy to undo, but if weight or movement is applied, it may not hold.



1. Right over left, and tie.
2. Left over right and tighten.

## 6. ROUND TURN AND TWO HALF HITCHES

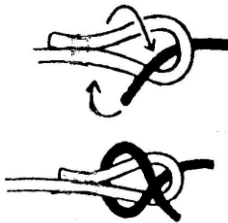
The **Round Turn and 2 Half Hitches** is used to tie something (boat, animal) to a fixed object (rail, fence or tree branch). It can also be used to secure one end of the ridge line for a tarp to a tree, or to secure the clothes line.



1. Take the working end of the rope and wrap it around the branch or pole once or twice.
2. Bring the working end back to the standing end of the rope and tie a half hitch by looping the working end over the standing end and pulling it through.
3. Loop the working end over the standing end again and pull on both hitches to tighten.

## 7. SHEET BEND

The sheet bend is used to tie two ropes of unequal thickness. It is used most often to tie the short rope of the flag to the halyard (on the flagpole). And in its doubled form, this knot will even hold in slippery nylon rope. You'll know you have a sheet bend if one end of the rope (the black rope in this diagram) is under the loop, while the other end is over the loop. With the reef knot, both ends of rope are over the loop.



1. Make a loop on the halyard (the white rope), but don't cross over.
2. Take the end of the rope on the flag (the black rope) and thread it from the bottom up through the loop.
3. Wrap the black rope behind the white rope.
4. Bring the black rope over the white rope, and tuck it under itself in the loop and over the white rope.

## 8. TAUT LINE HITCH or GUY LINE HITCH

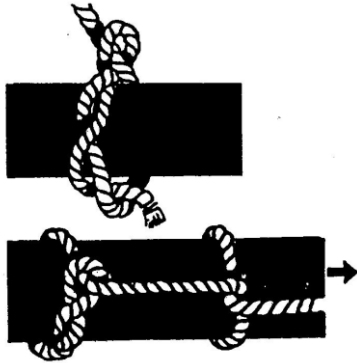
The Guy Line Hitch and the Taut Line Hitch are tied differently but both do the same job. Without undoing the knot, you can tighten or loosen the guy line just by sliding the knot.



1. Wrap the rope around the tent peg and make the knot closer towards the tent, so that you don't need to bend over so much when you need to adjust the guy line.
2. Coil the working end twice around the standing end of the rope back toward the tent peg.
3. Make one additional coil around the standing line on the outside of the coils just made. Tighten the knot.

### 9. TIMBER HITCH

In spite of the fact that this knot can be used to haul a heavy log, it can come undone very easily. However the log can only be pulled in one direction as shown.

