



South Pacific Division of Seventh-day Adventists

Pathfinder Honour: Trainer's Notes

Knot Tying 1



Instructions to Trainers / Instructors of this Honour

Thankyou for being involved with this Honour. These notes have been developed to assist in teaching / instructing this honour. We recognise that there is much more information available and we are grateful that you should share your expertise.

Please remember that Honours are designed to develop our Pathfinders in many ways; their interests, their knowledge and their relationship with their Saviour and Creator. Your enthusiasm and creativity will have a huge impact on those doing the honour.

To complete an Honour, the following (where applicable) must be completed satisfactorily:

- Physical and Practical Requirements.
- Honour Workbook.
- Honour Assessment Sheet. (*On SPD Honour Website but Leader's level access is required*)

Additional Reference Material

http://en.wikipedia.org/wiki/List_of_knots

<http://en.wikipedia.org/wiki/Knot>

<http://www.animatedknots.com/>

Acknowledgements

Unless stated otherwise, these notes are based on the following useful site:

http://en.wikibooks.org/wiki/Adventist_Youth_Honors_Answer_Book/Recreation/Knot_Tying

Please be aware that the material on this site and on other sites is beyond the control of the SPD.

Knot Tying 1 Honour

REQUIREMENT 1: Define the following terms:

It's a good idea to begin this honour with the definitions so your Pathfinders have a working vocabulary of the various terms involved. Telling them to 'make a bight' or 'take the standing part' makes little sense until these terms are understood.

a. Bight

The term bight refers to any curved section, slack part, or loop between the two ends of a rope.

b. Running end

The free end of the rope, usually shorter. This is the end of the rope in which a knot is being tied. It is sometimes called the 'end' or 'working end'.

c. Standing part

The part of the rope between the Running end and the Standing end (the end that doesn't move, think of it as if someone is holding it)

d. Underhand loop

A loop formed by passing the running end of a line under the standing part.

e. Overhand loop

A loop formed by passing the running end of a line over the standing part.

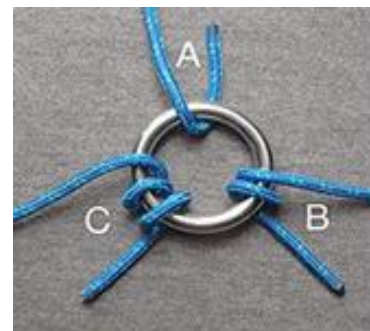
f. Turn

A turn is a component of a knot. Turns can be made around objects, through rings, or around the standing part of the rope itself.

Turns come in various forms, distinguished by the number of passes that the rope makes.

A turn or single turn requires one pass. The line makes a U-shape through or around the object, or half a revolution.

A round turn requires two passes and makes one and a half revolutions. Two round turns adds another pass and revolution.



A = Turn;
B = Round turn
C = Two round turns

g. Bend

A bend is used to tie two ropes together, as in the Sheet bend. Technically, even the Reef knot is a bend.

h. Hitch

A hitch is used to tie a rope to a spar, ring or post, such as the Clove hitch. Hitches can also be used to tie one rope on to another rope.

i. Splice

A knot formed by interweaving strands of rope rather than whole lines. More time consuming but usually stronger than simple knots.

j. Whipping

A binding knot used to prevent another line from fray.



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REQUIREMENT 2: Know how to care for rope.

The following Acronym is sourced from 'Abseiling Course – SROABN003A / SROABN004A' by NAOATAC (National Adventist Outdoors Training and Accreditation Council), South Queensland Conference, September 2003.

Chemicals: Keep away from chemicals such as bleaches, acids etc.

Abrasion: Keep rope out of sand and gritty surfaces.

Regularly Wash: Wash ropes in warm water with sunlight soap and fabric softener.

Excessive Temperature: Keep ropes away from excessive heat

Overload: Don't overload

Friiction: Minimise friction. It causes both heat and wear

Remove Kinks & Knots:

Out of Sunlight: Keep ropes out of sunlight as the UV rays deteriorate the rope.

Protect from Damage

Equal Wear: Try to use different parts of the rope and not just wear our one end.

Shock: Never shock load a rope.

REQUIREMENT 3: Describe the difference between laid rope and braided rope. List three features or uses for each.

In laid rope, bundles (usually three) of fibre or twine are twisted in the same direction, placed close to each other, and allowed to twist together. In braided rope, the fibres are woven together, often around some core material.

