

Basic Knots for the CERT Member.

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Objectives

- To provide the members with the basic knot terminology.
- To explain the basic knots that may be useful for the members.
- To demonstrate how to tie these knots.
- To provide a list of references and apps that may be useful to learn more about knots.
- To provide exercises that will allow the members to test their knowledge.

Introduction

Knots and lashings are useful tools that allow the knot tyers to make many useful things. The knots listed are based on my experiences as an outdoorsman, a sailor, emergency responder and a Scout Leader and are by no means the only ones that might work in these situations. These are basic knots that are easy to tie and very versatile. I would encourage everyone who takes this program to practice these until you can literally tie them behind your back on to ensure you know them in an emergency.

John R. Sanders

3 Tests of a Good Knot.

From the “The Boy Scout Handbook” 12th edition, page 382

1. It should be easy to tie.
2. It should stay tied.
3. It should be easy to untie.

Knots and Lashings Terminology.

- Cord, line and rope – although there is really a difference in these terms for the purpose of this program we will use the term rope.
 - Cord tends to be smaller diameter,
 - where lines and ropes are larger.
 - There are many kinds of construction and materials that they are made of as well. Learning the correct rope for the situation is going to depend on the many factors. For this reason we will focus on tying the knots and lashings.
 - The ropes provided to the team are not designed for a life line, that is one where someone may hang on the line in a rescue situation. Emergency Services should be contacted when this is needed.
 - Our ropes are useful for securing things together, for making barricades or borders and for making items around the sites.

Illustrations of the Terms.

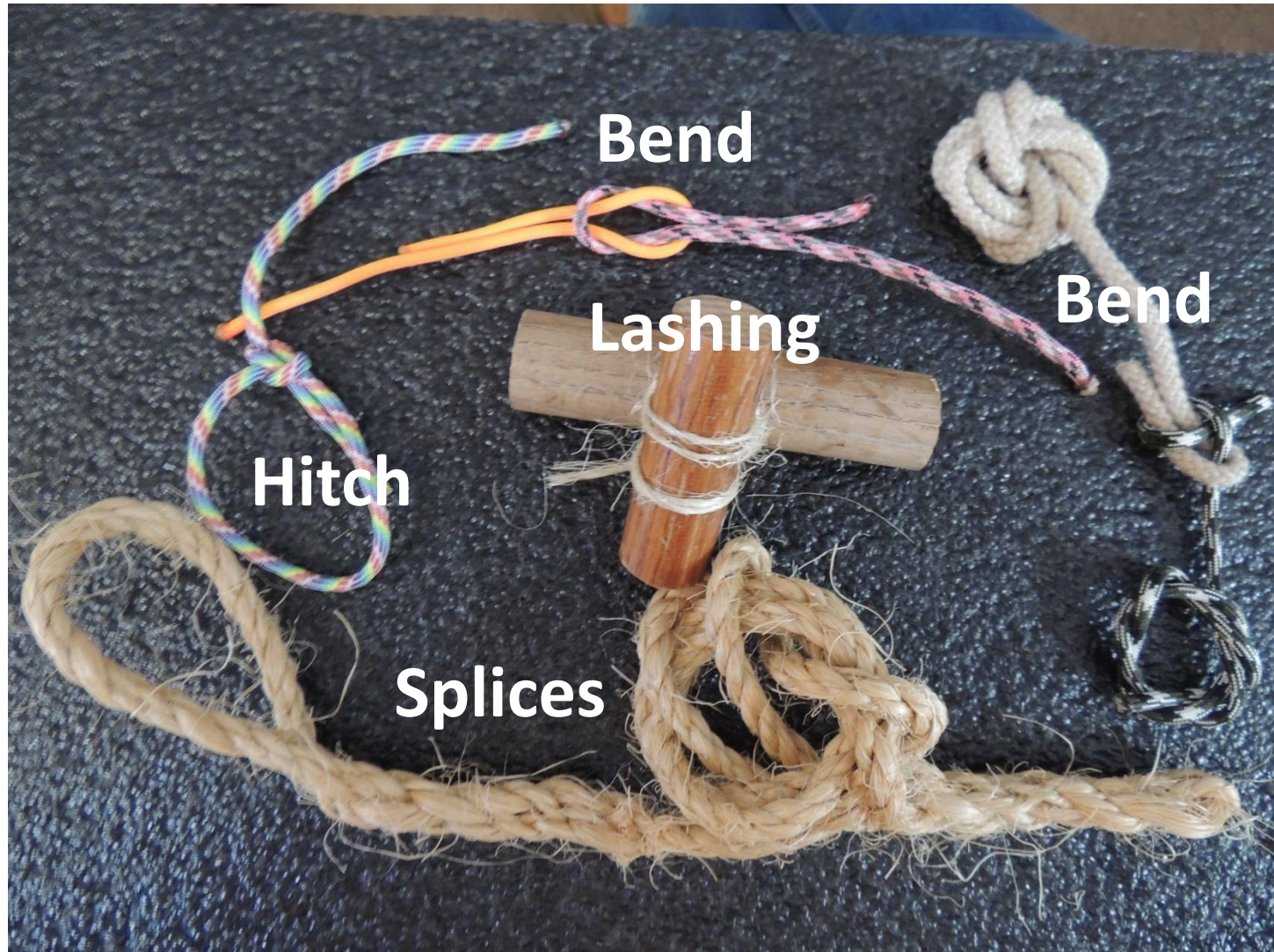


Knots and Lashings Terminology.

Continued

- Knot –is “any tie or fastening formed with a rope, including bends, hitches and splices.
- Bend – is used to join or fasten two ropes together.
- Hitch – is any form of various knots used to form a temporary noose in a rope or to secure a rope around a timber, pipe, or post that it will hold temporarily but can be easily be undone.
- Lashing – is used for binding, wrapping, or fastening two or more spars or posts together to make a structure. *We will cover lashing in another program to simplify this program.*
- Splice – is a method of joining ropes by unlaying the strands of both ends and interweaving these strands. *Due to the complex nature of splicing we will focus on tying knots in this program.*
- These definitions are from the “U.S. Army Guide to Rigging” 1968 edition.

Illustrations of the Terms.