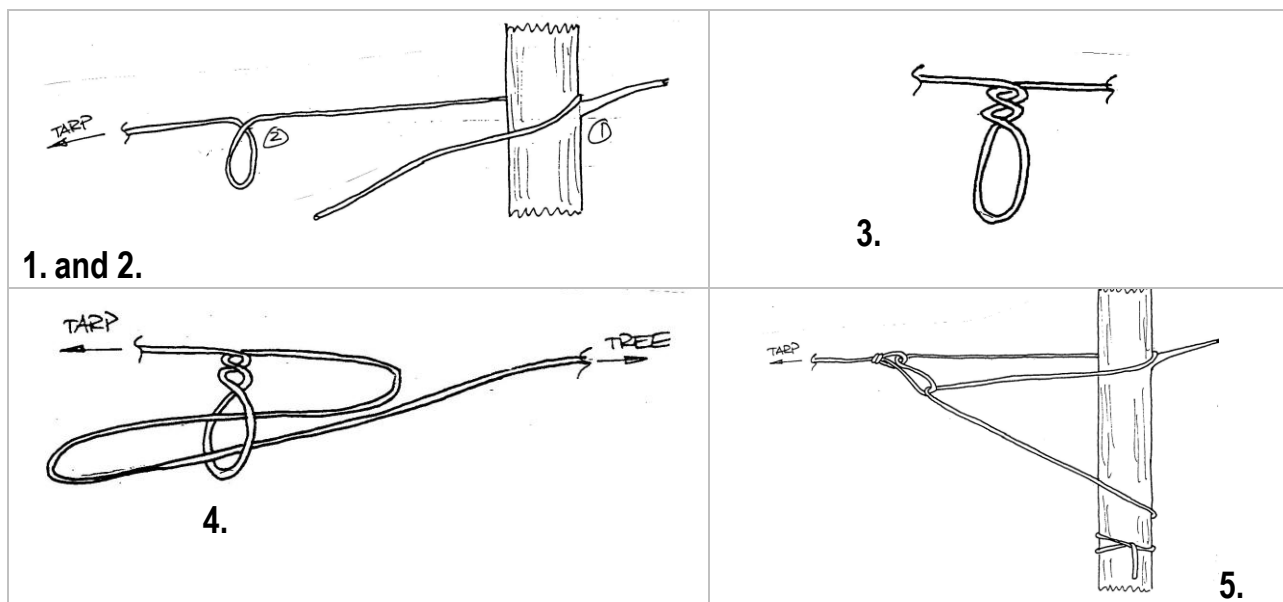


1. Pass the rope around a log.
2. Fold the working end of the rope over, and twist it 2 or 3 times.
3. Pull the standing end of the rope through the loop and tighten.
4. Further down the log, make a half hitch and pull the rope through.

### 10. TRUCKER'S HITCH

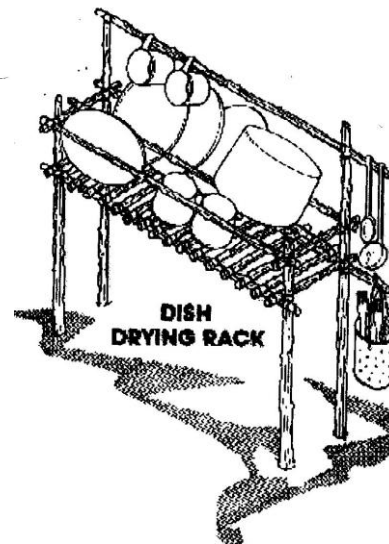
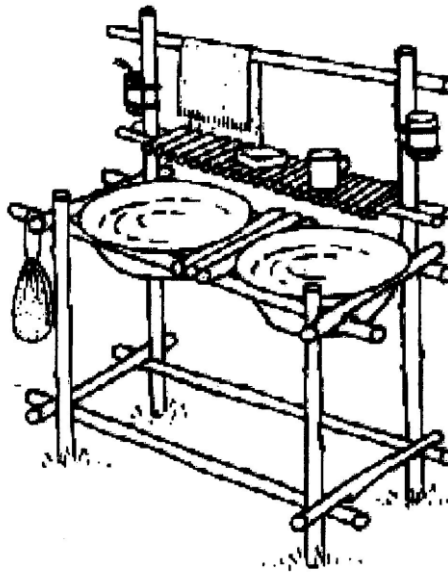
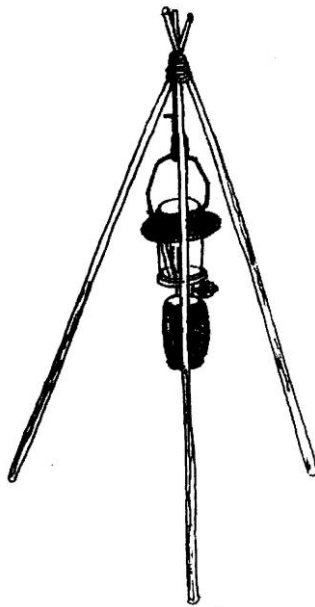
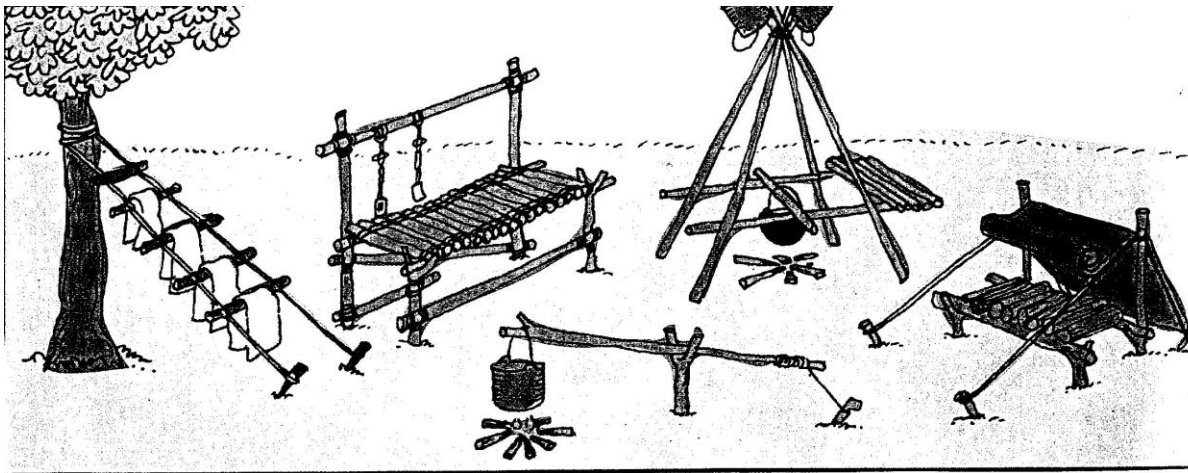
The Trucker's Hitch is a great knot that provides a lot of tension in the rope. It is easily adjusted and can be untied very quickly. It can be used in many different applications such as tarp and tent erection, tying a canoe on a trailer or to form a tight clothesline.

