Introduction to Sport Climbing

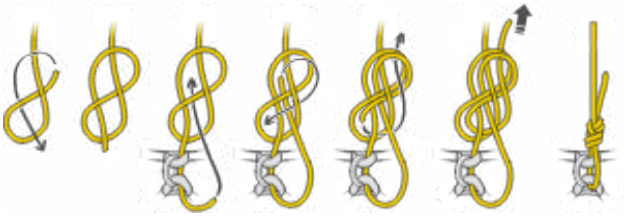
Knots and hitches

Below is a list of knots used by rock climbers and their common uses. A hitch is a type of knot that is tied around an object, most commonly a carabiner. When the object is removed the hitch collapses.

Overhand knot is the simplest knot. Can be used to join two strands of rope and is typically used when abseiling on two ropes.

Overhand knot on a bight is a simple and easy knot that is an option whenever a loop of rope (or bight) is required along a length of rope.

Rethreaded Figure-8 is most commonly used to tie into a harness. Always make sure that there is at least 10-15 cm of the tail of the rope left hanging out of the back of the knot.



(*Petzl*)

Figure-8 on a bight is similar to an overhand on a bight with an extra twist. It Is not very stable if pulled laterally so not the best option when loops are required along a length of rope but is useful for tying loops at the end of ropes, for example at the end of abseil ropes.

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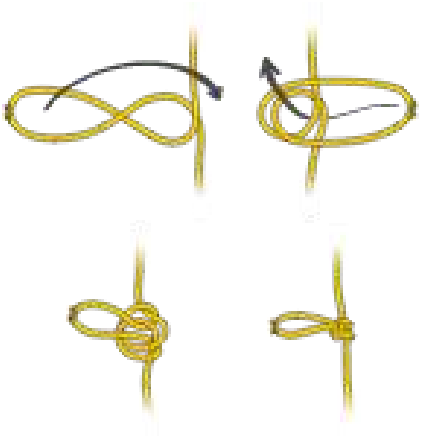
Alpine butterfly is a bight knot that can be used as an alternative to an overhand on a bight for creating loops along a length of rope. It has the advantage of being strong and stable when pulled laterally.



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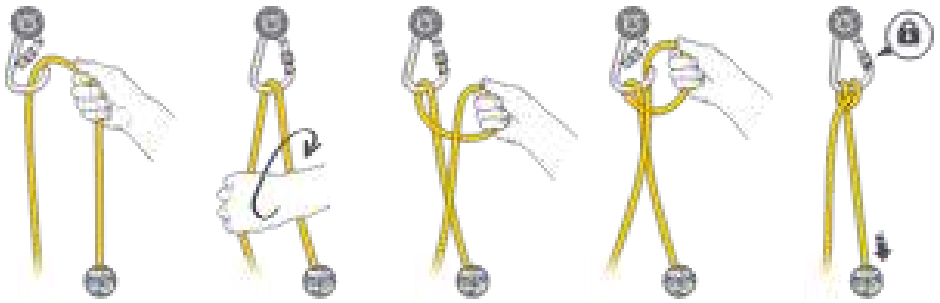
Double fisherman's is used to create prusiks from loops of chord and can be used to join two ropes together - especially if of different diameters.

Clove hitch is used to attach the rope to a carabiner and typically used to attach a climber to an anchor. It has the advantage of being adjustable without taking it off the carabiner and is easy to undo once loaded.



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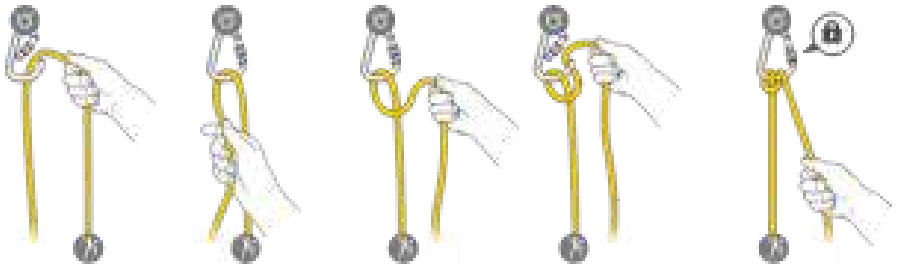
Italian hitch is a friction hitch (also known as Munter hitch) that can be used for rappelling and belaying.