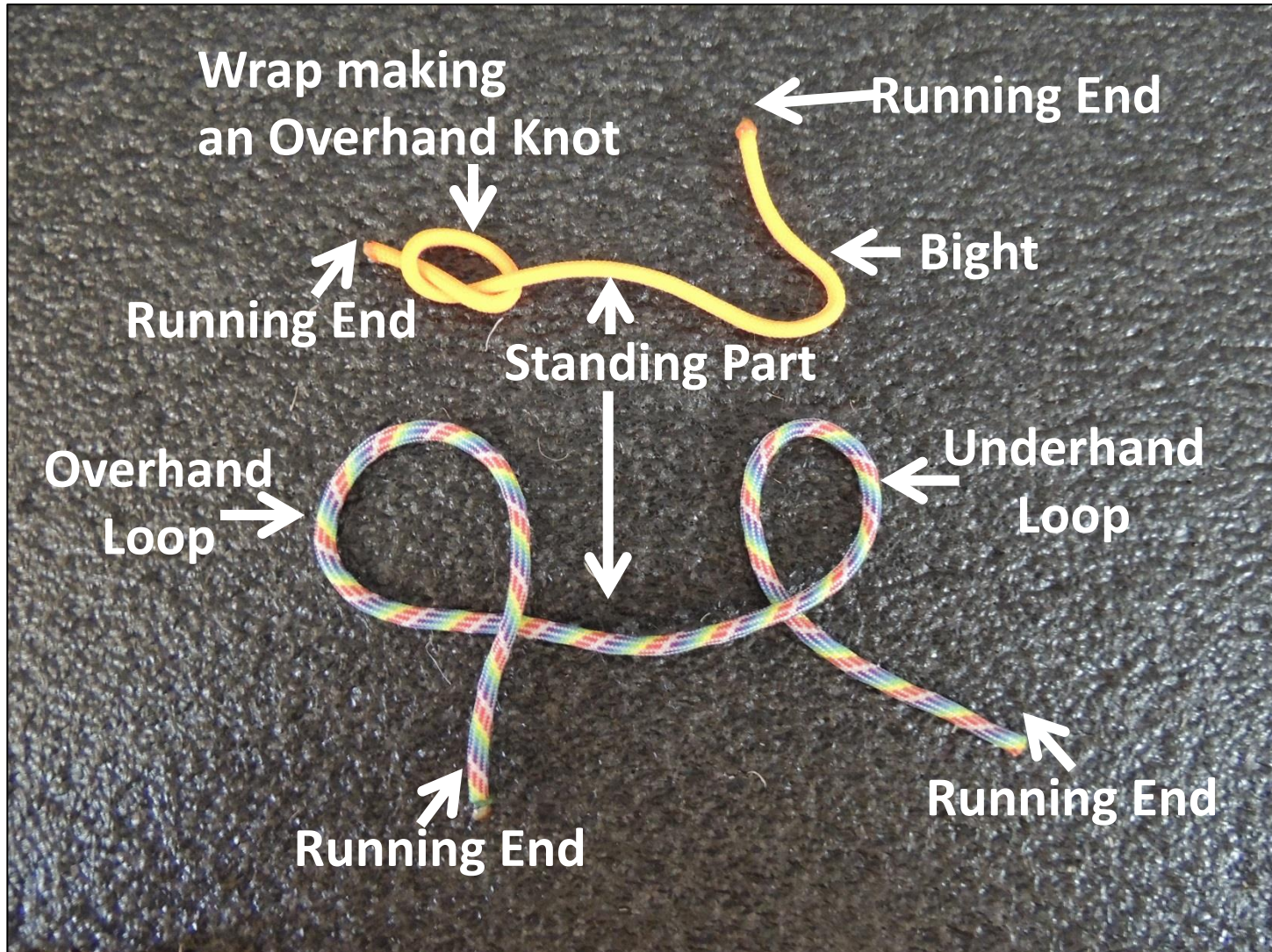


Knots and Lashings Terminology.

Continued

- Running End – is the end of the rope used to tie the knot also called the working end.
- Standing Part – all of the rope that is not the running end.
- Overhand Loop – formed when a loop is made so that the running end of the rope is on top of the standing part.
- Underhand Loop – formed when a loop is made so that the running end of the rope is placed under that standing part of the rope.
- Bight – formed by doubling back a length of the rope against itself to form a U. The running end does not cross the standing part.
- Wrap – a rope wrapped around itself forming either a half hitch or an overhand knot depending on how the tension is applied to the resulting knot.

Illustrations of the Terms.

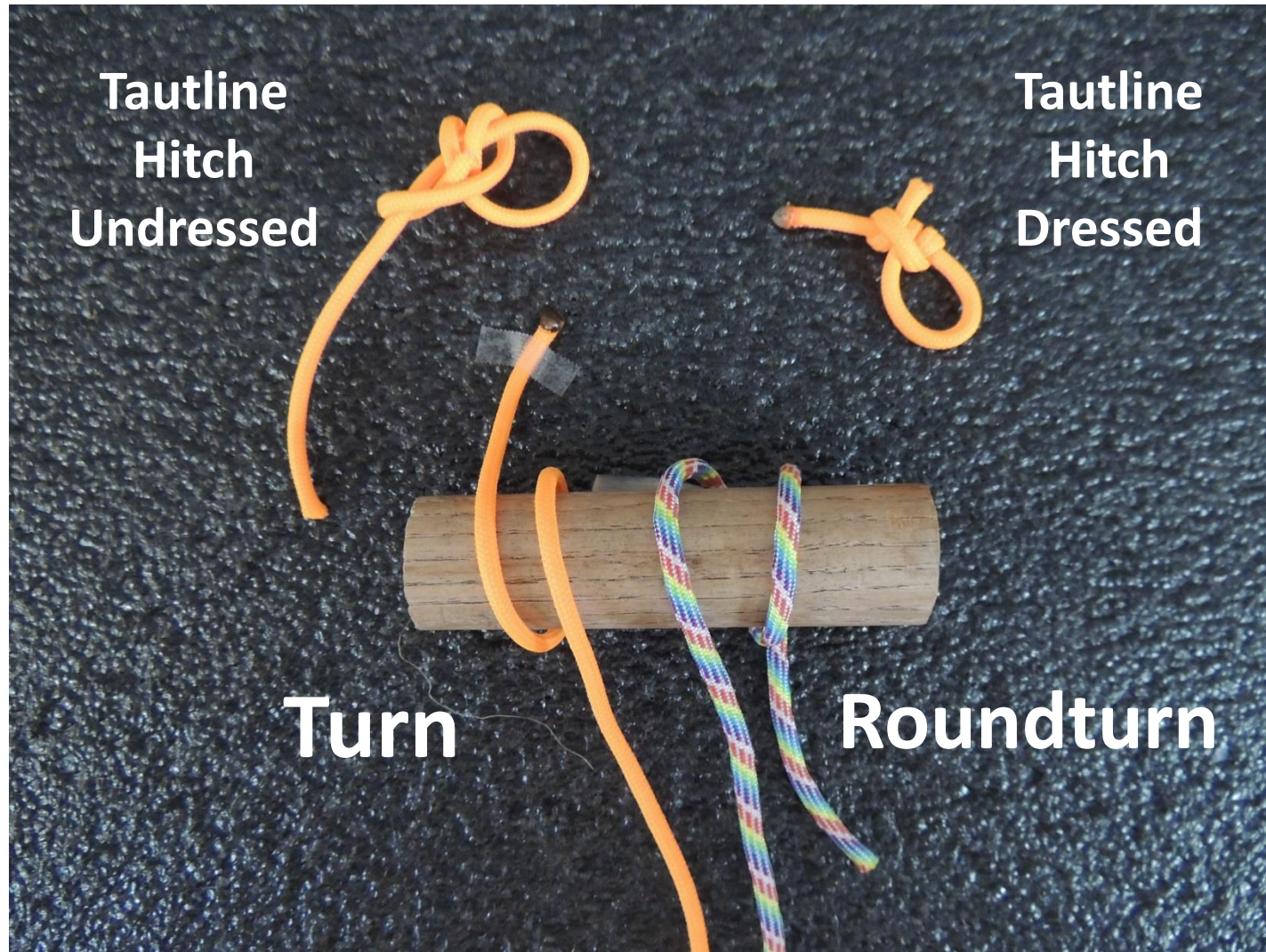


Knots and Lashings Terminology.

Continued

- Turn – wrap the rope once around a spar or stake. The friction created by the turn can help you control a rope that has tension on it, especially if you are letting out or taking it in.
- Roundturn – wrap the rope around a spar or stake and then halfway around again so that the running end of the rope is going back toward the standing part. A roundturn creates additional friction for controlling a line under strain.
- Dress a knot – to adjust a new knot so that everything is in its place. Dressing a knot ensures that the knot will perform as expected.
- These definitions are from “The Boy Scout Handbook” 12th edition, page 383.

