

Rock Rescue Course Notes



Stock Alpine LLC
www.stockalpine.com

AMGA-Certified Rock, Alpine & Ski Guide
IFMGA-Licensed Mountain Guide

July 2022



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Two-Day Rock Rescue Curriculum

Overview

We will be learning a progression of building block skills to handle most rescues while rock climbing. This course is designed for the recreational climber with a base of lead sport climbing experience. While people will come into the course with varying abilities, each person will be challenged.

Day 1: Ground-Based Field Day

Coffee Shop

- Complete paperwork: waivers, registration, exchange emergency contacts
- Course overview and introductions
- Causes and avoidance of rescue
- Situations for these skills
- Safety
- Calling for help

Field

- Gear and harness setup
- Knots
- Plaquette and plate lowers
- Knot pass
- Haul
- Counterbalance rappel
- Load releasable anchor
- Tandem rappel

Day 2: Cliff-Based Field Day

- Scenario: haul, plaquette lowers, knot pass
- Scenario: counterbalance rappel, load releasable anchor, tandem rappel
- Belay escape, ascend, transition to rappel
- Extra time
 - Roped fourth class climbing
 - Belaying two seconds
- Debrief: questions, where to go from here



Gear List

The gear on this list are simple, relatively cheap, and common to all trad climbing. We will not be using tethers on this course. Most professionals find the rope and lockers to serve the purpose better, are more clean, and more multi-purpose. Mark gear with colored nail polish.

___ **Harness.** With belay loop and gear loops. AGC choice: BD Solution, Petzl Hirundos.

___ **Climbing Helmet.** AGC choice: BD Vector Helmet, Petzl Sirocco or Meteor.

___ **5 Locking Carabiners.** Munter (pear-shaped) biners. AGC choice: Petzl Attache, BD Vapor Lock Screwgate.

___ **5 Non-Locking Carabiners.** Light, wire-gate preferred. AGC choice: BD Oz, Petzl Angle L

___ **Prusik Loops.*** Bring three, 1.5 m (5 feet) lengths of 6 mm accessory cord tied into a loop with a flemish bend. A 19 cm Sterling Hollowblock is nice, if you can find one.

___ **2 x Cordelette.*** Six m (20 feet) length of 6mm accessory cord.

* If you don't have prusiks or cordelette, then bring 50 feet of 6 mm accessory cord and we'll cut it to length. Opt for the most supple cord you can find.

___ **Belay Device.** AGC choice: Petzl Reverso 4, BD ATC Guide.

___ **1 x 60 cm Sewn Runner.** Dyneema or nylon.

___ **1 x 120 cm Sewn Runner.** Nylon. This will be your rappel extension.

___ **1 x 180 cm Sewn Runner.** Dyneema is good. For quad anchors.

___ **Belay Gloves.** Recommended. AGC choice: Petzl Cordex Glove, BD Crag Glove.

___ **Rock Rack.** Single rack if you have it. AGC choice: 1 set BD Camalot Ultralight, 1 set BD Camalot X4, 1 set BD Stoppers. 5 quickdraws, 5 alpine draws.

___ **Rope.** Single-rated 60 m rope. AGC choice: Mammut Infinity.



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Resources

- *AAC Accidents in North American Climbing*
- AAC Know the Ropes: americanalpineclub.org/know-the-ropes
- AMGA videos: amga.com/rock-videos/
- Animated Knots: www.animatedknots.com/
- *Self Rescue* by Fasulo and Clelland.
- *The Mountain Guide Manual* by Chauvin and Copolillo

Important Concepts

Aim to never need a rescue: While it is important to know how to rescue a partner in a rock setting, hopefully you will never do a real rock self-rescue. Instead, these skills are useful for everyday climbing situations such as lowering a climber to the ground, hauling a pack up a crux, or assisting a struggling climber.

Practice for a worse case scenario: When rock climbing, things can go from good to bad, very quickly. Hopefully a bad situation doesn't happen, but the more time you spend climbing, the greater your chance of needing a rescue. Rock rescue with an injured partner is akin to crevasse rescue, avalanche rescue, or CPR. It's good to practice, but hopefully you never use these skills for rescue.

Learn the fundamentals first: Rock rescue has many what-if situations and many tricks. Focus on building a solid foundation of skills that are applicable to many situations.

Problem solving: Mistakes are normal during these exercises. Use the building block skills you are learning to correct the mistakes and solve problems.

Choose the safest option: Conducting rock rescue is dangerous and stressful. Ask yourself: "What is the safest way to get out of this situation?" and "Should I try self rescue or should I call for a rescue?"

Move slow and check systems: Pause when things become confusing and trace through your system. Assure you have backups such as a third hand and blocking knots.

A real rescue is harder: You cannot use intuition to get through a rescue. You must practice and know the skills.



Causes and Avoiding Rock Accidents

Most accidents are from a slip or fall on rock on the ascent (AAC ANAC).

Cause	Avoidance
Exceeding abilities	Build experience before stepping up to the next level. Bail often.
Falling object	Wear a helmet.
Unroped fall	Rope together rather than solo. Practice with a Kiwi coil for short pitching in fourth class terrain.
Rappel failure	Weight test rappel before unclipping. Close the system.
Gear pulled out	Use bigger gear. Small cams have small holding power. Place solid gear. Place gear in easy terrain.

Self Rescue or Call for Rescue?

Plan and prepare for rescue

- Take a wilderness first aid course.
- Regularly practice self rescue skills.
- Think through “what if” situations.

Try self rescue first

- Rescue is slow and not reliable.
- Calling for rescue puts others at risk.