1. Throw one end of the rope over a branch 10' or so above the ground.
2. Make a loop in the rope about 10' to 15' from the tree.
3. Twist the loop 2 or 3 times.
4. Pull a loop from the "tree" side through the loop you've just made.
5. Pass the free end through the second loop, tighten up and tie off lower on the tree.



## GADGETS

Gadgets are camp furniture or utensils made out of green sticks or dowels. Do not use old dead wood as it tends to break easily. Some simple gadgets only need one or two sticks and may not even need to be tied together. Other gadgets can be quite fancy and may need several pieces of wood. Here are a few examples of camp gadgets. The sky is the limit for what you can make with sticks and cords.



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### **STICKS**

1. **Store bought dowelling** needs to be pre-cut to the desired lengths, but can be re-used over and over again. Dowels should be labelled with a Sharpie to indicate which piece of furniture each dowel is meant for. The disadvantages of store bought sticks is that, aside from the initial outlay of money, you need a place to store them, keep them organized, and need to be able to transport them (some sticks may be long and may not fit in just any vehicle).
2. **Sticks from the bush** will be suitable for small gadgets like wash basin tripods, or shoe stands. Forked sticks are especially useful. However you may not find enough sticks to do complicated gadgets. Also you may not find enough sturdy branches. Deadfall may have been on the ground for a long time and will not be strong. If you can break a stick with your hands, the wood is not strong enough. Be sure to scatter the sticks back in the bush when leaving camp (with strings removed).
3. **Other sources** - You can use old hockey sticks, old (curling) broom handles, and branches of trees or undergrowth that are being trimmed. Ask your municipal council arborist or a private arborist to set aside wood for you.

### **CORDS**

- The cord needs to be strong. If you can break it when you pull on the opposite ends, it's not strong enough. For most camp gadgets, butcher's cord is sufficient, but for projects that will take a heavier load, you may need braided polyester rope.
- Do not use yellow nylon rope as it loosens easily.
- To keep the cord from fraying, tie a knot at the end (like thread) or frap the end.
- When disassembling gadgets, avoid cutting the cords if possible. If you started with a clove hitch, (which is very easy to untie) all the cords can be undone, folded, tied and stored in a clear plastic baggie. Cords used to make a complex gadget, for example, an Iroquois table, should be kept together in their own baggie (labelled with a Sharpie).