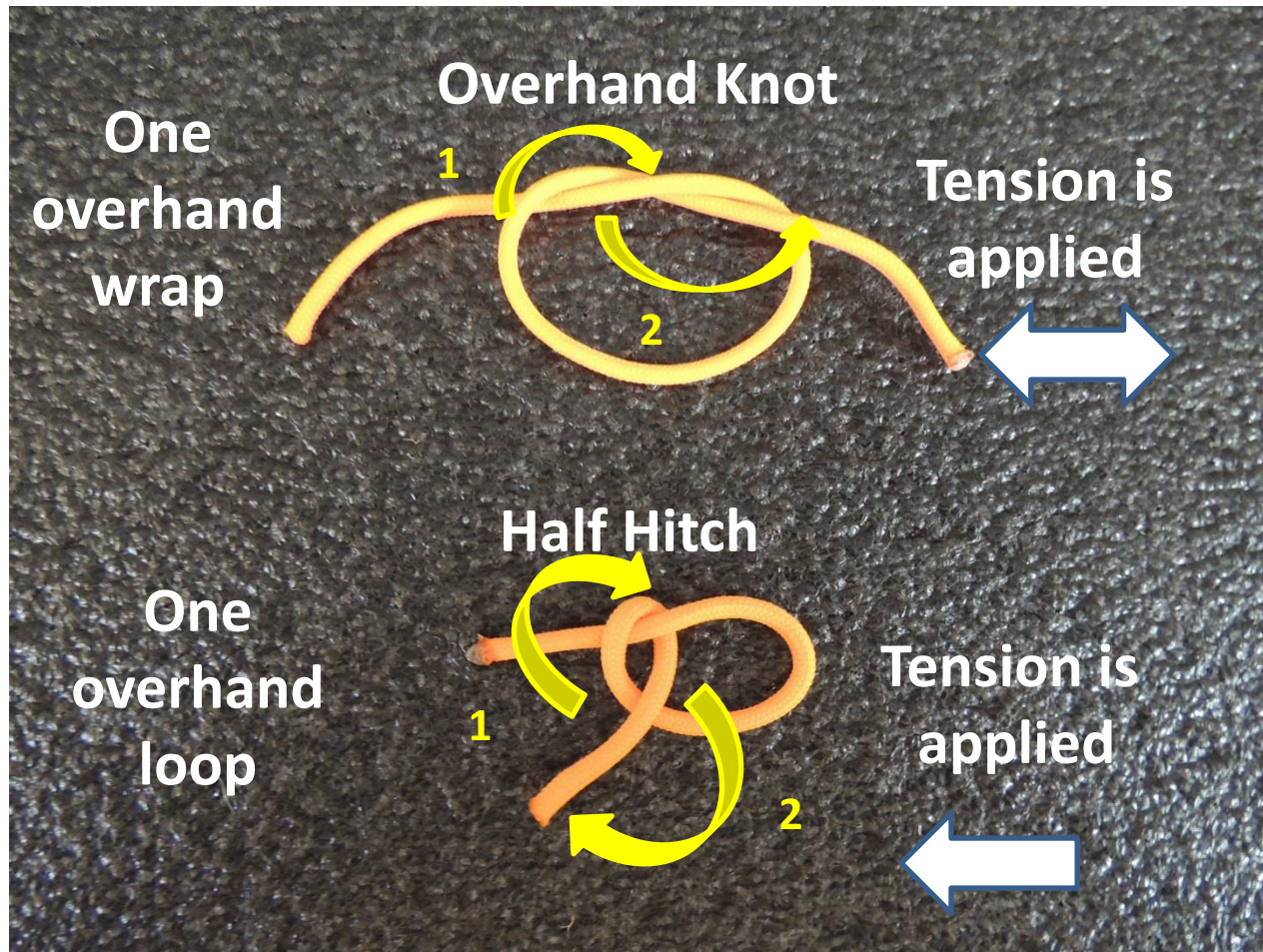
Illustrations of the Terms.



Overhand Knot

- Used as the basis for many additional knots such as a Square Knot. Also used as a stopper knot to keep a rope from slipping through something.
- Take the running end of the line and form a loop.
- Wrap the running end around the standing part of the line.
- If the two ends are pulled in opposite directions you make an Overhand Knot.
- If this knot is placed under tension it may be difficult to untie.

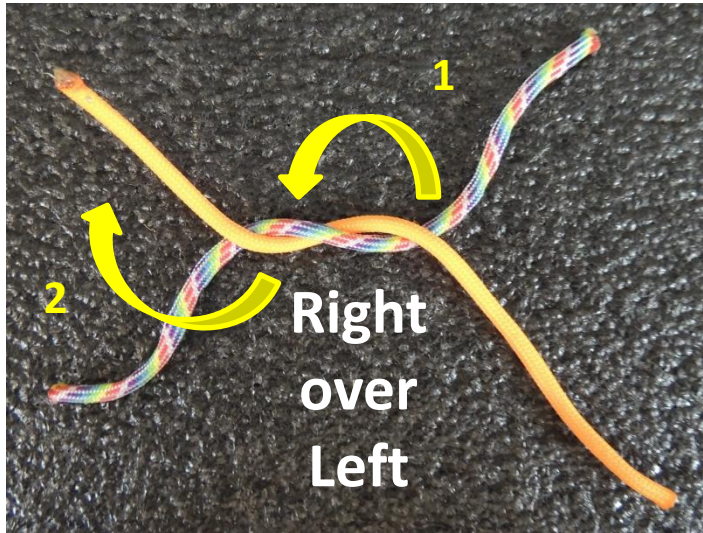
Illustrations of the Overhand Knot.



Square Knot

- Properly tied will join 2 ropes of equal size that can easily be untied.
 - Tied by remembering either:
 - Right over left, left over right
 - What's on top stays on top.
 - It is basically 2 overhand knots tied on top of each other.
- Take the running ends of two ropes and wrap one around the other one. Then wrap that one around the other rope again going the other way.
- To untie the knot quickly, take one end and pull sharply across itself to loosen the top overhand knot. Repeat this if the lower overhand knot is also tight.
- Not properly tied forms a Granny Knot that will not hold.

Illustrations of the Square Knot.



Square Knot

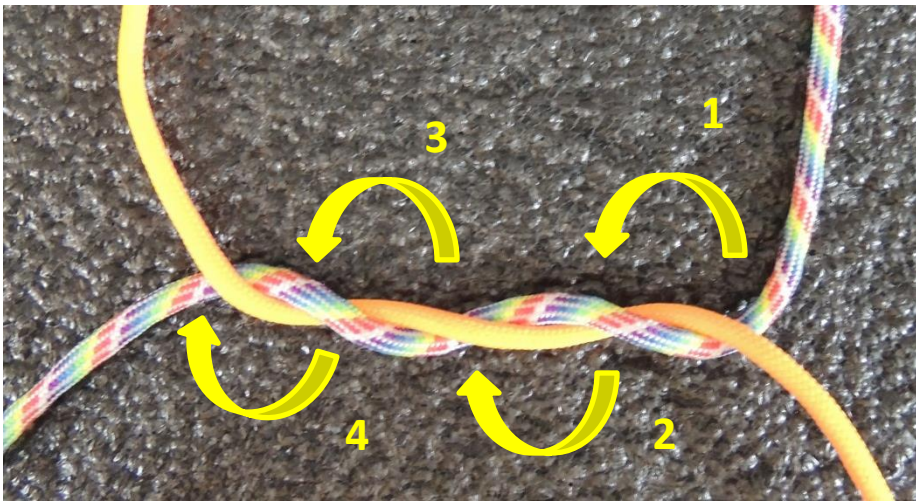


Granny Knot

Surgeon's Knot

- Basically a Square Knot with an extra wrap on the bottom Overhand Knot. The advantage of this knot is it will not loosen while tying the second overhand knot.
- Useful in tying off triangular bandages over wounds or tying off splints.
- Like the square knot wrap one end around the other end except put one more wrap for a total of 2. Pull tight to secure the knot.
- Wrap the end around the other one again going the other way and pull tight.
- To untie this pull sharply across the knot like a Square Knot.

