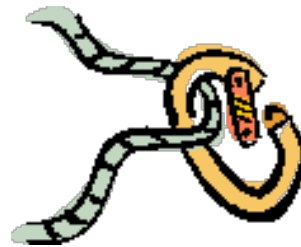


BELAY SCHOOL FOR APPLETON AREA SCHOOL DISTRICT

CLIMBING WALLS AND HIGH ROPES CHALLENGE COURSE



Rock climbing is a sport where you are always trying to push your limits. Expanding your comfort zone is a rock climber's goal and gratification. But a climber is only as good as their partner. A strong bond of trust is required between climbing partners and a climber must have enormous faith in the belayer to make that lunge they otherwise wouldn't or grab that pocket that looks way too small. Rock climbing is a team sport and a solidly trained team can go to great heights.

Rope-logy – “Cord”: Lifeline of our Program

Climbing Ropes

A climbing rope is typically about 75, or 105 feet, long. Climbing ropes have changed greatly with the introduction of newer materials. Today's ropes are stronger, lighter, and thinner and come with different characteristics:

Two Types of Ropes

- Static ropes are more durable, more resistant to abrasion, and lack elasticity. They should only be employed where shock loading never occurs: rappelling (abseiling) or, spelunking. They can be used to belay a climber for 3 to 1 system and Flying Squirrel in adventure education. 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 and protect the climber. They are designed to belay a lead climber or for top-roping. There is 8% stretch in 11mm rope. An 11 mm dynamic rope is used on all Ropes course and educational settings and 10.6mm used for indoor climbing wall. The overhead fall protection is approved by OSESH and exceeds 5,000. There is a minimum of 8 foot climb height do to the stretch under a load. Manufacturers typically use three or more colors for the sheath to distinguish them from static ropes.

Links

To read more about climbing ropes and their care go to the Outdoor Adventure Network [Article on Climbing Rope](#); Indoor Climbing's [Article on Rock Climbing Ropes](#); or Rock Climbing's article on [Climbing Ropes Explained](#).

Two parts of the Rope and Logging of Rope

1. Kern mantle ~ inside core of white fibers of rope, gives strength to rope
2. Sheath ~ outside covering (usually colorful)
3. Spools of 660 ft., cut to length for event,
4. Ropes must be labeled with color tape for identification
5. Rope Logs will be kept to keep track of number of climbs. Ropes will be retired at 1000 climbs or defective.

Test for Integrity

1. Test for integrity; slide rope through index finger and thumb feeling for: flat spots, tears, bugles, flicks, if question a defect have another person check spot.
2. Always check rope before (uncoiling) and after (coiling) climbing session
3. Store rope in dry/cool place – if wet or need to wash use Woolite and air dryer.
4. Don't step on rope! When dirt gets ground in rope it will start to abrade the fibers from within. Walking on rope is a disrespectful to rope! Call out "Pizza" when you catch someone stepping on rope. When using outdoor can use a tarp to coil rope on whenever possible.
5. Keep ropes away from: petroleum products, direct sunlight, suntan lotion/screen, or bug spray. Use hand wipes or baby wipes after applying sunscreen or bug spray.

Extra rope information

Climbing rope logs should be kept current and accurate! All events the ropes will be retired at 1000 climbs except Pamper pole (Leap of Faith), which will be retired at 350 due to the shear force and load on this rope. A retired rope it must be sprayed with BLACK paint or use black tape and cut up. They may be recycled for handrails, jump ropes, but NOT for climbing. Lastly, ropes that have sat unused for 3 years must be retired.

Personnel – are the weakest link in the system! Equipment (mechanical) does not fail people do!

Rock Climbing Knots & Knot Craft

Knots are central to climbing systems. They join everything - from the cord tied on your cams to the rope tied on your waist - and they help to create belaying and self-rescue systems.

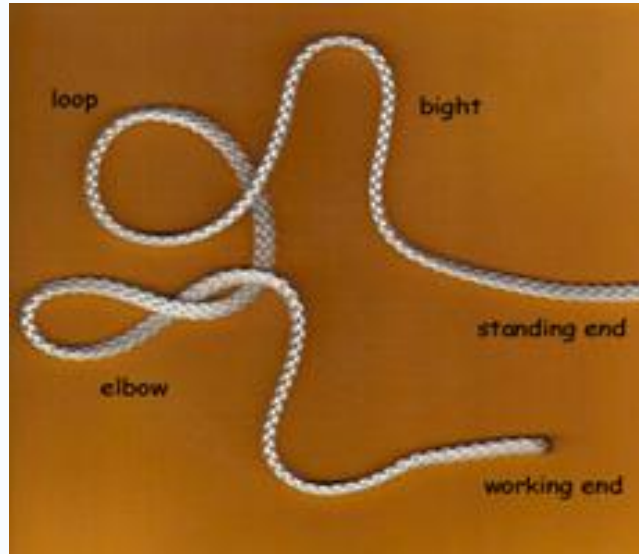
In a sport as complex as rock climbing, you might expect that you would have to master many dozen different specialized knots, yet nearly the opposite is true. If you learn just a few knots and their variations, you can have a long and successful climbing career. While there are a host of other knots available, we will only learn the most fundamental knots and their variations.

A few terms are useful as you learn these knots

- Live or working end: the end of the rope being used, the end you are holding in your hand
- Standing or running end: the part of the rope running toward the far end; if you are tying into the rope, the live end is the end you are tying into and the standing end is the end of the rope that lies in a pile at your feet
- Bight: a pinched bend in the rope; the strands do not cross

- Loop: a bend in which the strands cross
- Tail: the live end of rope left over after tying a knot, and sticking out of the knot
- On a bight: a knot formed in the middle of a rope
- Dressing: the act of making a knot neat and tight

Components of a Knot & Additional Knot Information



Great Resource for Knots

Wikipedia, the free encyclopedia. This site has animations of knots and history, theory, and more. Check it out!
["http://en.wikipedia.org/wiki/Knot"](http://en.wikipedia.org/wiki/Knot)

Additional Knot Sites

- [Tie knot](#)
- [Grog's Animated Knots](#)
- [How to tie over 35 knots](#)
- [International Guild of Knot Tyers](#)
- *Knot Tying Notation*, by Peter Suber. Not for beginners.
- *Knots on the Web*, an extensive collection of links, covering knot tying, knot theory, and knot art
- *Life on a Line*, a free online book about underground rope rescue which discusses various knots in detail with regard to their strength etc.
- [The Notable Knot Index](#)
- [Knot Tying Video](#) Commercial video/DVD on knot tying.
- [Gallery of animated knots](#)
- [Pictures of Common Knots](#)
- [Learning about tying and topology](#)
- www.videos.sailingcourse.com/bowline_bight.htm

Activity: Common Thread

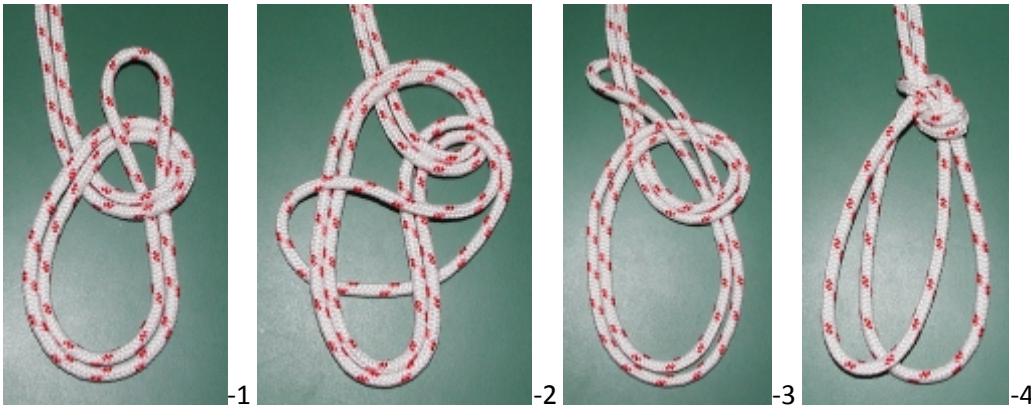
Types of Climbing Knots essential for Belaying Demo Knot: Whole, Part, Whole

Bowline on a Bight - It's a good knot because:

- It has redundancy
- It has two bights to clip into which reduces the shear force,
- Easy to check because if wrong it's a slip knot
- When loaded the knot is easily untied.

