

A Scouter's Knot Primer

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Basic and Pioneering Knots

This document is intended to introduce a person new to knots to enough knot lore that they can be effective in both using knots and teaching them to Scouts. The information covered here is for knots through First Class and for knots related to Boating and Pioneering. It does not cover knots specific to Climbing.

Introduction – Knots go back beyond recorded history. Some knots in common use today appear on the interior walls of Egyptian pyramids. We want to know how to tie knots, not to meet some advancement requirement but, because they are useful. Before we learn to actually tie some knots we should spend a little time learning some general principles that will help us both understand how knots work and how to select the best knot for a particular application.

Key Ideas:

All knots work because of friction or because of mechanical shape. The slipperier the rope the more contact and pressure it must have to hold, whether that is on the rope itself, some other object, or a combination. Really slippery ropes rely mostly on mechanical shape.

More and tighter bends increase pressure. However, every bend weakens the rope and the tighter the bend the more the rope is weakened, especially if the strain goes through the bend(s).

All other things being equal, the simplest knot that does the desired task is the best choice.

When selecting a knot for an application you should consider (balance) the following:

- The knot will do what I need to have done.
- I know how to tie the knot.
- It is easy to tie.
- It is easy to untie
- It is suited to the rope I am tying it in.
- It is suited to the environment (vibration, surge, tension, moisture).

Remember **No Knot is a Knot Until it is Set.**

Knot Names – Most knots have more than one name. Many knot names are applied to more than one knot. This happened because different professions named the knots they commonly used without regard to how the names were used by others. In Ashley's Book of Knots (ABOK) there are over 4000 illustrated, named and numbered variations on knots. To clarify what knot is actually being referred to, professionals use the ABOK number rather than a name. This problem only became worse when synthetic cordage appeared and whole new families of knots were created to deal with lower friction ropes. We will revisit this shortly when we look at 40 Knots on an old Scout knot crib sheet.

How many knots should I know? The glib answer is, it depends. For personal use, the number can be quite small. You should know a good knot for every function you would like a knot to perform. For most people these functions are:

- Tie two ropes together.
- Tie a fixed loop in the end of a rope.
- Tie a fixed loop in the middle of a rope.
- Tie a sliding loop in the end of a rope.
- Tie a rope to an object.

The Scout through First Class knots do all of these except to put a loop in the middle of a rope.

If you are going to teach knots you need to know more than one way to do each of these functions and you need to know all the knots that are required of your students. If you are going to engage in specialty activities you need to know all the knots particular to that activity.

The good news is two fold. First, the knots (but not necessarily the names) in many specialty activities overlap with the knots used in other activities. Second, many knots share some (or all) characteristics with another knot which has a different name because it is used a different way.

Additionally, many knots come in families which make them easier to learn.

So, you can become a seeming knot expert easier than you think.

When I entered the Coast Guard Academy at 18 I knew about 10 knots which I had learned in Scouting. When I graduated I knew about 20. After five years of shipboard service I knew close to 100. Of that number there are over 75 I have never used since I walked off my last ship.

So the answer to how many knots you should know is enough to do whatever it is you need to do.

Some Useful Terminology - It is easier if we use standard words to describe what we are doing when we make a knot. One set in vary common use:

Working (Running) End – The end of the rope I am using to tie the knot.

Standing End – The part of the rope leading away from the knot.

Bight – If I take the working end and bend it back parallel to the standing end, I make a bight.

Loop – If I take a bight and give it a half twist I make a loop.

Turns/Round Turns – If I wrap the working end around an object I make turns.

Tail – The amount of rope from the knot to the working end.

Understanding Knot Patterns – I am going to take you on a tour of an old Scout Knot Sheet to help you see and understand what I am talking about. For reference, I will refer to the side of the sheet with the title as side one (S1) and the other as side two (S2). You might find it instructive to have a practice rope and a short spar (pole) and do the transitions as you read them.

Go to side one of “FORTY KNOTS”. Go to the lower right corner and find the Blackwall Hitch. This simple knot is just a loop dropped over a hook. Go to side two, half way down on the left side and find the Slippery Hitch and the Half Hitch. The Slippery Hitch is just a Blackwall with the end of the line

passed back as a bight to make it quick release. The Half Hitch is a Blackwall with the loop wrapped around the standing end.