Illustrations of the Surgeon's Knot.



Right over Left 2 wraps

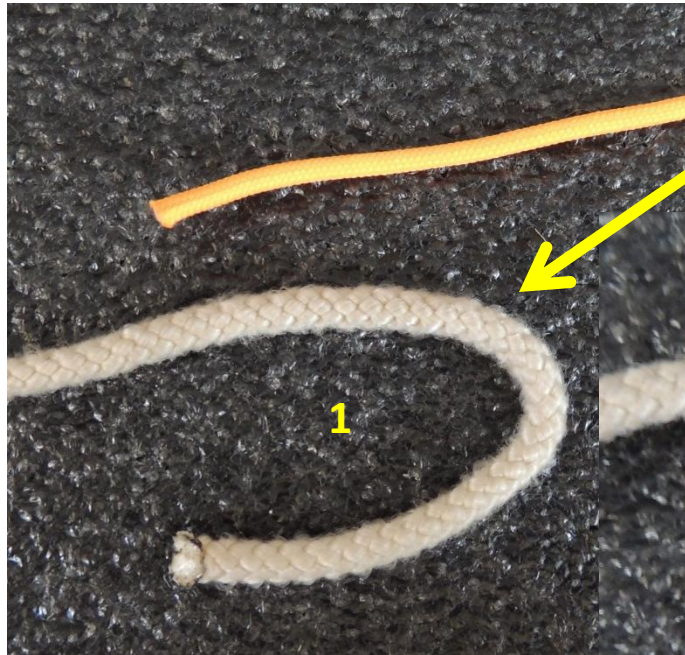


Left over Right 1 wrap

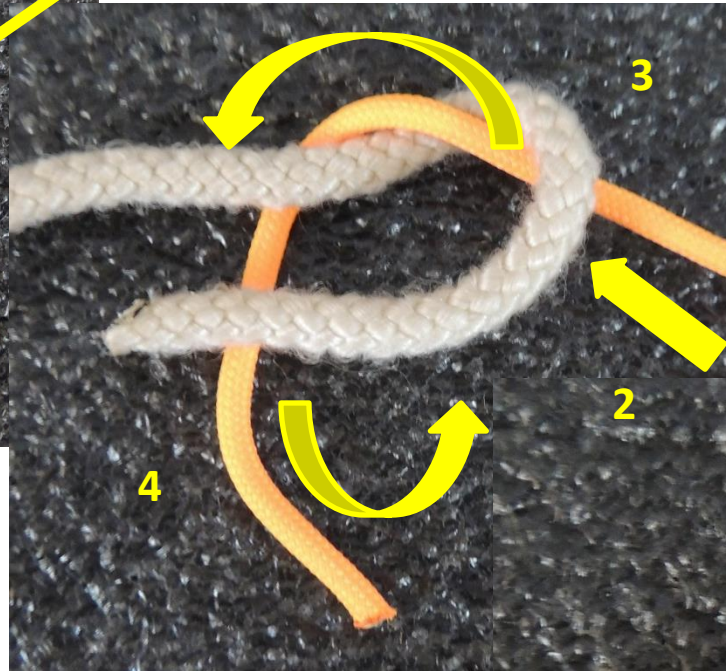
Sheet Bend

- Used to join 2 ropes of unequal size together.
- Make a bend in the running end of the larger rope.
- Then take the running end of the smaller rope up through the hole in the bend of the larger line.
- Bring the running end of the smaller line around behind the bend in the larger line to the front on the opposite side where you started.
- Take the running end of the smaller line under the standing end of itself where it comes out of the hole in the bend of the larger line.
- Pull the two ends of the bend of the larger line and the standing end of the smaller line below the knot to tighten.

Illustrations of the Sheet Bend

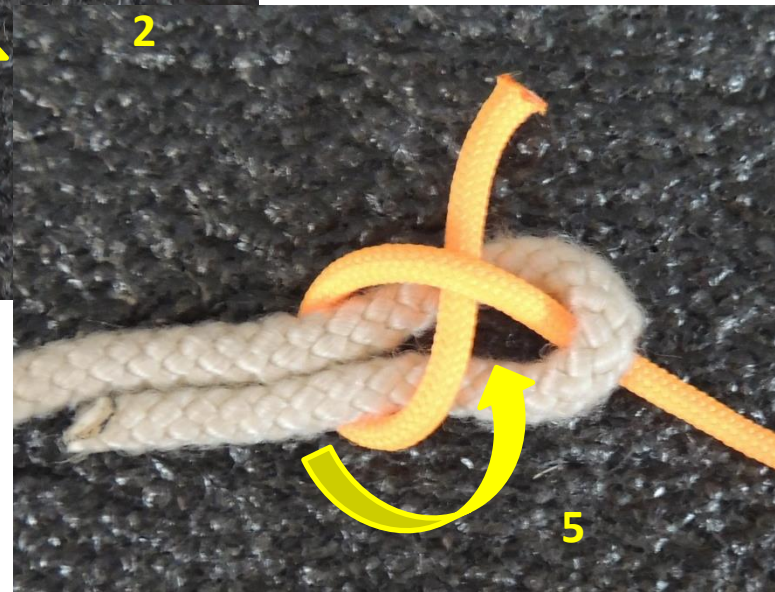


Make a bight in the larger rope.



Take the smaller rope up through the bight and around behind the bight

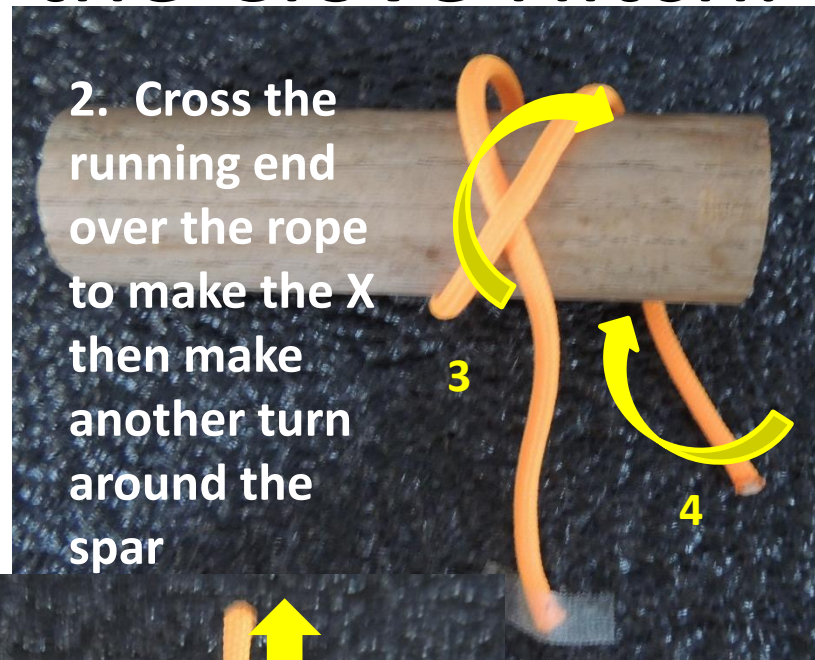
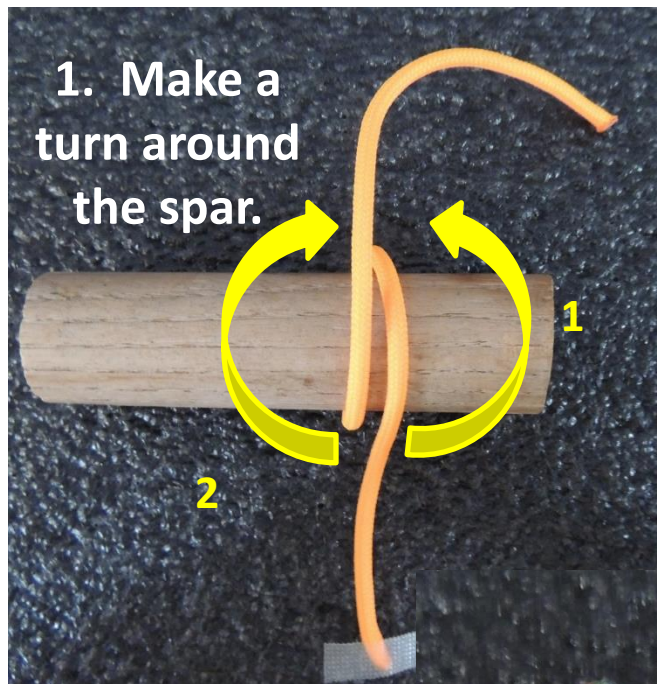
Insert the running end of the smaller rope under the smaller rope.



