

## CLIMBING FENCES, ROPES, KNOTS AND ROPE MAKING TECHNIQUES

**Stolen from UK Indymedia -**

[www.indymedia.org.uk/en/2006/07/346369.html?c=on#c152797](http://www.indymedia.org.uk/en/2006/07/346369.html?c=on#c152797)

Many activists get arrested cutting through military fences and so get the extra charge of 'malicious mischief'. Using a ladder to climb fences is impracticable as you tend to get intercepted and charged for approaching a base with a ladder. You can buy 'telescopic-ladders' but they are very expensive so here is the cheapo solution.



You can buy metal key-ring clips with chains for about a £1.50 from cornershops and newsagents.

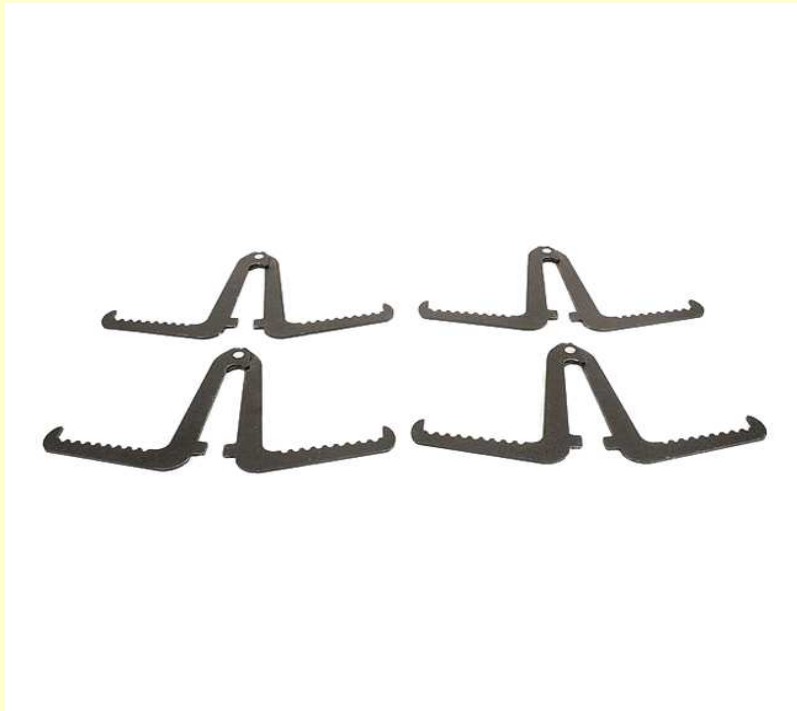
You can then clip the chains to fences to allow use as foothold and handholds. If the keyring clip is less than 7mm in diameter at it's thinnest - and most of them are - you can clip onto even the thin fences that they use at places like Faslane.

Bolting a piece of flat wood to the chain means the foothold stands proud of the fence and makes

it is easier and quicker for several people to use in the dark. These are pocket-sized / foot-sized so are easily concealed and only four are required to help the least fit activists easily climb an 8m fence, and are also cheap enough to be disposable in a rush. If you are very careful attaching it to the fence then you don't even set off the high-tech vibration sensors that military fences often utilise, at least until you start climbing.

Make sure the wood you use is strong enough to take your bodyweight after drilling - also - test them once you've built them.

And another tip from *Monkey Girl* - "The first person up needs to take some old carpet to throw over the barbed wire at the top - the thicker the better. This doesn't work so well with razor wire, though, (so I'm told)."



## Ascender (climbing)



Ascenders, left rigged for ascending, right shown open

An **ascender** is a mechanical device used for ascending on a rope. One such device is a Jumar, named after the Swiss factory which developed the first tool for sale in 1958. The device's name also leads to the term Jumaring for the process of using such a device. Other terms for this process include ascending, prusiking and jugging.

Ascenders offer similar functionality to friction knots, but are faster and easier to use, albeit with consequences in security (as ascenders can, even with a locking carabiner, come off the rope, and fail by shredding the rope at high loads, rather than slipping and fusing as with friction knots). An ascender employs a cam which allows the device to slide freely in one direction (usually the intended direction of movement), and provide a firm grip on the rope when pulled on in the opposite direction. To prevent an ascender from accidentally coming off the rope, a locking mechanism or trigger is deployed. The ascender is first attached to the climber's harness by a piece of webbing or sling, and then is clipped onto the rope and locked. For climbing on a fixed rope attached, for example, to snow anchors on a steep slope, only one ascender is used, keeping the other hand free for holding an ice axe.

Jumaring, also referred to as jugging, is where the second climber (the one who belays the lead climber on the route) uses ascenders to climb the rope instead of climbing directly on the rock. Along with the ascenders, one or more webbing "ladders" called *étriers* (or *aiders*) are typically used to allow the climber to use their feet to step up and pull themselves up the rope.

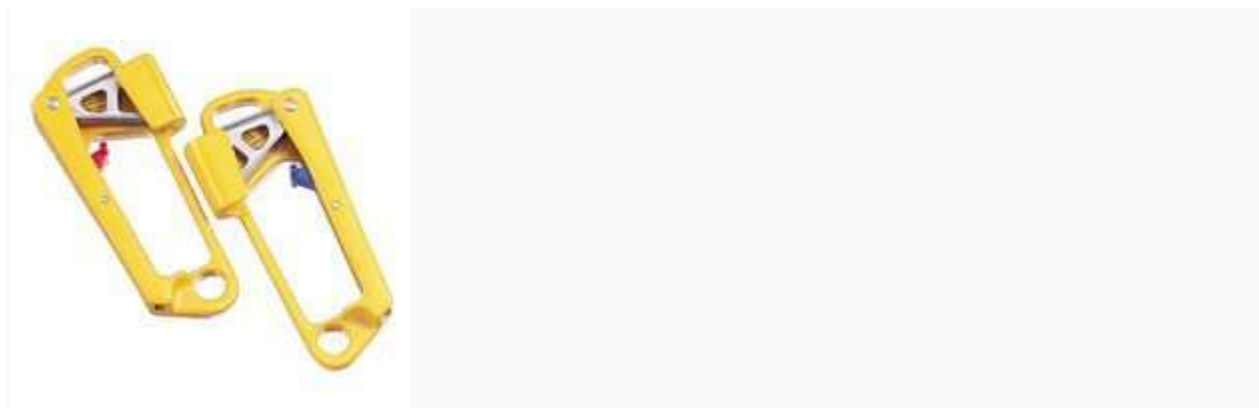
Ascending is not typically performed on free climbing routes where a climber uses his or her hands and feet on the rock, climbing the features, edges, cracks, and pockets that the route

provides without artificial aids. Typically, ascending is reserved for aid climbing where the climbers are climbing near-featureless faces of rock, usually with very thin cracks that a person probably could not get their fingers into to make the holds useful. In aid climbing, the climbers are very dependent on gear placements to ascend the route, using the étrier to step as high as possible on a piece of gear to place another piece of gear. Since some pieces are only intended for placement for movement and not protection, the leader does not leave every piece of gear he places to climb the route. The leader can climb with a lighter rack if he or she places gear necessary to advance on the route, then removes gear regularly as he steps into the next higher étrier, yet leaving enough safely placed gear to protect against a fall. Once the leader has set up the belay, the former belayer begins climbing the rope. Since the leader has more than likely removed a great deal of gear as he or she climbed the route, and the rock being relatively featureless, it makes ascending necessary to ascend the route.

In caving, ascending a rope by means of mechanical devices is often necessary and is the main alternative to ladder use. The rock which forms the cave is often wet, slippery, relatively featureless and often unreachable from the necessary rope locations. So climbing the rope may well be preferable to climbing the rock or a ladder, provided that a belay location that provides a dry ascent has already been found.

Ascenders can also be used as a braking component within a rope hauling system, often used in rescue situations.

## **Jumar Ascenders**



### **Description**

These ascenders are where the term ‘jumaring’ comes from. The integral handles are great for longer ascents. The trigger, which keeps the cam in open position, also acts as a safety block to the cam so that it can’t completely be opened when it’s in clamp position. This is a great safety feature, particularly when down jugging. This does however, require two handed manipulation, or a lot of trained dexterity to completely unhitch the ascender, so it is not as easy to clear pro, knots, ledges, etc...

## South African Abseil



Method of wrapping the rope for the South African Abseil

**Abseil:** Also known as: Rappel **South African Abseil** or *South African Double Roped Classical Abseil*. This variation of the non-mechanical classical abseil is a modern version of the original method used by mountaineers and rock climbers to quickly descend steep terrain by sliding down a rope wrapped around their body to create controlled friction.

### History

This method of classical (non-mechanical) abseiling was developed by South African mountaineering instructor/guide, Andrew Friedemann in 2000 whilst facilitating a Mountain Leader course in Mooi River - South Africa. The classical abseil taught on the course was deemed to be too onerous and an alternate was investigated with a group of students which would remove the issues of rope burn, lack of sufficient control and toppling over backwards which is a common problem with the standard classical abseil. Later on that same year, the method was demonstrated to the UIAA International Training Standards Working group seminar in Chamonix - France, and was dubbed the South African Abseil by those representatives present as none of the countries taking part had seen the method before.



Method of wrapping the rope for the Classical Abseil

## **Climbing Dumar How to climb REALLY HIGH chainlink**

Favorite

### **Step 1: The Dumar**

1. i dont think this is a good explanation but,... ya know. Well, a dumar is a block of wood, roughly a little larger than your hand. this piece of wood has a thick long nail going through the top and then bent into a hook shape, this grabs the fence while you hold on to the block 'o' wood.

2. a rope is attached through a hole in the bottom of the dumar, this rope has to be a loop that reaches down to your foot and then back up again.

3. that's it, to climb a fence you need two, one for your right hand and foot and another for your left limbs.

then to climb a chainlink fence you need to put one foot in each rope sling and then lift up one dumar (with your foot still in the loop) and hook it to a fence. then (using your foot and hand still attached to the fence) pull your other hand above the hand on the fence and put your foot in, repeat till you get to the top. (sorry it's real hard to explain without pictures, :[ sounds complicated but is quite simple

.

This is sooooo fun to use!! I have already made loads and used them alot! U can also use them on other things like walls and trees u no! Thanks...and boy soldier is the best book ever!

hi, im just saying, what if the holes in the fence arn't big enough for you to put your feet into, what would u do then?

Hi, What you are describing is a "Jumar." Your spelling is probably do the the pronunciation sounding a D rather than the J. Climbing a chain-link fence can e quite easy depending on which side you are attempting. If you examine the next one you happen by, look at both sides. You'll notice that what is typically the inside has a diagonal ridge formed by the wire weaving process. If you place the sides of your feet there rather than putting your toe "through" the diamond hole in the weave, you can literally go over an 18ft fence in about 5 seconds. Jumars are more of use when you need to ascend a long rope. A climbing rope is much thinner than the ropes found in gymnasiums and playgrounds. An example of a jumar technique can be see in the James Bond movie, "For Your Eyes Only," when James Bond climbs to the monastery. This example shows him make-shifting his shoe laces to climb rope.

thats not a d(j)umar, thats a prussic hitch. *thats different.*

now, when we get to the top... then what? also, what's the easiest way to get around razor-wire?

Several Jute fiber doormats sewn end to end with clothesline. Use the thicker ones if many people need to make the climb.

sweet!!! umm to get down you would hook the dumars on the top bar and throw the rope down the othor side and just put your feet in them... about razorwire, all i can say i thick longjohns with canvas pants/shirts, snake chaps and leather jacket or pliers, go to where the razor wire meets its support bars and there should be thick but easily bent wire holding it and just undo the wires. do this to about 3 to 5 of the support beams and then with the same wire wrap it around the razor wire connecting it to the fence about 5 diamonds down.



## How to Make Strong Ropes



What if your plane crashes in the middle of nowhere and you have to make a rope to tie a tent up or something related to that? Having the skill to make ropes is a great skill to have.

1. 1

**Make cordage.** A cordage is two or more bundles of fibers twisted in a manner that makes them grip against each other and stay together forming a twined length of rope. The twisting in the line increases the strength you can get out the fibers because all of the individual strands are being supported by each other's integrity in trying not to break. With this aspect you can take small fibers of anything be it grass, bark, napkins, shirts, plants, vines, plastic bags, and make rope out of them as long or thick as you want.

- Make a bundle of fiber that is half the desired thickness of the finished product.
- Grip the bundle with two hands. Your hands should be between 6 inches (15 cm) and 1 foot (30 cm) apart, and 1/3 of the way from the ends of the bundle.
- Twist the bundle clockwise with both hands until it is wound tight.
- Bring your hands together and keep twisting. A kink should form in the bundle. Continue until there are 2 or 3 layers on the kink.
- Attach the end to something that can rotate and continue twisting. Alternatively, attach it to something solid and twist it yourself.



- Use both hands to twist each loose end of the cordage clockwise. In addition, twist them around each other. The right side should over and the left side under. Continue until you run out of cord to twist.

2. 2

**Splice multiple cords together.** Rope splicing in ropework is the forming of a semi-permanent joint between two ropes or two parts of the same rope by partly untwisting and then interweaving their strands. Splices can be used to form a stopper at the end of a line, to form a loop or an eye in a rope, or for joining two ropes together.

- Begin your chord off center. This way, one side will run out of fiber before the other.
- Prepare another chord when the short side gets about 3 inches (7 cm) from the end. The end of the new chord should be tapered for about 4 inches.
- Lay the new chord parallel to the other one. Make sure it's sticking out about 1 inch from the "Y" shape made by the two sides of the original chord.
- Continue twisting as before. If there are bits of fiber sticking up where the overlap is, you can cut or burn them off when the rope is complete

### Make rope out of dead plants -- with no tools



1



2



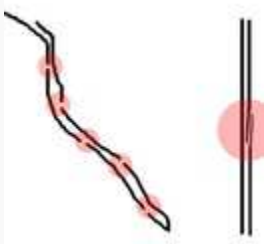
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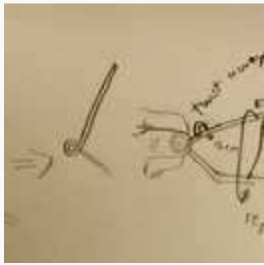
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5



6



7



I will teach you to make extremely strong rope out of common, dead plants with no need for tools. First, I'll walk you through the process of isolating some high-quality fiber from dead plants. (I demonstrate with dogbane, but milkweed is a fine substitute.) Then I'll show you the *reverse wrap*, which can turn any decent fiber into a sturdy cord.

In a wilderness survival situation, this skill will allow you to make fishing lines, spears and arrows, and snares, as well as construct certain types of shelters. Even certain firemaking techniques (e.g. bow drill) rely on having strong cordage.

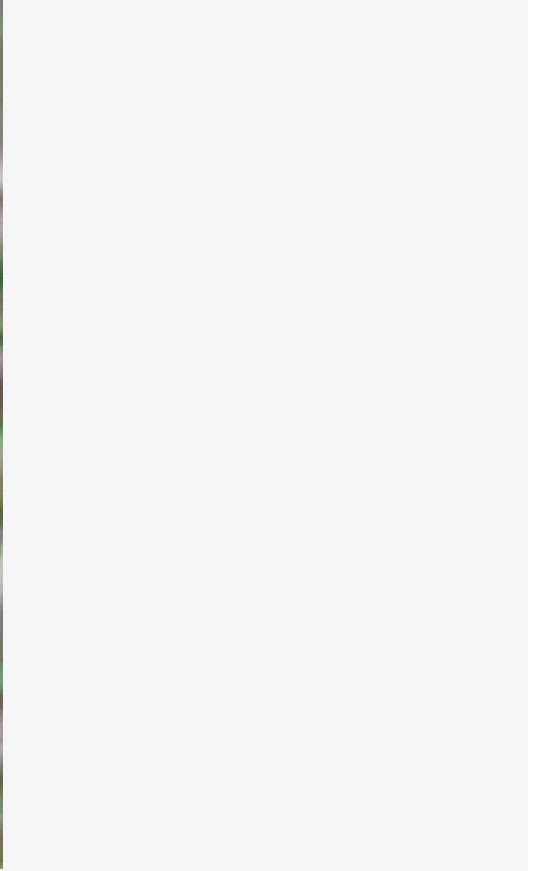
Just like fire, a good rope is a tool in and of itself.

**Step 1: Get some fiber (dogbane, here)**





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All you need for this instructable is some plant fiber. Dogbane (*Apocynum cannabinum* -- cannabinum means fiber-plant) is an excellent source, though milkweed and other plants will work just as well, or better. Related to milkweed, dogbane is likewise poisonous if ingested. Additionally, some people may react adversely to the latex sap. But handling dead stems should be fine for most folks. If you are prone to allergies or have easily irritated skin, I recommend finding a different source of fiber, such as milkweed or bark.

### **Other fiber sources**

#### ***Dead plants***

The best natural fiber sources are dead plants, though animal fur is supposedly an option. (I once saw a lady spinning thread directly off of an angora rabbit.)

Milkweed is very soft, and less allergenic. I haven't worked with it, personally, but I have seen the finished product, which looks very similar to synthetic string. The stalks should be harvested when they are dead and grey.

The inner bark from some trees is another excellent source, if you can collect enough. The trick is to find fallen branches, or dead trees with hanging bark. The best fiber trees are cedar, white basswood, tulip tree. Tulip tree (sometimes mistakenly called "poplar" or "tulip poplar") is quite common and frequently sheds branches. Tree-based fiber is strong, but coarse.

A note about cedar: You don't want the fibrous strands running along the outside of the bark -- the inside bark is where the good stuff is.



### ***Urban sources***

Plastic bags. They're everywhere! Shred them "lengthwise", that is, in the direction of the polymer. (Make note of which direction they rip most easily.)

### **Back to dogbane**

Dogbane grows readily in waste areas and disturbed soil, and seems to prefer partial shade. For this project, I biked over to an abandoned road that was intended for a subdivision. Plants are creeping across the roadway, the asphalt is breaking up from freeze-thaw stress and earthstar mushrooms, and there are healthy stands of dogbane, vetch, and other waste-area plants.

You'll recognize the plants by their 4-foot tall dark brown stalks and their dangling seedpods. Initially, the seedpods are paired tubes that come together at their ends but bow away from each other at the middle. As the pods decay, the tubes peel open, slowly releasing the fluff-carried seeds to the wind. (Remember, dogbane is related to milkweed.) Incidentally, this fluff is an excellent fire-starting material -- but that's a different instructable.

### **Step 2: Harvest your fiber**





The best stalks are tall (for efficiency), brown (gray is too old), and have high branches (to reduce the number of pesky branch nodes). Gray stalks are from one to two years ago, and the fiber may have degraded by now. Recently dead stalks are more difficult to clean, since the bark has not decayed as much. The happy medium seems to be one-year-old stalks. At the time I write this, new shoots are coming up, so last year's stalks are perfect.