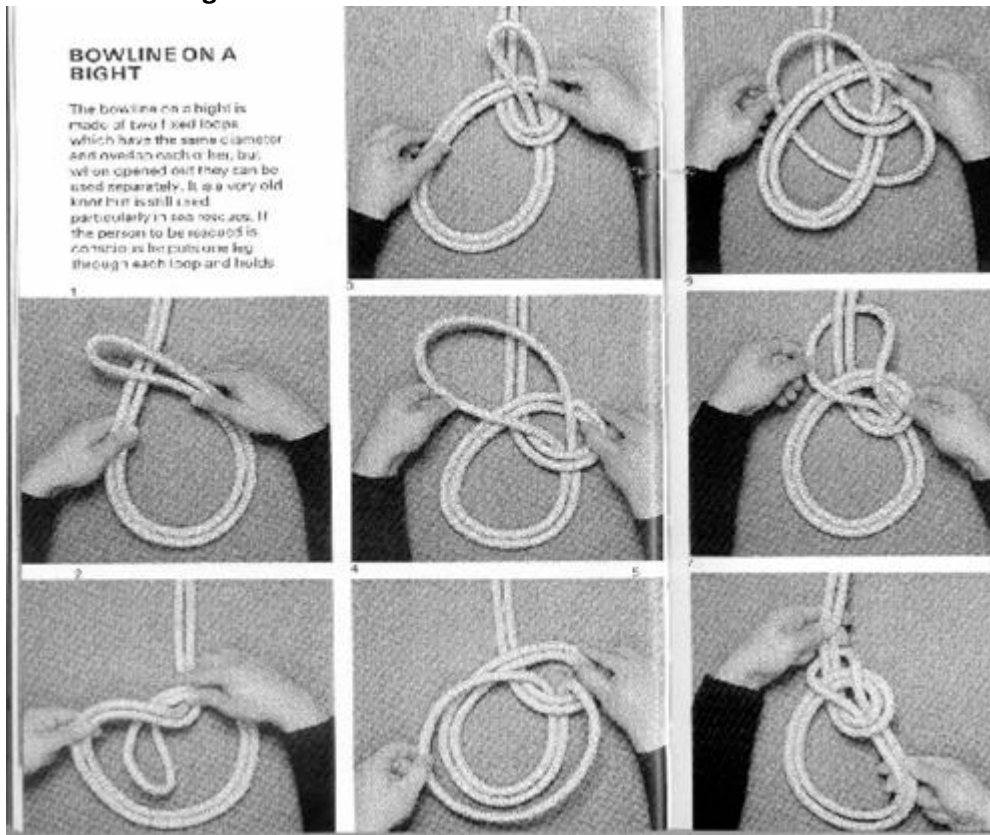
Bowline on the Bight

This is another double-loop variation of the [basic Bowline](#). To tie this knot, create a small loop in a doubled rope and bring the end of the doubled rope up through the small loop (picture 1). This creates two big loops which hang below the knot (where the [basic Bowline](#) has only one big loop). Now open up the end of the doubled rope and bring it down and around over the two main loops (picture 2), and then continue bringing it up above the small initial loop (picture 3). Dress and set the knot (picture 4). Now it looks like a [Double-Knotted Bowline](#) but with two loops instead of only one.



If you know how to tie the [basic Bowline](#) then the Bowline on the Bight is fairly easy to remember once you get the hang of it. It is easy to tie and easy to dress, it is easy to untie after it has held a load, and the two loops can be re-sized fairly easily. It is generally considered to have the same strength rating as the [basic Bowline](#).

Bowline on a bight:



Bowline on a Bight

Step #1	
Start with a bight of rope.	
Step #2	
Form a loop by bringing the end over the standing part.	
Step #3	
Insert the end of the bight through the loop.	

Step #4

Grasp the end of the bight and bring it toward you and down across the bottom of the loop.



Step #5

With your hand still on the end of the bight, drag it beneath all the material that makes up the loop so that it ends up behind the standing part.



Finished Bowline on a Bight - Front View

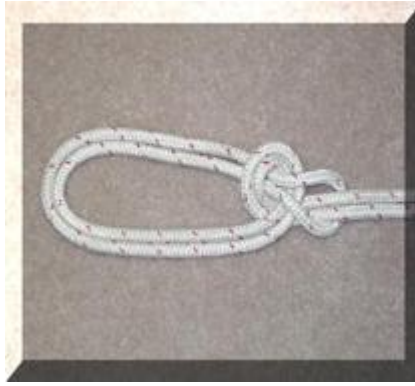
Pull on the lower loop to pull the end of the bight snug against the original loop. Pull on the standing part to set the knot



Finished Bowline on a Bight - Rear View

Pull on the lower loop to pull the end of the bight snug against the original loop. Pull on the standing part to set the knot





Bowline on a Bight

Double Overhand Stopper Knot

- Other names: Fisherman's knot, Safety knot or Back up knot
- Locks bowline on a bight
- Get tail out of the way of a climber
- Key words: Wrap over thumbnail, wrap around first digit of thumb, and replace thumb with tail (working end) and pull

Stopper Knot

The stopper knot is very handy in several situations. For instance you could tie one in the end of the rope it stops it unexpectedly passing through the belay/abseil device. Use it to backup your [bowline](#) on a bight knot. Two stopper knots are used to make the [double fishermans](#) for joining two ropes.

To tie a stopper knot in the end of the rope, follow these steps.

Step 1: Form a loop.



Step 2: Form a second loop behind the first one, as shown.

2.



Step 3: Pass the end back through both loops.

3.



Step 4: Pull tight.

4.



The Double Overhand Stopper Knot



Wrap the end of the rope round itself for two complete turns. Then, pass the end back through these turns and pull tight.

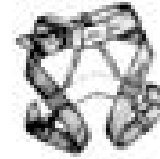
Automatic: Slow Fast

1 2 3 4 5 6 7 8

To tie the knot move the mouse along the numbers 1 - 8.

Key words: Wrap over thumbnail, then wrap around first digit of thumb to make an X, and replace thumb with tail (working end) and pull

Putting on the Harness



A facilitator should always have their harness on for the following reason:

- Need to be prepared to climb at anytime
- May need to set up or take down events
- May need to help down an individual that has frozen on an element with this a facilitator should try and make every possible attempt to talk that person down the pole.
- May need to perform a rescue of a participant on an element.