Being able to lock off an Italian hitch with a *Munter mule* hitch is useful for rescue situations.



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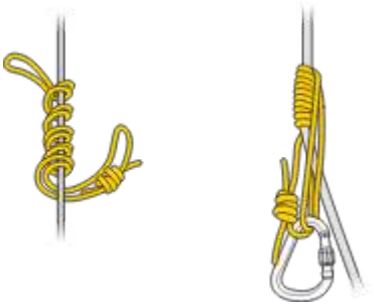
Prusik hitches

Prusiks are loops of cord and are lightweight, inexpensive and can be useful in a variety of situations. It is usual that 2 or 3 prusiks or other mechanical ascending devices are carried when climbing or mountaineering. Prusiks are made from lengths of 6 or 7 mm diameter chords with the two ends together using a double fisherman's knot.

There are dedicated hitches that prusiks are used for and three types that are commonly used:

French prusik locks in both directions and is releasable under load and therefore commonly used as an abseil backup**.** It is tied by wrapping a prusik loop around the rope a number of times and clipping both ends into a carabiner. It is important that there is not too much slack to ensure it grips so the prusik loop may need to be shortened with an overhand knot if necessary.



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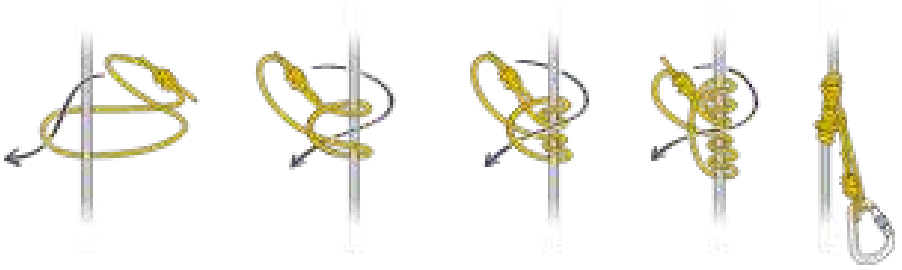
Classic hitch works with pulls in either direction along the rope. It is tied starting with a larks girth hitch) around the rope, with successive wraps fed through in the inside. Once tightened unc it can be loosened by wiggling the *Breaking bar* so that it can be moved up the rope.



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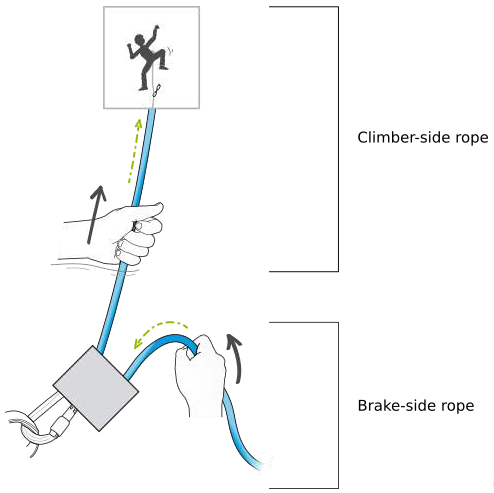
Klemheist hitch is quick to tie and is useful as it is the only prusik hitch that can be tied with tape sling. The disadvantage is that it becomes very difficult to release under load. It also works best when pulled in the downwards direction.

The number of wraps around the rope for all prusik knots should be a minimum of 3 but can be as many as 5 depending upon the diameter of the rope being ascended. The diameter of the prusik cord should be less than 2/3 of the diameter of the rope it is being wrapped around. Too many wraps will introduce too much internal friction within the hitch. This may prevent the prusik from working correctly and tightening around the rope when loaded. All prusik hitches must be neatly dressed to ensure they work well and correctly and always check that they grip satisfactorily before committing weight to them.

Belaying

Belaying is the process of controlling the length of rope in a roped climbing system using a belay device.