Calling for rescue

- Cell: dial 911, goes to Sheriff
- inReach, Spot, etc: goes to Rescue Coordination Center
- Sat phone: call JBER RCC 907-551-7230
- Relay Info: a) “I have a backcountry emergency.” b) Location, c) Your name & number, d) weather.

Helicopter safety

- Clear an area 100 x 100 feet
- Stay on downhill side
- Stay low and move slow
- Place a wind indicator



Safety Tips

- 1) **Watch your partner's actions for mistakes.** Four eyes are better than two.
- 2) **Dress and stress knots.** Make it a habit of tying knots that are clean and tight.
- 3) **Use lockers where carabiner failure is fatal.** In general, lockers should be used on your harness and masterpoint. Use opposite and opposed non-lockers if you're short on lockers.
- 4) **Close systems.** Do not leave loose rope ends. When rappelling, use a flat overhand knot to join the rope ends together. For loose ends such as when top-roping, or single-pitch sport climbing, use a barrel knot if a second climber isn't tied in,
- 5) **Extend rappel devices.** Rappelling with your device on an extension sling makes the system cleaner and easier to manage. Extensions also provide room to clip your autoblock backup to your belay loop.
- 6) **Use a third hand as backup.** You often need both hands when rappelling and lowering a victim from the top. The autoblock hitch from your belay loop acts as a third hand.
- 7) **Don't rely on single friction hitches.** The prusik, autoblock, and klemheist can slip and fail. Have a backup such as a blocking knot (overhand on a bight).
- 8) **Test friction hitches.** Friction hitches often slip. Weight test they are engaged before removing the backup.
- 9) **Weight test the rappel before unclipping.** Load the rappel rope and check the system before unclipping from the anchor.
- 10) **Use blocking knots as backup.** Also known as a catastrophe knot, the blocking knot is an overhand on a bight tied on the loose/brake strand of the rope. A blocking knot will jam against a slipping friction hitch or a failed belay. Use it when you're doing complicated ropework or if your hand is off the brake strand. Try to keep slack to the backup to less than two meters.



Knots

Use knots that are versatile and simple. Since they can be difficult to remember, opt for as few as possible. Avoid the double fisherman's knot which welds tight after several uses. Also avoid the bowline, which is difficult to check and can fail if used incorrectly.

Animated Knots: animatedknots.com

Autoblock Hitch: The most common friction hitch. Primarily used for third hand rappel backup because it is quick to tie and load releasable. It's low holding strength is okay for third hand because of the low force.

Backside Clove: This is the slack strand of rope coming from your clove hitch at the anchor. It is useful for transitions and load transfers.

Barrel Knot: A low-profile knot used to close the loose end of the climbing rope.

Clove Hitch: Your anchor clip in. Simple, solid, and easy to adjust.

Figure 8: The three common variations include 1) figure eight follow through for rope tie-in, 2) flemish bend to join cordelette and prusik cord loops, 3) figure eight on a bight to clip in a loose rope end.

Klemheist Hitch: This friction hitch is fast to tie when using long cordelettes and has the best grip for slippery dyneema webbing. Works best in one direction.

Munter Hitch: Works as an alternative for a belay/rappel device.

Munter Mule Overhand (MMO): This knot combination of knots and hitches is load releasable and fundamental to rescue.

Overhand Knot: Commonly used as a bight to clip in a loose rope end or to shorten prusik loops or cordelettes.

Prusik Hitch: The friction hitch with the most holding power. Good for the tractor on haul systems. The drawback is that it's not releasable under load and slower to tie than an autoblock or klemheist.



Main Rock Rescue Scenarios

Rescuing a leader who is less than half a rope length away.

1. Lower hurt victim to belay.
2. Tandem rappel if more rappels are needed.

Rescuing a leader who is over half a rope length away.

1. Ascend to the victim.
2. Counterbalance rappel if needed.
3. Tandem rappel if more rappels are needed.

Rescuing a follower who is less than half a rope length away.

1. Counterbalance rappel to a hurt victim.
2. Tandem rappel if more rappels are needed.

Rescuing a follower who is over half a rope length away.

1. Counterbalance rappel to anchor within half a rope length of the victim.
2. Transfer victim to a new load releasable anchor.
3. Counterbalance rappel to the victim.
4. Tandem rappel if more rappels are needed.

Rock Rescue Toolbox

These are the core skills that will be put together to deal with the above scenarios.