Nothing eats the dead stalks, so feel free to take as many as you like. Be gentle, though -- they are still attached to the living rhizome, from which future stalks will grow. The lower end is brittle enough to snap with a quick side-to-side motion.

Break off the branches and top, but carefully; both tend to take fiber with them. (I define the "top" as the upper section beyond the point where the stem has narrowed by about a third. More intuitively, this is the point after which there are too many branches and not enough fiber.)

### **Step 3: Break out the core wood**



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Flatten a stalk longitudinally to break the core "wood", and separate it into two roughly equal halves.

The wood is delightfully easy to remove. Starting at the thick end of one of the halves, snap off inch-long section of wood. To avoid peeling, pull up one end, then the other, until the strip is removed. Discard these. (You may notice that each half splits again into two quarters -- this is natural.)

For the purposes of this instructable, you'll only need to remove the wood from both halves of a single stalk. A 4-foot stalk may reduce to a 2-foot cord, but you can always add more to it later.

Using a 3-foot stalk (after discarding the top), this step took 6 minutes

#### **Step 4: Tenderize and clean**





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You now have two ribbons, one side of each covered in a flaky, dark brown outer bark. While the outer bark is only a bit annoying, the curly ribbon shape makes the fiber quite difficult to work

with. Also, there are likely bits of branch nodes and small pieces of wood hiding in there. We can kill three birds with one stone by tenderizing the fiber, which is as simply as grinding it between your thumb and forefinger.

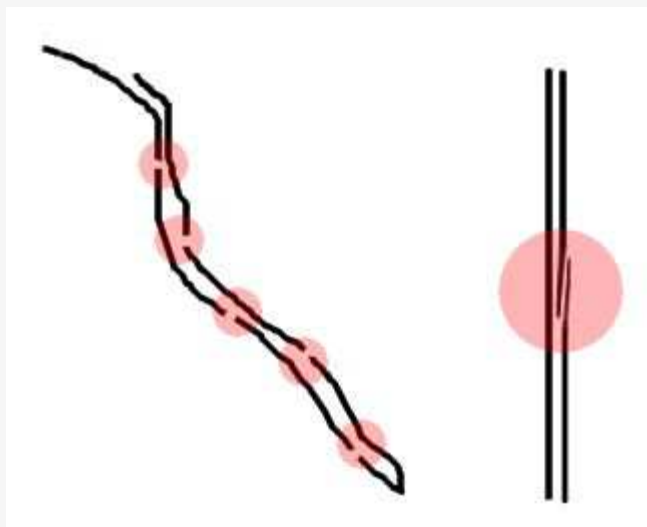
You'll note that while this does cause the fiber to separate somewhat (a necessary evil), it is still quite crosslinked.

With my three-foot-tall stalk, this step took 9 minutes, and my hands were a little sore. (This is the most annoying step.)

At this point, you have two strands, and each narrows along its length. To get a constant width, reverse one strand and lay it along the other. Rub them together a little bit so they stay roughly connected.

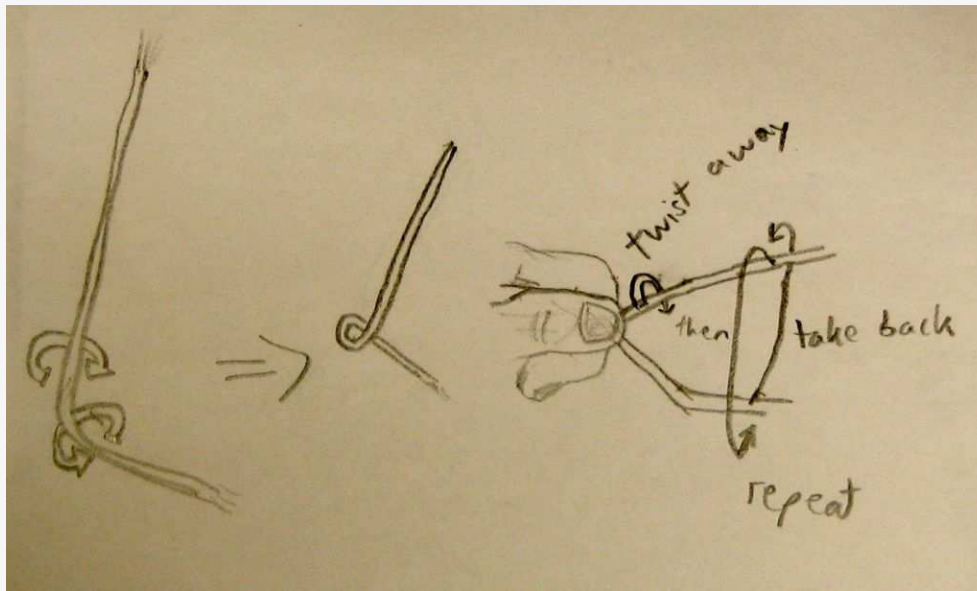
Now the fun part starts.

### **Step 5: Philosophy of cordage**



- Splice only one strand at a time. (Only one strand should end at a time.)
- Dry fiber can be wrapped more tightly than wet fiber. So make sure your fiber is dry. Wet-made cordage will fall apart when it dries.
- A finished cord can be used as a strand in a larger cord. That's how they make those awesome rope bridges in the Andes -- out of *grass*.
- Wrap tight, wrap sturdy. There's no way to fix a loose cord, aside from unwinding the whole thing

## Step 6: Reverse wrap



This is a highly tactile activity, so instructions can only go so far. Bear with me as I explain the reverse wrap from several different perspectives. Refer frequently to the diagram and video, but also experiment with different techniques.

### Start your strand

About a quarter of the way along the strand, twist a short segment in opposite directions to form a tight loop. (Twist away from you on the right hand side, towards you on the left.) Pinch this loop with your left thumb and forefinger.

There are now two strands, one closer to you and one farther away. You are ready to start.

### Wrap

For each iteration:

1. With your right thumb and forefinger a centimeter from your left, twist the farther strand "away" (clockwise if you are looking from the right). It should be twisted tightly, but not starting to loop. This step is called "twist away".
2. Use your (right) middle finger to clamp the closer strand to your (right) forefinger. Rotate your wrist 180 degrees back towards you, swapping the strands. This step is called "take back".



3. Nudge the Y-junction between the strands with your right forefinger a bit to keep the wrap tight.

Repeat many times!

### **How it works**

Have you ever taken a wall-mounted hand-cranked pencil sharpener apart? (Of course you have.) The two grinders are *precisely* like the two strands in a reverse wrap. The friction they exert on a pencil represents the friction between the two strands, which keeps them from unwinding.

### **Alternative techniques**

- If you want to do a quick'n'dirty wrap, twist a long section of fiber until it starts to loop and kink. Allow one kink to grow and twist. (The first time you do this, have another person help you by gently twisting the forming rope.)

### **Time required for wrapping**

Unlike the previous steps, this one is variable according to your needs. Here I have used the entire three-foot bundle for the starting cord, but I would ordinarily separate the bundle into several 3-foot sections to be spliced in later. This results in a much thinner, longer cord. If you divide the stalk into 2 3-foot sections, the cord will be half the width and twice the length, but will take something like *\*four\** times the amount of time. (Twice as many twists per inch, twice as long.)

### **Step 7: Contributed notes**

There are a bunch of neat suggestions and tips in the comments, and I'd like to highlight some here.

- Purocuyu says that rolling the fiber on your thigh works if you wear jeans, but recommends putting a patch of scrap denim over your leg anyway -- this technique can wear through cloth pretty quickly. (Wade Tarzia mentioned this method. It's a variant on the "twist and kink" mentioned in the section "Alternative techniques".)
- Purocuyu has had success with yucca, which is great news, since the stuff grows like a weed in some areas. I've heard of retting yucca leaves to extract the fiber, but this commenter says to try scraping the leaf body off of the fiber using a sharp-edged implement.
- Wade Tarzia notes that there is historical precedent for using fiber from coconut husks. (Another good source, because coconut fiber should be plentiful where it exists at all.)
- Several commenters have noted that strips of cotton from old t-shirts work well

## How to Make Rope By Hand

### ***Things You'll Need***

- Hemp or other fiber

Show More

### **Instructions**

1.

- 1

Select a fiber that can be twisted together into longer lengths. Almost any material will do. Take two strands and twist them together. The process is very similar to making thread. The longer the initial length of the fiber, the easier it is to make the original strand or yarn. Short fibers will need to be continually joined together to make a piece of decent length. Continue working with your fibers until you get a piece of usable length. The length needed will depend on your circumstances.

- 2

Keep the twist tight. You might want to secure one end to something and walk away backwards with the fibers in your hands. Keep twisting as you go. Old-time rope makers used a ropewalk, a long open area for twisting yarns and rope. Once you've finished with one strand, make another. The more yarn you use, the stronger and heavier your rope will be.

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Take two lengths of your yarn and begin to twist them together. Twist them the opposite direction of the original yarn strands. The reverse twist prevents the original yarn from unraveling. Two yarns twisted together are called a marline. You can twist marlines together to make even larger ropes or cables. Large cables will probably require the use of some leverage. You might try a wheel that will turn the individual ropes.

- 4

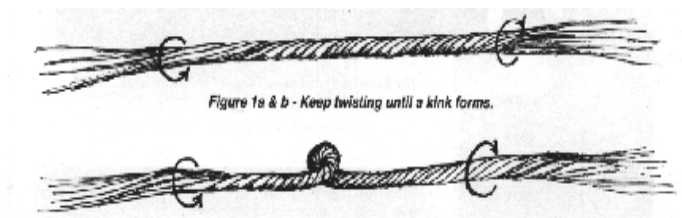
Keep your ropes taut at all times. Kinks and loose yarn will ruin the rope. Pull as hard as you can while twisting. A well-made rope possesses amazing strength though made of thin individual fibers. Metal cables that support suspension bridges are made in much the same way. Experiment with materials, as some make better rope better than others, but in a pinch out in the wilderness, you can even make rope from shredded bark.



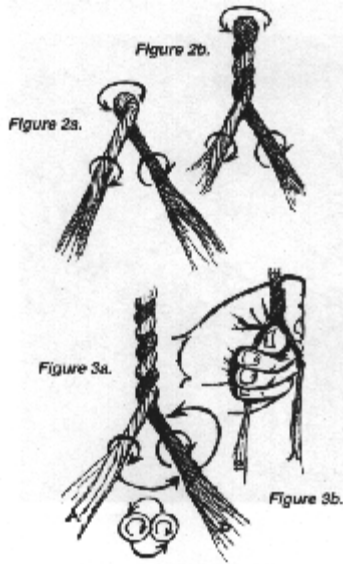
### **Make Rope from Plants – Natural Cordage Making**

You can make rope or natural cordage (rope and string) from many different fibers including (Bast) Dogbane, Milkweed, Nettles, Hemp, Flax; (Leaves) Cattail, Yucca, Agave, Douglas Iris; (Bark) Willow, Maple, Basswood, Cedar; (Root) Leather Root, Beach Lupine; (Whole stem) Tule, straw, Juncus. Each material has specific requirements for extracting and preparing the fibers, but there are only two basic ways for using the fibers to make rope or cord: braiding (or plaiting) and twining. Braiding was usually done with flat, split materials such as cattail or flattened straw. The instructions in this article will deal only with twining to make rope, specifically with two ply (S-twist, Z-ply, also called right-handed) natural cordage.

After preparing a bundle of fiber half the thickness of the finished cord, place your hands six to twelve inches apart and about one third of the way from one end. Twisting the fibers clockwise with both hands, wind the bundle tight (making single-ply natural cordage).

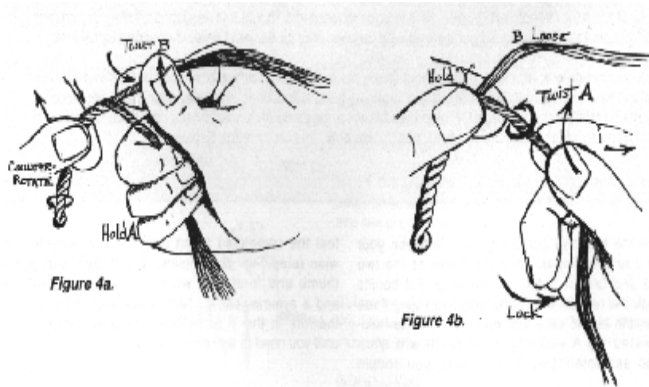


Bring your hands closer together and keep twisting. The kink should rotate on its own in a counterclockwise direction (Fig. 1a & b). Twist until two or three rotations occur (Fig. 2a & b). This is the start of a two-ply cord. At this time you can attach the end to something (or someone) which can rotate (free-end) and keep twisting with both hands turning clockwise OR you can attach the end to something solid (fixed-end) and begin twisting and counter-rotating (see below).



Counter-rotating, one form of finger-twisting, involves each hand applying a clockwise (S) twist into a ply, while passing the right ply over, and the left ply under (counter-clockwise or Z-plying). In Figure 3a, your left hand twists ply A clockwise, while your right hand does the same with ply B'. At the same time, you pass ply B over and behind your left thumb and lock it in place with your remaining fingers, as in Figure 3b. You then take A in your right hand and B in your left and repeat, over and over and over again. These two methods are particularly handy to make rope with larger and coarser materials such as cattail and tule.

Finger-twisting finer material to make rope or natural cordage is usually done completely in the hand, with the finished string being wound on a bobbin or netting needle as you go. Your left hand acts to control tension while your right hand does the twisting.



Begin as in Figure 1, then place the Y (the point where the two plys come together) between your left thumb and fore finger. Take the lower of the two ply strands and twist it tightly clockwise until it begins to kink. Lock the twist in by closing your remaining three fingers over the strand (see Fig. 4a.). Then, while holding the twisted ply A securely, twist ply B with your right thumb and forefinger. As you twist, you should feel the completed string begin to twist counter-clockwise (step Fig. 4b.). Follow this motion with your left thumb and forefinger while maintaining even tension and a symmetrical Y. Next move your left thumb up to the fork in the Y as before and repeat steps 1 and 2 until you need to add more fiber.

### Splicing

If you began your cord off-center, then one side will run out of fiber first. As you get to within about 3 inches of the end of this short ply, prepare another bundle of fibers the same size as you began with, but taper the end of the bundle for about 4 inches. Lay this bundle parallel to the bundle being replaced, and sticking out about an inch beyond the Y (Fig. 5).

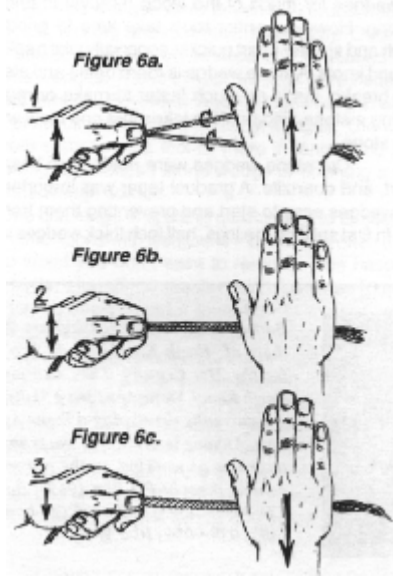


Figure 5.

Continue twisting the cordage as before. You should also add in if one ply becomes thinner than the other, or if both plies become thinner than they started. In these cases add just enough fiber to bring them back to correct size. Ideally, your cord should stay the same size throughout, although aboriginal cordage did vary about fifty percent in nets. Bow strings and fish lines under heavy pull should be very even. It is also possible to add to both sides at the same time by bending a bundle of fiber in half and placing the Y of the bundle into the V of the Y, but it is harder to keep from making a lump at this point. After your string is finished, you can cut or burn (carefully) off the overlap ends to make your string less fuzzy.

Dry surfaces tend to slip, so you should keep your hands and the fiber damp while you are working. Squeeze out excess water though or your string will be loose when it dries.

Finger-twisting methods are best used to make rope when a relatively small amount is being made and/or has to be very tight and even, and when very stiff or coarse materials are being used, such as cattail or tule. When you want to make rope in mass quantities, it is much faster and easier on the hands to use the leg (thigh) rolling method. The principle is the same, S-twist, Z-ply, but the twist is applied by rolling on the leg, rather than twisting between the thumb and finger. You can continue to work without getting cramps in your hand muscles, and you can (with practice) work faster (about ten feet per hour). The critical element in making this method work is having the right surface on which to roll. Traditionally the bare left thigh is used. If you do not want to expose your skin, or if your legs are hairy, you can use pants, but these should be tight around your leg, so they won't bunch up as you roll, and they should have a rough enough surface to give traction. Keeping them damp is also critical. I keep a bucket of water next to me while I work. (This method is illustrated in Figure 6a-c.)



Roll both plies away from you with the palm of your right hand (pre-roll each separately). Your left hand holds the Y and follows the movement.

Bring the two plies together by moving the left hand forward and back. If the two plies did not get tightly rolled the first time, carefully pick up both plies and repeat step one first.

When the plies are tight and touching, bring the right palm back towards you, counter-rotating the two plies into two-ply cordage.

Before you begin, prepare as much fiber as you will be using during that session. Once you get into the rhythm of the work of making rope or cordage, you won't want to stop and clean material.

*Originally published in the SPT Bulletin of Primitive Technology, Fall, 1996.*

*Rope-making is an ancient art that made possible transportation, construction, farming and a host of other projects upon which human civilization was built. Until about 100 years ago, most rope was made using hand methods. These methods still work quite well and, for heavy ropes, allow you to make substantial ropes for an affordable price. To make rope, however, you'll need to first build a rope-making machine.*

## 1. Skids

- The ends of the rope making machine are two sawhorse-like structures mounted onto skids. At one end of the sawhorses nail a pair of heavy upright 2 x 6's to either side of the sawhorse ends, about 2 feet apart with wooden cross members. Nail a flat, 3/4-inch plywood sheet about 2 feet square between the uprights at the top. Bolt the assembly to one end of each pair of saw horses.

### The Twister Mechanism

- Drill 3 holes 10 inches apart in the sheet in a triangle shape. This is where you will mount the hooks that will twist the rope. You'll need three 8-inch long, 3/8-inch steel rods. Bend the rods into 3 identical shaped "Zs," similar to the starter crank on a Model T Ford. Each bend needs to be exactly 90 degrees. The center section should be no more than 4 inches long. Insert the three rods through the holes in the plate. The center sections of the rods should hang straight down and the third parts of the "Zs" should stick out like handles. Give each a crank and make sure they turn freely without bumping into each other.

Cut a plywood sheet into a triangle with 12-inch sides. Drill holes to match the placement of the ends of each crank. Use a bolt threader to thread about 3 inches of the ends of the cranks. Thread a bolt and washer onto each crank, slip the triangular plate over the crank ends and double bolt it into place. Attach a heavy duty handle to the center of the triangular plate. Now when you crank the handle, all three rods turn together. With a torch and pipe wrench, bend the part of the "Z" rods that is sticking out the other side of the end plate into 3 hooks.