Helpful information about the Climbing Harness

- A harness consists of a waist belt, leg loops, a buckle, and, generally, a belay loop. There are three basic styles: alpine, fixed leg loops, and adjustable. Harnesses of all types come with gear loops attached to the waist belt.
- Adjustable harnesses have buckles on the leg loops as well as the waist belt, so they will fit over just about anything. They are a little heavier than harnesses with fixed leg loops and usually not as comfortable, but the advantage of adjustability often outweighs these disadvantages.
- Alpine or diaper-style harnesses do not have any leg loops to step through, so they can be put on while you are wearing skis or crampons. The leg loops are formed after the waist belt has been secured by pulling straps up and around the thighs. They are great for longer climbs on which the ability to drop the leg loops may be important. They also fit over a wide variety of clothing, so are great for summer rock climbing as well as winter climbing.
- Harnesses with fixed leg loops are the most popular for rock climbing. They fit precisely over the clothes worn for rock climbing, usually have padded waist belts, and are the lightest and most comfortable harnesses. They do not adjust, however, so they will probably not fit over all the clothing needed for winter climbing.
- Once the style of harness has been selected, work to get the right fit. Choose a harness primarily on fit. The thigh diameter, waist size, and rise (the vertical dimension between the leg loops and waist) all must combine to fit your individual requirements.
- On alpine and adjustable harnesses, the only decision is to buy one with the proper size of waist belt. When the harness is properly sized, there is still some room on either side of the buckle to either tighten or loosen it.
- If you choose an adjustable harness that is too small, it may not buckle safely over winter clothing; if it is too large, it may not cinch down enough over a pair of shorts. On harnesses with fixed leg loops, be certain to fit the harness over the clothing you will be wearing when you climb.
- The waist belt should tighten in the middle of its adjustment range and the leg loops should be snug around the upper thighs without restricting movement.
- The waist belt on any style of harness should be tightened enough so that it cannot be pulled down over the climber's hips. When you try a harness on, hang in it off a rope, just as you will really be using it.
- Whatever the choice in harness, use it according to the manufacturer's directions. Pay close attention especially to the proper use of the buckling systems and tie-in locations.

Harness Safety Dynamics

- Construction: Harnesses are made of nylon webbing of various widths, and may be padded or not.
- Strength Characteristics: Harnesses are designed to hold the force of the most severe fall with ease. However, they are only strong enough when they are sized correctly and their buckles are threaded according to the

manufacturer's specifications. Harnesses do not fail because they are not strong enough, but because they are not used properly.

- Care: Check harnesses regularly for wear or damage. With proper care, most harnesses will last several years - check the manufacturer's recommendations.

Climbing Carabiners

- Carabiners are the metal snap links that connect the parts of the climbing system. Climbing carabiners are made of steel or aluminum and come in two gate shapes: straight and bent.
- Straight-gate carabiners are the most versatile. They can be used for any application.
- Bent-gate carabiners have a dogleg in the gate that facilitates clipping the rope. For this function, they work very well. Bent-gate carabiners are to be used only on the rope-end of a sling or quickdraw. The bend in these carabiners that makes them easy to clip also makes it easy for them to unclip themselves.
- Bent-gates can unclip themselves if clipped directly to a fixed, immobile point like a bolt or piton. Be careful where they are used.
- Carabiners also are made in a variety of body styles. The most versatile is the D or modified D shape. They are strong and easy to use. Oval-shaped carabiners are good for racking, but not as strong, and sometimes it is hard to figure out where the gate opening is in a pinch.
- There are some important numbers embossed on the spine of carabiners. They are the UIAA strength ratings. Carabiners are rated for failure strength with the gate closed in both the major (end-to-end) and minor (side-to-side) axes. High numbers are a good sign of a secure and durable carabiner, but sometimes at a premium price. Carabiners are rated in kilonewtons (kN), a measure of force, which is mass times acceleration.
- Remember, a falling climber is accelerating. For conversion purposes, 1 kN is approximately equal to the force of 220 pounds.

Carabiner Safety Dynamics

- Construction: Carabiners are made of steel or aluminum and come in many shapes and styles. The basic shapes are oval, D, and bent-gate. The two basic styles of carabiner are non-locking and locking. Non-locking carabiners are used in most parts of the system between belays: They connect quickdraws and slings to pieces of protection, and are used to link parts of the belay anchor.
- Locking carabiners have a mechanism that locks their gates in the closed position. There are many variations that incorporate a screw gate or some kind of twisting lock mechanism. They are used when maximum security is needed: belaying, rappelling, clipping into an anchor, or creating a top-rope anchor.
- Strength Characteristics: Carabiners are capable of holding far more than they will ever need to. However, they are only strong enough when they are loaded along their major axis and with the gate closed. Cross-loading them (along the minor axis) or loading them with their gate open greatly increases the risk of failure. When climbing, ensure that no carabiner will be crossloaded, bent over an edge, or positioned in such a way that it could accidentally open.
- Care: Carabiners need no special care. Keep them clean and check them periodically for excess wear (grooves worn from rappelling or lowering, weakened gate springs, cracks, et cetera). A carabiner that has been dropped a few feet but has no visible cracks can be put back into service.

Locking Carabiners

A locking carabiner is an essential part of your personal climbing gear. It attaches a belay/rappel device to the harness. A good choice for the primary locking carabiner is one that is large, easy to handle, and pear-shaped (called HMS). These carabiners do everything.

These carabiners all have locking mechanisms that help keep the gate closed and provide a much greater margin of safety over non-locking carabiners. The lock on these carabiners consists of either a sleeve that screws over the gate or some type of spring-loaded autolocking mechanism. Either type works well, although screw-gate lockers can offer more security.

Climbing Helmet

Helmets save lives and are considered an essential piece of equipment when climbing. A helmet is an essential piece of all-around equipment.

They protect the climber and belayer from injury caused by falling objects, and also offers some protection in case of a fall. Like the seat belt in your car, your climbing helmet is the single most important piece of safety equipment you can use.

Years ago helmets were heavy, uncomfortable, and boring, but now helmets are so light, comfortable, and stylish that there is no excuse for not wearing one.

Helmet Safety Dynamics

- Construction: Most helmets are made of either fiberglass or some kind of plastic. Plastic helmets are lighter. Helmets are designed to protect the climber from the impact of falling objects. Some also provide side impact protection when a climber falls. They all have a suspension that keeps the helmet off the climber's head and are held on the climber's head by a chin strap.
- Strength Characteristics: Climbing helmets are designed to absorb impact but they are not magic. They cannot protect the climber from big rocks, chunks of ice, or long, hard falls.
- Care: Check regularly for cracking or delaminating. Fiberglass helmets last longer, up to fifteen years if not damaged. Because they break down chemically when exposed to ultraviolet (UV) light, plastic helmets have a shorter life span, about 10 years.

Climbing Clothing

For Rock climbing, dress in layers. Clothing for the gym climber is simple: shorts, sweats, tights, anything that is easy to move in. Gyms are often cold, so a sweatshirt or sweater is nice to wear until you are warmed up.

Remember that you will be wearing a harness and that it is best to keep your waist area neat and visible. Super baggy clothes or large shirts that cover up the harness are not recommended.

Clothing for outdoor sport climbing is similar, but add a jacket and hat for weather protection. Sport climbing outside is characterized by periods of intense climbing that generates plenty of warmth, followed by long periods of standing around belaying or resting. Be prepared to put on a jacket or even warm-up pants to stay warm in between climbs.

Choose synthetics for clothing on longer traditional climbs because they do not absorb water, are warm when wet, and dry quickly. Always have a rain parka and possibly rain pants, a hat, and an extra warm vest or sweater accessible in a pack if the forecast is questionable.