Features / Uses of Laid Rope

1. Repels water
2. Able to withstand immense strain.
3. Can be spliced with standard techniques.

Features / Uses of Braided Rope

1. Works well with pulleys and rigging.
2. Spinning (lariats and lassos).
3. Decorative knots.

REQUIREMENT 4: Identify the following types of rope:

a. Manila

Manila is a type of fibre obtained from the leaves of the abacá (*Musa textilis*), a relative of the banana. It is mostly used to make ropes and it is one of the most durable of the natural fibres, besides true hemp. Manila is a coarse, brown fibre; about the same colour and feel as a coconut shell.

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b. Sisal

Sisal is valued for cordage use because of its strength, durability, ability to stretch, affinity for certain dyestuffs, and resistance to deterioration in saltwater. Sisal ropes and twines are widely employed for marine, agricultural (baling twine), and general industrial use. Sisal fibres are smooth, straight and yellow and can be long or short.

c. Nylon

Nylon rope is often white, but any colour is possible. It has a smooth, silky feeling to it, and it coils easily. Nylon rope does not float in water. It is a synthetic-fibre rope.

d. Polypropylene

Polypropylene rope is most often yellow, though any colour is possible. It is often used in marine applications because it floats in water. The rope is sometimes difficult to tie as it is somewhat stiff and brittle. It is a synthetic-fibre rope.

One way to identify rope is to visit a hardware store or place where rope is sold. Ask an expert. Also, the packaging will tell you what the rope is made of. If you want to be sure, buy some of each type (with the labelling) or examine it closely in the store.

REQUIREMENT 5: What are some advantages and disadvantages of synthetic rope?

These are general statements. Rope properties depend on the material and processes used.

Advantages

- Improved abrasion-resistance
- Better resistance to ultra-violet light (ie exposure to sunlight)
- Lighter. Some float in water.
- Length does not vary as much when wet
- Rot-resistant

Disadvantages

- Some synthetics do not hold knots well
- More slippery
- Melts when heated
- Stretches more than natural ropes.

REQUIREMENT 6: Make a knot board showing the following knots

Here's an opportunity to exercise creativity in making a knot board to put on display.

a. Granny knot



Use: This knot is generally used for tying packages etc. It can come undone under pressure but can also be difficult to undo. Don't get it mixed up with a Square knot.

How to tie:

1. Twist two ropes together. Right over left
2. Now bring the ends right over left, under then through.
3. When pulled tight, the strands from the same rope come out of the knot on different sides.

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b. Square (or Reef) knot

Use: Also known as a Reef knot, the Square knot is easily learned and useful for many situations. It is most commonly used to tie two lines together at the ends. This knot is used at sea in reefing and furling sails. It is used in first aid to tie off a bandage or a sling because the knot lies flat.



How to tie:

1. Twist two ropes together. Right over left
2. Now bring the ends left over right, under then through.
3. When pulled tight, the strands from the same rope come back out of the knot together, in the same direction.

c. Overhand knot

Use: This is the first stage of many knots but can also be used to stop the end of a rope from being frayed or as a stopper knot to use up the left-over running end of a rope after another knot has been tied.

How to tie:

1. Make a loop with your rope
2. Take one end of your rope and run it through the loop you just made.
3. Pull both ends of the rope tight.

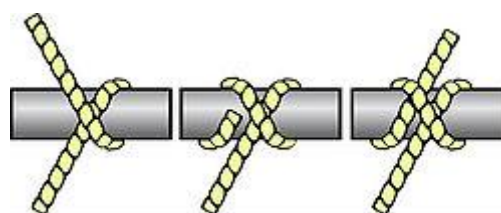


d. Clove hitch

Use: This knot is the 'general utility' hitch for when you need a quick, simple method of fastening a rope around a post, spar or stake.

How to tie:

1. Make a turn with the rope around the object and over itself.
2. Take a second turn with the rope around the object.
3. Pull the end up under the second turn so it is between the rope and the object. Tighten by pulling on both ends.

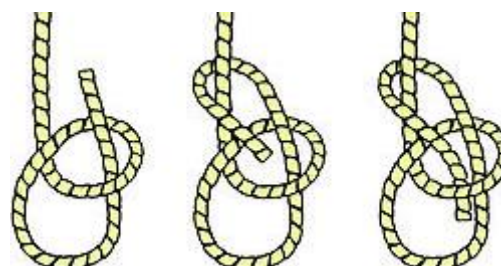


e. Bowline

Use: This knot doesn't jam or slip when tied properly. It can be tied around a person's waist and used to lift him / her, because the loop will not tighten under load. In sailing, the bowline is used to tie a halyard to a sail head.