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### **The Rope Turning Mechanism**

- On the other skid, make a second "Z" rod the same way you did the first 3. Mount the end plate on legs attached to the end of the sawhorse assembly. Drill a hole in the center of the end plate. Insert the "Z" crank and prepare it as you did the previous ones. Bend the rod into a single hook and attach a wooden or plastic handle over the end of the crank on the sawhorse side.

### **Finished Product**

- When you are done, you'll have one skid with three hooks that turn in unison in the same direction with a single crank and another skid with a single hook that turns with a crank. You need a triangular plywood jig that measures 12 inches on a side. Cut a 2-inch half circle notch in the center of each side. This jig will be used between the strands of the rope to keep them apart till you are ready to do the final twist. Check out the detailed rope-making instructions included in the Resources.

### **How to Braid Multiple Ropes to Make a Single Rope**



You can make rope more durable by braiding it together.

*Rope is a versatile and utilitarian item that has been constructed for thousands of years out of different fibers, such as hemp, cotton, flax and wool. If you are interested in making your own homemade rope, you can do so by twisting together fibers into long rope cording. Once the thin rope has been constructed, you can braid multiple ropes together to make a strong, heavy-duty rope that rivals that of a rope found in a home improvement store.*

### **Things You'll Need**

- Metal clamps
- Vice grip



Show More  
**Instructions**

1.

○ 1

Clamp each end of four thin rope strands into individual metal clamps. Use an industrial metal clamps that will not slip off of the ropes.

○ 2

Place the other ends of the thin ropes into a vice grip. Clamp the vice grip onto a table top, and twist the grip until the rope are pressed tightly in between. Make sure that the ropes are lined up evenly in the vice grip.

○ 3

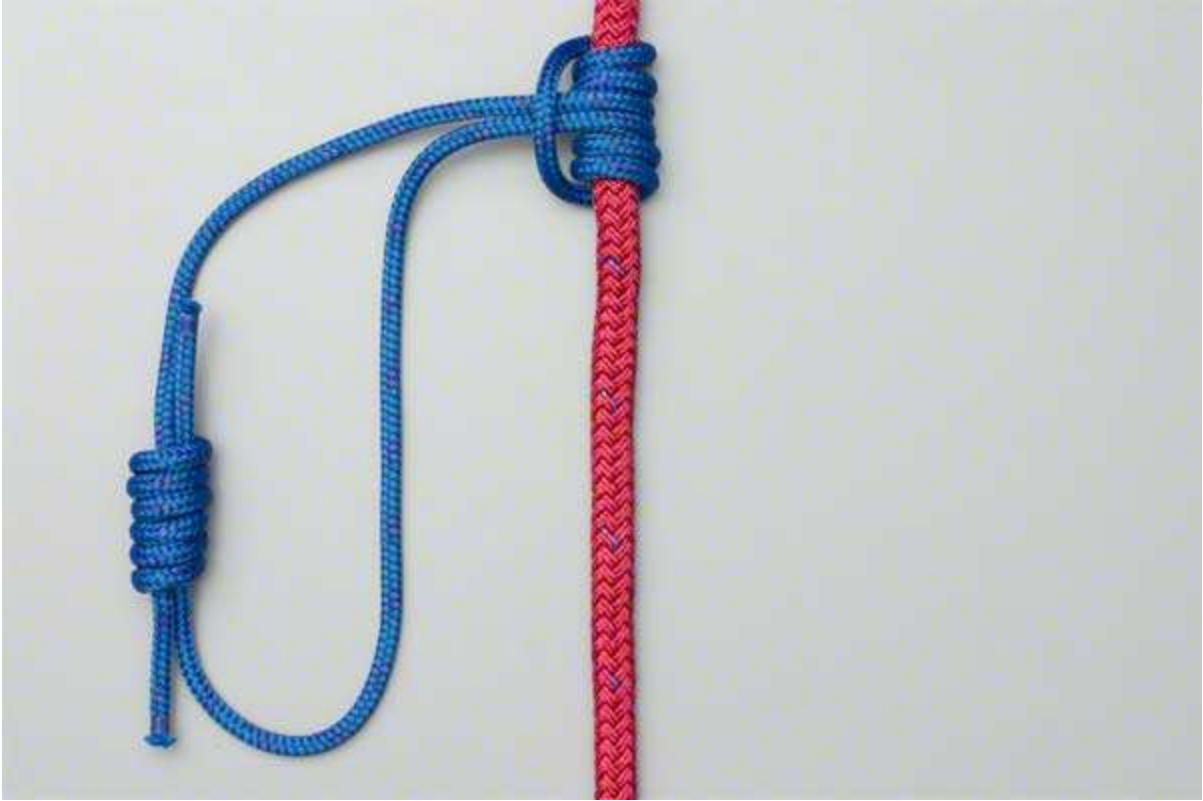
Twist the two ropes on the right side in opposite directions, twisting the farthest right rope clockwise and the other rope counter-clockwise. Wrap the twisted ropes together, which will cause them to become tightly intertwined. Clamp the ends into a single metal clamp.

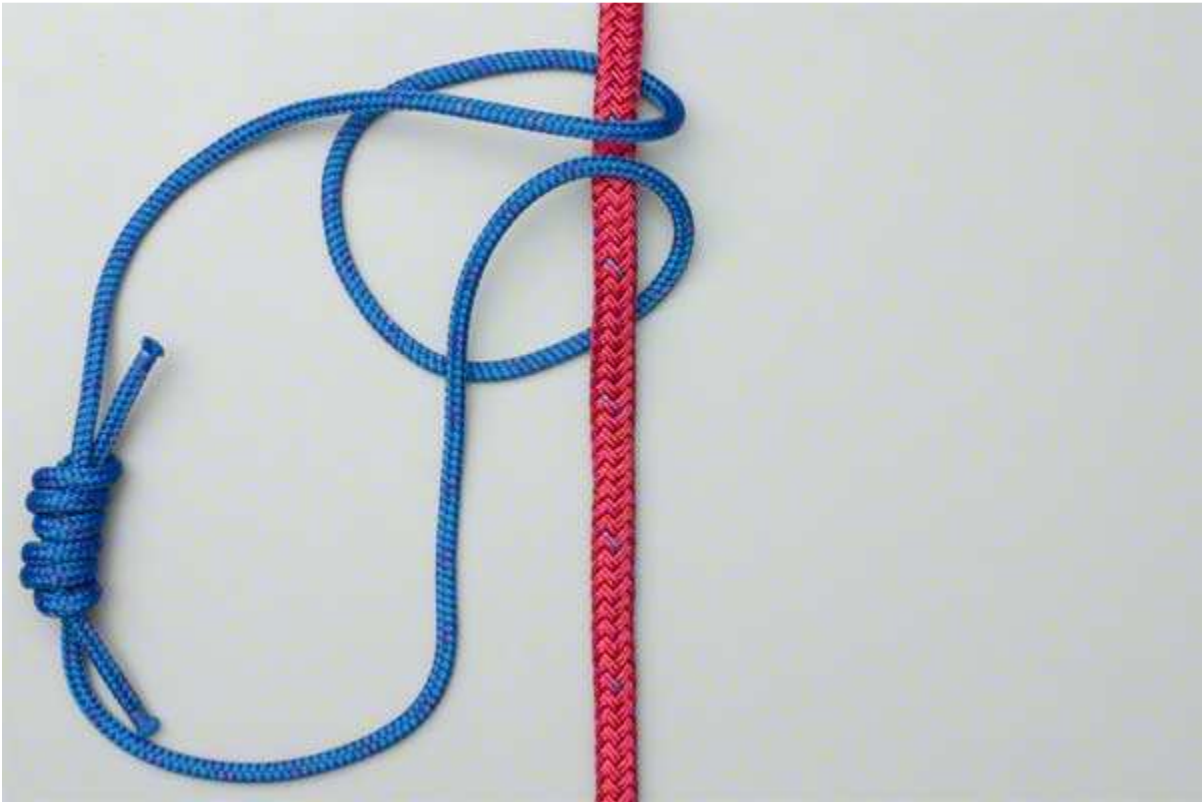
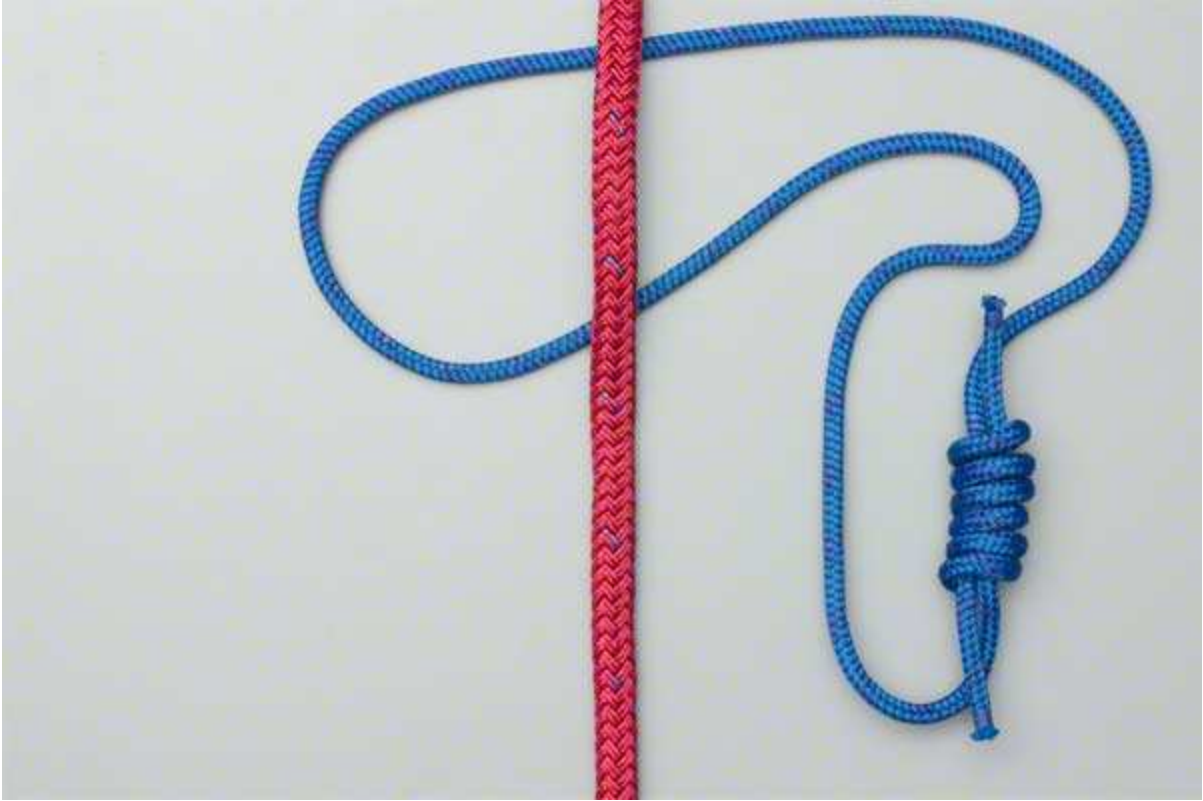
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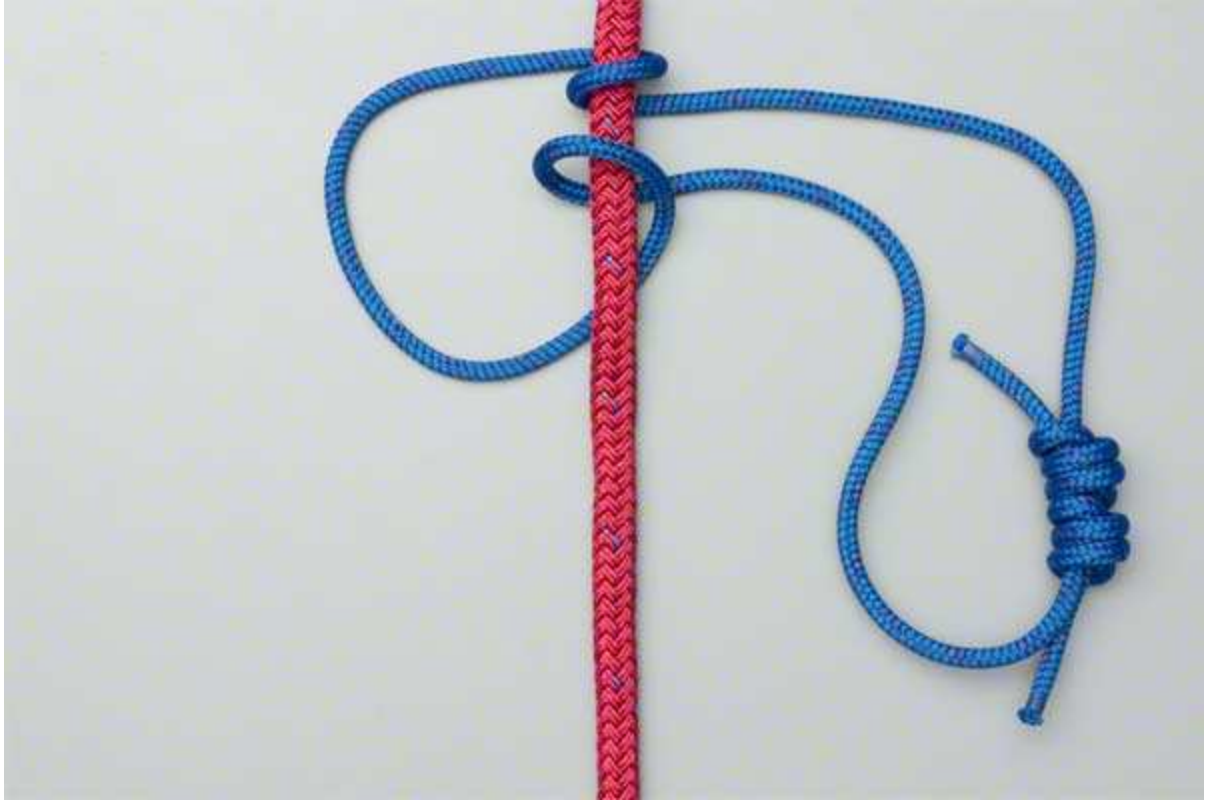
Twist the two ropes on the left side in opposite directions, twisting the farthest left rope counter-clockwise and the other rope clockwise. Wrap the twisted ropes together, which will cause them to become tightly intertwined. Clamp the ends into a single metal clamp.

○ 5

Wind the newly-twisted two ropes in opposite directions, as before. Wind the right rope in a clockwise direction and the left rope in a counter-clockwise direction. When you wind the two ropes together, they will become tightly intertwined into a single thick rope. You can now remove all of the clamps and remove the rope from the vice grip.













### **Prusik Knot (Triple Sliding Hitch) Tying**

Use a piece of cord formed into a loop. Pass the knot around the rope three times inside the loop. Make sure the turns lie neatly beside each other and pull the knot tight.

### **Prusik Knot (Triple Sliding Hitch) Details**

**History:** The Prusik knot was developed in 1931 by Dr. Karl Prusik (sometime president of the Austrian Mountaineering Club and often misspelled "Prussik".) It appears to be identical in structure to a knot described by Ashley for hoisting a spar. (ABOK # 1763, p 300), but Ashley did not name this knot and did not describe the slide and grip feature.

**Structure:** The knot requires a "Prusik Loop" which is constructed by joining the two ends of a length of rope using a Double Fisherman's or a Triple Fisherman's.

## Klemheist



[www.animatedknots.com](http://www.animatedknots.com)

### The Klemheist

**Uses:** Its principal use is allowing a rope to be climbed. Two Prusik loops are alternately slid up the static rope: a long Prusik loop allows the climber to lift himself using leg power, and a second short Prusik loop is attached to the harness.

## Bachmann Hitch



[www.animatedknots.com](http://www.animatedknots.com)

### The Bachmann Knot

In rescue work, if a climber has to be pulled up, a Prusik loop can hold a pulley block purchase system on a climbing rope.

**Slide and Grip Knots:** Because the Prusik is a symmetrical slide and grip knot, it is useful if a load might need to be applied in either direction. For loads which are always applied in the same direction other knots are preferred such as the Klemheist or the Bachmann pictured here.

### Climbing Ropes Explained popular

Submitted by rck\_climber on 2001-10-17 | Last Modified on 2010-02-26

Rating: ★★★★★ ▶ Login to rate this article. Votes: 6 | Comments: 14 | Views: 83930

There are basically two "types" of ropes, Dynamic and Static. These can be used in a number of applications, depending on their width, length and options. The following will give you an understanding of the different types and options used in most climbing ropes today.



## **Two Types**

### ***Dynamic:***

The rope is designed to stretch at a designated percentage given a static load of a designated weight (i.e. 6.5% stretch on static load of 80Kg). The reason these ropes are designed to stretch is to minimize and absorb some of the impact of a fall - imagine taking a 20' fall w/ no stretch, you could snap your back in two! These ropes are used in any/all lead climbing to protect the climber by absorbing the impact of a large fall. This is the standard in rock climbing. These ropes can be used for rappelling, top-roping and hauling gear like it's cousin, the static rope, but understand that these practices will put more wear and tear on the ropes and cause them to wear out faster.

### ***Static:***

Static lines are the opposite of dynamic ropes and market their ability to NOT stretch under load. These are primarily used for rappelling, top-roping and hauling gear, however should NEVER be used for lead climbing

## **Sizes (Both lengths and widths)**

### ***Single:***

Single ropes are generally between 9.5mm and 11mm in width and vary greatly in length, although the climbing standard seems to be the 10.5mmx50m. The general rule of thumb that thicker is stronger does not necessarily hold true as you would imagine. For example, my Sterling 10.2mmx60m is rated for 10-11 falls; while their 11mmx60m is also rated to 11; and their 9.7mmx60m is only rated to 5. Despite the .5mm difference between mine and the 9.7mm, mine will take 5-6 more falls, where as the .8mm difference between mine and the 11mm really sees no gain. Check the rope's ratings and decide what you're going to be doing on the rope when you make that decision. The thinner the rope, the lighter it is, especially when you have 150' of thread strung out - it can get pretty heavy.

### ***Twin:***

Twin ropes are two separate ropes of the same size that are designed to be clipped together through each piece of gear. These ropes are extremely thin, usually about 7.6mm each, and are primarily used in ultra-long rock, ice, mixed routes and expeditions that require light-weight gear.

### ***Half or Double:***

Half or Double ropes are two separate ropes of the same size that are designed to be clipped independently into pieces of gear. These ropes are considerably thicker than the Twin ropes, usually about 8.8mm, so that they can hold a fall should the other fail. Shaky pro, long, scary traverses, and razor sharp rock require the confidence and the security of half (double) ropes.