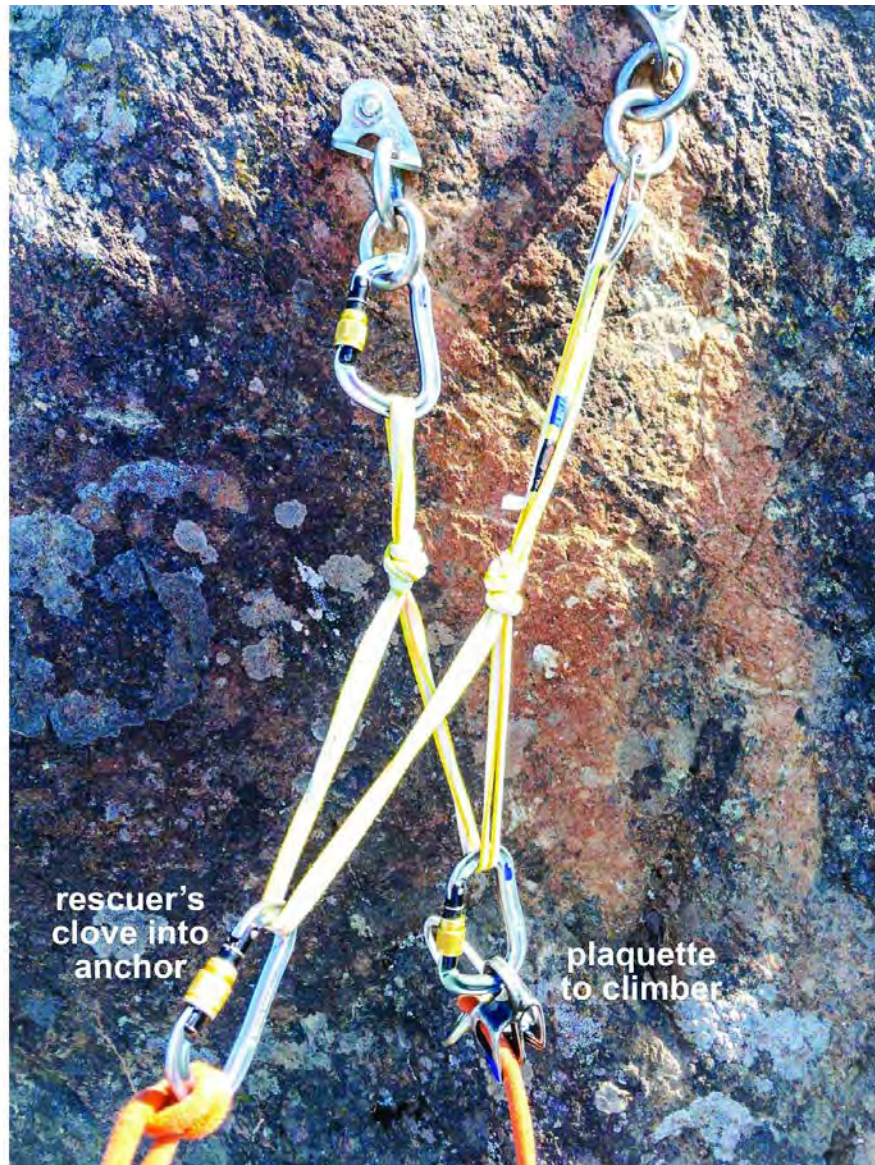
1. Anchors
2. Rappel extension
3. Backside clove
4. Backups
5. Load transfer
6. Lower
7. Knot pass
8. Haul
9. Counterbalance rappel
10. Load releasable anchor
11. Tandem rappel
12. Belay escape and ascend



1. Anchor

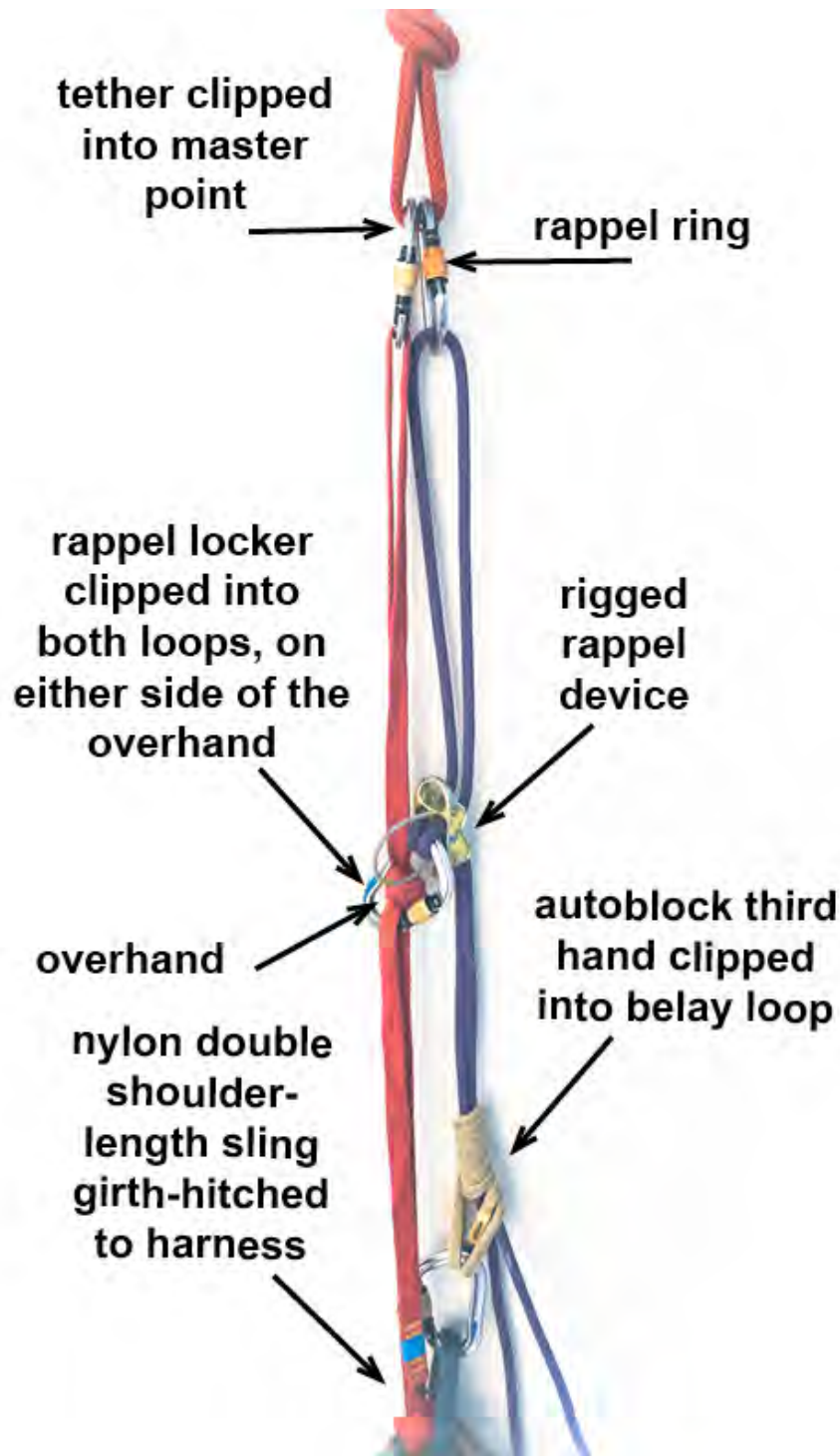
Use **Earnest**/Serene anchors when possible: equalized, angles, redundant, no extension, solid, timely.