Belay School Information

Indoor Belaying

You can have the gear, know your knots and signals, know the rating of the route, and have the moves memorized, but unless you can belay safely, you are not ready to climb. No other skill is as important to safe climbing than belaying, and there is no better compliment than to be described as a great belayer.

Learn the techniques and responsibilities of belaying, and practice until it is second nature-remember, your partner literally trusts you with his or her life.

The term belay is derived from a French verb that means “to hold fast or to protect.” For the climber, to belay means to protect a climber by controlling his or her rope so that in the case of a fall, the rope will be held fast.

The key to a good belay is friction. Belay devices provide manageable friction by putting a bend in the rope that allows the belayer to feed rope out and take rope in easily; yet lock off to catch a fall.

Proper rope handling, communication, and technique are mandatory elements of safe belaying. The following elements of the belay system are universal to all types of climbing. Start by learning these techniques either in a gym or other controlled environment with an instructor.

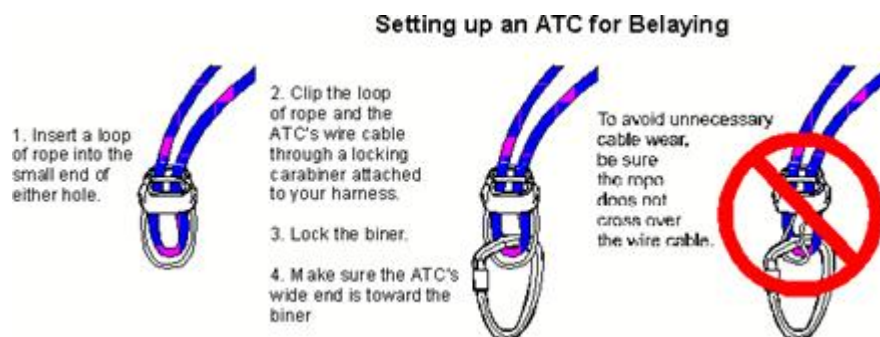
Setting up a belay

After the climber is tied in, the belayer must set up a belay. Grasp the rope a comfortable distance from the climber and form a bight in the rope. Push the bight through the appropriate hole or slot in the HB Sheriff belay device. Clip the bight into the locking carabiners that is clipped into the harness’s belay loop (a vertically oriented, full-strength sewn loop on the front of many harnesses connecting the waist belt to the leg loops).

The retaining cable of the belay device is also clipped into the locking carabiners. (Practice inserting and removing the rope from the belay device without ever removing the retaining cable from the locking carabiners; it is a habit that will help prevent dropping the device.) Lock the locking carabiners.

Demonstrate proper set up:

See diagram: Setting up an ATC for Belaying



Rope Handling

The first thing, to do after the belay device is loaded is to identify the brake hand. The standing end of the rope-the part that emerges from the belay device and does not lead to the climber-is the brake side of the rope. The hand that

holds that side of the rope is the brake hand. The hand on the live end of the rope—the end going to the climber—is called the guide hand.

The number-one rule of belaying is to never let go with the brake hand. To stop a fall, or to hold a climber on the rope, pull back with the brake hand. This action bends the rope around the belay device, clamping the device against the locking carabiners. The friction that is created stops the fall. Braking is achieved by this technique. It is not a matter of a strong grip; the equipment does the job.

When the climber moves away from the belayer, slack must be fed out. This is done with each hand on its respective side of the rope, simultaneously feeding and pushing the rope out to the climber. The brake hand naturally stays on the rope during this motion.

Taking the rope in as a climber moves toward the belayer is a bit more difficult. Here are the best techniques: As the climber moves up and slack develops, pull the rope through the belay device with the brake hand. The guide hand can assist by pushing the rope into the device. When the brake hand is extended out a comfortable distance, slide the guide hand down the standing side of the rope until it is possible to pinch the brake side of the rope with the guide hand below the brake hand.

Both guide hand and brake hand are now momentarily on the working end of rope. This allows the brake hand to slide up the brake side of the rope toward the belay device without ever letting go of the braking side of the rope, and prevents any rope from slipping back through the belay device. The process is continually repeated as the climber progresses, and the belayer is always ready to lock the rope off in the brake position should a fall occur.

PULL, BRAKE, SWITCH, SLIDE method that works well is for the belayer to pull the rope through the device with the brake hand, lock the device off, reach over and hold the lock-off position with the guide hand, and then slide the brake hand back down.

A more reliable, easier-to-master belay: the “hands-down” method. One demo and I was convinced — this is a better belay to teach, especially for top roping. The sequence is simple. Holding your brake hand palm-down with your thumb toward the belay device and your feeding hand in its traditional palm-up/pinky-toward manner, pull in rope in the usual, hands-in-unison fashion. At the end of each stroke, immediately pull your brake hand back down to the brake position (Figure 1). Now move your feeding hand from the climber’s side of the rope to the brake side, grasping the rope just beyond your brake hand, where it serves temporarily as a back-up brake (Figure 2). Next, slide your brake hand back up the rope (Figure 3). Return your feeding hand to the starting position, and repeat the sequence. Many students find it helpful to repeat the mantra: “Pull — brake — switch — slide.”

There are several advantages to this technique: It employs an instinctive palm-down braking position; it makes it difficult for a belayer to pinch both ropes with the brake hand, a common mistake in the “pinch” method; it eliminates the problem of a belayer extending his brake hand beyond his feeding hand, forcing him to remove the brake hand on the recovery (another very common mistake); and it keeps the brake hand in a good position for confident lowering. When taking in rope, students will sometimes make the mistake of pulling rope laterally from the belay device with their brake hands. This, of course, activates the device and causes a great deal of friction. To remedy this, instruct students to move their brake hand toward the top rope anchor, rather than to the side, when recovering rope, and remember that this system is indicated for top roping only.

The hands-down method is all I use and teach anymore, and I’m told it’s gaining popularity with gyms and climbing schools. First-time climbers and grizzled mountain guides alike can benefit from this simpler, more foolproof belay.

See Pictures Below:

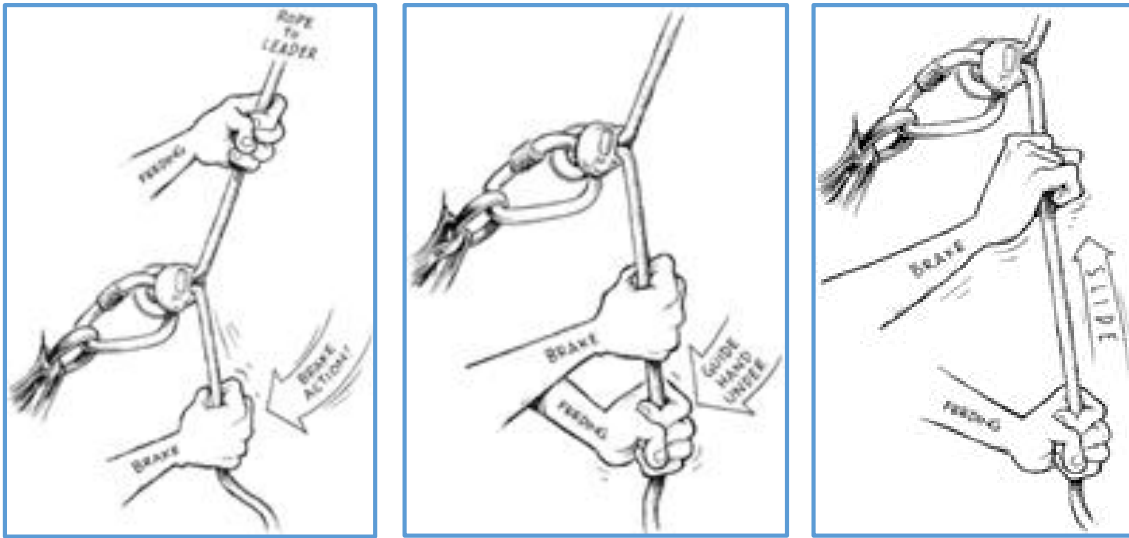


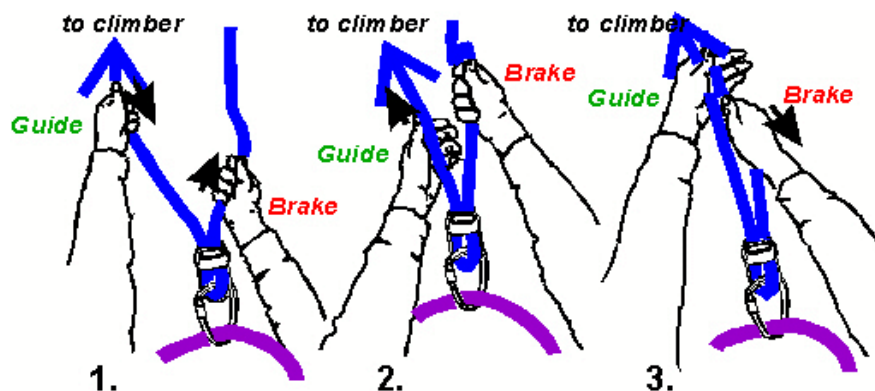
Figure 1. Brake in the normal manner Figure 2. then move your feeding hand down to brake Figure 3. and slide your brake hand back up.

(Slip, Slap, Slide Method) This is not an easy technique to learn. One trick is to start learning in “first gear.” Keep the guide hand extended straight out, with both sides of the rope running through the open palm. Pull rope through the device and toward the guide hand with the brake hand. Allow both ropes to easily slide through the guide hand until the moment when the two hands meet. Then quickly pinch the brake side of the rope with the guide hand and slide the brake hand back down the rope to prepare to pull in another length. Do not move the extended guide hand; just relax and let the rope run through it until it has to pinch the brake strand. As soon as this is mastered, move to “second gear.” Now the guide hand starts moving back and forth in conjunction with the brake hand, pulling the rope in, then extending out to pinch the brake rope while the brake hand slides down. Practice!

Taking Rope In (as the climber ascends)

1. With both hands firmly on the rope, the guide hand pulls the rope towards the ATC as the brake hand pulls rope out and away from the ATC (Figure 1).
2. When the guide hand reaches the ATC, hold the rope fast with the brake hand, while sliding the guide hand up the live end of the rope until it is above the brake hand (Figure 2).
3. The guide hand now grasps both ends of the rope and pinches both off with the thumb while the brake hand slides back down the rope to the ATC. The hands are now back in position to repeat step 1 (Figure 3).

The brake hand never leaves the rope!



Lowering

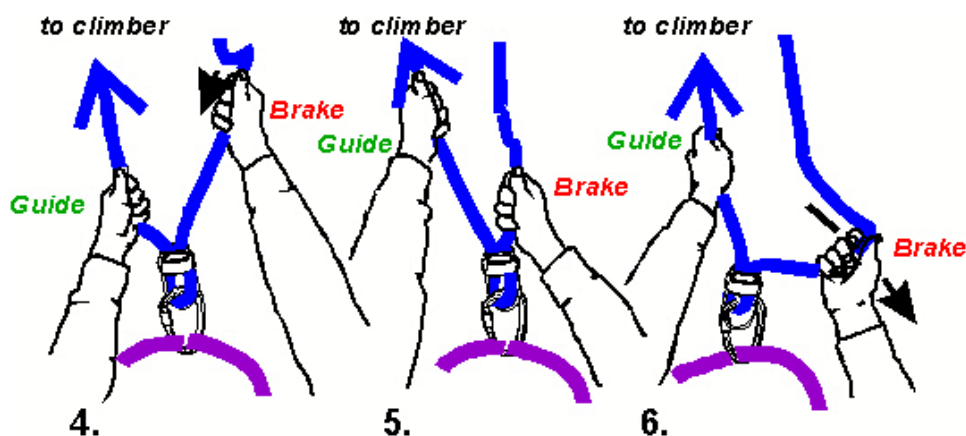
The belayer often has the job of lowering the climber back down to the ground after the climber has reached the top of the climb. Lowering begins with proper communication. The belayer first pulls in as much slack as possible through the belay device until the climber is felt on the rope. Then the belayer locks off the rope in the brake position.

The climber weights the rope and the belayer lowers the climber down. Allow the belay device to do the lowering by adjusting the angle of the brake side of the rope as it feeds into the device. The climber will lower faster as the rope is raised up, slower as it is angled more sharply down toward the brake position.

Using both hands on the brake end of the rope makes for smooth lowering. Let the rope run through your hand at a moderately slow pace. Try not to be jerky.

Letting Rope Out (when the climber needs slack)

1. With both hands firmly on the rope, the guide hand shuffles the rope away from the ATC (Figure 4 – 5).



Locking Off the Rope

Locking off is to keep more rope from paying out if the climber is falling, or if you need to hold tension on the rope (for example while a climber rests).

Using the brake hand, bend the rope across the ATC. This collapses the ATC onto the locking carabiner and locks the rope off (Figure 6).

Outdoor Belaying

Belaying is belaying, right? Well, not really. Belaying indoors is always the same: You stand on the floor and belay either a lead or a top rope. Belaying outdoors is not so simple. You may be positioned below the climber, maybe above; the ground may be flat, sloping, or rocky, or you may be hanging off the belay; you may or may not need to be anchored; reaching the belay anchor may be as straightforward as walking up to the base of the route (as in a gym) or require a rappel or a belay from above.

Belaying outdoors involves making decisions about the anchor, the position of the belayer, and the belay technique. Being able to safely set up belays in a wide range of outdoor situations requires an understanding of the system options, the technical proficiency to set up correctly the chosen system, and the maturity to know your limits. Learn the systems, pick the best option for the situation, but do not experiment-if you move out of your comfort zone, you may put yourself and others at risk.

There is common ground between belaying indoors and outdoors. The actions of belaying (paying rope out, taking rope in, catching falls, lowering climbers) and the tools (plates, tubes, auto-locking devices, and the Munter hitch) are all the same. The difference is in the application of the actions and the tools.

The CATCH principles: It is imperative when climbing outdoors that the belayer is prepared to catch a fall. Unlike in the perfect environment of the gym, climbing outdoors has too many variables to allow for casual belaying. To help ensure safety, adhere to the following CATCH principles:

C – Be sure the system is closed by having the belayer clipped into the rope.

A – Align the belayer between the anticipated direction of force.

T – Have the belayer positioned tight to the belay anchor.

C – Be sure the communication is clear between the climber and the belayer.

H – Be sure the belayer's brake hand is on the rope and he or she can belay safely.

Closed. Closing the system is fundamental in climbing—we do it when we back-buckle our harness and tie a keeper knot in our figure eight knot—and is very important in belaying. Climbers are injured each year when their belayer drops them because the end of the rope passes completely through the belay device. The simplest way to close the system is just to have the belayer tie the end of his or her rope to the harness—the belayer has to tie in to climb the route anyway. If the belayer is not planning to climb the route, then he or she can close the system by tying a figure eight on a bight below the belay device.