Because they're used in pairs, half ropes offer climbers many advantages over single ropes such as allowing the leader to clip into protection independently which places far less force on questionable gear; providing more safety for the second in the event of a fall on long traverses; and, they provide the security of an extra rope in case the rope becomes cut from rockfall, sharp edges, or ice tools.

## **Options**

### ***Dry versus Standard(non-Dry):***

Some ropes are given a special treatment to keep them from absorbing water in the same way that you would waterproof a boot. These ropes, called Dry ropes, are used primarily for ice climbing and mountaineering where you expect your rope to encounter wet conditions and where if it does get wet, it would turn into a long, skinny, chunk of ice. While ropes are not adversely affected simply by getting wet, they do, however, absorb water easily, which greatly increases its weight, making it that much harder to climb. If you only plan on rock climbing, I see no need to get a Dry rope. Something to keep in mind is that like any waterproof treatment, this too will eventually wear off the rope as well depending on how often and under what conditions you use your rope.

### ***Bi-Color or Half-n-Half:***

These ropes are unique in that the color or pattern of the rope changes at the halfway point of the rope making it easily distinguishable. Nearly every climbing rope is sold with some sort of mark that designates the mid-point of the rope, but most of them wear off one way or another, whereas Bi-color or Half-n-Half ropes will never lose their easy to find mid-point designator. It's extremely important that climbers' ropes are marked for the halfway point so they can determine whether they can make it down on one rope, or if they need to bring two.

## **Fall Ratings**

Fall ratings are governed by the UIAA (International Union of Alpine Associations) who issues standards that ropes must meet to become "CE" certified. Ensure that any rope you purchase is CE certified, basically saying, "This product is fit for its intended use." Fall ratings measure the number of falls that your rope is rated to safely take. While the UIAA standard for falls is 5 falls for single and half (double), and 12 falls for Twin ropes; you'll often see ropes that advertise much higher fall ratings, these numbers are given by the manufacturer, but are still only tested to the UIAA standard. It's important to keep a log of your falls so you can track the wear on your rope. Fall Ratings vary greatly by size and manufacturer - do some research on this and find the rope that will suit your climbing applications and style.

Here are some other UIAA shock load standards:

- Anchors: 25 kN
- Carabiners: 20 kN
- Slings: 22 kN
- Harnesses: 15 kN
- Rope: 9 kN

- ***Choosing A Climbing Rope***

- Word from the editors: *We'd like to thank Kathy and Leigh from **MountainWoman.com** for this excellent piece.*
- Lots of people ask about what to look for in buying a rope. It's a hard question to answer because there are so many variations both in the properties and features of ropes, and in the types of climbing that they are best suited for. Balance the relative importance of various features according to the type of climbing activity the rope will be used for.
- The first thing to think about when shopping for a rope is what kind of climbing you will be doing, and in what kind of environment. From this will come an idea of which features are important to look for, and which don't matter to you.
- I'll start by describing the different characteristics and properties of ropes, and then take a look at how those variations make different ropes better fitted for one type of climbing versus another.

- ***PART ONE: Attributes and Characteristics of Ropes***

- **1) UIAA rating system:**

- The UIAA (Union Internationale des Associations d'Alpinisme) has established standard testing procedures to measure, among other things, how a rope reacts to severe falls. Ropes are drop tested with a standardized weight and procedure simulating a very nasty leader fall. This tells us many of these hypothetical falls the rope can withstand before it ruptures. Different categories of rope have different norms, but the UIAA standard requires climbing ropes to withstand a minimum of 5 such test falls. Virtually all the ropes on the market can withstand the minimum number of test falls, while some are rated to a much higher number.
- The second thing the drop test measures is the amount of force which is transmitted to the falling climber. For all UIAA tests, these forces must stay within a certain range, in other words the rope has to absorb a minimum amount of energy.
- The UIAA also rates factors such as rope stiffness, sheath slippage and rope stretch under body weight.

- **2) Single, Half, and Twin ropes:**

- A single rope is meant to be used alone. Half and twin ropes are a pair of separate ropes which are used together, in parallel.
- Half ropes are often both clipped into each piece of protection, but can be clipped to alternating pieces. This is particularly helpful when the line of the climb would otherwise generate a lot of rope drag because of zig zags or traverses. On traverses, leaving one rope out of a piece of protection can provide better protection for a second as well, as it will allow one of the ropes to be oriented upward sooner than the other one, reducing the swing potential.

- When using twin ropes the leader must clip both strands to every piece of protection, as the individual ropes are not meant to hold a fall on their own. This makes them less useful than half ropes for reducing rope drag. However, both half and twin ropes share certain distinctions from single ropes, which provide advantages and disadvantages in certain contexts:

- - while heavier in total weight, they allow one to rappel twice as far as a single rope;
- - they provide greater protection against abrasion or cutting over sharp edges due to their redundancy and load sharing
- - this is an advantage in the mountains;
- - two ropes are more complex and difficult to manage in belaying, stacking etc., which takes up more time.

- **3) Length**

- As the manufacturing process and materials become more advanced and sophisticated, we are seeing ropes become narrower and lighter without diminishing strength and performance. This has allowed them to be longer without increasing weight. Although longer ropes are always heavier and harder to manage than shorter ones, still there are advantages in many contexts to having more rope to work with: therefore standard lengths have tended to creep upward over time.
- One most commonly finds ropes in 50m and 60m lengths. Longer ropes of 70 meters or more are becoming more common and popular for some applications.
- As a generalization, greater length is less useful in a mountaineering context. Time is always of the essence in the mountains, and the simplicity of rope handling saves time. Also, one rarely needs or wants to run out very long pitches in the mountains, or at least the frequency and relative importance of doing this, is less than the importance of lighter weight and relatively easy rope handling.
- Longer ropes are becoming more popular in cragging, sport climbing and top-roping areas. Here, time is less important, and except at very high levels, weight is also not so crucial. Longer ropes allow one to set up longer pitches for "slingshot belays". At more and more crags, pitches of 80 to 85 feet are not uncommon, so the danger of running out of rope when lowering a leader from the top anchor is greater with shorter ropes.
- **4) Static vs. Dynamic**
- Climbing ropes are designed to belay a leader, and for that reason they are dynamic - this means that they are designed to stretch under high load so as to absorb the shock force. This protects the leader, the belayer and the protection by reducing fall forces.
- Static ropes are more durable and resistant to abrasion and cutting than are dynamic ropes, but they lack the necessary protection against shock loads produced in a leader fall. For that reason they are used only in situations where such shock loads would never occur: rappelling, canyoning, spelunking etc. Static ropes are often used to create or to extend top rope anchors, and they can be used to belay a climber in a "slingshot belay" context. They should NEVER be used to belay a lead climber.
- **5) Stiffness.**
- One of the things that climbers seem to be very particular about is how stiff a rope they like. There doesn't seem to be a lot of agreement about this. Basically individual climbers learn what they like. For mountaineering, where coils are often carried over the shoulder or in the hand while moving, a softer rope more readily accommodates twists and is

therefore more manageable. Also if you use a munter hitch to belay, you will have less twisting problems with a soft rope than with a stiff one.

- The UIAA also rates rope stiffness in a standardized test. They tie an overhand knot, weight the knot to a specific amount and then measure the size of the hole in the knot. The UIAA expresses their standard by saying that a rope must measure at or less than 1.10, but what that number means exactly I'm afraid I honestly can't tell you! Soft single ropes have a rating of around .75 "mystery units", while stiff ropes are up around 1.0.
- **6) Durability:**
- This quality is difficult to define or assess, since we don't really know how durable ropes are: we never use them until failure and we don't therefore know when they're really worn out. In practice, decisions about a rope's state tend to be based on how fuzzy they are. Fuzzy ropes impart more rope drag, absorb more water, and inspire less confidence. There does seem to be a relationship between stiffness and durability, where the stiffer the rope the more durable it is. But other factors besides stiffness also effect durability, for example single pick construction tends to "fuzz out" faster than double pick. It's also true that different manufacturers weave the sheath more or less tightly and this too can effect durability. This is a complicated factor, and unfortunately not really verifiable. If your concerns revolve around safety questions, then a general rule is that skinnier ropes basically will have less of a margin for abuse, wear and tear than fatter ropes. But this margin is very high in all new ropes. Ropes very rarely break other than from getting cut, and it's not clear how much more resistant to cutting newer ropes are than more "worn out" ropes.
- **7) Weight:**
- Weight is important in a number of different ways. Anytime you have to carry the rope very far, such as in the mountains, at altitude, it's certainly beneficial to carry less weight. Another time weight can be important is when you're trying to climb at your very limit. When people are trying a difficult red point they often choose a very light weight rope, while for working a route and learning the moves, they worry less about the weight.
- Weight is expressed in grams per meter. These days light ropes weigh in at less than 60 grams while heavier ropes can be as much as 80 grams.
- **8) Diameter**
- Single ropes run from a narrow extreme of about 9.4mm to a thick end of the spectrum at 11mm, while half and twin ropes vary between barely over 8mm to around 9mm. The correlation between weight and diameter is a loose one. So if your concern is weight, look at weight, not diameter. Other factors such as stiffness, durability and number of test falls held are also only loosely correlated to diameter. So look for the individual features and properties you're after, and don't be locked into thinking that a particular diameter rope will necessarily have these features.
- One property that is directly related to diameter however, is how hard or easy the rope is to grab, fatter ropes being easier to hold onto than skinny ones.
- **Options**
- Many rope models are available both with and without certain features such as dry treatment, bicolor, middle markings and the like. The desirability of these features again depends on the intended use.
- Dry treatment is very useful in snow and in the mountains - even though the dry treatment adds a little bit of weight, a sodden rope is even heavier and its strength and performance are somewhat compromised. Freezing temperatures can make a stiff unmanageable cable out of your rope, and the dry treatment becomes even more worth it in these conditions. Dry treatment is obviously less advantageous in cragging contexts.

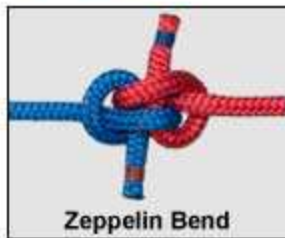
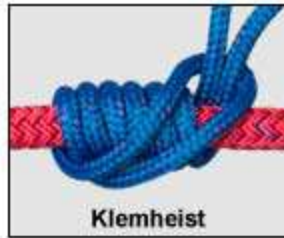
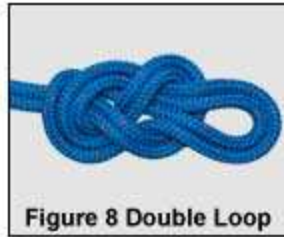
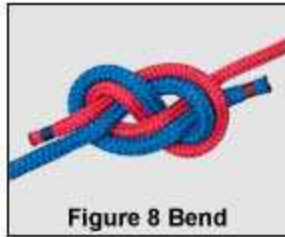
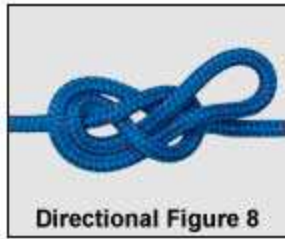
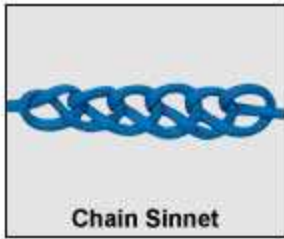
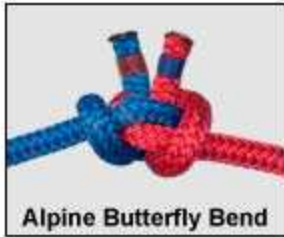
- Bicolor ropes have a change in pattern or in color halfway along the rope. This is particularly useful in sport climbing or single pitch climbing where the leader will be lowered off of a top anchor to the ground. The change in pattern alerts the belayer when the halfway point is reached, so they won't come up short or lower their partner off the end of the rope by accident. Even so ALWAYS tie a knot in the end of your rope when lowering a climber!
- ***PART TWO: Different Applications and Uses, Preferred Rope Features***
- **1) Alpine climbing on rock and mixed terrain**
- A 50 meter single rope that is reasonably light in weight, with a soft hand, will facilitate moving quickly due to easy and efficient rope handling. Mountains make for hard use though, so durability is desirable. You want a dry treated rope for the mountains.
- On routes where long rappels are necessary, you must choose between using a single rope in combination with a lighter, narrower haul line (6 or 7mm) which is carried or trailed on the climb and used on the rappels, or alternatively, to use half or twin ropes. When climbing, rope handling is easier and more efficient with a single rope. When rappelling twin or half ropes are easier to manage. Other considerations are weight: the single/haul line combination being probably slightly lighter; and protection against rope damage over edges or from rockfall, where half and twin ropes are better. This latter problem may or may not be a significant consideration depending on your area or your use.
- For many alpine rock routes, lengths of even less than 50 meters are often preferable. For example, on the Matterhorn, which involves more than 4000 feet of 3rd and 4th class scrambling up and down, and a few short pitches of 5th class climbing, I bring only a 30 meter rope. In general, extra length in ropes makes the rope handling more cumbersome and adds weight.
- **2) Long alpine ice routes or faces**
- On alpine ice routes, such as many in the Canadian Rockies or the Alps, a longer rope might be useful, 60 meters or even longer. On this type of route the terrain is smooth and uniform with good visibility and consistent climbing. A longer rope allows you to run out longer pitches with fewer belay stances, saving you time.
- **3) Glacier travel**
- For glacier travel, with no significant leading on technical ground, you can and should go with a half rope (not twin), as weight can be saved and the rope is still strong enough for this purpose. Dry treatment is very desirable. In order to allow plenty of rope for complicated crevasse rescue haul systems, you will want 50 meters.
- **4) Waterfall Ice**
- For waterfall ice climbing, many climbers like twin ropes, while others prefer the simpler rope handling of a single rope. 50m and 60m lengths are both popular among ice climbers, and dry treatment is highly recommended.
- **5) Rock Climbing**
- In rock climbing, the picture gets a bit more complex as different needs conflict:
- Pure top roping, no leading: With no leading going on, a static line is arguably best, since it doesn't stretch under body weight, so a belayer can hold the climber without them

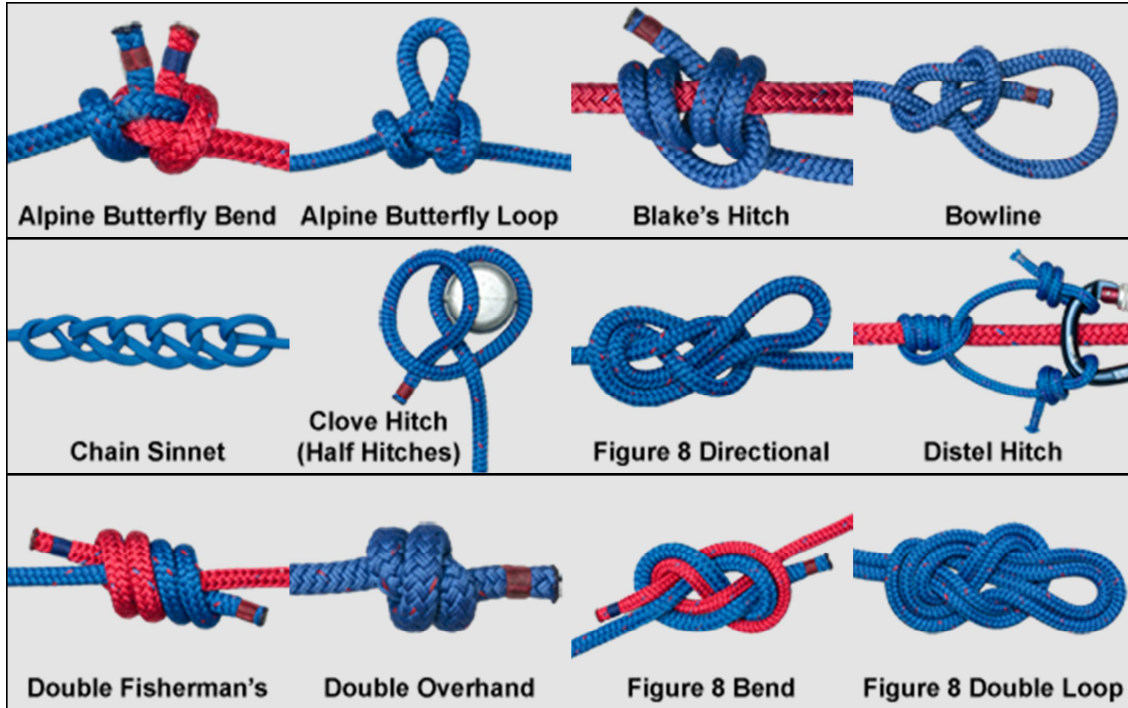


falling at all. This would be a specialized use of the rope since you can't lead on it, so most people might not want to buy a separate rope just for this purpose. Most other features such as weight, stiffness etc. won't matter much for this use.

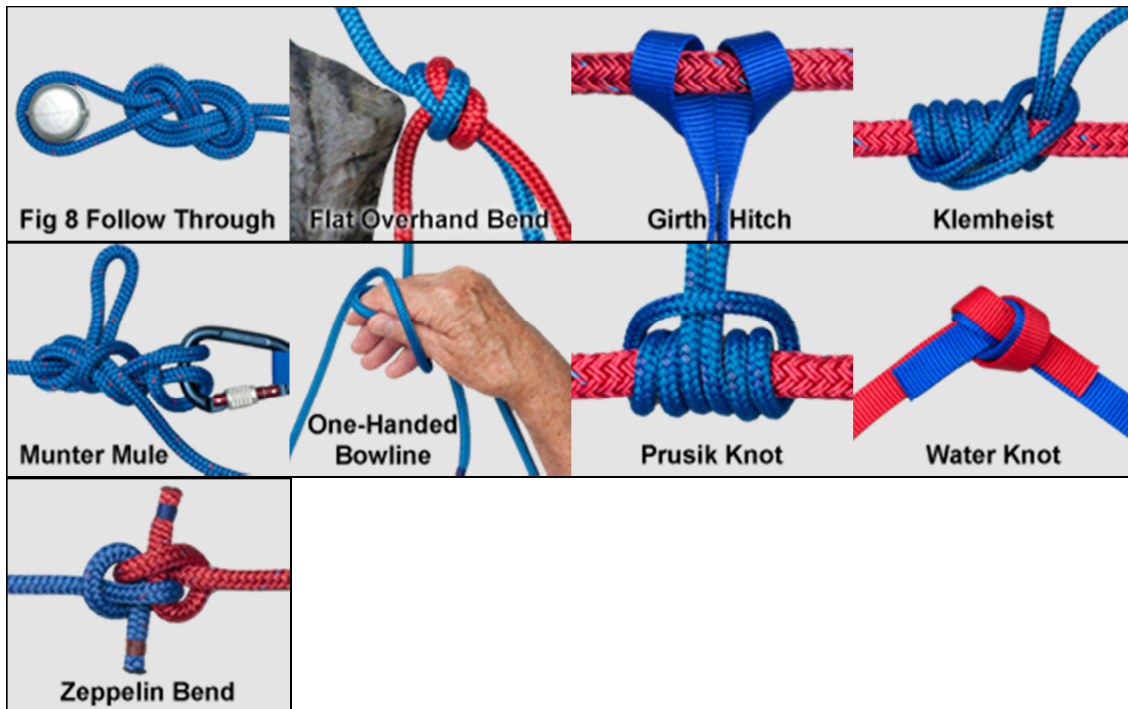
- **Sport climbing:** For sport climbing people often like to use a long rope, 60 meters or even longer. The added length allows climbers to be lowered to the ground from top anchors, on increasingly long pitches. If you intend to use your rope a lot in this context, look at how long the pitches at the area you will be climbing, and how much of your climbing will be in this area. Other features to look for: for working a route, taking repeated falls and rests, go for a medium weight and medium durability rope. For doing your hardest red points, weight will become more critical, so buy light. Finally, as I mentioned above, bicolor ropes can be really helpful in sport climbing, to reduce the risk of lowering your leader off the end of the rope or being caught hanging.
- **Multi pitch rock climbing:** It's hard to generalize about multi pitch rock climbing, but usually 50 to 60 meter ropes of around 10 mm diameter will work well in most areas. One of the main considerations would be how long you think the pitches are going to be on the routes you'll be doing. Some routes (a small number of them, admittedly) go better with 60 meter ropes because of where the belay anchors are. An increasing number of rappel routes are set up for 60 meter ropes. There are several examples of this in the Shawangunks, for instance.