The **Quad Anchor** is a multi-directional anchor that works well if you have two solid bolts or two solid ice screws. A 180 cm sewn sling works the best, but it can also be done with a cordelette.





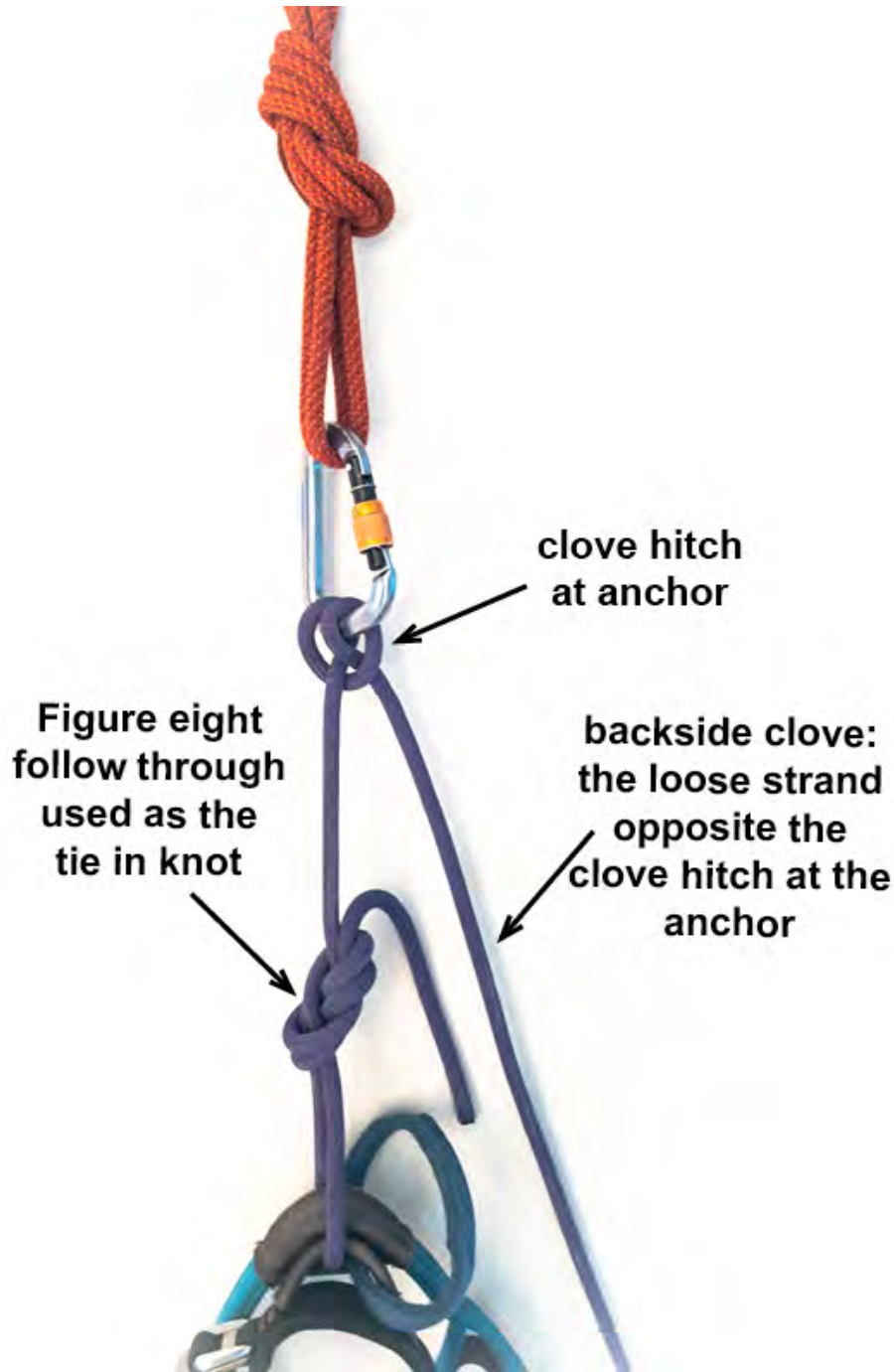
2. Rappel Extension





3. Backside Clove