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Top roping is commonly used at crags with fixed anchors at the top of the established climbs. The rope is attached to these fixed anchors either by accessing the top of the crag from above or by the first climber lead climbing upwards from the ground. Subsequent climbers are then belayed from the ground or bottom belayed.

The live or climber-side rope refers to the length of rope between the climber and belay devices and the dead or brake-side rope refers to the rope that is on the other side of the belay device. It is important to have at least one hand on the dead rope at all times regardless of the device being used.

Coiling ropes in loops introduces twists that can make handling difficult. It is preferable to lap coil or flake ropes in a back and forth motion across the hand or shoulders so that there is always a gap in the loops. These coils can then be tied off into a rucksack coil for carrying or a single butterfly coil that is useful for strapping the rope to a pack for carrying.

Lap coiling rope

Clipping quickdraws

Aim to clip each bolt from a comfortable position alongside it. Although it is tempting to clip bolts as soon as you can reach them, avoiding this minimises the amount of slack rope out and is less strenuous than clipping from below. Care is needed when clipping the second or third bolts where it is often possible to hit the ground if slipping off whilst clipping with excessive slack.

It is possible for the rope to unclip itself from a quickdraw during a fall. To avoid this, make sure the rope is clipped so it comes up through the rope carabiner, with the gate facing away from the direction of travel and the rope running over the spine rather than the gate.

Sport climbing anchors

The most common top anchor setup are two ring bolts. Otherwise there may be a single ring or mallion equalised to two bolts. Old anchors may just have chain-link with a narrow diameter opening.

To clean a sports route with two ring anchors at the top:

1. Clip part of the anchor as a runner. Your belayer can take your weight and allow you to clip in hard comfortably.
2. Attach to anchors with either a PAS or two quickdraws.
3. Pass a bight of rope through both rings. Once through, tie a figure-8 on a bight and clip this to the belay loop of your harness with a locking carabiner.
4. Untie the rethreaded figure-8 (that you climbed on), remove the knot and pull through the rings.
5. Check that all your weight is back on the rope and your belayer is ready to lower BEFORE removing your PAS or quickdraws.
6. Lower to the ground.

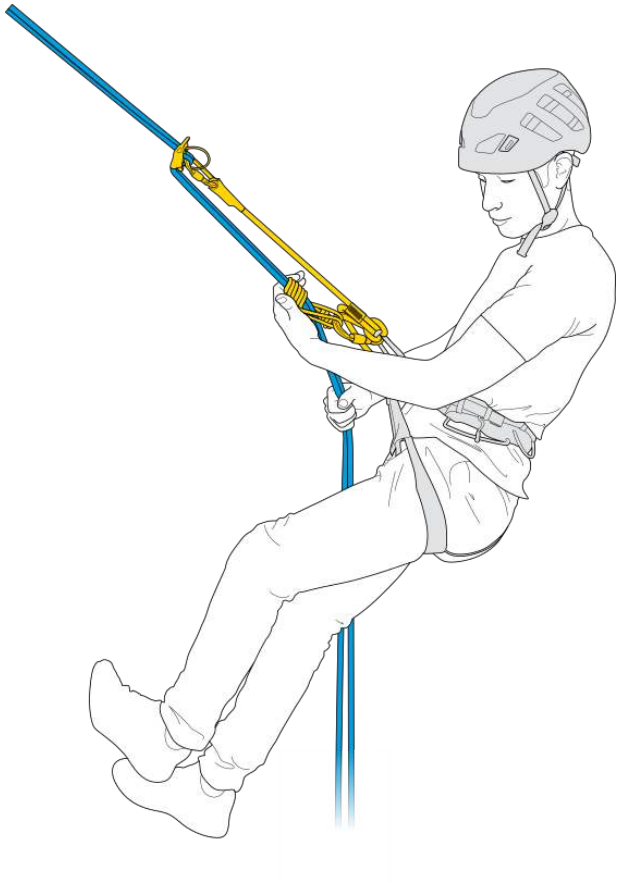
If the top anchors are too small to pass a bight of rope through, you will have to untie from the end, making sure there is no risk of dropping the end by tie-ing it in, and pass a single strand through the anchors before tying back in.