Aligned. Whenever possible the belayer should be clipped into an anchor on the ground, either with the climbing rope or with slings girth-hitched to the harness. After clipping in, the belayer should determine the most likely direction he or she will be pulled if the leader falls, and align with it. A falling leader will create a straight line between the first piece of protection and the anchor, and the belayer, if not aligned with that, can be pulled out of position.

Tight. Just being in line between the anchor and the anticipated direction of force is not enough. The belayer must also be positioned tight to the belay anchor; if not, he or she risks being pulled until positioned tight and could lose control.

Communication. Before leaving the ground, the climber must communicate clearly with the belayer about what is going to happen. Will the leader be lowered after clipping the top anchors? Will the leader rappel? In the first situation, the belayer must keep the leader on belay; in the second, the belayer will take the leader off belay while he or she rigs the rappel. If the leader expects to be lowered and the belayer expects him or her to rappel, there could be fatal consequences. Get our communication clear.

Hand. It seems like such a simple thing: Feed rope in and take rope out without letting go of the brake hand. It is amazing how frequently climbers—especially novices—fail to do this correctly. Before the climber leaves the ground, be absolutely sure that the belayer can and will keep the belay in effect until the climb is over. An extra 10 minutes on the ground practicing could save the climber's life.

BELAY SCHOOL LESSONS

Belay (French word means “to protect”)

How to Belay

Belaying itself is relatively simple provided one is always paying attention to your climbing partner. The end of the rope which passes through the top-rope anchor and goes back down to the climber is called the "working" end of the rope. The "working" end is handled by the "guide" hand. The other end of the rope is the "brake" end which is handled by the "brake" hand. You must always have at least one hand on the brake end of the rope at all times. If you don't, and the climber begins to fall, you will not be able to regain control of the rope, and the climber may be injured. As the climber proceeds up the wall, it is the belayer's job to take up the rope and make sure there is no slack in the system. This limit the distance the climber can fall.

Make sure both hands never leave the rope!

Belay Techniques

Show – Tug-a-War Analogy. See diagram below

- One v. One ~ Explain: Whoever is bigger and stronger is going to win!
- One v. One with a tree or Volleyball pole. Unless you have a mechanical advantage, such as a tree or pole which creates friction (i.e. belay device).
- One v. Five students with rope wrapped 2 or 3 times around tree or pole.
- Debrief: How friction can be used to one's advantage.

One v. One

A-----B

No Mechanical advantage (no friction)

One v. One w/ tree or pole

A-----@-----B

Friction allows the smaller person to have a stalemate

One v. 5 w/ wrap around tree or pole

Teacher-----@@-----XXXXX

Teacher versus five of your strongest students! Wrap rope three times around tree and teacher hold rope with your two fingers. You will win! These examples help the students understand friction.

Great Way to Check for Understanding

Hand on head to check for understanding –

Gold Line Jousting

Named after original climbing rope made out of “hemp”

- Start with both jousters using dominate hand ONLY on rope, feet must be together, and a slight “smile” in the rope (best out of 3)
- Then Non-dominate hand

- Technique to be successful: Push/Pull/Push~ watch feet, get them to move feet
- It's a game of balance, and getting a feel of the rope.

Diagram of Goldline Jousting:

Beginning Climbers – (Everyone) demonstrate **Body Belay** - Work with Partner

- Right hand – Brake – Never comes off rope! And Brake down to inside thigh.
- Left hand – Guide hand
- Body belay a stack of rope with dominate handed then partner body belays
- Body belay a stack of rope with non-dominant hand then partner body belays
- Use body belay to get comfortable with rope in hands.
- Partner can put their hand on belayers brake hand to remind them not to remove it.
- Multiple Body belayers on one rope, with limited ropes ~ demo technique

“Slip, Slap, Slide”

- Dominate hand
- Then Non-dominant
- Eyes closed

“Punch, Brake, (Switch), Slide”

- Rope over the top with thumb (punch)
- Grab rope under brake hand with guide hand
- Slide brake hand up & pull and punch

Body Belay Variations

- Dominate palm up (slip, slap, slide)
- Non-dominant hand
- Over thumb – dominate
- Non-dominant
- Eyes closed – dominate
- Non-dominant
- Slow motion – Young kids – 1st step

Belay Relay Race

- Competition ~ Belayer- Body Belays fast as they can, rope should not touch floor
- Parameters to add: Eyes closed, stop, fall, or go commands
- Repetition is the Key

Instructors Key Point: Watch Belayer – good ready position and brake hand does not come off

Fishing in the Dark

This is a good activity to get students to focus on their tactile sense (develops sense of feel of rope)

Signals: Instructor demonstrate

- Signal forward
- Signal stop
- Signal back
- Start with eyes open then close to feel

Belayer's Reaction to commands

- Stop – Brake (resting)
- Back – Brake (like a fall)
- Forward – Belay – Rope in

Check for understanding – show of hands above head 1-10 = 10 being very comfortable

Show and Tell of Climbing Equipment

Harness – waist – 2 finger between waist band – above hip bone, Finger in belay loop should be in belly button

- Legs – SAME – should be able to squat
- Double back Buckles

Carabiners – loaded – hole up and show finger pull

HB Sheriff ~ Keeper wire (cable or hard wire)

Two holes will use top hole

HB Sheriff or ACT – The belay device has two openings and the bight can be put through either hole or both for repelling. On the backside of the sheriff there is a wire loop that gets clipped by two carabiners to the belayers harness. To set up the sheriff the belayer must first figure what hand they feel most comfortable as the brake hand. Then they must make a bight in the rope and slip it through one of the openings in the sheriff. Using both carabiners in opposing each other, belayer will then clip, flip, and screw down the carabiners through the rope and the wire loop. The sheriff works by applying friction on the rope by placing a bend in the rope against the sheriff. This friction helps stop the rope from slipping when the participant falls and helps control the decent of the climber to the ground.

Helmets

Rope Care

Horizontal Belay with HB Sheriff Belay Device Variations

- a. Dominate hand **“Pull — brake — switch — slide.”**
- b. Non-dominate hand pocket
- c. Punch method – Dominate hand
- d. brake straight down – palm up – brake to hip
- e. Non-dominate
- f. Eyes closed – dominate
- g. Non-dominate
- h. Slow motion – Young kids – 1st step

Yo Yo Belay / Sling shot / Dynamic

Diagram:

Four person Participation Belay – Groups of 4

- a. Belay
- b. Back up Body Belay 45degree behind belayer with a Slight smile
- c. Anchor
- d. Climber
- e. Model station

Safety check

- Check self
- Belay/Climber – check other
- Back up and anchor – Check Belay/Climber
- Belay team practice it 2 times before vertical belay
- If Outside you can hook top anchor to a fence
- Possible incline belay works well

Belay School should take 5 days – test in on 5th day

- Motor skills – need to be down then teach safety!
- Rotate all four through it position
- Feel good about where at – Check for understanding
-

Teaching Safety after motor skills are down

Step 1:

1. Carabineers – opposite and opposing
2. Climbers – Check harnesses, squeeze carabiner, knots, helmet

Step 2:

1. Belay inspects Climber – 3 person check – head to toes check
2. Climber inspects Belay

Step 3:

1. Back up inspects by anchor and back up belayer
2. Take jobs serious – “did you do your job?” – get in a habit of checking one another.

If make mistake – Take belay certification away and they must get Recertified! This will go a long ways if you nail a student early in the lesson.