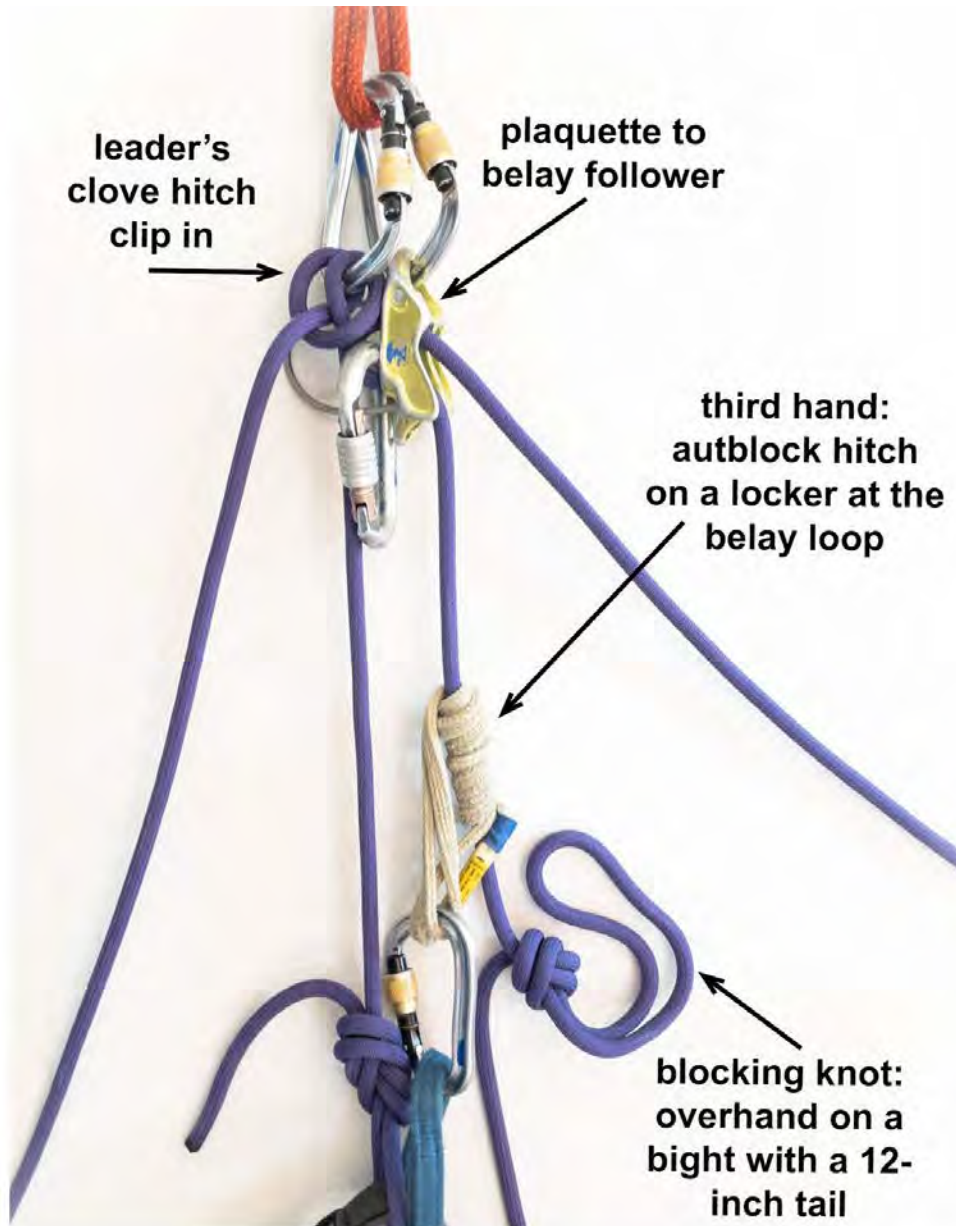
This is the slack strand of rope coming from your clove hitch at the anchor. It is useful for transitions, load transfers and anytime you need an anchored portion of rope.





4. Backups

A third hand and blocking knot are used as backups in case a mistake is made.