If I take the tail of the half hitch and wrap it around the part of the rope going around the log, I have a Timber Hitch (side one, middle right [S1MR]). If I add another half hitch, away from the Timber Hitch in the line of pull, I have added a Killick (S1ML). Note the close relative of the Timber Hitch, the Stevedore's Knot (S1CL).

If, instead, I take the tail of the half hitch and pull it back across the top of the log I have made an Overhand Knot (S1UL). Of course, I do not need the log... If I wrap the tail around the rope another time I have a Double Overhand (S2UR). If I combine the Double Overhand with a single Overhand I have a Surgeon's Knot (S2LL). If I combine two Overhands I get either a Square (or Reef) Knot (S1UC) or a Granny Knot (S1LR). The Square/Reef Knot is two interlocked bights and is MUCH stronger than the Granny. We NEVER teach the Granny. If I take the tails of both ropes in the second Overhand and push them through as bights for quick release I have a Bow Knot, also known as a Shoe Knot (S2C).

If I make a bight with one rope and interweave a Blackwall (Half Hitch) from another rope I get a Sheet Bend (S1C). If I make the tail of the Blackwall a bight for quick release I get a Tiller's Hitch (S2LR). If, instead, I need more friction I can take the tail of the Blackwall and do an extra Round Turn and I get a Double Sheet Bend (S1C).

If I make a loop in the middle of the rope and then interweave a working end bight I get exactly the same knot as a Sheet Bend except all made from the same rope and we call it a Bowline (S2UL), the King of knots for fixed loop and versatility.

If I need a stronger joining knot than either a Square Knot or Double Sheet Bend I can interweave two loops, instead of two bights, and I get a (Double) Carrick Bend (S1LR).

If I start with a Blackwall and then add a series of Killicks around the spar (or rope) I get a Chain Hitch (S2LL) which can be used like a Timber Hitch.

Now turn your attention back to the Overhand Knot (S1UL). If I start near the working end and twist a bight into a loop ($\frac{1}{2}$ twist) and then pull the working end through the loop I get an Overhand Knot. If I do a full twist and then pull the working end through the loop I get a Figure Eight Knot (S1UR). If I tighten either of these all the way down to a lump on the end of the rope they are called "Stopper Knots" because they are used to stop the end of the rope from passing through a hole or block.

If I leave them loose I can follow through the knot backwards with another rope to make a very secure joining knot. If I do it with the Overhand Knot I get the Overhand Bow (S1LL) also known as the Water Knot. If I do it with the Figure Eight Knot I get the Figure Eight Double (S2UC) also known as the Figure Eight Follow Through, a very common climbing knot. These work well on slippery rope by increasing the contact area between the ropes.

If the rope is too slippery for these to work we take advantage of the mechanical properties of the stopper knots. If I make an Overhand Knot and think of the loop as a hole I can pass another rope through the hole and tie another Overhand Knot in that rope. When I tighten the knots the stopper knot can not pass through the hole. It works even better if the second Overhand is tied around the first rope. When I do this and pull the knots together I get a Fisherman's Knot (S1LL).

Finally, we are going to look at the “Loop Twist” knots.

If I twist two bights into loops on a rope so that the ends come over the rope in the same direction and slide those loops over a spar, when I pull them tight I get a Lark’s Head (S1UR) also known as a Cat’s Paw, Cow Hitch, Girth Hitch or Ring Hitch. If I pull the ends through the Lark’s Head more than once wrapped around a rope rather than a ring or spar, I get a Prusick (not on the sheet). If, instead of putting the Lark’s Head around a ring or spar, I put it around a rope through a ring I get a Sailor’s Knot (S1UL). If I twist the loops two or more times and put it over a hook or spar I get a Cat’s Paw (S1LL).

If I twist two bights into loops on a rope so that the ends come over the rope on opposite sides and slide those loops over a spar I get a Clove Hitch (S1C). If I put that Clove Hitch around the rope instead a spar I have Two Half Hitches (S2CR). Despite what is shown here, Two Half Hitches is normally tied with a round turn. If I add more round turns the resulting knot is one form of Rolling Hitch (S2LL), not the form in the Pioneering Merit Badge Book.

If when tying the Clove Hitch around the rope I add an extra turn at either the beginning or the end of the knot I end up with either a Tautline Hitch (S2LC) or a Midshipman’s Hitch (S2LR). These knots are effectively interchangeable in name and strength and are equally useful for an adjustable loop.