BARK method

B – Buckler B – Beaners, buckles, bucket

A – Anchor A

R – Ropes R

K – Knots K

HEAD to TOE Check

Climbing Calls

Proper and clear communication is another key to safe climbing. Communication between belayer and climber can be difficult. Whether you are in a crowded gym or on a windy crag, sometimes it is impossible to hear exactly what the climber 50 feet above you said.

The following commands are standard for all types of climbing and should be used at all times. These standard commands provide not only the words, but the syntax, that make communication possible in difficult situations:

The following verbal commands must be used verbatim before the start of a climb:

Climber: “On Belay”

Belayer: “Belay is On”

Climber: “Climbing”

Belayer: “Climb On”

At the end of the climb, when the climber has reached the desired height, the following communication should take place. This signals that the climber is done climbing no longer.

Climber: “Taxi”

Belayer: “Taxi On”

At the end of the climb, when the climber has returned to the ground, the following communication should take place. This signals that the climber no longer needs a belay.

Climber: “Off Belay”

Belayer: “Belay Off”

Other commands can be used by the climber to let the belayer know of his/her intentions. The following is a list of climber commands and appropriate responses by the belayer:

Climber: "Up Rope" or Tension"

Belayer Action: "Thank You". Take available slack out of rope.

Climber: "Slack"

Belayer Action: "Thank You". Give climber slack to lessen the tension.

Climber: "Falling"

Belayer Action: Go immediately to braking position.

Climber: "Down Climb"

Belayer Action: "Thank You". Watch climber descend and give appropriate slack as climber needs it.

Post Commands – by wall

Helpful Tips:

- **Belayer** – Unhooks – Climber – Because climber fatigued, hands cramped or handing crew
- **6 person team** – 2 others – ground crew

Spot – put hands on

Words of encouragement

Anchors – 2 hand grab and harness

Front end loading – step to prevent problems

1. Inspect rope – second checker
2. Tow Haul Rope
3. Bowline on a Bight
4. Check all equipment

First time – Belayer – have them be a second Belayer to get warm-up

First time up for Belay Cert. – Have them climb 12 ft. up wall off the ground.

Belay team in Vertical Plane

- One time – climb 8 ft. min/12 ft. ultimate
- **Instructor** – In between Belayer/Backup when feel uncomfortable

- **To ceiling** – Repetition until earn your confidence!

Vertical Plane – Things to watch for

1. long hair
2. sweatshirts
3. necklace
4. t-shirt

They may get caught in HB Sheriff when you move to belaying in the vertical plane. How do you get object out to get out of Belay Device

- 2 people pull down on rope – helps to free it
- Trauma Scissors – cut object getting in the way

STRETCH ROUTINE is a must when you're ready to begin to climb and belay.

1. Head to toe stretch program
2. Emphasis shoulders, arms, and hands

Handshakes to get partners

- Iowa/Wis. Handshake – Interlock thumbs down with the cow
- Sneaky Handshake – Index finger – tickle palm
- Shake Hand – You're a Rock Star
- Ankle shake
- Nerdy High Five – reach ones shoulder.
- High Five,
- Forearm,
- Power
- Salmon
- Helicopter
- Butterfly

Rock Climbing [Terminology](#)

adjustable harness - A harness on which the size of the waist belt and leg loops can be adjusted with buckles

aid climbing - Pulling on protection to make upward progress on a climb

backup belayer - A second person who feeds the rope to the primary belayer; he or she will lock off the belay if the primary belayer loses control

belay - Means "to hold or protect"; refers to a system of devices and techniques that combine to protect a climber from being injured in a fall by locking the rope

belay anchor - Any single-point or multipoint anchor from which a belay is made

belay device - Any of several devices that are used to create a bend in the rope that provides manageable friction for belaying or rappelling

belay loop - A sewn loop on the front of some harnesses: used for belaying and rappelling

bight - Any bend in the rope that does not cross itself; used in many knots and to thread belay rappel devices

bombproof - A completely reliable anchor; also called a bomber

bouldering - Low-to-the-ground climbing wherein the climber can jump back down to the ground, and a rope and belay are not necessary

braced stance - A belay position wherein the belayer's body is positioned so that it is able to hold a fall without additional anchor

brake hand - The hand that holds the rope on the side of the belay device opposite the climber and that will activate the locking mechanism; the brake hand never leaves the rope

brake strand - The strand of rope on the brakeband side of the belay

butterflying the rope - A method for temporarily storing the rope in which loops are dropped alternately over the belayer's tether

carabiner - An steel snap-link used to connect parts of a climbing system

CATCH - A set of belaying principles: Closed system, Aligned and Tight to the anchor, Communication clear, and brake Hand on the rope

class - A rating system from 1 to 6 that describes general difficulty, ranging from bouldering to aid climbing

cleaning - To remove protection from a climb

cord - Nylon fibers woven like a rope using Kernmantle construction, typically 5.5 mm to 8 mm in diameter; used tied in short loops as clamping hitches

cordelette - A 6- to 9-foot loop of cord usually between 5.5 mm and 8 mm in diameter tied with a double or triple fisherman knot; has many uses, including building belay anchors and as a component of self-rescue systems

core - The climbing rope's central core of woven nylon fibers; accounts for about 85 percent of the rope

crimp - A small handhold in which the fingers are hyperextended

crunch - The position in which the feet are held high and the hands low

crux - The hardest move or series of moves on a pitch; the hardest pitch on a multipitch climb

double fisherman - A standard knot for joining two ropes together; knots are tied on each strand that jam together under a load

double-pass buckle - The standard harness buckle; requires the waist-belt webbing to be threaded through twice, crossing over itself and locking on the second pass

dressing - The act of making a knot neat and tight

dynamic move - A move wherein the climber moves aggressively toward a hold and will fall off if he or she does not grab it securely; see also static move

dynamic rope - A climbing rope that is designed to stretch considerably and absorb the force of a falling climber; the only kind of rope suitable for leading

edging - Using the inside or outside edge of the shoe on a protruding hold

ERNEST - A set of principles for constructed belay anchors: Equalized, Redundant, No Extension, Strong and Stable, Timely

extension - A potential slipping of components in an anchor system to adjust for the failure of any point; causes an undesirable shock load

face climbing - Climbing technique that uses small ledges for hand- and footholds

fall factor - A measure of the severity of a fall; derived by dividing the length of the fall into the length of rope in the system: the maximum fall factor is 2

fall line - A line parallel to that of gravity

figure eight knot - A knot shaped like an 8; has many uses, including connecting the rope to the harness, tying into an anchor, tying two ropes together, tied on a bight to form a loop, et cetera

flagging - Using the weight of one foot and leg, in the air, to help maintain balance while making a move with the other foot and leg

free carabiner - A carabiner carried on the rack by itself with nothing clipped to it

free climbing - Climbing wherein the hands and feet are used alone to make progress, and climbing equipment is used only to provide protection in the case of a fall; see also soloing

friction wrap - A technique for creating a belay anchor wherein the rope is wrapped, often several times, around a tree and uses the friction alone for security

front-pointing - Using the toe of the shoe placed straight onto a foothold

gaston - A side-pull hold in front of the body, held with the thumb down

grade - A rating system of I through VII that describes the approximate time (commitment) it will take to climb a route, from a couple of hours to several days

Gri Gri - An auto-locking belay device made by Petzl

guide hand - The hand opposite the brake hand; helps position and manage the rope

hangdog - To work the moves on a route by resting on the rope between attempts

highstep - A move wherein the next foothold is above the waist

keeper knot - Any auxiliary knot used to ensure the security of another knot; for example, a half double fisherman knot tied after a figure eight tie-in is a keeper knot