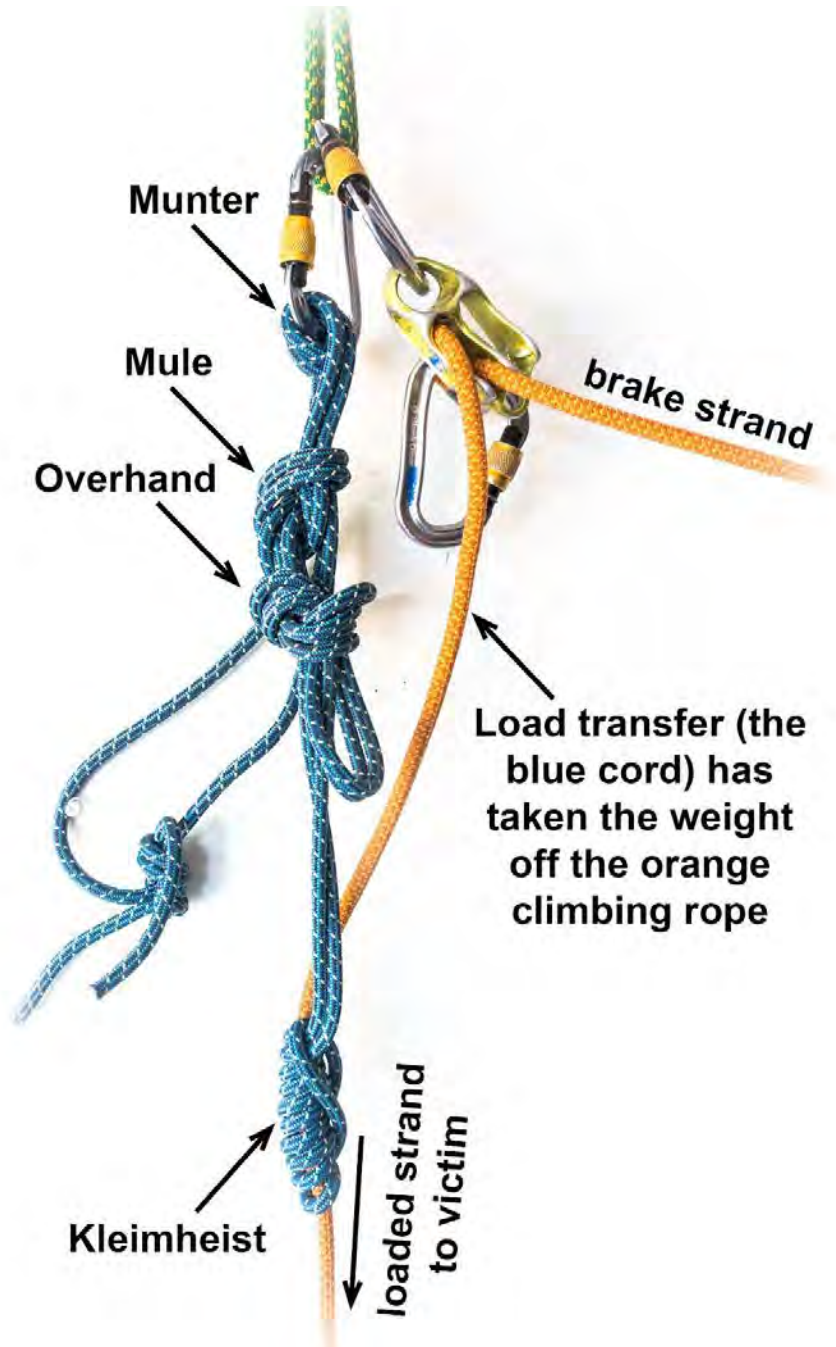
5. Load Transfer

Use the munter-mule-overhand to take the load off the rope for a short bit. This example shows the load transfer using a cordelette.

- Klemheist cordelette onto loaded rope.
- MMO cordelette to locker at the anchor.
- Ratchet the brake locker to transfer the load onto the cordelette.

The backside clove also works for a load transfer.

- Place a prusik on the load strand.
- MMO the backside clove to a locker on the prusik.
- Ratchet the brake locker to transfer the load onto the backside clove.



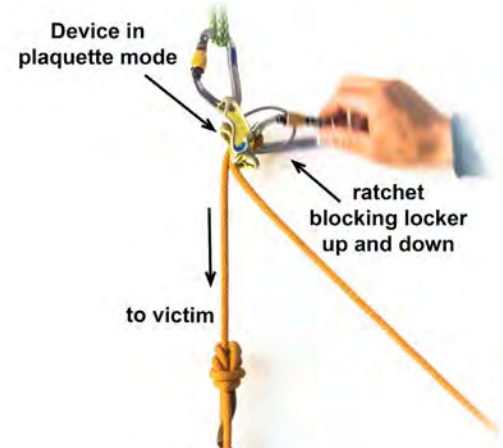


6. Lowers

If you belay a follower from the anchor on a plaquette (guide mode), know how to lower them to the ground after they have followed a pitch or are dangling below a roof. The three options for lowering a climber from plaquette mode include ratchet, load strand direct, and redirect lower. The best lowering option is the redirect lower. The small release holes on the BD ATC Guide and Petzl Reverso should not be used for lowering as they are all or nothing and cause accidents.

Lower Method 1: Ratchet

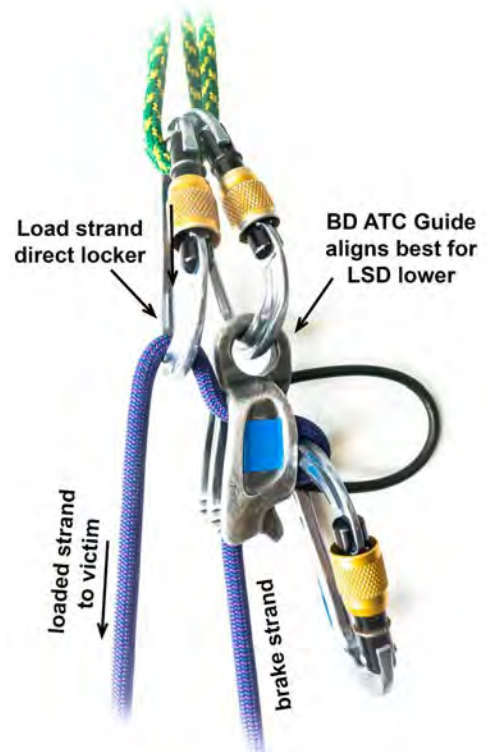
To gain a foot or so of slack, simply crank the blocking carabiner up and down to inch the hanging climber down.



Lower Method 2: Load Strand Direct

This is a good option for a quick lower to the ground if the climber can unweight the rope for a moment.

- 1) Add a third hand.
- 2) Ask the climber to unweight rope.
- 3) Clip unweighted load strand to the master point with a locker.
- 4) Lower.