# Grog's Index of Climbing Knots



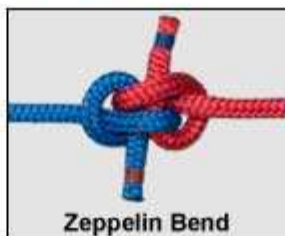
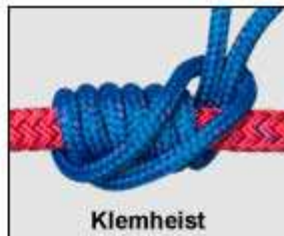
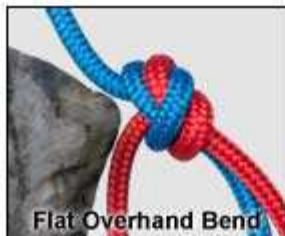
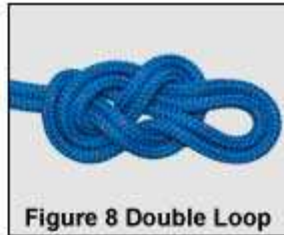
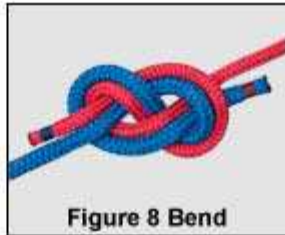
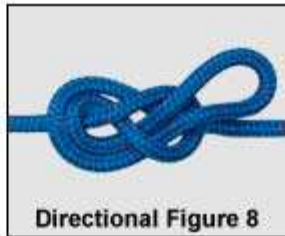
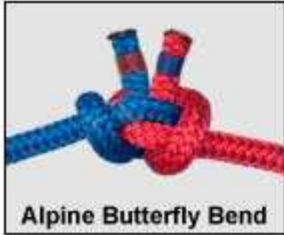


**Instructions:** Move the mouse over each knot. Look at the description to find out what it can be used for. Click on the knot you wish to see. On the new page wait until the selected knot starts to tie itself.





# Grog's Index of Climbing Knots



## Climbing Knots

### Welcome to Climbing Knots

These animated knots are for climbers, rescue workers, arborists, tower-climbers, and others who use rope in man-carrying applications. Select the knots from: the index above left; the pictures above; or the Climbing Usage page.

### Selection

This selection is based on consultation with, and feedback from, many experienced climbers.

### Omissions

The Overhand Knot and the Figure 8 Knot, which both underlie other Climbing Knots, are included in the Basics Section.

### Deaths

Climbing, caving, etc., are challenging and dangerous. The American Alpine Clubs' Statistical Tables for North America report over 30 deaths a year for the last 55 years. This website is about knots. It is no substitute for thorough instruction and expert supervision. Knots and anchoring techniques used for rappelling must be checked, checked again, and appropriate. For example, a quick-release hitch, e.g., a Highwayman's, must never be used for rappelling.

### Climbing Ropes

A climbing rope is typically about 60 meters, or 200 feet, long. However, longer ropes are available, up to and in excess of 85 meters. Climbing ropes have changed greatly with the introduction of newer materials. Today's ropes are stronger, lighter, and thinner and come with different characteristics:

- **Static ropes** are more durable, more resistant to abrasion, and lack elasticity. They should only be employed where shock loading never occurs: rappelling (abseiling), spelunking, or canyoning. They can be used to belay a climber. However, a **lead climber** should **never** employ a Static rope: in a fall, the rope lacks the required elasticity to minimize injury. Manufacturers typically use only two colors for the sheath.
- **Dynamic (Climbing) Ropes** stretch under a shock load, absorb some of the shock force to protect the climber. They are designed to belay a lead climber or for top-roping. Manufacturers typically use three or more colors for the sheath to distinguish them from static ropes.

### Links

To read more about climbing/caving ropes and their care go to the Outdoor Adventure Network Article on Climbing Rope; Indoor Climbing's Article on Rock Climbing Ropes; Rock Climbing's article on Climbing Ropes Explained; or Storage & Ganter's article Physics for Cavers: Ropes, Loads, and Energy. For details about testing rope, knots, and gear, go to Tom Moyer's Website.

### Modern Alternatives

Descent devices such as Brake Bar Racks and "8" rings are kinder to the Static rope and easier to manage than a Munter Hitch. In addition, various devices are available to use instead of the Prusik Knot or the Klemheist. However, in an emergency, the knots described here are reliable, trusted alternatives which require only a locking carabiner.

**Uses and Options:** Choose what you want to do and make a selection from a list of the options.

### **Joining Two Ropes**

- Reliable join which is easy to undo
- Bend based on Alpine Butterfly Loop
- Join two ropes – compact, neat knot
- Join ropes based on familiar Fig 8 knot

### **Make a Loop in a Piece of Rope**

- Make a loop in middle of piece of rope
- Loop in the end of a piece of rope
- Loop in rope end using one hand
- Secure a figure-8 loop to a ring or bar
- Double loop in middle of a rope
- Loop in rope for pull in one direction

### **Abseiling (Rapelling)**

- Knot for controlled descent (or ascent)
- Loop Hitch for Climbing a Rope
- Join avoids catching during descent

### **Temporary Hitch**

- Quick hitch

### **Slide and Grip Knots**

- Slide and Grip Loop – one direction
- Slide and grip used by arborists
- Slide and Grip Loop, either direction
- Slide and Grip Knot, using rope end

### **Webbing Knots**

- Join the ends of two pieces of webbing
- Attach webbing loop to harness

### **Coil Rope to Prevent Tangle**

- Make chain to shorten rope

### **Make Knot on Rope's End**

- Reliable stopper knot

## **Select the Use You Need**

The list above provides you with some of the uses you are likely to need while climbing. Visualize what you would like to do. Move the mouse over the items. Read the description. Click on the item you decide best meets your needs.

### **Omissions:**

The Overhand Knot and the Figure 8 Knot are included in the **The Basics** section although they form the basis for many Climbing Knots.

**Fast Medium Slow**

**1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 Back View**

Use the **Arrow Keys** or hover over the Buttons above. [View Video](#)

### **Double Fisherman's, or Grapevine Bend, Knot Tying**

Overlap the two ends. Wrap one end around both ropes two full turns. Then pass this end back through these turns and pull tight. Next pass the other end two full turns around both ropes. Pass this end back through and pull tight. Pull on both ropes to tighten the two knots against each other.

### **Double Fisherman's Knot, or Grapevine Bend, Details**

**Structure:** The Double Fisherman's, or Grapevine, Bend (ABOK # 294, p 50.) consists of two Strangle Knots (like double overhand knots) each tied round the other standing end. However, because it is created around another line, this structure may not be obvious.



Triple Fisherman's Knot

**Safety:** For load-bearing using modern high modulus ropes such as Spectra, Dyneema or Kevlar/Technora, use a **Triple Fisherman's**. In each stopper knot the rope is passed around a third time before being threaded back through the loops. The triple, or even quadruple, version is also used by fishermen to join two lengths of fishing line.





### The Prusik Knot

**Uses:** The Double Fisherman's Knot (Grapevine Bend) is *the* way to join two ends of a line to form a Prusik Loop and is also an excellent and reliable way of joining two climbing ropes. It can be used for a full rope-length abseil; after which it should still be possible to retrieve the rope.

**Inspection:** The Double Fisherman's Knot (Grapevine Bend) is not complicated. Nevertheless, it can be tied wrongly and then fail. If you tie it and your life depends on it, inspect it carefully. If *someone else* ties it, inspect it *extremely* carefully.

**Pros:** The Double Fisherman's is a well known, reliable, compact knot suitable for use when retrieving an abseil.

**Cons:** The Double Fisherman can lock up so tightly that it is effectively welded. Although it is regarded as a standard method of joining climbing ropes, the Zeppelin Bend performs the same task but is much easier to undo because it does not jam. The Figure 8 Bend may be bulkier - especially when stopper knots are added for safety. It is however, relatively easy to teach and inspect.

### **Munter Mule Combination Hitch Tying**

Pass the rope into the carabiner. Twist the rope above into a loop and hook it onto the carabiner to take the load. Create two loops and then, around the climbing rope, tie a slip knot leaving a long loop. Use it to tie a Half Hitch to secure the knot.

### **Munter Mule Combination Hitch Details**

**The Munter:** The Munter Hitch - (the Italian Hitch), 1 - 6 in the animation, allows controlled descent when rappelling (abseiling). The climbing rope passes through a locking carabiner,

round the rope, and back through the carabiner. For controlled descent, the brake hand need only apply relatively little force on the free end.

**The Mule:** The Mule Hitch, 7 - 11 in the animation, is used to secure the Munter. Using a bight of the rope, a Slip Knot followed by a Half Hitch is tied around the standing end. This final Half Hitch is essential because the weight of the hanging rope might otherwise easily undo the Slip Knot. When loaded, the Mule knot tends to slide down tight against the Munter and can be somewhat difficult to undo.

**Requirements:** Use a carabiner large enough to allow the hitch to be inverted through the carabiner when pulled. The load end should pass first round the spine side (not the opening side) of the carabiner. Then during descent, the rope will not chafe against the lock with the risk of opening it.



Munter Hitch for Small Rope

**Using Thin Rope:** In an emergency, modern, high strength, thin rope can be used for the Munter. Additional turns should then be taken round the spine of the carabiner to reduce the strain as shown here. These extra turns are not necessary with 11mm climbing rope.

**Advantages:** The greatest advantage of the Munter is that it can be used with minimum equipment – just a locking carabiner.

**Disadvantages:** The Munter kinks the rope, imparts a twist to it during descent, and also makes the rope fuzzy if used often.

## Munter Tied Off with Half Hitches



Munter Tied Off with Half Hitches

## Munter Tied Off with Overhand Knot



## Munter Tied Off with Overhand

**Alternatives for Tying-Off:** These two pictures show two of the alternative methods for tying-off the Munter: Two Half Hitches, and the Overhand Knot.

The animation used the mule with a half hitch but the Overhand Knot is more common. Some climbers use three half hitches in preference to two.

**Control Heavy Load Descent with Super Munter:** When lowering a heavy load, an extra turn can be added to make the Super Munter. The added turn through the carabiner provides extra friction and, as a side benefit, prevents twisting of the rope.



**Normal Mirror**

**Fast Medium Slow**

**1 2 3 4 5 6 7 8 9**

Use the **Arrow Keys** or hover over the Buttons above. [View Video](#)

## Handcuff Knot Tying

Use the rope to form two identical loops. Overlap them as though tying a Clove Hitch. Then thread each loop through the other loop and tighten. Insert the victim's limbs into the loops, tighten, and apply traction.



## Handcuff Knot Details

**Origin:** This knot was described by Ashley (ABOK # 1134, p 206) for use as a handcuff. However, the knot possesses minimal locking action and could never live up its name. For added security the two ends can be tied together with one or more Overhand Knots.

**Use:** In Search and Rescue Operations, the Handcuff Knot is avoided because of the inherent danger of **damage to the victim**. However, it is worth considering if there is no other way of rescuing someone trapped, e.g., in a crevice or in a hole below grade. The two loops are placed around the wrists or the ankles. The two ends are then pulled to tighten the loops for traction. It can also be used to restrain an animal or drag an animal carcass.

**As a Chair:** The size of the loops can be fixed by using each end to tie a half hitch around the adjacent loop. The loops can then be placed around the thighs to lift someone in a seated position. If capable they hold the lifting end; if not, the free tail is wrapped around the torso and tied back to the lifting end.

**Tying it:** As shown in the animation the initial stages are exactly the same as those used when using Loops to tie a Clove Hitch.

**Caution:** This method of applying traction to limbs is potentially traumatic and must be used only when alternative lifting methods cannot be employed.



**Fast Medium Slow**

**1 2 3 4 5 6 7 8 9 10**

Use the **Arrow Keys** or hover over the Buttons above. [View Video](#)

### **Hasty Webbing (Emergency) Harness Tying**

Tuck a loop of the strap into the waistband. Pass both ends back between the legs, around the thighs, through the initial loop and around the waist to use up the strap. Secure it with a Square (Reef) knot backed up with Half Hitches. Lift with a carabiner through the loop and waist turns.

### **Hasty Webbing (Emergency) Harness Details**

**Structure:** The Hasty Webbing Harness enables a temporary lifting harness seat to be constructed from a piece of webbing strapping.

**Technique:** Approximately twenty feet of webbing strap is required. Form a loop about six inches away from the center of the webbing and tuck the loop into the waistband. This means that the final knot will be tied above one hip. For security the Square (Reef) knot must be backed up with a pair of Half Hitches either side of the Square (Reef) knot.

**Comments:** I am indebted to Boyd Hoyle for his reminder that Square knots are best avoided in safety applications. While fully supporting his caution, there is no ideal alternative which acts as a binding knot and readily cinched tight. A Water Knot may be more appropriate for webbing but it is almost impossible to tie quickly and cinch it tight. And, it too would require back-up half hitches either side.

**Alternative Harness:** Alternative webbing harnesses can be found online such as the Swiss Seat which employs a similar principle.



Use the **Arrow Keys** or hover over the Buttons above.

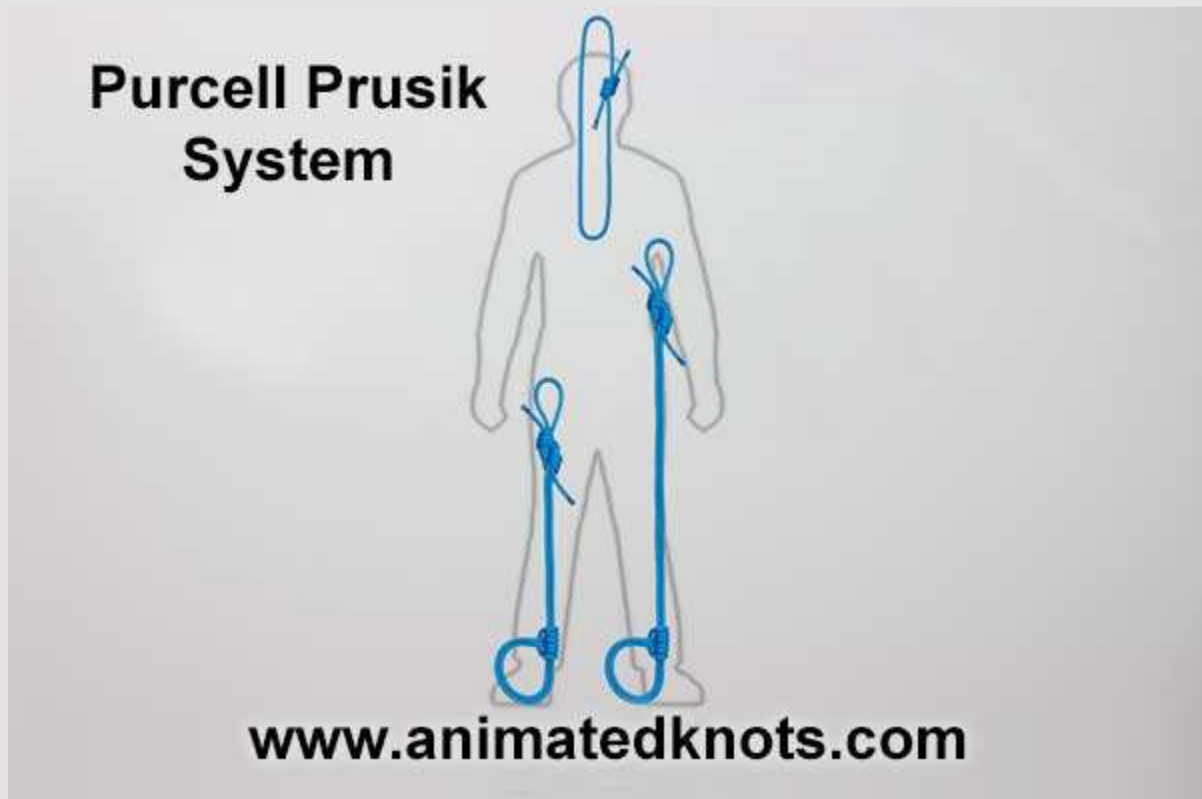
### **Purcell Prusik Tying**

Lay the rope out to form two loops with the ends overlapping. Use the overlapping section to tie a Figure 8 knot. Twist the long loop to form a pair of three-turn coils. Position these coils to form a tube. Pass the short loop and the Figure 8 Knot through the tube. Tighten the tube and adjust the length.

### **Purcell Prusik Details**

**Purcell Prusik Loop** is an adjustable loop suitable for making the components of the Purcell Prusik System and an adjustable tether. - The Purcell Prusik System is standard personal protective equipment for many rescue personnel operating in technical Search and Rescue settings.

**Uses:** This system is utilized for a wide range of applications including: adjustable attendant/patient tethers, load releases/transfers, or friction hitches/rope grabs.



Purcell Prusik System

**The Purcell Prusik System** comprises three components: a long foot Purcell Prusik, a short foot Purcell Prusik, and a harness or waist Prusik. The top of the Figure of Eight loop on the long one should reach the chest/nipple height of the rescuer; the top of the Figure of Eight loop on the short one should reach the rescuer's iliac crest (top of hip bone.) The Harness Prusik should reach from the chest/ nipple line to a height about 4 inches above the helmet. See the measuring guide below.