### **How to coil cords or ropes for storage**

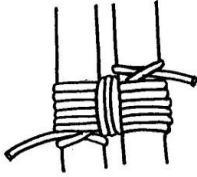
When you're finished using cords and ropes, it is important to keep them tied neatly so that they are not a tangled mess the next time you need to use them. This applies to guy lines on tents and flies, ropes used for bedrolls, cords for gadgets, etc.

1. Hold one end of the rope in your hand, and wrap the cord or rope around and around your elbow and hand.
2. When you reach the end, bring it to the middle of the bundle and wrap it around the strands a few times – starting at the far end until almost the end of the rope.
3. Tuck the end under the last loop. It's better to leave a short piece sticking out, so it doesn't come undone.
4. Because yellow nylon ropes are so slippery, leave more rope at the end so that you can tuck the rope under the last 2 or 3 loops, and leave a longer portion sticking out.

## LASHING

- All lashings begin with a **Clove Hitch** (it's flat and can be tightened) and end with a **Reef Knot** or a **Clove Hitch**.
- The number of times you lash and frap depends on the thickness of the cord or rope. The numbers provided below are just guidelines.
- Pull the cord or rope as tightly as possible each time it goes around.

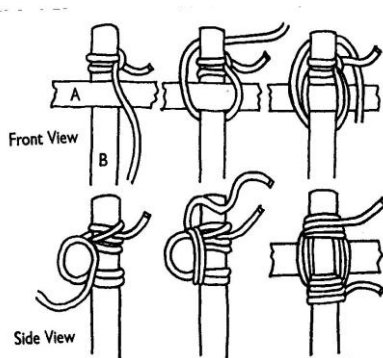
### FRAPPING



Frapping is wrapping the cord perpendicularly between the lashing to add tightness which makes your gadget more secure.

### SQUARE LASHING / DIAGONAL LASHING

- **Square Lashing** is used to join 2 sticks to form a plus sign +. Square lashings can be used to make the legs of a table.
- **Diagonal Lashing** is used to join 2 sticks to form an X. Diagonal lashing can be used to add support to the upright legs to make the table sturdier.



1. Put a **Clove Hitch** around one stick.
2. Wrap the working end around both sticks tightly like a "God's Eye" 4 to 6 times.
3. Frap between the 2 sticks tightly 3 or 4 times.
4. Finish it with a **Reef Knot** or a **Clove Hitch**.

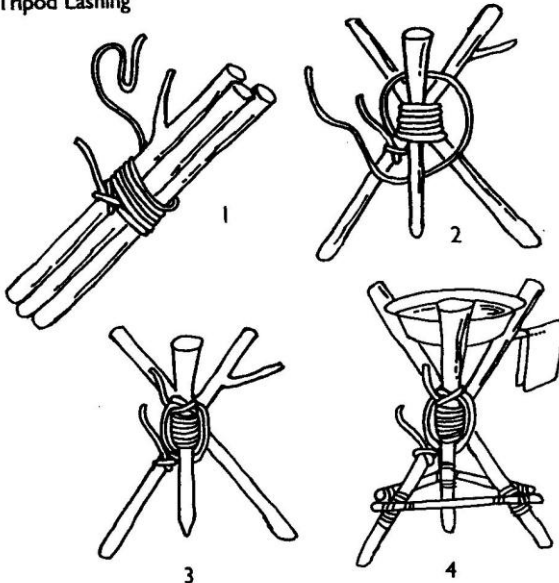


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### A. TRIPOD LASHING

- Tripod lashing is similar to diagonal lashing, but uses 3 sticks rather than 2.
- A tripod can be used to hold a wash basin, or be arranged over a fire with a pot hanging from it.
- All 3 sticks don't have to be the same length, but in order for the tripod not to lean or tip over, make sure the bottom ends of all the sticks touch the ground before you start lashing them.