How to tie:

1. Make the overhand loop with the end held toward you, then pass end through loop.
2. Now pass end up behind the standing part, then down through the loop again.
3. Draw up tight.



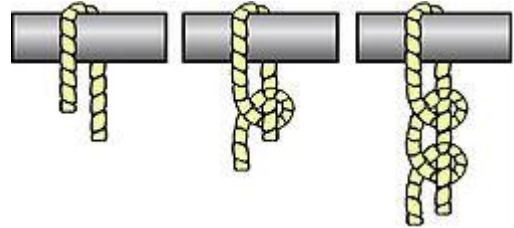
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f. Two half hitches

Use: This reliable knot is quickly tied and is the hitch most often used in mooring a boat.

How to tie:

1. Pass end of rope around post or other object.
2. Wrap short end of rope under and over long part of rope, pushing the end down through the loop. This is a half hitch.
3. Repeat on long rope below first half hitch and draw up tight.

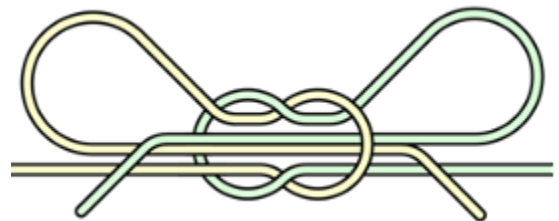


g. Double bow

Use: This knot is generally used when tying shoelaces.

How to tie:

1. Using both running ends of the lace tie an over hand knot – Right over Left.
2. Make a bight with the right hand running end.
3. Bring the left hand running end over the bight, around and then pull a bight through the gap between.
4. Pull tight



h. Slip knot

Use: A slip knot is one that will tighten under load, and which can be easily untied by pulling on the running end. This knot is typically a component of more complicated knots, and is generally not used by itself.

How to tie:

A slip knot can be tied by starting an overhand knot, but instead of passing the running end through the loop, pass a bight through instead.

WARNING: If tied as shown, the running end (on the right) will pull through the loop if even the slightest load is applied to the standing end (on the left). If one reverses the standing end and running ends in the illustration, the knot is far more stable. As shown, the knot will hold a load on the running end, but not on the standing end.



i. Fisherman's knot

Use: This knot is used for joining two pieces of rope (or fishing line) together or for making prusik slings in rock climbing.

How to tie:

1. To tie the fisherman's knot, lay the two ends to be tied alongside each other and facing opposite ways.
2. Tie an overhand knot on the first rope and pass the second rope through the loop formed.
3. Tighten the overhand knot, to prevent the line inside it from flopping around.
4. Then tie another overhand knot on the second rope with the first rope passing through it.



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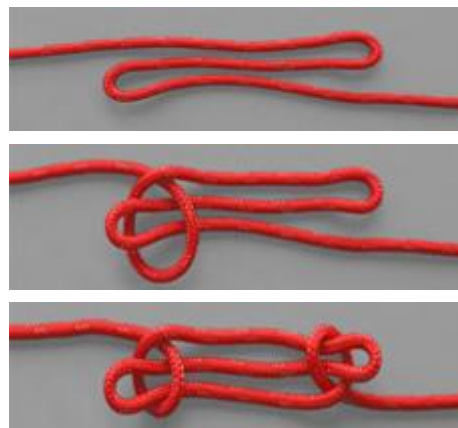
j. Sheep shank

Use: The sheepshank knot is used to shorten a length of rope. It can be used for tensioning loads on vehicles or trailers. It comes undone easily unless it is under tension.

How to tie:

1. Fold the rope to the desired length.
2. Form a half hitch in one standing end, drop it over the adjacent bight, and tighten it.
3. Form a half hitch in the other standing end, drop it over its adjacent bight, and then tighten it too.
4. Apply the load carefully.

WARNING: Keep this knot under tension or it will come untied.

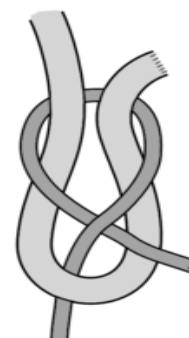


k. Sheet bend

Use: The sheet bend knot is excellent for joining two ropes together, especially if the two ropes are not the same size. When tied properly, it will not come undone and it is easy to untie. It is very similar to the bowline.

How to tie:

1. Make a bight at the end of the larger rope (if they are not the same size).
2. Run the end of the smaller rope through the bight, entering from the bottom.
3. Wrap the end of small rope around the back of the large rope, crossing the short end of the large rope first.
4. Tuck the end of the short rope under itself, on top of the bight.



l. Timber hitch

Use: The timber hitch is a knot used to attach a single length of rope to a piece of wood. This knot is easily undone after use.