If the top anchor does not have a single focal point and the two rings are far apart or they are smaller, it may be preferable to abseil to minimise wear to the fixed anchors and the rope through excessive twisting.

Abseiling

Abseiling (also known as rappelling) is a fundamental technique required for climbing and mountaineering. Whether abseiling on a single or doubled rope, the principles remain the same. For pitched climbs that require steep abseiling often two 50 or 60 metre ropes are usually carried so that full pitches can be abseiled.

Abseiling systems



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An extended abseil system is most commonly used with the abseil device extended above the belay loop with a short, knotted sling or a Personal Anchor System (PAS) and the backup prusik attached to the harness belay loop. Although dedicated PAS are commonly used for sport climbing, for mountaineering an extended abseil is only used during the descent and for weight efficiency can easily be improvised from a 120cm sling when required.

A backup is often used when abseiling incase of inadvertently letting go of the dead rope. A backup is also useful when having to clean a route, manage rope or to construct multi-pitch anchors whilst hanging on the abseil rope. a French prusik can be placed around the rope and attached to the belay loop of the harness. French prusiks are preferable in this situation as they are releasable when loaded. It is important that the abseil device is extended sufficiently so that the backup prusik cannot interfere with the device which could result in it failing to lock.

A prusik backup can be avoided if there is someone at the bottom able to hold the rope. If this backup belayer is ready to pull down hard on the rope, the abseil device will lock. This is known as a Fireman's belay.

On all abseils where the rope doesn't reach the ground, individual knots should be tied in each end of the rope. Alternatively the first abseiler can stay tied into the end of one of the ropes, providing the ropes are secured at the abseil anchor.

Before committing to an abseil:

1. Ensure that the anchors are secure and attached correctly, you are likely already attached to the anchors so this would have been done already;
2. Check that your harness is on correctly and the buckle(s) are doubled back on non-self-locking harnesses;
3. Check your belay device is threaded correctly and the carabiner attaching your belay device to your harness is locked (squeeze the gate to test it);
4. Check that the end(s) of the rope are touching the ground or have a knot tied in it/them;
5. If you are using one, check your abseiling backup is working correctly (see below);
6. If you are using a *Personal Anchor System* (PAS) to attach to the anchor, all your weight should be on the abseil device and rope with the personal safety is slack as a check before unclipping it from the anchor.

Retrievable abseils

(Petzl)

Most of the time when multi-pitch abseiling in the mountains a Retrievable abseil system is required. This allows the rope to be pulled down after use in order to continue onwards with the descent. This is done by threading the rope or ropes through an anchor that is left behind and then abseiling on two strands of rope. When the bottom of the pitch is reached, one strand can be pulled to retrieve the rope(s). If using a single rope only half its length can be descended at a time.

Once a retrievable abseil is set up, the ends of the rope can be lapped and thrown down. It is common for the rope to get caught on ledges so the first person down should backup their abseil system leaving their hands free to manage the rope if need be so as to never allow the ends of the rope to get snagged above them.

On steeper faces and in windy conditions is to lap the rope over a sling attached to the side of the harness in ‘saddle bags’ for the first abseiler to carry down.

(Petzl)

Two ropes are often carried on longer steeper and more technical routes to enable full rope length pitches to be descended. There are a number of options to join two ropes but the simplest for tow ropes of the same diameter is using an overhand knot. The knot must be neatly dressed with at least 30 cm of tail for each rope as in extreme cases it is possible for this knot to roll and undo itself. A major advantage of this knot is that it has a flat surface that rolls well over edges. The ropes must be of similar diameter or very near to it. If not, then use a double fisherman’s knot.

To remember which strand of the rope to pull, the personal safety can be clipped around it. It is also important to remember to take the knots out before retrieving the ropes as they can get stuck at the anchor.

On lower angle broken ground it is best to keep abseils short to make the rope easier to manage. Many established abseil descents in NZ mountains are setup for 30m abseils.

Carrying a lightweight tagline (a thin 50m or 60m long 5.5mm diameter spectra chord or similar) allows full rope lengths to be abseiled without carrying a full second rope. The abseil is set up on the full rope and the tagline is used to pull and retrieve the rope.