Tripod Lashing

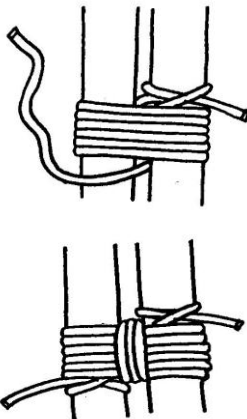


1. Put a **Clove Hitch** around one stick where you want the sticks to split open (e.g. where the basin will sit).
2. Wrap the cord around all 3 sticks tightly about 4 to 6 times.
3. Spread the 3 sticks out and frap around each of them 3 to 4 times.
4. End with a with a **Reef Knot** or a **Clove Hitch**.
5. For a sturdier tripod, lash sticks horizontally between each 2 legs.

### B. SHEAR LASHING

Shear lashing is used to join 2 sticks together. The main uses for shear lashing are:

- A. To join 2 short sticks to make a longer stick.
- B. To join 2 (or more) sticks together to make them stronger.



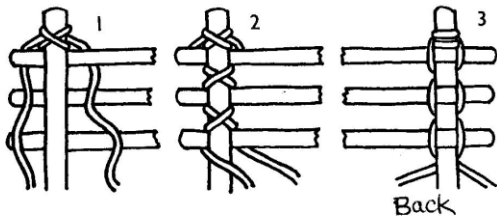
1. Put a **Clove Hitch** around one stick.
2. To make a longer stick, place the two sticks side by side, with one extending in one direction and the other stick extending in the other direction. Overlap the 2 sticks as much as possible for strength. (If there is a lot of overlap, you could shear lash both ends.)
1. To make 2 (or more) sticks stronger, put them side by side (or bundle them).
2. Wrap the working end around all the sticks tightly 4 to 6 times. If the sticks need to take a heavy load, like a foot bridge, use a strong rope and wrap it more times.
3. Frap between 2 sticks tightly 3 or 4 times.
4. Finish it with a **Reef Knot** or a **Clove Hitch**.

### **C. CONTINUOUS LASHING**

Continuous lashing is different from all the other lashings because the sticks are wrapped only once. It is used to make a flat surface like a table top.

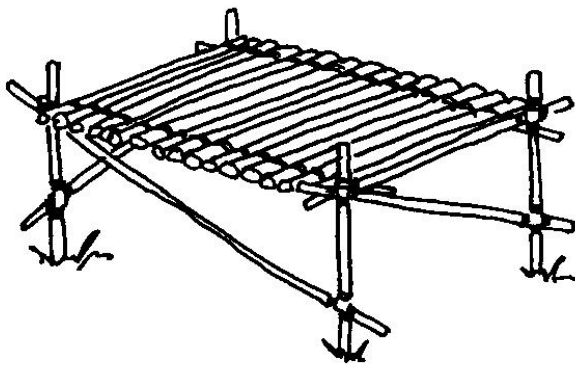
#### **To make a table top, you will need:**

- 2 long sticks (the length of your table)
- The number of short sticks that form the surface of the table top will depend on how close you need the sticks to be. Depending on how you will use the surface, you may put some sticks spaced out but others close together – all on the same gadget.
- If the lengths of the short sticks are different, sort them in descending order (for neatness).
- 2 pieces of cord that are each 3 x the length of the long sticks.



1. Make a clove hitch in the middle of one rope, and put it on one long stick. Place the long stick perpendicular to the short sticks.
2. Criss-cross the cord on the top side, and bring it under the horizontal stick – one rope on each side.
3. Bring the ropes up on top and criss-cross again. Pull the rope tight each time.
4. Space the short sticks out as needed.
5. Finish the lashing with a **Reef Knot** or a **Clove Hitch**.
6. Repeat the steps with the second long stick.

### **BASIC TABLE**



#### **To make a basic table, you will need:**

- One continuously lashed table surface.
- Table legs. 4 sticks are square lashed to the table surface.
- For stability, sticks can be diagonally lashed between any 2 legs. If you lash an X on each side, you will need 8 sticks. This should allow the table or seat to bear quite a heavy load.