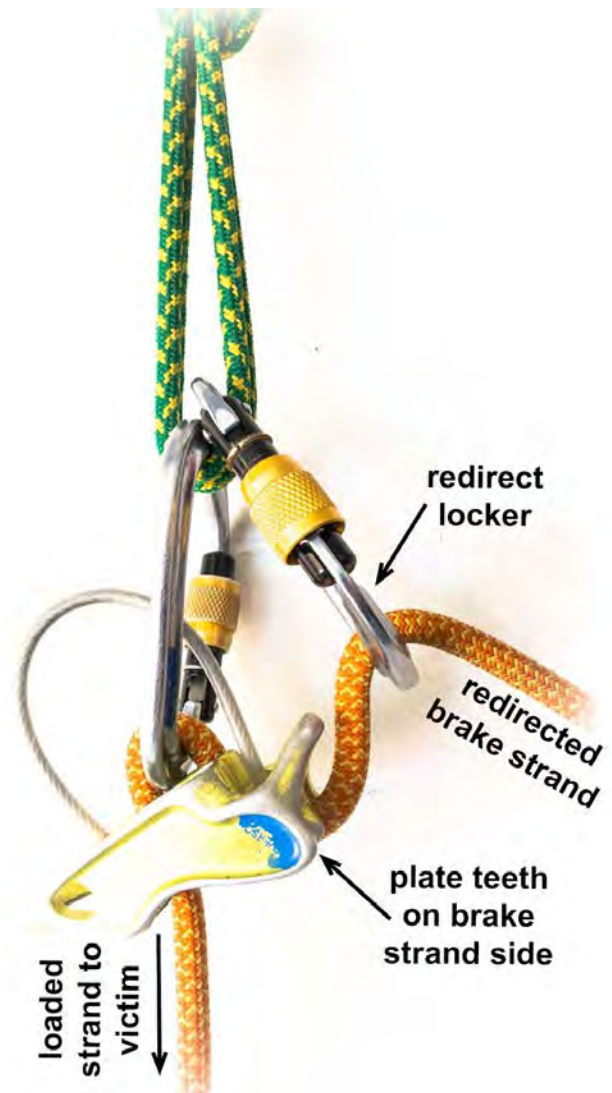




Lower Method 3: Redirected Plate Lower

This is the best lower option. This example uses a load transfer to change from top belay using a plaquette to a redirected plate for lower. The load transfer is needed if the victim can't unweight the rope. For example, a climber is free hanging below an overhang and can't unweight rope.

- 1) Add a **blocking knot** to the brake strand.
- 2) Add a **third hand** to the brake strand.
- 3) Add **load transfer** to unweight the rope.
- 4) **Redirect** the brake strand to the master point with a locker.
- 5) Convert plaquette to redirect **plate** lower.
- 6) **Release** and remove the load transfer to load the third hand.
- 7) **Lower**.

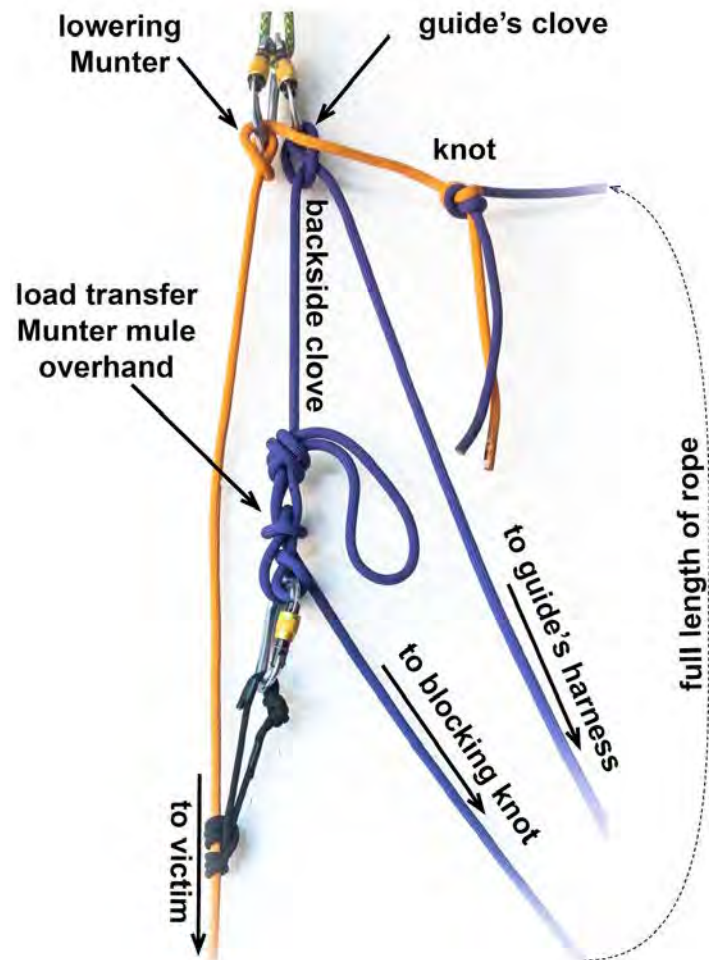




7. Knot Pass

The knot pass is used to lower a climber to the ground from high on a climb by tying two ropes together. Another application is for passing a knot that is isolating a damaged section. Perhaps the easiest knot pass method is to lower using a Munter hitch on a large Munter carabiner and stuff the overhand knot through the Munter hitch. This example uses a load transfer using either a cordelette or the backside clove.

- 1) Backed up by a third hand, lower climber on Munter until the knot is 1 foot from the Munter.
- 2) Set third hand.
- 3) Add a blocking knot with 6 feet of slack.
- 4) Close to anchor, add load transfer with a backside clove or cordelette.
- 5) Put load on load transfer.
- 6) Move the third hand to the other side of the knot.
- 7) Feed knot through Munter.
- 8) Release load transfer to load the repositioned Munter.
- 9) Remove the blocking knot and lower.