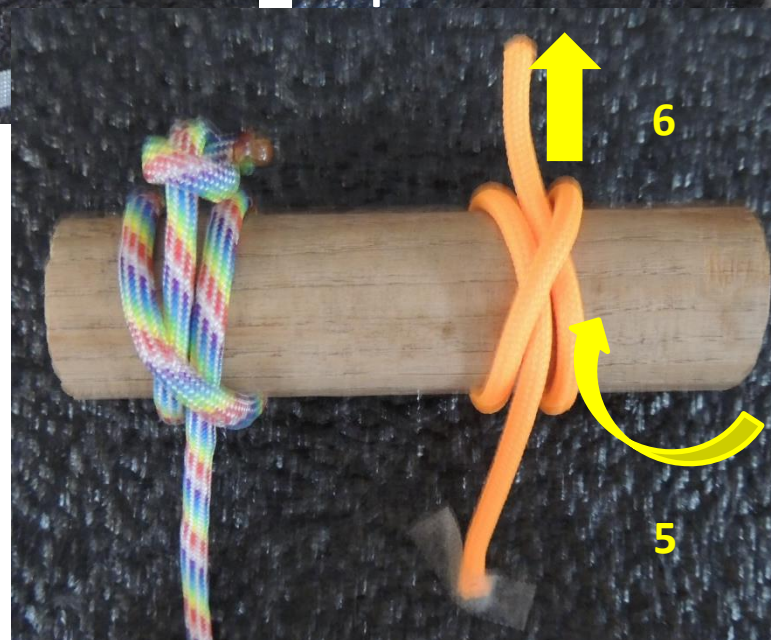
Clove Hitch

- Is used to join a rope to a spar or post.
- Take the running end of the line around the spar or post make a turn around the post.
- Take the running end across the first turn making an X.
- Continue around the spar or post again.
- Take the running end under the X and parallel to the original line.
- If the rope will be under tension from changing directions tie a stopper knot such as an Overhand Knot or Figure 8 Knot in the end of the rope.

Illustrations of the Clove Hitch.



4. Tie a stopper knot to secure the hitch.

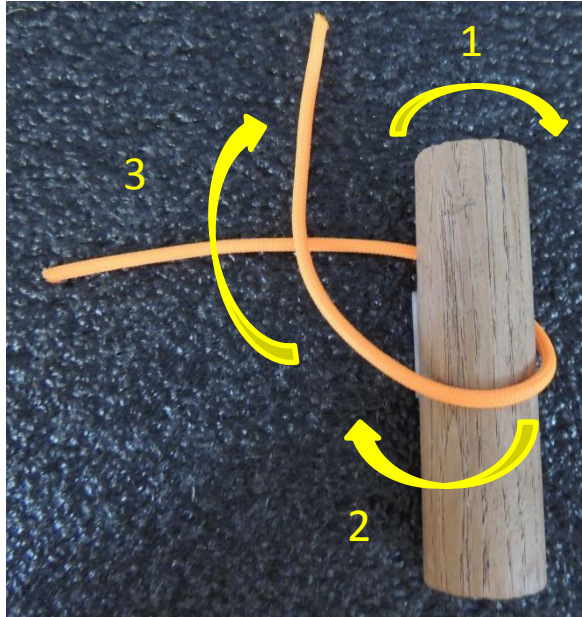


3. Take the running end under the X parallel to the standing part of the rope.

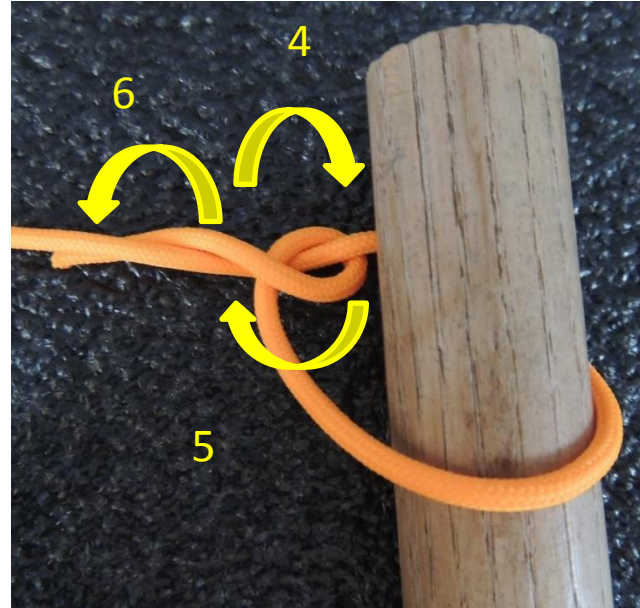
2 Half Hitches

- Used to make a loop that can be adjusted.
- To make tying easier we will tie this knot around a spar.
- Take the running end of the rope around the spar.
- The running end will come over the standing part of the rope and bring it through the hole formed by the turn. This forms a half hitch.
- Like with a Clove Hitch, take the running end across the rope so it forms an X.
- Continue around the standing part of the rope and take the running end under the X parallel to the rope.
- Pull on the standing part of the rope above the knot to tighten it.
- Basically you have tied a Clove Hitch around the standing part of the rope.

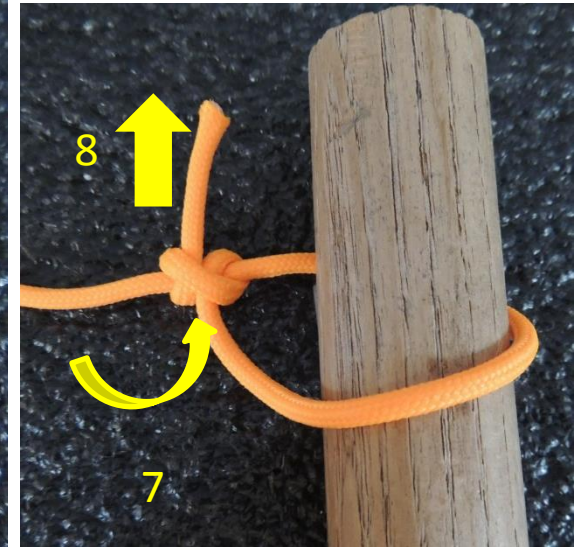
Illustrations of Two Half Hitches.



**Make an
overhand loop
around the spar.**



**Take the running end
through the loop and
across the rope to
make the like a
Clove Hitch.**



**Continue around
the standing part
of the line and
under the X to
complete the knot.**

Tautline Hitch

- Used to make a loop that can be adjusted and held tight or taut. It is useful when staking a tarp or tent to a stake in the ground when the Tautline Hitch is the lower knot forming the loop for the stake.
- Like with 2 Half Hitches we will tie this knot around a spar to make it easier to see.
- Take the running end of the rope around the spar forming a turn.
- The running end will come up through the hole formed by the turn.
- Go around the standing part of the rope a second turn.
- Take the running end over the two turns forming an X and around the standing part a third time.
- Take the running end under the X and parallel to the rope.
- Remember 2 turns inside and 1 turn outside. This knot needs to be dressed to work properly.
- To adjust the loop, hold the loop to a wide angle and slide it up or down. To secure the loop pull the knot so the loop forms an acute angle to the rope.