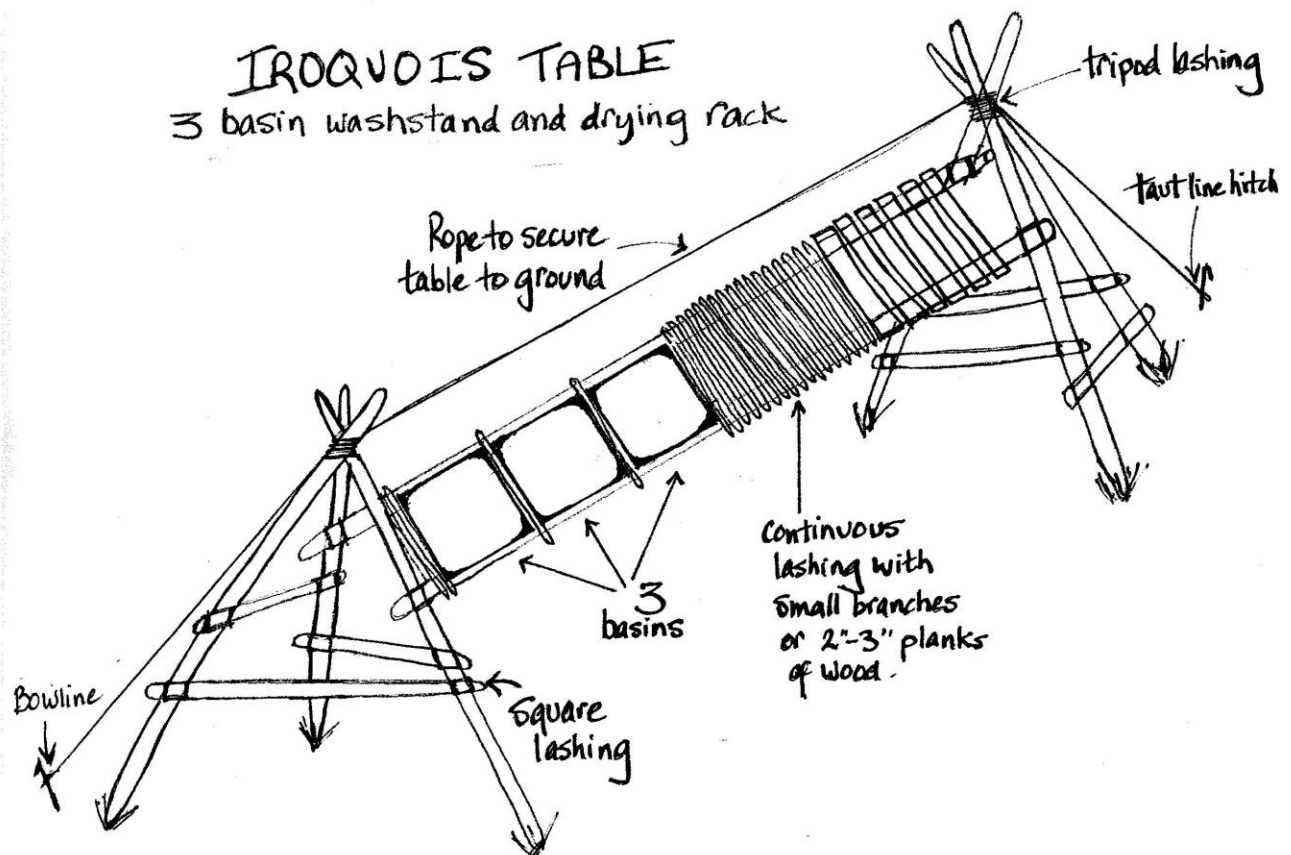
## IROQUOIS TABLE

### To make an Iroquois table you will need:

- 8 x 6 ft poles
- Small green branches or 2 to 8-inch wide planks of wood.
- Twine
- Rope and 2 pegs