## Purcell Prusik Tether

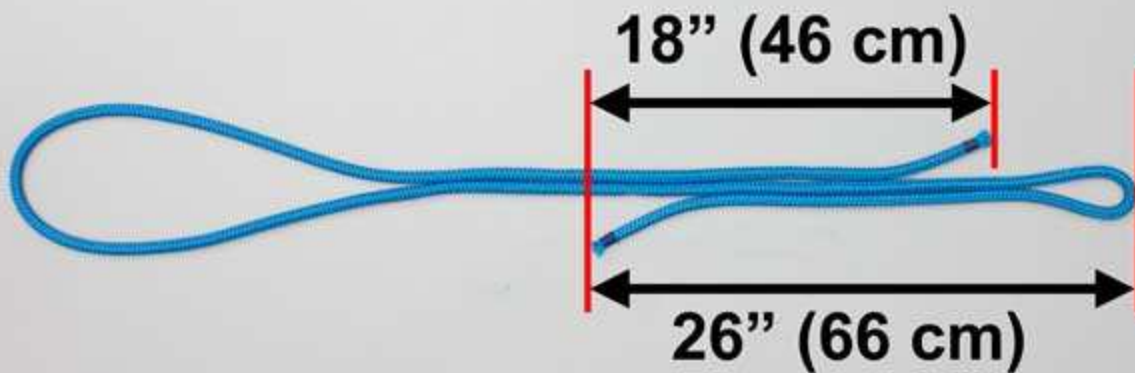


[www.animatedknots.com](http://www.animatedknots.com)

### Purcell Prusik Tether

**The Purcell Prusik Adjustable Tether** uses a Purcell Prusik Loop. It must be used with the small loop at the bottom. Then, if the climber grabs the Figure 8 Knot, it holds instead of slipping.

## Purcell Prusik Lengths



[www.animatedknots.com](http://www.animatedknots.com)

### Purcell Prusik Lengths

**Measuring Guide:** Typically constructed with 6 or 7 mm cord with the following overall lengths: 1.5-2.0 meters (Harness); 3.5 meters (Short); and, 4.5 meters (Long). The picture (right) shows the usual length for the small loop and for the overlap.

To tailor the overall lengths more accurately for an individual, the tables below show suggested lengths. These tables are derived from data originally shown on the The Swiftwater Rescue Website:

#### Total Length in Inches Height Long Short Harness

|           |     |     |    |
|-----------|-----|-----|----|
| <b>60</b> | 156 | 135 | 64 |
| <b>61</b> | 157 | 137 | 65 |
| <b>62</b> | 159 | 138 | 65 |
| <b>63</b> | 160 | 139 | 66 |
| <b>64</b> | 162 | 140 | 67 |
| <b>65</b> | 163 | 141 | 67 |

#### Total Length in Meters Height Long Short Harness

|             |      |      |      |
|-------------|------|------|------|
| <b>1.50</b> | 3.92 | 3.41 | 1.61 |
| <b>1.55</b> | 3.99 | 3.47 | 1.64 |
| <b>1.60</b> | 4.07 | 3.53 | 1.68 |
| <b>1.65</b> | 4.14 | 3.59 | 1.71 |
| <b>1.70</b> | 4.22 | 3.64 | 1.74 |
| <b>1.75</b> | 4.29 | 3.70 | 1.77 |

|           |     |     |    |
|-----------|-----|-----|----|
| <b>66</b> | 165 | 142 | 68 |
| <b>67</b> | 166 | 144 | 68 |
| <b>68</b> | 168 | 145 | 69 |
| <b>69</b> | 169 | 146 | 70 |
| <b>70</b> | 171 | 147 | 70 |
| <b>71</b> | 172 | 148 | 71 |
| <b>72</b> | 174 | 149 | 72 |
| <b>73</b> | 175 | 151 | 72 |
| <b>74</b> | 177 | 152 | 73 |
| <b>75</b> | 178 | 153 | 73 |
| <b>76</b> | 180 | 154 | 74 |
| <b>77</b> | 181 | 155 | 75 |
| <b>78</b> | 183 | 156 | 75 |
| <b>79</b> | 184 | 158 | 76 |

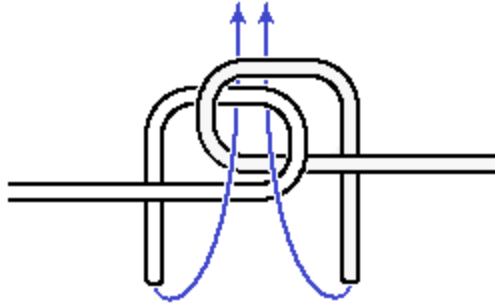
|             |      |      |      |
|-------------|------|------|------|
| <b>1.80</b> | 4.37 | 3.76 | 1.80 |
| <b>1.85</b> | 4.44 | 3.82 | 1.83 |
| <b>1.90</b> | 4.52 | 3.88 | 1.86 |
| <b>1.95</b> | 4.60 | 3.94 | 1.89 |
| <b>2.00</b> | 4.67 | 3.99 | 1.92 |

**Tying the Purcell Prusik:** The animation shows the two coils forming in the long loop as if by magic. The practical method to form the two coils is by wrapping the line around the finger and thumb. Then join the finger and thumb together to arrange the coils neatly as shown.

**Advantages:** The Purcell Prusik Loop provides an excellent system for ascent/descent and also makes a safe adjustable tether.

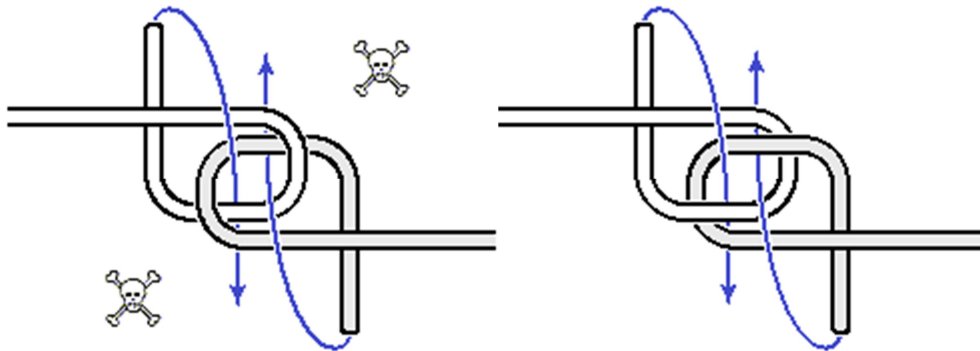
**Disadvantages:** Some climbers report finding the system somewhat bulky.

### **Butterfly Bend**



This is a pretty decent bend that is nothing more than a Butterfly Loop with the loop cut. It's not completely symmetric, but it has good security and is pretty easy to tie and untie.

### Evil Impostor



**Evil Impostor of Ashley Bend & Butterfly Bend (ABoK #1408/1409)**      **Ashley Bend (ABoK #1452)**

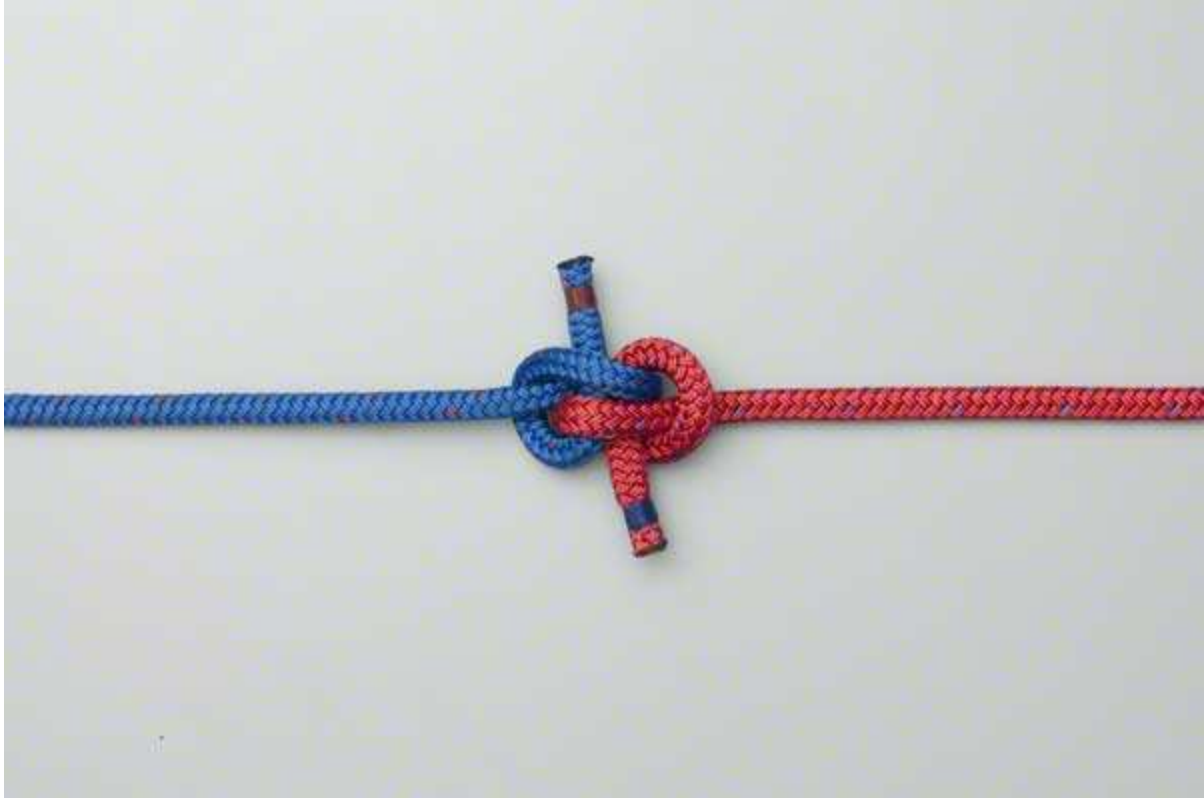
Both the Butterfly Bend and the jam-prone Ashley Bend\* can be mistakenly tied to form something that looks like the intended knot, but has poor security properties and can roll apart under certain loads in certain conditions. What makes this more dangerous is that the negative properties of this evil impostor are not usually apparent when setting the bend.

This evil or malignant impostor bend is discussed by Ashley in his Book of Knots as entry #1409 and as its more stable shifted form under entry #1408. The only difference between the two is that the more stable form has its free ends rotated or twisted relative to one another in the opposite direction from the insecure version.

Although the danger of tying this impostor is greater in the attempted Ashley Bend, one can imagine the "b" shape rotated counterclockwise, revealing that this same path of error for the Butterfly Bend is at least possible. The general knot form of the half hitch loop is another possible evil impostor for the Butterfly Bend

and the Butterfly Loop, especially with some alternative tying methods for the loop.

If you feel that you may make such a mistake for these bends, the Zeppelin Bend is an excellent alternative, which has no serious impostor risk when tied with the "b" and "q" method, and may be immune to evil impostors regardless of method. The issue does not seem to affect the two common means of tying the Butterfly Loop shown here.



**Normal Mirror**

**Fast Medium Slow**

**1 2 3 4 5 6 7 8 Back View**

Similar:

**Alpine Butterfly Ashley Hunter's Zeppelin**

Use the **Arrow Keys** or hover over the Buttons above. [View Video](#)

### **Zeppelin Bend Tying**

Form a bight in both ropes and overlap them. Pass each end around across itself - going over for the top bight and under for the bottom bight. Thread both ends past each other through the middle. Tighten to form the Zeppelin Bend. Back view.

### **Zeppelin Bend Details**

**Uses:** The Zeppelin Bend is one of the bends employing interlocking overhand knots. It is a reliable bend that can be untied even after being heavily loaded but not, however, while still under load. It is an excellent alternative to the more widely used Double Fisherman's because it eliminates the risk of jamming.

**History:** The Zeppelin Bend has been described as used to secure Airships. Vice Admiral Charles Rosendahl, Commanding Officer of the American Zeppelin (Los Angeles/ZR3), was supposed to have insisted that the knot be used to moor his airship. Doubt has now been cast on both the use and the authorship.

Giles Camplin, Editor of Airship Heritage Trust's Journal Dirigible reported the following in Issue No. 60, Summer 2010: (1) the docking procedure typically employed shackling two wires together; (2) in later life Rosendahl claimed ignorance of the knot; (3) a Zeppelin knot cannot be untied under load; (4) a bend joining two ropes would be an awkward way to moor anything; and (5) a rigger who flew on the R100 reported they always used a Rolling Hitch.

**Similar Knots:** The Zeppelin Bend is remarkably similar to several other bends including the Ashley, Hunter's, and the Alpine Butterfly Bend. Essentially all these knots employ interlocking overhand knots with the ends threaded through or across the middle. David M. Delaney tested these bends and the Carrick Bend for their tendency to jam. He heavily loaded the knots tied in 1/16 inch braided nylon. The Ashley and the Hunter's consistently jammed tight and would have had to be cut to release them. The Alpine Butterfly Bend, the Zeppelin, and the Carrick could all be untied easily using fingers and fingernails. Amongst the family of bends based on linked overhand knots, it would seem prudent to avoid the Ashley and the Hunter's.

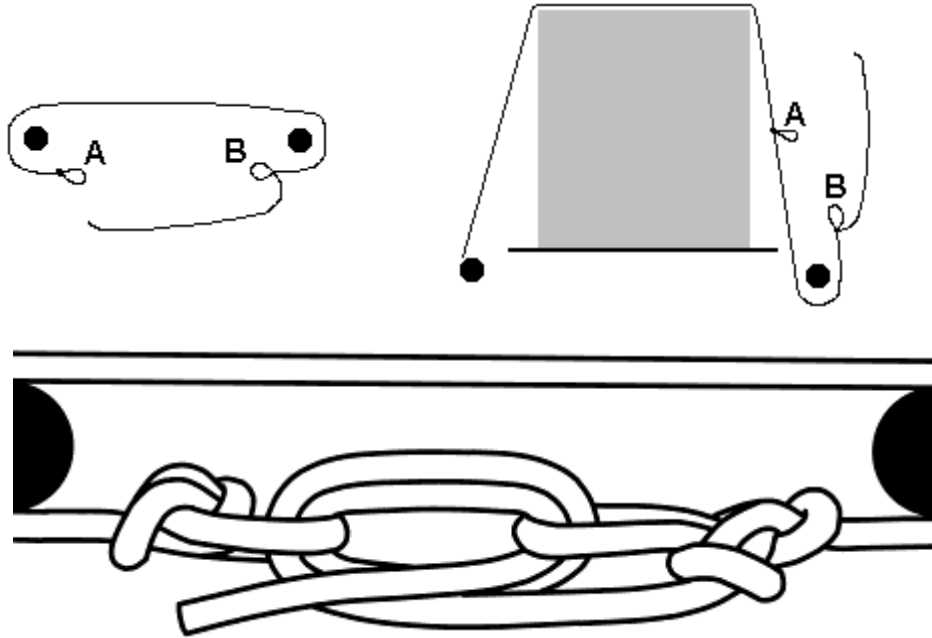
**Tying it:** The arrangement of the interlocking loops and the path of the ends through the center are critical. Although the Zeppelin is secure and can be untied easily, its similarity to other bends employing interlocking overhand knots risks confusion - and mistakes. For this reason we also recommend the Alpine Butterfly Bend tied using the same technique employed for the Alpine Butterfly Loop. Technique is critical because Roo emphasizes the risk of creating an Evil Impostor when tied incorrectly.

**Advantages:** The Zeppelin Bend is reliable with very little tendency to slip or bind. Testing by Roo found the knot to be exceptionally secure and shake-resistant in all materials. In this respect he regards it as superior to the Alpine Butterfly Bend.

**Disadvantages:** Attention to tying it correctly is critical. After it is tied, it can be hard to distinguish it from the less satisfactory Hunter's Bend.

**Versatackle**





The Versatackle is a self-locking method of gaining mechanical advantage with rope much like a block and tackle.

At both "A" and "B", put the loop of your choice. I prefer a Butterfly Loop or Span Loop for making a loop on the bight. Take the extra rope coming from B and pass it through loop A, then back through B, then A, then B. **Go through each loop the same direction each time for best results.** For example, in the first diagram, the free end would always be circling clockwise between the two loops.

Typically, you pull the free end through each loop two or perhaps three times, depending on the rope and the situation. As mentioned before, it is self-locking, meaning that just by pulling the free end and letting go, the Versatackle's internal friction will hold the load.\*

Use it for binding, clamping, pulling or whatever. The downside is that it can cause premature rope wear. If you're tying down a load on a truck, tie the butterfly a few feet off the bed, loop the rope down around a hook, and tie another butterfly with plenty of extra rope, as shown in the second diagram. You can figure out the rest from there. This concept is easily adapted to various uses.

You can also gain mechanical advantage with a rope in a little more involved method called the Spanish Windlass. With fewer tucks, the Versatackle can be used to lower a heavy load. The Versatackle has a high mechanical advantage, so occasionally feel the ropes as you tighten things to avoid applying too much force. If you often use the Versatackle for the same task, leave the loops tied in the rope to save time.

---

\*It's always good practice to tie off the free end of the Versatackle to keep things tidy, even if

you don't think it needs the extra security.

There are scores of tie-down systems loosely referred to as Trucker Hitches which only use one loop on the bight, and are tied off with a slipped half hitch or the like since they are not self-locking. Since they only simulate a single-pulley system, they do not develop much tension, and the tension that is developed is partly or mostly lost in the process of tying off, depending on the dexterity of the tyer. If you decide to use such a system, be sure you familiarize yourself with decent loops on the bight, such as the Butterfly Loop, Span Loop, or Farmer's Loop.

A Spanish windless (or windlass) is a device for moving heavy loads such as rocks and logs.

#### ***WARNING***

When setting up a Spanish Windless do not use nylon or other synthetic fiber ropes that stretch under a load. If you slip or let go of the poles the energy you used to stretch the rope will be released as the rope returns to its original length. This release of energy could cause the poles of the windless to spin around causing injuries to anyone near by. Natural fiber ropes, such as sisal, have little stretch; therefore are much safer to use.

#### ***MATERIALS:***

■ 1 - 10' (3 meter, 8 cm) pole

■ 1 - 7' (2 meter, 8 cm) pole

■ 1 - 3/4" (2 cm) rope, 65' (or 20 meters) long (natural fiber)

**SET-UP:**



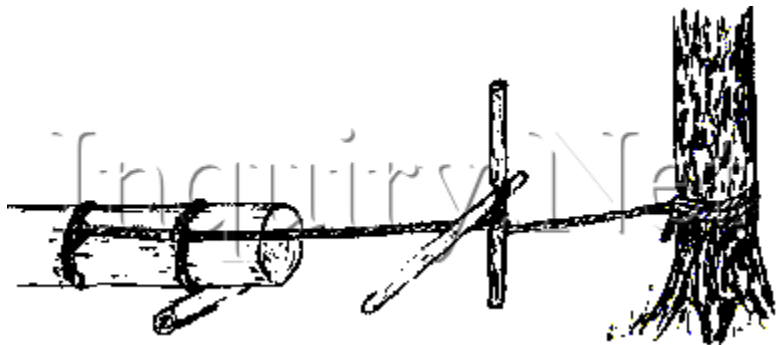
*STEP 1:* Tie one end of the rope to the load and the other end to a secure anchor point. Leave some slack in the rope so that the windless can be rigged.