If I create two bights of line that are parallel two each other with a shared center line and then pass loops over the ends (a Killick or Half Hitch) I get a Sheepshank (S2TC) which is useful for bypassing a weakened section of rope which is under constant load.

If you have stuck with me this far, and have done the knotting, you have learned many (~30) of these Forty Knots. We have skipped the Lariat Loop (Honda), the Fisherman’s Eye (a Fisherman’s Knot to make a loop instead of join two lines), a Miller’s Knot (of little use except to tie off cloth bags), the Running Knot (obvious to tie but seldom used), Bowline on a Bight (for another time), Hitching Tie, Halyard Bend, Fisherman’s Bend, and Marlinspike Hitch.

If you need to make a running knot (creates a slip loop) you can make any fixed loop knot and pull the line through the loop.

The easiest way to make a quick release knot is to finish by turning the working end into a bight and passing half the bight through as the last tuck.

What we have just done was designed to help you understand knots and how they work. The way you have just seen to tie a knot may not be the best way, and may not, in certain circumstances, work at all to tie a given knot (e.g. can you slip the loops of a twisted loop knot over the ends of a ring).

Basic and Pioneering Knots

This section will provide more detailed information on how to use and tie these knots. For the most part you will be sent to Animated Knots or troopresources. Like many sites they are inclined to only agree with their own naming conventions. Look beyond the pictures and learn what the knot’s strengths and weaknesses are.

For basic ASM work, focus on those marked *. For Pioneering MB add **. For greatest utility add ***.

- * Basic Scout Knot
- ** Pioneering Knot
- *** Summer Camp Knot

Stopper Knots

- *Overhand - <https://www.animatedknots.com/overhand-knot>
- **Figure Eight - <https://www.animatedknots.com/figure-8-knot>

Joiner Knots or Binder Knots (Tie two ropes together)

- *Square (Reef) Knot - <https://www.animatedknots.com/square-knot>
<https://troopresources.scouting.org/square-knot/>
<https://troopresources.scouting.org/square-knot-visual-approach/>
- *Sheet Bend - <https://www.animatedknots.com/sheet-bend-knot>
<https://troopresources.scouting.org/sheet-bend/>
Also **Double Sheet Bend (See 40 Knots)
- **Carrick Bend - <https://www.animatedknots.com/carrick-bend-knot>
<https://troopresources.scouting.org/carrick-bend/>
- **Water Knot - <https://www.animatedknots.com/water-knot>
<https://troopresources.scouting.org/water-knot/>
- **Zeppelin Bend - <https://troopresources.scouting.org/zeppelin-bend/>

Fixed Loop Knots

- *Bowline - <https://www.animatedknots.com/bowline-knot>
<https://troopresources.scouting.org/bowline/>

Slip Knots

- *Timber Hitch - <https://www.animatedknots.com/timber-hitch-knot>
<https://troopresources.scouting.org/timber-hitch/>
- ** Running Bowline - <https://www.animatedknots.com/running-bowline-knot>

Adjustable Loop Knots

- *Two Half Hitches - <https://www.animatedknots.com/two-half-hitches-knot>
<https://www.animatedknots.com/round-turn-two-half-hitches-knot>
<https://troopresources.scouting.org/two-half-hitches/>
<https://troopresources.scouting.org/roundturn-with-two-half-hitches/>
- *Taut Line (Midshipman's Hitch) - <https://www.animatedknots.com/midshipmans-hitch-knot>
<https://troopresources.scouting.org/taut-line-hitch/> See 40 Knots

Mid Line Loops

- **Alpine Butterfly - <https://www.animatedknots.com/alpine-butterfly-loop-knot>
<https://troopresources.scouting.org/butterfly-knot/>
- *** Figure Eight Loop - <https://www.animatedknots.com/figure-8-directional-loop-knot>

Hitches (Attach a rope to an object).