### You will need to construct:

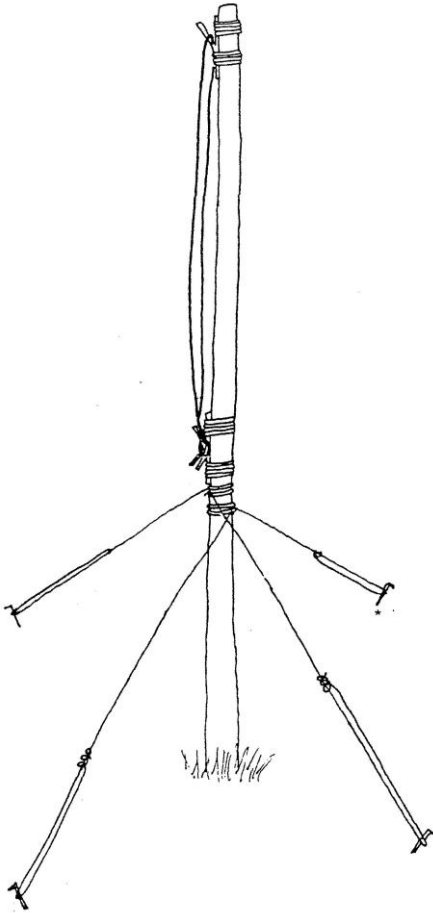
- 2 tripods, one for each side.
- Continuously lash a "counter top" to create a surface for dirty and / or clean dishes. Leave space for 3 basins.
- The "counter top" is then lashed to the tripods.
- For additional stability, run a rope between the tripods, and peg the guy lines into the ground. Put coloured tapes on the guy lines at eye level to prevent someone from tripping on the guy lines.
- Additional shelf space can be lashed onto the tripod and / or the counter if desired.



## FREE-STANDING FLAGPOLE

### To construct a free-standing flagpole you will need:

- one long pole – at least 2 ½ m tall (or **Shear Lash** 2 shorter poles together)
- 2 lengths of ropes – each approximately 9 m long.
- a hook (pulley or forked stick) at the top of the pole for the halyard to slide
- (optional) a cleat mounted or lashed on the pole



1. If there isn't a pre-made "hook" or pulley for the halyard, **Shear Lash** a small forked branch so that the halyard can be raised.
2. Make a **Clove Hitch** in the centre of each rope and slip them over the pole. One clove hitch should be about ¼ way from the ground, and the other is about 1/3 way from the ground.
3. Have someone hold the flagpole upright. Peg each end of the rope, 90° from each other. Tie a **Taut Line Hitch** and adjust the length.
4. Most likely there will be no cleat to tie the halyard, so the flag carrier will need to know to secure the halyard to the flagpole with a **Clove Hitch** or **Round Turn and 2 Half Hitches**.
5. If it's windy, the flagpole will need to be placed in the ground, in a fire bucket, or a Christmas tree stand.

## **OTHER RESOURCES**

1. [www.shurdington.org/scouts/](http://www.shurdington.org/scouts/)
2. <http://animatedknots.com> (with app for \$5)
3. [http://www.youtube.com/playlist?annotation\\_id=annotation\\_582984&feature=iv&list=PL9463AB0DC625A4D3&src\\_vid=5F2PHmF048I](http://www.youtube.com/playlist?annotation_id=annotation_582984&feature=iv&list=PL9463AB0DC625A4D3&src_vid=5F2PHmF048I) A lot of knots
4. In Lions Area, you can contact the Camp Advisor and a pair of “**Knotty**” **people** will teach your unit knots and gadgets at your normal meeting time.
5. Girl Guides of Canada website, [www.girlguides.ca](http://www.girlguides.ca) / Memberzone / Camping and Resources / Outdoor Activities & Skills / Knots and Hitches / for diagrams and information.
6. [http://www.netknots.com/rope\\_knots/tautline-hitch/](http://www.netknots.com/rope_knots/tautline-hitch/)
7. <http://i1.ytimg.com/vi/FqxESYQWTdQ/mqdefault.jpg>