*STEP 2:* Follow the diagrams to set up the poles at the mid point of the rope.



*STEP 3:* While one person holds the upright pole, a second person rotates the longer pole around the upright so that the rope begins to wrap around the upright pole. Adjust the height of the rope so that it can be easily stepped over.



*STEP 4:* Continue to rotate the longer pole around the upright.



*STEP 5:* As the rope wraps around the upright it will be necessary to move the base of the upright to keep it vertical.

**NOTE:** Be careful that the two ends of the rope are kept at the same level on the upright.

We have all heard of withes. Can you make one?

**Hickory Withes.** Select a green branch of Mockernut, Shagbark, or Pignut hickory, of diameter to give strength required. One-half inch is a practical size for hand work. The longer, straighter, and more uniform the branch, the better it will serve your purpose. Carefully trim off all lateral twigs if any exist. Holding the branch firmly in both hands, bend it from butt to tip and in every direction, gently at first to avoid kinks. Continue this "working up" process until the entire stick is supple, taking care not to leave stiff or unworked sections.

Now tie it into an overhand knot, large at first, then reduce the size of the bight by sliding along the end and standing (tip and butt). Continue to wrap the ends around the original loop until they are used up. A good withe when completed should have three strands in every part, be free from kinks and nearly circular. Such a withe will withstand an outward strain of from 100 to 1,000 pounds.

We know that withes (sometimes spelled *wythes*) have been in use by civilized peoples for the past four hundred years, and beyond a doubt they were used by the ancient tribes. Bacon relates the story of a condemned Irish rebel early in Queen Elizabeth's reign, or about 1560, who requested of the deputy that he "be hanged in a withe, not a halter." Withes in those days were made of willow or osier. The hickories are American trees and supply our best material where great strength is required. Ax and hammer handles, as well as wooden axles, whiffletrees, and ox yokes, are examples. This wood will not, however, withstand exposure to the weather.



*A Hickory Withe Made By Frank Stoll*

The uses of withes are too many and varied to enumerate in detail, but in general they have served the purposes which ropes and iron bands now serve. A few suggestions follow: For hoops or bails on tubs, pails, or baskets; as a binder for the top of a tripod for open-fire kettle, poles for tepee, or for derrick; for holding banisters and railings in place or for shackles in the game of "Stung."

Woodcrafters might try substituting withes wherever ropes are needed as binders, and report the uses.



## How to Make a Rope

**By Frank Stoll**

Did you ever make a rope? It is an ambition worthy of every Woodcrafter. "But," you say, "how can we make ropes? The materials from which they are made are found in distant lands." Commercially and generally speaking, that is true, although cotton, of which the United States produces 60% of the world supply, is used extensively in the manufacture of cords and lines. Cotton is perhaps the most flexible of the commercial materials and is sufficiently strong for the smaller cordage. Common hemp is superior, possessing the combination of strength, flexibility, and durability.

Custom among sailors has decreed that the term "rope" indicates that the diameter is one inch or more. Other authorities agree that the diameter may be one-half inch or more. However, we hear cords of one-quarter inch diameter called "rope."

The principal rope materials are: common hemp, Manila hemp, sisal hemp, Phormium hemp, Sunn hemp, Jubbulpore hemp, jute, coir, flax, agave fiber, and cotton, all of which are vegetable.

A rope is composed of a certain number of strands, the strand itself being made up of a number of single threads of yarn. Three strands twisted together form a "hawserlaid" rope. The prepared fiber is twisted or spun to the right hand to form the yarn; the required number of yarns receive a left-hand twist to form a strand; three strands twisted to the right make a hawser; three hawsers twisted to the left form a cable. Thus the twist in each operation is in a different direction from that of the preceding one. The yield of rope from a given length of yarn is about three-fourths of the length of the yarn composing it.

The material from which you make your rope is, for the purpose of learning, of less importance than the method employed. Almost any available fibrous material will serve your purpose. The young, inner bark of most shrubs and trees is very adaptable. The accompanying illustration is made from such bark of the hickory, is about the color of Manila paper, is reasonably flexible and very strong. The length of the individual fibers is of little consequence, since in hand-made rope additional pieces are twisted into the "strand" as required to maintain a uniform size.

Having selected your material, make three little bundles of uniform size. Around each bundle, near one end, wrap a single thread of the material. Now place the three bundles parallel, with binding threads at the same point, and again wrap a thread around the three directly outside of the first three threads. These bundles are your strands. Holding this foundation firmly in the left hand, with thumb and finger tips at the band, take one strand in the right hand and twist it to the left; meanwhile wrap it outside of the other two strands to the right. Hold this one in place with the thumb of the left hand, while the same twisting and wrapping operation is practiced on strand number two. Now hold the two in place, retaining the twist, while the third strand is twisted and wrapped. All that now remains is to repeat the process, introducing additional threads to the strands as others are used up in your progress.



*1. Hondas Used on Catch Ropes.*

*A & B-Method of Tying the Lariat Loop.*

*C-Wire Added for Protection Against Wear and to Increase Weight.*

*D-A Metal Half Honda Used for Weight.*

I sat for an hour in my room the other afternoon watching a boy trying to rope an old packing box out in the alley behind our house. The poor fellow did not know the first principles of handling a lariat and his efforts to snare the box with the old clothes line he was using were pathetic.

Finally I took pity on him and went out with my ropes and showed him the inside on the trick. A day or two later I saw him out in the same alley, this time with a brand new rope, which he was dropping on the box quite regularly.

The trouble with this boy in the beginning was largely in his rope: the best roper in America could not have done much with the old clothes line he was using. Just any rope one happens to pick up will not make a lariat. Trying to use the clothes line has discouraged many a boy and girl ambitious to become a roper. For throwing, secure 35 feet of new Manila rope, 3/8 inch thick, at any hardware store. There are other types of rope used in roping (See Chapter IV), but there are none of them suitable for a beginner to start practice with. The 3/8 inch Manila rope is the ideal practice rope. Buy one. Splendid ready-made Manila lariats are on the market, but be sure you specify 3/8 inch.

Tie a lariat loop at one end, forming the eye or "honda." To do this, a simple overhand knot is tied as in Picture 1, Figures A and B, and the end passed through as indicated by the arrow. Study the photographs carefully and you will get the method. The eye thus formed should be from 3 to 4 inches long. Tie an overhand knot on the end to prevent it from pulling out. Jam the whole knot as hard as possible. Now pass the other end of the rope through the honda and you will have a lariat, or lass-rope, or riata, or soga, or just plain rope as those who use it frequently are most prone to call it. "Lasso" is seldom used as a name for a rope; it is a verb and refers to the act of throwing a rope. "Lariat" comes from the Spanish "La riata."

No, you do not need a metal honda on the throwing rope. That is the mistake so many beginners make. Such a heavy honda would render the rope practically useless for our purpose. After one has become a good roper and wants to weight his rope on the end for certain uses, he can easily do so by winding a little wire around the honda. Brass hondas have their use but not on throwing ropes of this type. Many a horse has had his eye knocked out with these heavy metal hondas, and many a boy has injured his playmate with their.

A still better honda than that obtained by the lariat loop described above can be made by doubling the end back and splicing it there with an eye splice. This is much less common than the lariat loop, however, due probably to the fact that few cowboys know how to splice.

A little wire wound round the end of the honda as in Figure C, Picture 1, prevents wear, as well as adding a little weight, which is often desirable.

Bill, who was a little shaver in camp and just learning to rope, foolishly sank the noose of his lariat over the head of one of the camp's peppy young riding horses who wasn't used to ropes, cowboys and such things. No sooner had the noose settled than the colt's heels were up in the air



and he was off across the pasture field with the unfortunate and much dazed Bill dragging on the ground behind him.

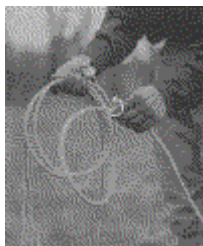
What happened was that the knot which Bill had tied on the "home" end of his rope to prevent it from unraveling had caught somewhere in his short or belt or top part of his trousers (he doesn't know yet just where, nor how) and before he realized what was happening he was on the ground and bounding his way over the bumps. Being the little fellow that he was, his weight furnished little resistance to the frenzied horse, who tore most of the way around the circle of the "ranch" before Bill was able to disentangle himself from the rope.

The mistake Bill made was in putting the knot on the end of the rope. Knots have a habit of doing such things. What he should have done was to lash the end with a piece of twine. Had he been on horseback the knot might have caught somewhere in his saddle or trappings and both he and his horse given an unexpected upset.



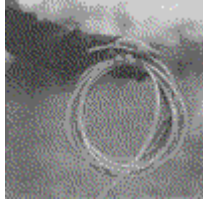
*2. The Noose on the Catch Rope  
Ready to be Thrown*

We are now ready to rope. Holding on to the honda, throw the rope out on the ground and shake the kinks and twists out of it. Now shake out a noose in the right hand as in Picture 2. The noose should be roughly four or five feet long, the exact length as it hangs making very little difference, and the honda should hang about half way down or a little more. Be sure the honda is on the outside-the side away from you. That is important. Now with the noose all arranged, coil up the lariat with the left hand, taking the coils in the right hand. Each coil should be about 15 or 18 inches long. When the coiling is completed, transfer the coils to the left hand, as in Picture 4, taking the end between the thumb and finger. This coiling should be carefully done so that the rope will run out smoothly from the hand when it is thrown.



*3. Coiling-Give the Rope a  
Half Turn With Your Fingers  
Each Time You Lay a Coil in*

To be able to coil a lariat neatly and quickly is an accomplishment in itself and there is a little trick to it which can be easily picked up. As you hold the noose in your right hand as in Picture 2 and bring the coils around with your left hand, give the rope a half turn toward you with your fingers each time as you lay it in your hand, as indicated in Picture 3. This makes the coils lie flat in your hand and prevents the kinking which is so annoying.



*4. Hold the Coils  
in the Left Hand.*

For the position you are in just before throwing, study Picture 5 carefully. Standing in this position, swing the noose up and around overhead as in Picture 6. This is your wind-up. You do it for much the same reason that a pitcher winds up in baseball-it gives you steadiness and helps your aim. Furthermore, it opens the noose for the throw. This swinging is done with a right to left motion that is, as the noose passes in front of you it is moving from your right to left. As you swing it in the air you can let out more rope and thus enlarge the noose until it feels in your hand to be about the right size for the throw. Just how big the noose should be depends upon the object at which you are throwing-one has to learn to judge this from experience. Two or three swings should be sufficient.



*5. Ready to Throw.*

Let us suppose that we are roping a post in the back yard having wound up, step straight toward the post and throw. Keep your eye on the top of the post and throw straight at it. Do not throw in the general direction of the post and trust to luck that the noose will hit it: Put it there. Just as in baseball some players fail to bat consistently because they take their eyes from the ball a fraction of a second before the bat connects, or would have connected, so in lariat throwing you must keep your eye on the target constantly, from the time you start the wind-up until the noose hits or misses. You may do nothing more than wrap the rope around yourself the first time, but never mind that. Stay with it.



*6. The Wind-Up Swing.*

At the start it is best to stand not more than ten feet away from the post. Gradually you can work back to thirty feet, which is a good distance to test one's skill. It is the usual maximum distance for roping, although Texas cowboys sometimes succeed in making catches at forty or even fifty feet.



*7. Step Forward and  
Throw Straight At It.*

If these instructions are being followed, all you will have to do is to keep working. It will come to you before you know it. There is only one secret in roping, and that is work. To become a good roper you must practice, practice, practice. For my part, I never admit to myself that I can do anything of this sort until I can do it fifty times in succession on several successive days. Keep score on yourself as you practice: How many times out of twenty-five can you rope the post? Then how many out of fifty? Do not stop today until you have beaten yesterday's record.

You may have trouble at times in getting the loop to open for you as you swing it in the air. This is due to the fact that the rope is twisted. When such is the case there is no use trying to throw, nor is there any use putting your foot on the noose and trying to stretch the kinks out of it as amateurs are wont to do. Slide the honda down to the end, and, taking it in your hand, unwind and shake the twists out. Then re-coil and the noose will stay open. It takes time and is annoying, but there is no other solution.

**THE STRAIGHT THROW OR TOSS**



*8. Arrangement for the  
Toss or Straight Throw.*

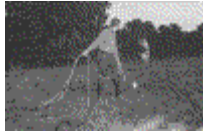
Another method of lariat throwing is the toss or straight throw, which is a cast without a wind-up, and is really much more useful and convenient than the wind-up method; in fact, in the actual roping of animals it is indispensable. Experienced ropers seldom use the wind-up except on horseback. To walk into a corral of horses swinging a noose around one's head preparatory to throwing would be the height of folly; it would work the horses up into a frenzy and make it exceedingly difficult to single out the one desired. Instead the rope must be thrown from the ground without any preliminary swinging. The wind-up is the usual method on horseback, but is seldom used on the ground.

Arrange the rope as for the wind-up throw, and stand as in Picture 8. Note that the palm of the hand holding the noose is up and that the noose is well to the rear. From this position step toward the post with the left foot and throw the noose over and down on it without any preliminary winging. At the start it is better to stand about six feet from the target and toss the noose over on it until the wrist develops the right motion. With a little practice this method becomes much easier and more fascinating than the wind-up.

## THE LEFT TO RIGHT THROW

Roping an animal around the neck with either the wind-up throw or the toss is a simple task, provided he is facing you or headed toward your right. If he is headed toward the left, however, the task is much more difficult and requires the left to right throw.

Arrange the rope as before, holding the noose in your right hand, but wind up by swinging it from left to right that is, as the noose passes in front of your body, it is moving from left to right. Cast so that the noose approaches the target from the left.



*9. Waiting for Him*

With the development of skill in handling the rope, posts and stationary targets soon become uninteresting and we want the challenge of a moving object. Dogs, calves, pigs, chickens, in fact everything in the neighborhood that could run, were pressed into service by the writer. It is in working on these dodging targets that we really develop skill in manipulating a rope and find the greatest joy in lariat throwing. The fascination is greatly increased, however, if we have learned the art of roping by the feet.

## ROPING BY THE FEET

The trick and fancy roping of the rodeos calls for the stunt of roping horses by the feet.

Have you ever watched the circus cowboys do it? If you have, you sort of wished you were a cowboy with a flock of horses, and could do the thing yourself. You can, and you do not even need a horse to practice on; you can rope the feet of a running boy and get just as much of a thrill out of it as if he were a broncho.

Tell the boy who is going to run for you to come fast and pick his feet up high. Let us hope that he is good natured and does not mind being tripped up now and then, for he can help you a great deal if he is so disposed. He will probably be "rope shy" at first-that is, just as you throw for his feet he will unconsciously and unintentionally slow up or shy away from you, thus causing you to miss. To prevent this, place a stick on the ground about ten feet in front of you and have him run over it. But caution him not to slow nor try to hurdle or jump over the rope.

Shake out a big loop on the ground, at least six or eight feet across for beginners, and arrange as in Picture 9. Note particularly that the back of the roper's hand which is holding the noose is toward the runner.



*10. After His Feet*

Now let him come and yell to him to come fast. Just as he passes throw the rope over and down at his feet, as in Picture 10. Note that the back of the roper's hand is still toward the runner. He has not just swung his arias around parallel to the ground; rather, he has brought it over and down, turning his wrist as he threw so that the back of his hand and consequently the same side of the loop is toward the runner.

That is the difference between throwing to rope him by the head and by the feet. In throwing for his head you throw straight at it, while in catching his feet you turn your wrist and get him with the back side of the loop. Try it a time or two: it is not as hard as it sounds.

If you timed it right the loop will be there waiting for him as he passes and he will step right into it. Really, he ropes himself. All you do is to toss the noose over and have it waiting for him. It will take a little practice to time it just right. You will probably throw too soon at the start -it is better to wait a little too long, if anything.

What if the boy is coming from the opposite direction? You make precisely the same movements as before. The palm of the hand holding the noose will, of course, be toward the runner as you rope him now, for he is coming from the other direction, but your wrist will be in exactly the same position as before.

### **ROPING SEVERAL RUNNERS**



*Picture 11*

A favorite stunt of the trick-roping cowboys of the rodeos is to catch several horses running side by side in a rope. This is by no means a difficult stunt, and any one who can rope one boy should have no difficulty in roping several (Pictures 11 and 12).



*12. All Five of Them  
by the Feet*

Have the boys lock arms to keep them close together, and tell them to sprint as fast as possible. Shake out a very big loop, and throw it just as you would if only one boy were running. Start by roping two boys, then add one at a time until you can manage six or seven.

### **ROPING HORSES**



Roping a horse by the feet is in no wise different from roping a running boy; exactly the same movements which caught the boy will catch the horse. Make the loop sufficiently big, and step right up and rope him.

Of course, you must have a rider for the horse who will put him past you within roping distance while you practice. If your horse will canter past without stopping short or shying when the rope is thrown you are indeed fortunate. We watch the fancy trick ropers and marvel at their skill, but we forget that some of the credit is due the horse and the man who is riding him. These roping horses are specially trained and the rider has worked with the roper so long that he knows just what to expect.

There are some horses which could not be ridden for roping in a hundred years, but most horses soon get used to the rope. Some will not shy in the least, even at the start. The best trick roper in

the world could not catch a horse consistently if he stopped or shied past him, so do not be too severe with yourself if you miss now and then with a green horse. Put him past at a good fast canter, about eight or ten feet in front of you.

### **ALL FOUR LEGS**

As soon as the rope hits the horse's feet, pull up quickly and you will have him trapped by the front legs. If you throw a big loop and hesitate just a second before pulling up you should have him by all four legs, which is a pretty and spectacular piece of roping. Having pulled the rope tight, drop it and let it drag on the ground. The rider should immediately pull up the horse and stop him, remove the rope and ride back for the next catch.

### **ROPING HORSE AND RIDER**

Toss a big noose over the horse's head so that it falls behind the rider, circling both the rider and the horse's neck.