Kernmantle - Means "core and sheath" and is the method by which climbing ropes are constructed

Kevlar - A synthetic material that is used to make cord and some climbing accessories

lap coil - A coil that consists of overlapping loops, typically tied off so it can be carried like a backpack; is less likely to tangle when being uncoiled for use

lead climbing - A system of climbing from the ground up wherein a climber ascends while belayed from below by a partner, trailing a rope and clipping it through intermediate protection points; when the leader reaches the end of a pitch, he or she will anchor the rope and belay up the second climber on a top-rope; the process is then repeated until the top of a climb is reached

leader - The person leading a pitch; also called the lead climber

lead fall - A fall taken while leading; in the case of a lead fall, the belayer will hold the fall, which will be caught by the last piece of protection

Leave No Trace - A nonprofit organization that promotes a low-impact environmental ethic of the same name

leg loops - The part of the harness that goes around the legs

lieback - A hold that is oriented vertically and pulled on sideways; also called a side pull

live end - The end of the rope tied to the climber

locking carabiner - A carabiner with any of various locking mechanisms that keep the gate from opening unexpectedly

lock off - A body position in which the climber holds him or herself in place with one arm fully contracted

loop - A bend in rope or webbing that crosses over itself

lowering - A method of descent wherein the climber weights the rope and is let down by the belayer; the common method of descent from a slingshot belay

mantle - A series of moves that allow the climber to stand up on a foothold; similar to the movement used to climb out of a swimming pool

master point - The central attachment point in a belay anchor

nut - Generic term for any piece of passive protection

on a bight - A knot tied in the middle of a rope on-sight To lead a route on the first try without falling

open grip - A handhold in which the fingers are not hyperextended

opposition - Using opposing forces for strength; usually refers to two pieces of protection that are placed to hold force in opposite directions and tied together to form one multidirectional anchor

overhand backup - An overhand knot tied on a bight to form a loop that is clipped in to the system as a backup

overhanging - Any section of rock that is steeper than vertical

palming - Using the palm of the hand as a friction hold

pinch grip - A handhold in which the fingers and thumb work in opposition to pinch a hold

prusik - A clamping hitch used in belay and self-rescue systems

rand - The outside portion of the shoe that runs around the shoe just above the sole; usually made of rubber in a climbing shoe

rappel - Any of various methods of descending a rope using controlled friction

redirect - Changing the direction of a vector by rerouting it; can increase control; for example, running the rope from the belayer's device through an anchor before going to the climber

redpoint - To climb a route without falling after repeated tries

redundancy - A principle of climbing that builds extra equipment into a system as a backup

remote master point - A system for belaying wherein the device used to belay is attached directly to the anchor and is operated by the belayer from a distance

rest position - To hang straight-armed off a high bold to conserve energy

reversed and opposed - A method for using two carabiners together so they are oriented with their gates opening in opposite directions and on opposite sides; used any time maximum security is required

rope bag - A nylon sack used to carry the rope; opens to form a mat on which the rope can be stacked on the ground

rope drag - Friction caused by the rope running through parts of the system

round coil - A way of coiling the climbing rope in a traditional circular coil; usually carried over the head and one shoulder

sandbag - To mislead someone regarding the difficulty or danger of a route; potentially dangerous

self-rescue - Any rescue system utilizing only the climbing equipment that the climbers on the scene possess
sewing machine legs
Involuntary shaking of the legs due to nervousness

sheath - The woven nylon outer layer of a rope that protects the core from damage; accounts for about 15 percent of the strength of the rope

slingshot - The standard system for top-roping wherein the rope is doubled through an anchor at the top of the route and the climber is belayed from on the ground

slip-lasted - A shoe that is not constructed around a stiff midsole; see also hoard-lasted

slippers - Thin, lightweight climbing shoes, usually without laces, that offer great sensitivity but almost no support

Spectra - A synthetic material used to make cord or webbing and used in many climbing applications

spider - A self-rescue system that hangs two or more climbers off the same cordelette or sling simultaneously

sport climbing - Climbing, indoors or out, in which all the protection and anchors are permanently in place

spotting - Giving protection to a climber climbing close to the ground by standing under him or her and using outstretched arms to help cushion a fall; often used when bouldering

squeeze chimney - A chimney small enough to just barely admit the climber's body

stacking the rope - Uncoiling the rope into a loose pile with a top and bottom exposed; the climber tics in to the top end; minimizes tangles

standing end - The opposite end of the rope from the one the climber is tied to; see also live end

static elongation - The amount a rope will stretch when holding a body-weight load

static move - A move wherein the climber moves slowly and in control and will not fall off if the next hold is not grabbed securely; see also dynamic move

static rope - A climbing rope that is designed to stretch little and is used in situations wherein only body-weight loads are expected, such as rappelling, ascending fixed ropes, et cetera

stemming - A climbing technique wherein opposing footholds are pushed off from each other for security; often used in inside corners

stopper knot - A knot tied in the end of a rope or sling to keep something else from sliding off it

straight-gate carabiner - A carabiner with a straight gate

tail - The amount of rope sticking out after a knot is tied

test-fall - The laboratory fall used by the UIAA to test ropes; a 16.5-foot fall on 8.25 feet of rope

tether - The short section of rope formed when the climber ties a figure eight on a bight and clips in to the anchor; length varies depending on the situation; also called a leash

third class - Slang for soloing; to "third class" a route is to demote its grade to that of a thirdclass route, which does not require a rope

top-lower - To lower a climber from above

top-rope anchor - The belay anchor for a top-rope

top-rope fall - A fall while climbing on a top rope; usually very short unless there is slack in the system

top-roping - Any of several systems wherein the climber is protected from falling by an overhead belay

torquing - Twisting hands, fingers, or feet to increase the security of a jam

traditional climbing - A climbing system wherein the protection points and belay anchors that are placed in the rock while climbing the route are removed by the second

trammig - A system that uses a quickdraw on the climber's harness clipped to the rope running between the top anchor and the base of the route; keeps the climber within reach of the rock while being lowered on overhanging or traversing routes

transition - The steps required to change from one fundamental system to another; for example, from climbing to rappelling

traverse - Any part of a climb that moves sideways rather than up

tri-axial loading - A dangerous situation that arises when a carabiner is stressed by three vectors, one of which is not aligned with the carabiner's long axis; weakens the carabiner and can cause failure if shock-loaded

UIAA - The Union Internationale des Associations Alpines; the international agency that sets standards for and tests climbing safety equipment

undercling - A hold that is oriented so that it is best when pulled up on

unidirectional - An anchor that is secure in only one direction

"up rope" - A command made by the climber asking for slack to be removed from the system

vector - Any quantity with both magnitude and direction (for example, a climber hanging on a rope forms a vector between him or herself and the anchor)

waist belay - A belay method that uses the belayer's body to create the friction necessary to hold the climber; its use is limited to low-load situations

Yosemite Decimal System - American rockclimbing rating system (abbreviated YDS); rates the difficulty of individual Class 5 moves on a scale from 5.0 to 5.14; routes above 5.10 are further broken down into subratings a through d (for example, 5.12a)

Rope Management - Coiling over the neck

Tired of holding up the coils of rope while butterflying it? If you know how to **butterfly a rope**, then this is an easy way to take the weight off your hands.

See the sequence of images below for how to do it.

There is one disadvantage when you are coiling a cold wet rope - and you have to hang it over your neck. Perhaps it's not worth the saving of effort then!





Butterfly coil