Illustrations of the Tautline Hitch.

1. Make a
overhand
loop
around
the spar

1



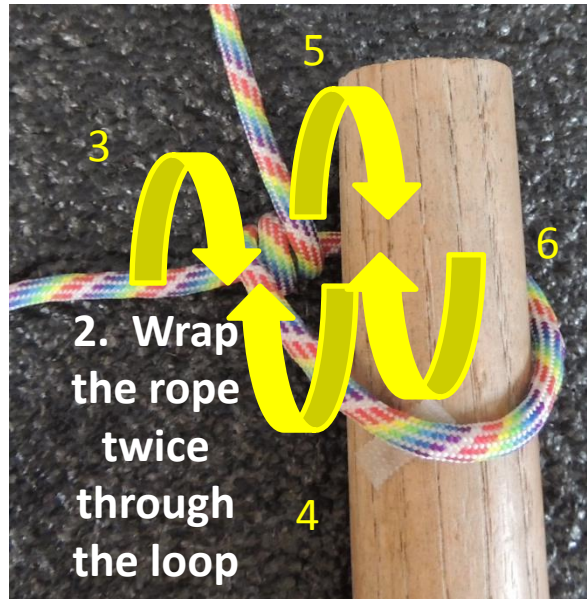
2. Wrap
the rope
twice
through
the loop

3

5

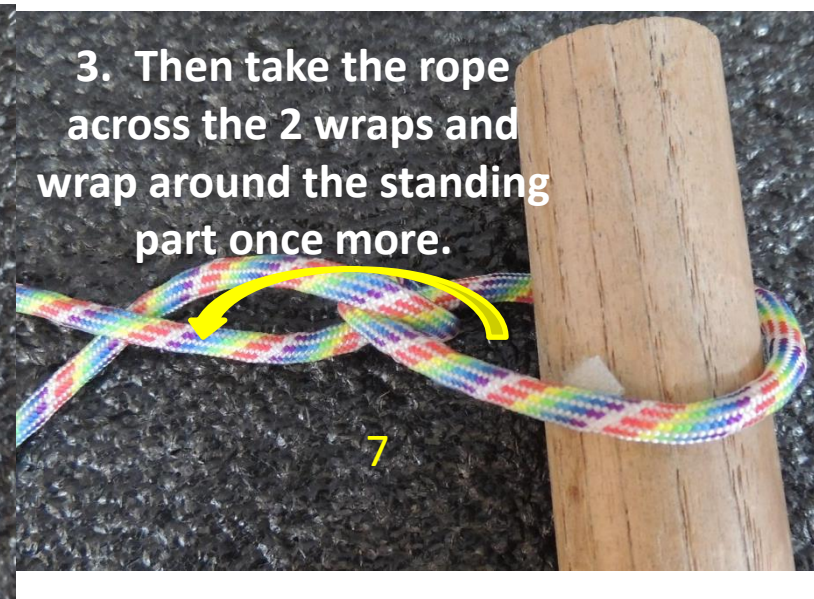
4

6



3. Then take the rope
across the 2 wraps and
wrap around the standing
part once more.

7



4. The running end
goes under the X to
complete the knot.

9

8



An obese angle will slip

Remember
2 wraps in and 1 wrap out for a
Tautline Hitch.
1 wrap in and 1 wrap out is
2 Half Hitches.

A acute angle will hold.



Bowline

- Used to make a loop in a rope that will not adjust but is easy to untie.
- With the standing part of the rope laid away from you, make an overhand loop with the running end. Leave enough running end to wrap around the object you wish to go around.
- Take the running end from the underside of the overhand loop coming up through the hole of the loop.
- Go around behind the standing part of the rope and back to the hole of the loop forming a bight around the standing part of the rope.
- Place the running end down through the hole the loop parallel to the rope that came through.
- Grab the 2 ends of the running end and the standing part of the rope above the knot and pull opposite directions to tighten this knot.
- The rabbit comes out the hole, around the tree and back in the hole. Grab the tree and the route of the rabbit to tighten.

Bowline Continued

- To loosen the knot even when it has been under tension, turn the knot over so the part of the running end that goes behind the standing part, the bight, is facing you. Push the bight away from you to loosen the knot.
- The Bowline is sometimes called the “King of Knots” since it is so versatile. It is used to tie a loop around a person in rescue since it will not tighten around the person.

Illustrations of the Bowline.



1. Make an overhand loop with the standing part away from you and enough running end to go around your spar.

2. Bring the running end up through the loop and around behind the standing part.



The rabbit comes out of the hole, around the tree ...



3. Take the running end back through the loop to complete the knot.

4. Pull on the standing part and the running end to tighten the knot.



Pull on the tree and the rabbit's route to tighten.

Illustrations of the Bowline.



In synthetic rope back up the bowline with a stopper knot.

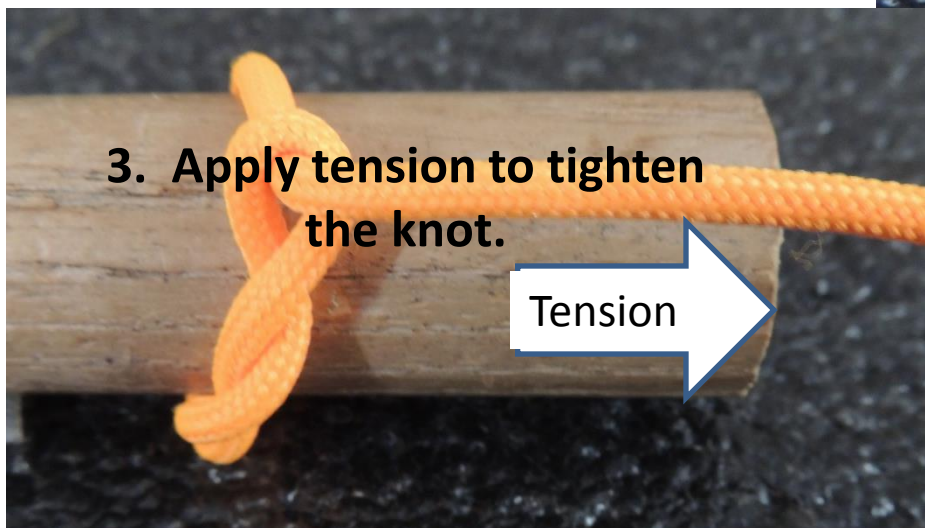
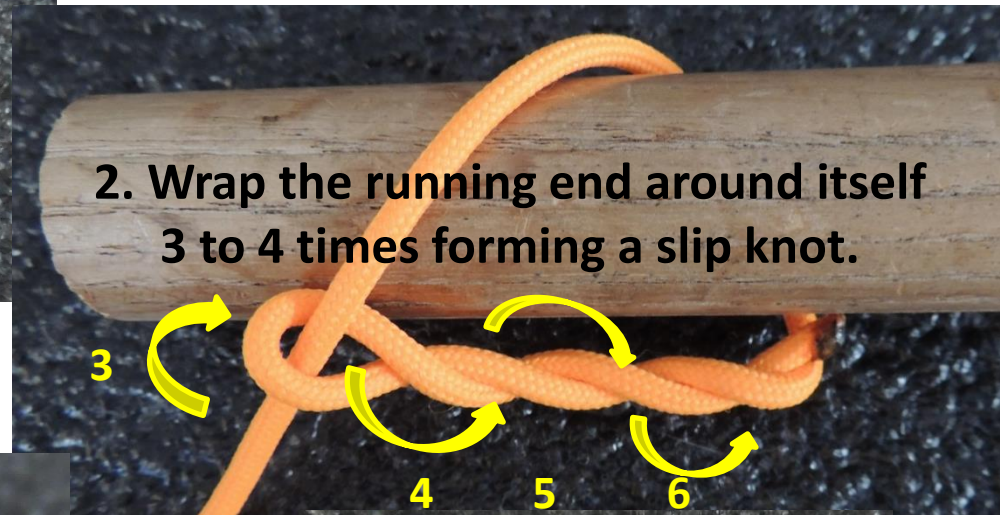
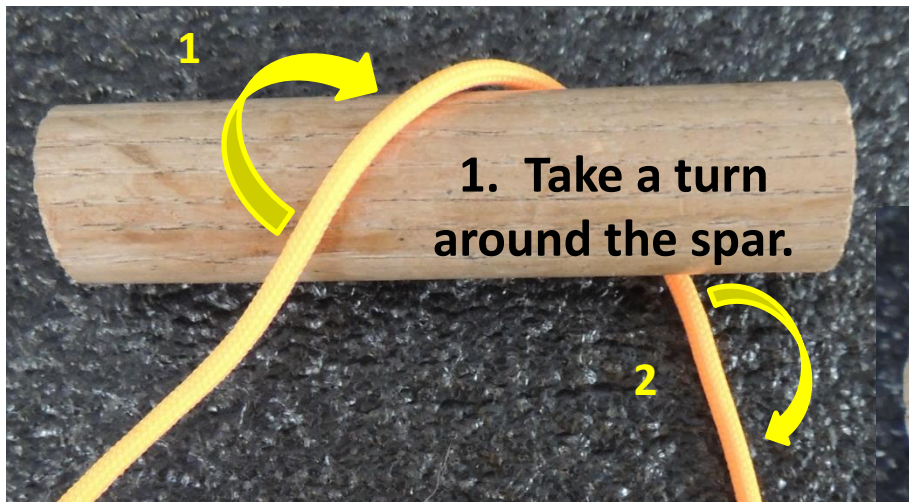