### **HORSE'S TAIL**

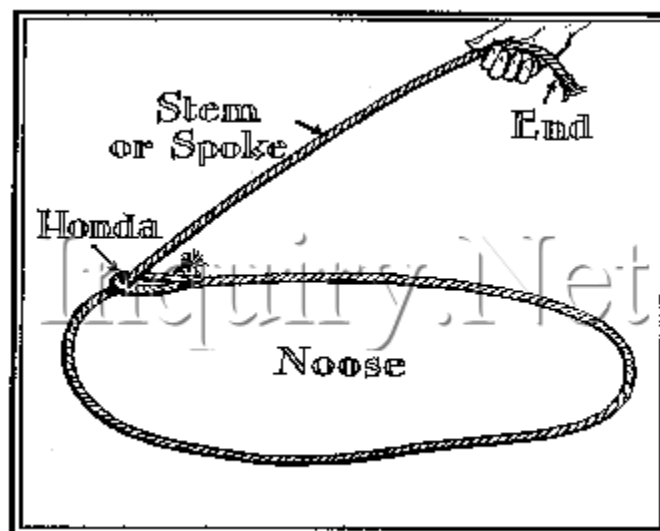
A clever stunt with which the trick ropers often conclude their exhibitions is to rope the horse by the tail. Use a small noose, and just as the horse canters by, flip it up against his hind legs, snaring him by the tail. Of course, you will have to stand very close to the side of the horse as he passes.

### **FANCY TRICK ROPING**

Fancy roping includes both lariat throwing and rope spinning. When the rope spinning stunts in "How to Spin It" have been mastered, particularly the ocean wave and the skip, it is possible to spin the rope for a few seconds while the horse is coming up, and then to rope him with the spinning noose. These tricks require years of practice and are beyond the scope of the average amateur.

### **THE MAGUEY ROPE**

The best quality 3/8 Manila rope recommended for the above tricks is the ideal practice rope for beginners, but those who develop a real interest in roping will probably want a Maguey rope (pronounced ma-gay), which is a Mexican hand-made rope of agave fiber. It is unexcelled for lariat throwing and trick roping. Lariat Types & Care contains the details regarding this rope, which is very inexpensive and can be obtained from any cowboy outfitters





When Vincenti Orespo, a Mexican cowpuncher, came to this country a few years ago and signed up with Buffalo Bill's Wild West Show, rope spinning was a thing unheard of. Ever since the first herd of cattle grazed its way across the western prairies, lariats were an indispensable item in the cowboy's equipment, but it was not until this Mexican put himself on exhibition for Buffalo Bill that it occurred to any one that a rope could be spun.

It was not so long ago that Vincenti came-rope spinning is really a very modern development in the use of the lariat. He was not a finished rope spinner, this Mexican; not by any means. But he was an excellent straight roper, and did a lariat throwing act which put most of our American cattle chasers out of the picture. And in the course of this act, he introduced a simple rope spinning trick or two which he had invented back home, and incidentally, showed to the world for the first time that a lariat could be spun.

Our American cowboys were not slow in picking up this new turn, and soon had stolen the Mexican's thunder, for they developed the stunt of rope spinning far beyond his wildest dreams, evolving in time the present day intricate art with its almost limitless variations, as we see it performed by our roping artists on the stage or in the Wild West shows. The American ropers were the first to jump through a rope.

Lariat throwing is one thing; rope spinning is something else. Lariat throwing is useful in catching horses and cattle on the ranches, and was indispensable in the early days. But rope spinning has no practical value, aside from the fact that it is splendid exercise and a wonderfully fascinating sport.

"I'd sure like to go on a ranch out West and see the cowboys spin a rope," said a boy friend of mine the other day as he was perspiring over a stubborn lariat which refused to spin for him.

When this boy's dream is realized, if it ever is, and he makes his trip to the western ranches, he will doubtless be distinctly disappointed, for search as he will he may not be able to find a single rope-spinning ranch hand (unless he goes to some of the dude ranches employing show cowboys), but he will find plenty of fine straight ropers who can rope and hog-tie a steer in less time than it takes us to tell about it. If he should single out the ranch boss and ask him why this is so-why none of his cow hands can spin a rope, he would soon find out in no unmistakable terms.

Should the ranch boss hire a man who can spin a rope he would have all the cowboys on the place spinning ropes-in fact, little else but rope spinning would happen if the men had their way, and the ranch work would be sorely neglected. So the ranch boss is uninterested when a fancy rope spinner applies for a job, and as soon as a man demonstrates his ability too often along this line he usually moves along to another ranch.

But as sport and recreation, rope spinning is more appealing than straight roping could ever be. There are so many different tricks and endless variations which add color and variety, and present constantly new challenges to one's skill and athletic ability. Then, too, it gives one a work-out.

In learning to spin a rope, a smooth floor is a big asset. Do not attempt it in the drawing room, however, especially if you are particular about the polish and fixtures, and do not practice in clothes which you expect to use for any other purpose. A rope has the habit of picking up all the dirt on the floor. Girls should wear knickers-a skirt will be constantly interfering with the rope.

In rope spinning, the rope is all important. One cannot pick up just any rope and hope to succeed. Most men have tried at some time in their lives to spin a rope but usually without success. The reason, no doubt, lies partly in the fact that the rope was not adapted to that purpose. A Manila throwing rope is useless for spinning.

If you have ever seen a roping artist in a lariat spinning exhibition, you will recall that he picked up a separate rope for almost every series of tricks he attempted. Without the just-right rope for the particular trick we are learning, our efforts are very likely to be futile. One finds this out more and more as he progresses. While learning to spin a rope, the writer has worked for weeks on a certain trick and failed, only to learn through experimentation that the rope was not right for that particular trick. With the proper rope success would have come in a few days.

The best quality of braided cotton sash cord is needed for successful spinning; this can be obtained from most hardware stores. Be sure to secure the 3/8 inch size, commonly designated as No. 12. Made up spinning rope in the proper lengths and weights to meet the demands of the tricks described herein can be obtained from your dealer or a manufacturer of spinning ropes.

For the beginner at rope spinning, 20 feet of rope is about the right length. In the trick pictured in the frontispiece, a 22 foot rope is being used. A small boy may find 17 or 18 feet a better length. Secure 20 feet, and after a trick or two have been learned, if the rope seems too long, cut it down. It is not wise for an amateur to try to use a long rope by holding it short. Cut it off.



15. *Hondas Used in Spinning Ropes.*

(a) *Wired Honda.*

(b) *Added Wire for Weight.*

(c) *Light Aluminum Honda.*

(d) *Heavy Brass Honda.*

Bend one end back and wire it there with copper wire, forming an eye or honda, about 3 inches long, as in Figure A, Picture 15. Pass the other end through the honda and the rope is ready to use. Some ropers prefer a light weight aluminum honda (Figure C), but it is not at all essential.

Are you looking for an easier way to untie jammed-up knots? Most people know the standard method of looking for "ears" or "collars" of rope in the knot to shift. What if you don't have that option, or it just isn't working? One other method is to quickly and **firmly** twist the parts of the rope just outside the knot back and forth as you push in slack.

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The reason this works is because of the phenomenon of compound sliding. For an example, set a book on a slight incline on which the book will stay put. Now, start pushing the book sideways with a pencil, and you'll notice that it'll start sliding down the ramp slowly even though it couldn't before. Friction forces act opposite of local relative velocity, so transverse motion takes very little force to occur. This also accounts for why it is easier to insert a plug gage in a hole if you twist as you push.

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Another method, for more complex knots, requires knowledge of the way knots work. Many knots have four parts of rope either going in or out of the knot in various places. If you jammed a loop knot by pulling on ends 1, 2, and 3, for example, the knot may be made to change into a

more workable shape by pulling hard on only ends 2 and 3, or maybe ends 3 and 4. An easy way to exert this force is by tying the desired ends to bars, and holding down one bar with your feet while you pull the other bar with your hands.

Because this final method could cause the knot to become more tightly jammed than before if you don't know what you're doing, this should only be used as a last resort if you can't get the twist & push method to work after several minutes.

### **The Power of Friction**

The frictional resistance force, demonstrated above, varies exponentially with the number of turns around the fixed round object and exponentially with the coefficient of friction. What that means is that given a big enough rope and a strong enough round beam, a child could gently lower a loaded log truck off the edge of a cliff as long as there are enough wraps around the beam.

Just be sure that the object you wrap around can take the force and the torque! If the object can spin, you will just have a pulley and thereby almost no frictional resistance to help you. Since the energy absorbed by the frictional resistance is converted to heat, if you lower a heavy load too quickly, you may burn or melt something.

This principle of friction is also used in the rope wrench.

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HOME

$$P_2 = P_1 e^{\mu\theta}$$

Where

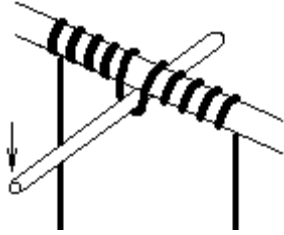
P = force

$e$  = Euler's constant [2.718...]

$\mu$  = coefficient of friction

$\theta$  = total angle of contact, in radians [ $180^\circ = 3.14$  radians, approx.]

### **The Rope Wrench**



Need to apply torque to a pipe? As demonstrated in the Power of Friction page,

rope can really grab, given a few turns.

This same principle can be used to torque a smooth cylindrical object. Use a

long bar as shown above and plenty of turns of rope to get a grip. You can use

fewer turns of rope if you put a tight binding knot on the ends or if you weight

the ends of the rope to resist what little force is left at the ends of those coils.

If you don't want to mar the object you're turning, wrap the lever with leather

or some other cushioning material.

If the cylindrical object is free to rotate or roll, the lever can winch or windlass

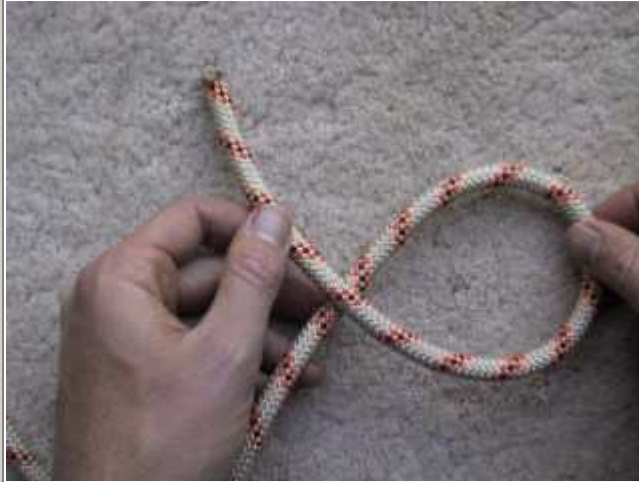
the rope in with considerable force, depending on the lever length and drum diameter

The double overhand is used occasionally as a stopper knot, tied in the rope to prevent you from abseiling off the end.

It is more often used to tie loose ends off around the main strand of rope. It is also used to tie up knots such as the rethreaded figure-of-eight or figure-of-eight on a bight.

It is also used as the basis for the double fishermans bend to tie two ropes together.

Pass the end of the rope over itself...



... and then under itself and through the first loop formed.



Pull the knot tight and set.



The alpine butterfly is a useful knot as it enables a loop to be tied in the rope. While you could use a figure-of-eight loop, it has the ability to be less strong in this situation.

Pass the length of rope across your palm.





Wrap the rope around your hand to make a complete turn.



And once more.



Reach under the outermost loop with your other hand and pick up the middle loop



Pull the middle loop out and over the other two loops.



And then feed it back through the other two loops.



Pull the three parts of the knot (the two ends plus the loop) to tighten and set.



The one-sided overhand bend is often referred to as the European De due to the fact that it looks insufficient for tying two ropes together. 1

one of the best knots to use to tie two ropes of equal diameter together for an abseil. While the double fisherman's bend is a stronger knot, the EDK is easier to tie, easier to undo, and less prone to catching on sharp edges on the pull-down. However, this knot may be unsuitable for tying together older ropes, as the weaker knot **combined** with the loss of strength in older rope may be unsafe.

Note that EDK sometimes refers to the figure-of-eight version of this knot.

**Do not use this to tie two ropes together.** If set badly, it can unroll with less than 50kg of weight, and is extremely dangerous.

This knot should be tied with at least 30cm (12 inches) of tails in the free ends, to avoid any chance of it unrolling and the knot failing. It should only be used to tie together two ropes of the same or similar diameter.

See the link above, and also Rope Sport Myths for other links to information on this and other knots for tying two ropes together.

Hold the two ends together and pass them over the main ropes.



Feed the two ends through the loop formed...



... and pull tight and set the knot



The tape knot, as its name suggests, is used to tie the ends of tape (we usually into a loop for an anchor).

It is actually just an overhand bend tied in tape, but rarely known as such. Note that tape knots can fail under cyclic loading/unloading, so you should ensure that the knot has sufficient tails (20 cm/8 inches) if you have a number of people abseiling off the anchor. You should also check carefully if you are using a knot set by another party, as the margin of safety may have diminished.



Start by tying an overhand knot in one piece of tape, making sure not to introduce any twists.



Starting from the free end, retrace the original knot with the second piece of tape.



Continue retracing...



...until you have retraced the entire knot.



Pull tight and set the knot



The Munter hitch, probably known more correctly as the Italian hitch Knot to know for climbers and abseilers. It can be used as a descende belay device for climbing, if you don't have an alternative.

**If you haven't used it before, make sure that you test it under controlled conditions before using it in a real application.**

### **Prusik Knot**

A Prusik knot, named for its inventor Dr. Karl Prusik, an Austrian mountaineer in the



1920s,

is a

sliding friction knot or hitch that is used by climbers to ascend a fixed rope. The knot, tied with

a loop of cord attached onto the rope, is clipped to the climber's harness and then pushed up

the rope by the climber. When it is weighted by the climber, the knot grips the rope, allowing

the climber to ascend upward.

Prusik knots have advantages and disadvantages:

- Usually used in pairs.

- Are easy to tie.

- Don't damage the rope

- Can slide down as well as up the rope.

- Can be tied with either a thin cord or a nylon sling.

- Are ineffective on icy ropes.

- Are prone to tighten up after being weighted or loaded.

- Are commonly used in emergency situations such as escaping a belay after an accident or

- ascending the rope after falling into space below an overhang.

Prusik is also used as the verb "to Prusik" meaning to ascend a rope using a Prusik knot.

Also "Prusiking" is the act of ascending a fixed rope with the knots.

The cords used to tie Prusik knots are usually called "Prusik slings."

## **How to Tie and Use a Klemheist Knot**

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The Klemheist knot, like a Prusik knot, is a friction knot or slide-and-grip hitch that is tied

around a climbing rope with a thin length of cord. When a climber loads his weight onto the

knot, it tightens and cinches onto the rope. Klemheist knots are used in pairs to ascend a

fixed rope by sliding the knots up the rope. Since the Klemheist is not symmetrical like a

Prusik knot, it is only useful for going one way on a rope.

### **Klemheist Knot is Easy to Tie**

It's very important to learn this friction knot so if you have to do a self-rescue, you will be able

to do it and won't be floundering at the end of your rope. The Klemheist knot is easy to tie and

with a bit of practice you can tie it with one hand. The Klemheist knot is superior to a Prusik knot

because, unlike the Prusik, it is easy to loosen up after being weighted. It also can be tied with

slings or webbing rather than just cord, making it ideal to use if you're not carrying Prusik slings

#### Step 1: How to Tie a Klemheist Knot



#### **Step 1: How to Tie a Klemheist Knot**

To tie a Klemheist knot you need “Prusik slings,” which are two lengths of thin cord (preferably

5mm or 6mm in diameter). The thinner the cord is in relation to the thickness of the climbing

rope, the greater the ability of the knot to grab the rope. It's best to make the Prusik slings

about two feet long, although some climbers like having one of the slings as long as four or

five feet. Buy a five-foot length of thin nylon cord that is specifically made for climbing.

Avoid buying spectra cord since it can melt if the knot slips. Tie the ends together with

a double-fisherman's knot, forming a closed loop.

### **First Step to Tie a Klemheist Knot**

The first step to tie a Klemheist knot is to take the loop of cord and place it behind the main

climbing rope. Then, after leaving an open loop about 4 inches long at the top and with the

knot in the cord at the bottom, wrap the cord around the rope four or five times. Keep the

wraps neat and tidy.

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Step 2: How to Tie a Klemheist Knot



### **Second Step to Tie a Klemheist Knot**

The second step to tie a Klemheist knot, after you've wrapped the

Prusik sling around the climbing

rope four or five times, is to take the bottom tail of the sling (the end with the knot) and pass it

up through the open loop at the top of the knot. Tighten down and dress the knot by neatly

arranging the wraps. Now clip a carabiner into the bottom open loop and test it. If it slips,

add another wrap. If it doesn't, you're ready to go.



The Klemheist knot, also called a Machard knot, is usually used by climbers in emergency situations when it is necessary to ascend a fixed rope, either to lend aid to an injured climber, to rescue yourself after falling on an overhanging face, or to self-evacuate after falling into a crevasse.

### **Escaping the Belay**

The Klemheist knot is also good for tying off an injured climber's rope and escaping the belay

to seek help. Remember always to tie the rope into the belay after you've escaped. Practice

tying the knot until you can tie it with one hand. This skill is useful if you're hanging below an

overhang or using one hand to hold a climber's weight with your belay device after he's fallen.

### **Best Ascending Knot**

Klemheist knots really shine if you need to ascend a fixed rope. While most climbers use

mechanical ascenders to climb a rope, Klemheist knots are a good substitute. If you're

going to ascend a rope, you'll need to tie two knots on the rope and use them in tandem

with one for the right hand and one for the left. The sling from the top knot is clipped

directly into your harness's belay loop. The sling from the bottom knot is clipped to a

sling for a foot loop. Some prefer clipping both slings to their harness so they're tied into

both knots and using separate foot slings for each foot.

### **How to Prusik**

To ascend the rope with knots is called Prusicking. Before you try this in an emergency, practice

so you're familiar with the motion because it isn't as easy as it looks! The basic technique is to

weight the bottom knot by standing in the foot sling. Then slide the barrel of the upper knot



(clipped to your harness) up the rope until it's taut. Now sit in your harness, weight the top knot,

and slide the lower knot up. Repeat the motion and you're golden. Again, practice and then

you'll know how to tie and use the Klemheist knot.

The Prusik knot was invented by Dr Karl Prusik (sometimes spelled F part of last century. The benefit of the knot is that it when weighted, it is tied around. When the weight is removed, it is free to slide. This in a number of self rescue situations.

The knot must be tied with a rope of diameter less than the main rope of the knot is reduced the closer the two ropes are in size. 6mm cord : abseiling rope is usually sufficient.

The number of turns can be adjusted to suit the conditions. More turns There are numerous other knots these days that perform the same function knot has largely been superseded. The one advantage that the Prusik is symmetrical, so is effective regardless of the direction of pull. The I be a little better if you want pull in just one direction.

|   |  |
|---|--|
| <p>The description assumes that you are tying the knot with a prusik loop (a short piece of cord tied into a loop).</p> |  |
|---|--|

|  |  |
|--|--|
| <p>Make a bight with the end of the cord, and pass it under the main rope.</p> |  |
|--|--|

Pass the end with the knot around the main rope ...



... and through the loop formed.



Repeat this process, passing the end with the knot through the loop.



And once more.



Pull the knot tight and set it neatly.