How to tie:

1. To make the knot, pass the rope completely around the wood.
2. Pass the running end around the standing part, then through the loop that you have just formed.
3. Make at least three turns around the loop then pull on the standing part to tighten.
4. Take care that you double the rope back on itself before making the three turns, or it won't hold.

WARNING: Three are recommended for natural rope such as jute, whereas five turns are needed on synthetic rope like nylon.

This knot is also known as the 'Bowyer's Knot' as it is used to attach the lower end of the bowstring to the bottom limb on an English Longbow.



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m. Taut line hitch

Use: The Taut-Line Hitch is an adjustable loop knot for use on lines under tension. It is useful when the length of a rope will need to be periodically adjusted in order to maintain tension. Tension is maintained by sliding the hitch to adjust size of the loop, thus changing the effective length of the standing part without retying the knot. When under tension, however, the knot will grip the cord and will be difficult to cause to slip.

It is typically used for securing tent ropes in outdoor activities involving camping, by arborists when climbing trees, for creating adjustable moorings in tidal areas, and to secure loads on vehicles. A versatile knot, the Taut-line hitch was even used by astronauts during the second Space Shuttle mission to repair the Hubble Space Telescope.

How to tie:

1. Pass the working end around the anchor object. Bring it back along side of the standing part and make a half-hitch around the standing part.
2. Continue with another wrap inside the loop, effectively making a round turn around the standing part.
3. Complete with a half-hitch outside the loop, made in the same direction as the first two wraps, as for a clove hitch.
4. Dress by snugging the hitch firmly around the standing part. Load slowly and adjust as necessary.

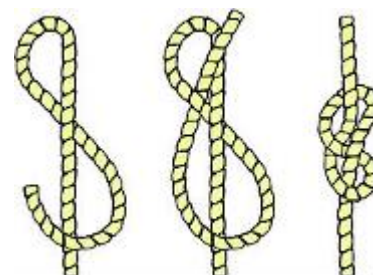


n. Figure eight knot

Use: This knot is ideal for keeping the end of a rope from running out of tackle or pulley.

How to tie:

1. Make underhand loop, bringing end around and over the standing part.
2. Pass end under, then up through the loop.
3. Draw up tight.



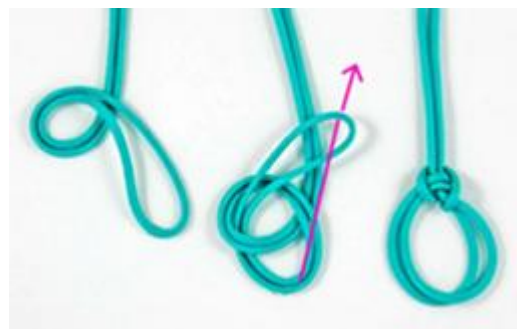
o. Bowline on a bight

Use: This makes a secure loop in the middle of a rope which does not slip

How to tie:

Note. A bight is the middle part of the rope (not the ends)

1. Fold your rope in half.
2. Make a loop in one side of the rope.
3. Feed the other end through the loop.
4. Pull the pulled through loop over the top and behind the large loop.
5. Pull tight.



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p. Prusik knot (Also known as Prussik or Prussic knot)

Use: A Prusik is a friction hitch used in climbing, caving, rope rescue and by arborists to grab a rope (sometimes referred to as a rope-grab). The term Prusik is used both for the knot, for the loops of cord, and for the action (to prusik).

A Prusik rope is a circular loop with a circumference of 20 to 100 cm (depending on its intended use). Two Prusik ropes are tied to another rope which is anchored above. When the Prusik knot is under tension, it grabs the rope to which it is tied. When not under tension, it is easily moved. The climber places one foot into each loop, and shifts all of his or her weight to one of them, releasing the tension on the other. The rope without tension is then slid upwards on the vertical rope. The climber then shifts his or her weight to the other loop and slides the first one up. This is repeated until the rope has been ascended.

Prusiks will work around two ropes, even two ropes of different diameters. Prusiks provide a high-strength and relatively fail-safe (ie. they will slip before damaging the rope or breaking) attachment, and are used in some rope-rescue techniques. Prusiks are good to use in hauling systems where multiple rope-grabs may be needed, and where mechanical rope-grabs are not available.