**The front and back side of a Bowline.
To break the knot, even when it has been under tension, push the back side of the bight towards the standing part.**

Timber Hitch

- Used to secure a rope to a tree or spar that needs to be pulled along. It is easy to tie and untie around the log.
- To make this easier to tie we will tie it around a spar.
- Make a turn around the spar with the running end.
- Take the running end around the standing part of the line and wrap it around itself (the running end) at least 3 to 4 times. This makes a slip knot around the spar.
- Pull the standing part of the rope to tighten the loop.
- If you are pulling a long log over a distance where you will change directions adding a Half Hitch above the Timber Hitch will allow you to pull the log easier. The new hitch is called a Killick Hitch.

Illustrations of the Timber Hitch.



Illustrations of the Timber Hitch and a Half Hitch making a Killick Hitch.



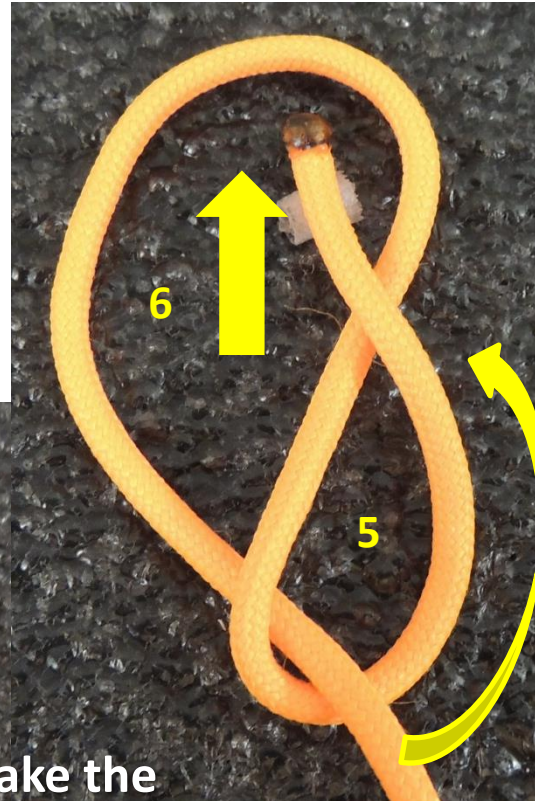
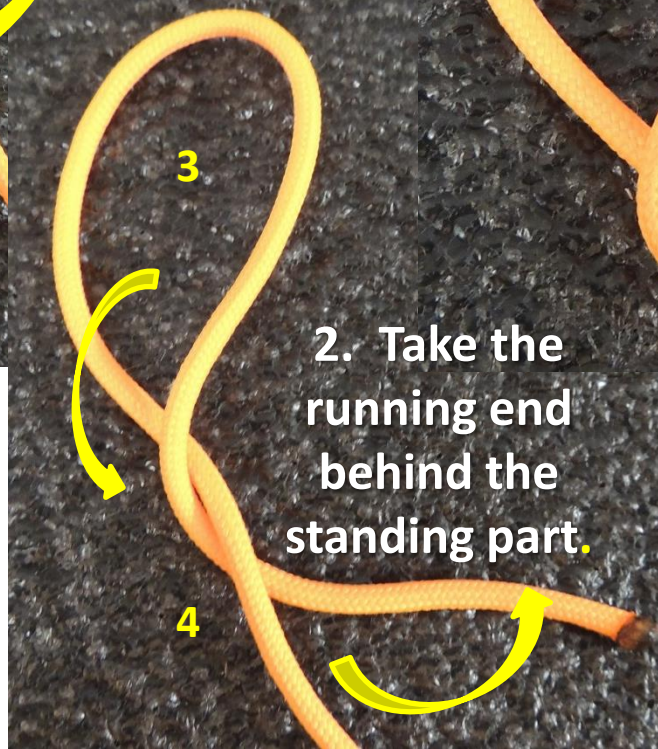
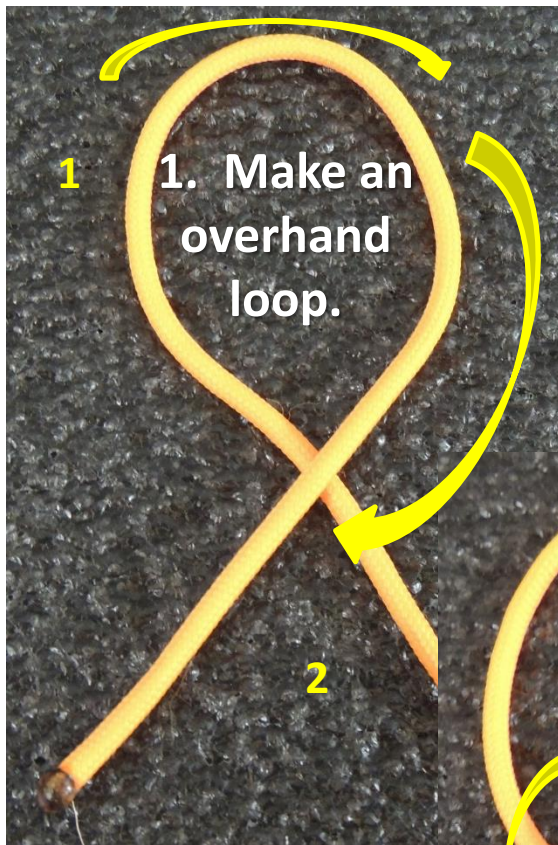
If you have to pull a spar over a long distance with changes of direction along the route try this hitch.

The Killick Hitch keeps spar from twisting from side to side.