- *Clove Hitch - <https://www.animatedknots.com/clove-hitch-knot-using-loops>
<https://www.animatedknots.com/clove-hitch-knot-rope-end>
<https://troopresources.scouting.org/clove-hitch/>
<https://troopresources.scouting.org/half-hitches-over-an-open-ended-pole/>
<https://troopresources.scouting.org/half-hitches-and-clove-hitch-video/>

- <https://troopresources.scouting.org/half-hitches-and-lashings/>
- ** Constrictor - <https://www.animatedknots.com/constrictor-knot-folding-method>
<https://www.animatedknots.com/constrictor-knot-rope-end-method>
<https://troopresources.scouting.org/constrictor-knot/>
 - ** Rolling Hitch – <https://scoutpioneering.com/videos/pioneering-knots/rolling-hitch/>
 - ** Draw Hitch - <https://scoutpioneering.com/videos/pioneering-knots/draw-hitch/>
 - *** Cleat Hitch - <https://www.animatedknots.com/cleat-hitch-halyard-knot>

Specialty

- ** Bowline on a bight - <https://www.animatedknots.com/bowline-on-a-bight-knot>
- ** Lark's Head - <https://www.animatedknots.com/cow-hitch-knot-end-method>
<https://www.animatedknots.com/cow-hitch-knot-loops-method>
<https://troopresources.scouting.org/larks-head/>
- ** Prusik - <https://www.animatedknots.com/prusik-knot>
- ** Sheepshank - <https://www.animatedknots.com/sheepshank-knot>
<https://troopresources.scouting.org/sheepshank/>
- *** Swivel Hitch/
Heaving Line Knot - <https://www.instructables.com/How-to-Tie-a-Heaving-Line-Knot/>

FORTY KNOTS

A VISUAL AID FOR KNOT TYING

OFFICIAL EQUIPMENT—BOY SCOUTS OF AMERICA

The Scout Seal is Your Guarantee of Quality, Excellence and Performance



OVERHAND KNOT



SAILOR'S KNOT



SQUARE KNOT



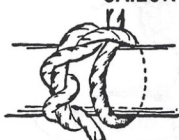
LARK'S HEAD



FIGURE EIGHT KNOT



STEVEDORE'S KNOT



KILLICK HITCH



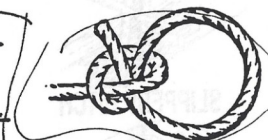
SHEET BEND



SHEET BEND DOUBLE



TIMBER HITCH



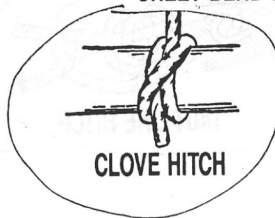
LARIAT LOOP



OVERHAND BOW



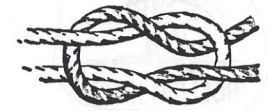
CAT'S PAW



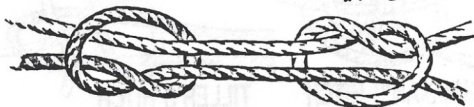
CLOVE HITCH



BLACKWALL HITCH



GRANNY KNOT



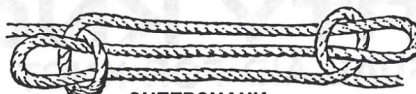
FISHERMAN'S KNOT



DOUBLE CARRICK BEND



FISHERMAN'S EYE



SHEEPSHANK



MILLER'S KNOT



RUNNING KNOT



BOWLINE

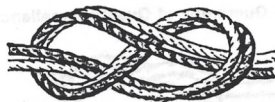


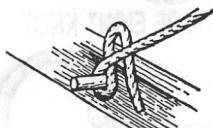
FIGURE EIGHT DOUBLE



BOWLINE ON BIGHT



DOUBLE OVERHAND



SLIPPERY HITCH



HALF HITCH



BOW KNOT



TWO HALF HITCHES



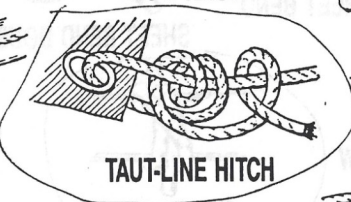
HITCHING TIE



ROLLING HITCH



CHAIN HITCH



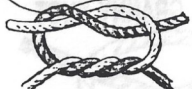
TAUT-LINE HITCH



HALYARD BEND



FISHERMAN'S BEND



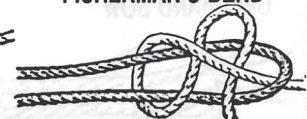
SURGEON'S KNOT



MARLINSPIKE HITCH



MIDSHIPMAN'S HITCH



TILLER'S HITCH