How to tie:

1. The Prusik is tied by wrapping the prusik loop around the rope a number of times (depending on the materials, but usually 3-5 times), and then back through itself, forming a barrel around the rope, with a tail hanging out the middle.
2. When the tail is weighted the turns tighten around the main rope and grab.
3. When weight is removed, the loop can be slid along the rope by placing a hand directly on the barrel and pushing. The trick is, if it grabs well, then it is hard to slide along the rope.
4. Breaking the Prusik free from the rope after it has been weighted can be difficult, and is easiest done by pushing the bow, being the loop of cord which runs from the top wrap, over the knot to the bottom wrap, along the tail a little. This loosens the grip of the hitch and makes movement easier.



Locked while holding tension



Slides readily without tension.



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q. Carrick bend

Use: Use: The Carrick bend is used for joining two lines. It is particularly appropriate for very heavy rope or cable that is too large and stiff to easily be formed into other common bends. It will not jam even after carrying a significant load or being soaked with water. The Carrick bend's aesthetically pleasing interwoven and symmetrical shape has also made it popular for decorative purposes.

In the interest of making the Carrick bend easier to untie, especially when tied in extremely large rope, the ends may be seized to prevent the knot from collapsing when load is applied. This practice also keeps the knot's profile flatter and can ease its passage over capstans or winches.



The ends are traditionally seized to their standing part using a Round seizing. For expediency, a series of double constrictor knots, drawn very tight, may also be used. When seizing the Carrick bend, both ends must be secured to their standing parts or the bend will slip.

WARNING: The Carrick bend is generally tied in a flat interwoven form shown above. Without additional measures it will capsize (collapse) under load into a secure and stable, although bulky, form. If the knot is allowed to capsize naturally under tension, considerable slippage of line through the knot can occur before tightening. The knot should be upset carefully into the capsized form and worked up tight before actual use.

How to tie:

Refer to different coloured ropes in knot diagram opposite.



r. Surgeon's knot

Use: The surgeon's knot is similar to a square knot, except that the first stage is doubled. This helps the knot stay tight while it is being tied.

How to tie:

1. Tie an overhand but with one extra twist; right over left.
2. Now tie another overhand; left over right.
3. Pull tight



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s. Figure eight on the bight

Use: This knot is used for Rock climbing and abseiling.

How to tie:

1. Make a bite in the end of your rope of about ½ metre.
2. Tie a standard figure eight with the bight.
3. Pull tight

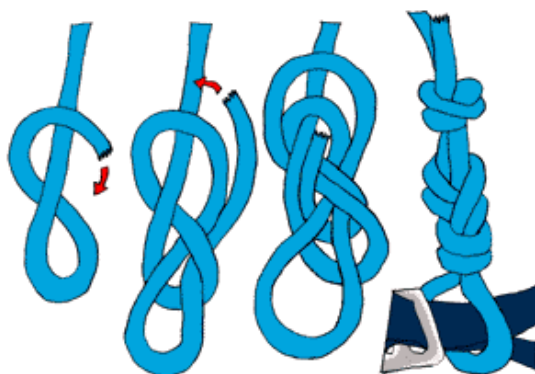


t. Retrace (or Follow Through) figure eight knot

Use: This knot is used for tying into a harness.

How to tie:

1. Tie a figure eight leaving approximately ½ metre on the running end.
2. Slide the running end through your harness.
3. Now with the running end “retrace” the knot, following how the rope runs exactly.
4. Make sure the rope is not twisted in any way.
5. Draw up tight.
6. Use a fisherman’s knot as a stopper knot with the excess running end.



REQUIREMENT 7: Demonstrate the ability to tie from memory the 6 basic knots as well as 10 knots of your choice from the list of common knots above.

Trainers, no doubt you have found that many of your students tend to forget their knots soon after they are taught. This is especially true if they are not revised frequently and if there is a huge list of knots that they are expected to learn.

The knots we have listed as ‘basic’ are the foundation for many other knots and it is expected that a student is proficient with each of the six knots. The common knots have universal use and these knots will be useful for most endeavours through life.

Here are some suggestions for ‘knot’ games to aid the memory process:

1. Have students tie knots when blindfolded or with their hands behind their backs
2. Have students tie knots with their hands poking through a hole in a wall or window.
3. Have a knot-tying relay. Line the students up into teams. The first team finishing their knots (all the same knot or different knots correctly tied) is the ‘winner’.
4. Tie a team knot. All members of a team hold onto a rope. Without letting go of the rope, they must tie a specified knot. Alternatively, they may hold hands. This can be a fun-filled team building exercise.