Figure 8 Knot

- Used as a stopper knot to keep a rope from sliding through your hand or a pulley where you want a bigger knot than a Overhand Knot.
- Make an overhand loop in the end of your rope leaving a few inches of running end to tie the knot.
- Take the running end behind the standing part of the line and returning to the top.
- Push the running end through the original hole formed by the overhand loop. Pull the ends in opposite directions to set the knot.
- If placed under tension this knot can be difficult to untie but it is easier to untie than a Overhand Knot.

Illustrations of the Figure 8 Knot.



3. Take the running end through the original loop.

4. Pull to finish the knot.



Applications Quiz.

1. This knot is used to join to ropes of equal size together.

- a. Tautline Hitch
- b. Sheet Bend
- c. Square Knot
- d. Figure 8 Knot



Applications Quiz.

2. This knot is used to pull a log or spar.

- a. Clove Hitch
- b. Timber Hitch
- c. Tautline Hitch
- d. Sheet Bend.



Applications Quiz.

3. This knot is used to make a non adjustable loop and is sometimes called the King of Knots.

- a. Bowline
- b. Square Knot
- c. Clove Hitch
- d. Surgeon's Knot



Applications Quiz.

4. This knot is used to tie a rope to a spar or post. It may require a stopper knot.

- a. Figure 8 Knot
- b. Sheet Bend.
- c. Two Half Hitches
- d. Clove Hitch.



Applications Quiz.

5. This knot is used to join 2 ropes of different sizes.

- a. Square Knot
- b. Sheet Bend
- c. Figure 8 Knot
- d. Surgeon's Knot



Applications Quiz.

6. This knot is a form of a Square Knot that is useful in tying off a bandage or a splint tied with a cravat.

- a. Surgeon's Knot
- b. Square Knot
- c. Sheet Bend
- d. Tautline Hitch



Applications Quiz.

7. This knot is used to make an adjustable loop in a line that will hold when tightened or made taut.

- a. Two Half Hitches
- b. Timber Hitch
- c. Figure 8 Knot
- d. Tautline Hitch



Applications Quiz.

8. This knot is used as a stopper knot where a larger knot is useful.

- a. Overhand Knot
- b. Figure 8 Knot
- c. Sheet Bend
- d. Clove Hitch



Applications Quiz.

9. This knot is used to make a loop that can be adjusted.

- a. Tautline Hitch
- b. Clove Hitch
- c. Two Half Hitches
- d. Square Knot



Applications Quiz.

10. This knot is a component of many other knots and also a stopper knot.

- a. Overhand Knot
- b. Figure 8 Knot
- c. Bowline
- d. Sheet Bend



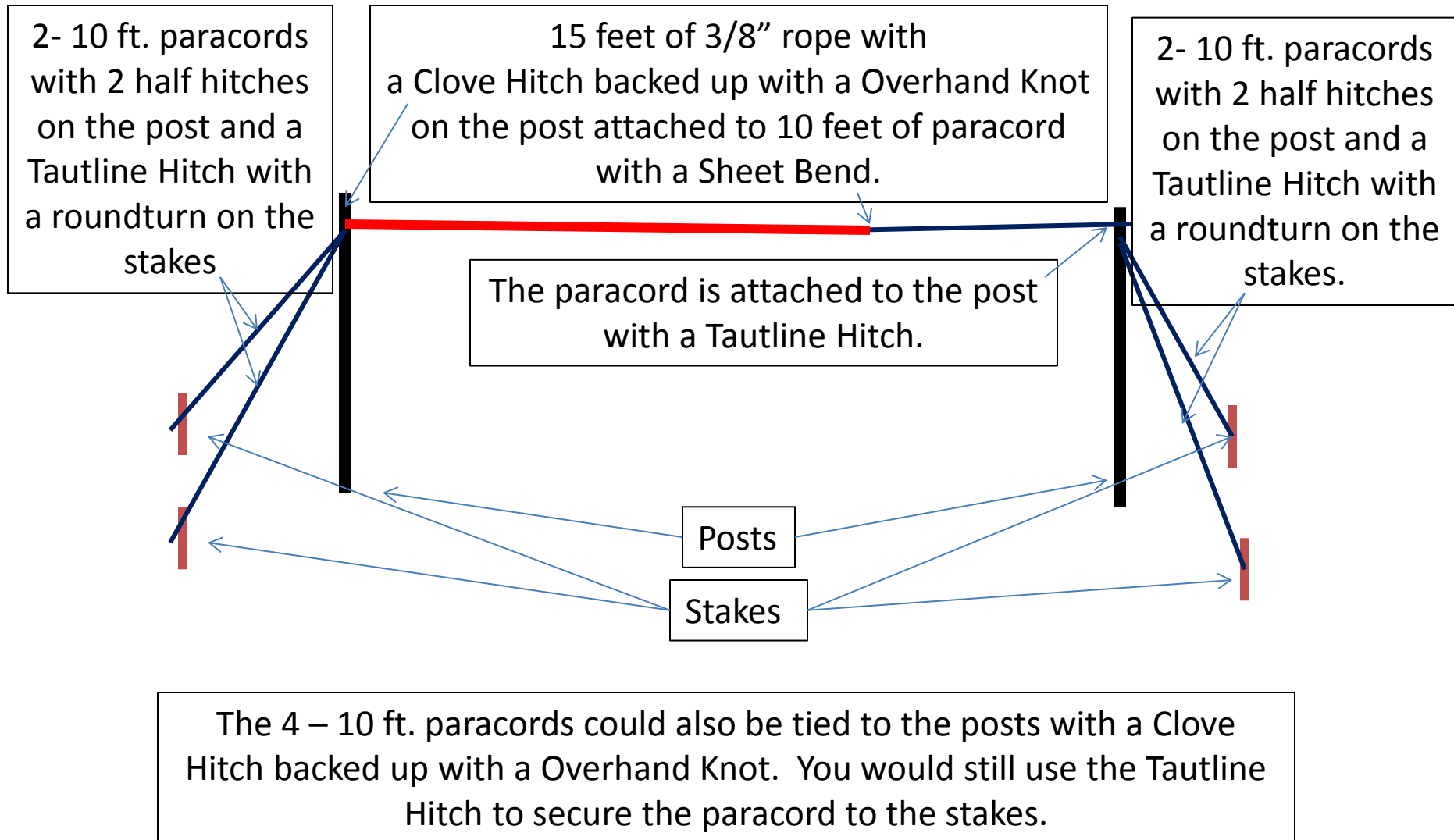
Answer Key

- | | |
|-----------------|-------------------|
| 1. Square Knot | 6. Surgeon's Knot |
| 2. Timber Hitch | 7. Tautline Hitch |
| 3. Bowline | 8. Figure 8 |
| 4. Clove Hitch | 9. 2 Half Hitches |
| 5. Sheet Bend | 10. Overhand Knot |

Practical Exercise

- You have been asked to rig a rope between posts to act as 20 feet of clothes line. You have 2 posts, 4 stakes, 1 - $\frac{3}{8}$ inch rope 15 feet long and 5 – paracords that are 10 feet long. Draw how you would rig this showing the knots you would use and where they are in the system.

John's Solution to the Practical Exercise



To learn more about ropes and knots...

- The Boy Scout Handbooks and Fieldbooks.
- The Boy Scout Pioneering Merit Badge Book.
- Morrow Book of Knots.
- Ashley's Book of Knots
- Chapman's Piloting and Seamanship.
- The Ultimate Encyclopedia of Knots and Ropework.
- Various survival manuals
- Various military manuals
- 3D Knots app by Nynix LLC

Closing

- The knots presented are a good start to having the tools to use ropes in the field. Additional programs will be developed to help the team members learn more ways to use ropes. If you don't know what knot to use in a situation ask for help from the team members who do know knots.