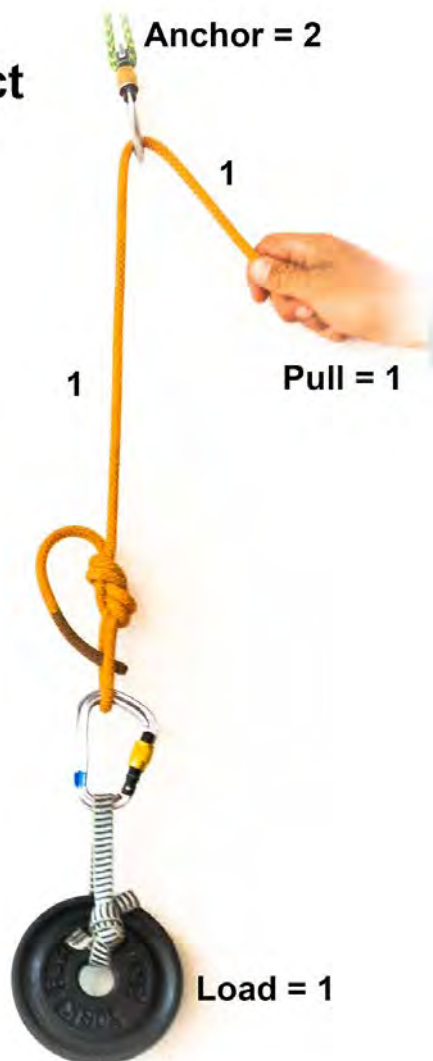


8. Haul

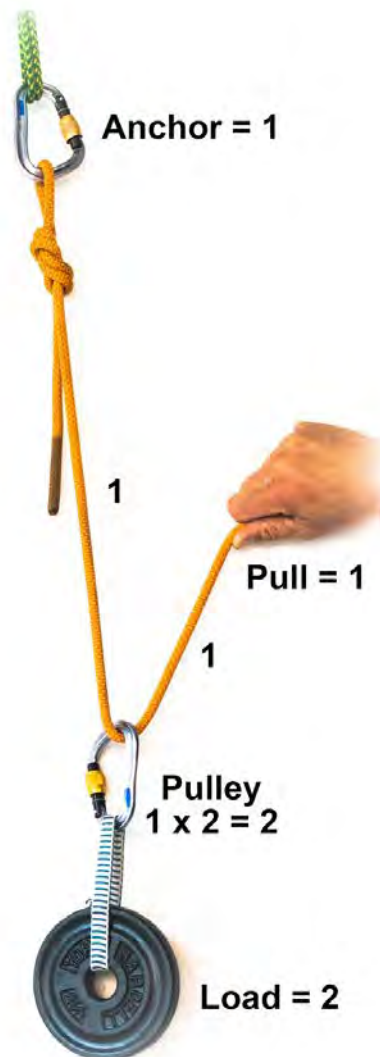
Counting Mechanical Advantage

- Start the calculation as 1 from the pulling side.
- There is equal force on the rope on either side of the pulley.
- Pulleys multiply the force by 2 on the load side of the pulley.
- Don't count the force on the anchor to determine the output.
- Add the outputs.

1:1 Redirect

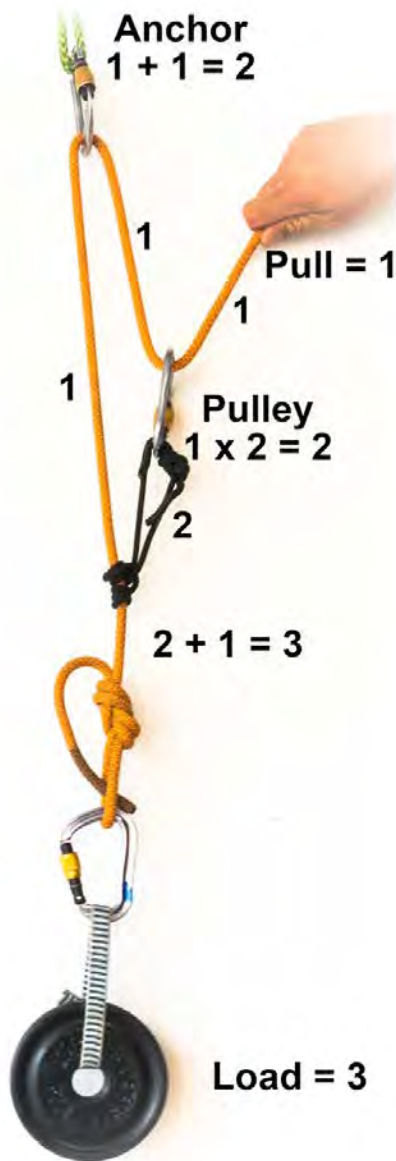


2:1

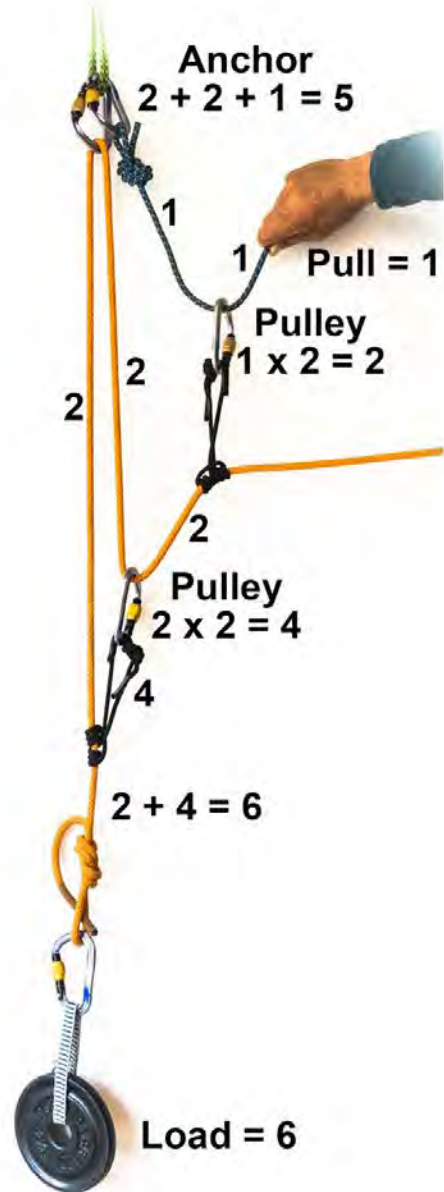




3:1



6:1





Hauling can range from assisting a climber through a hard move, to hauling their full body weight. The haul taught here is similar to a crevasse rescue haul progression starting with a 2:1, and adding 3:1 to make a 6:1.

Haul Nearby Climber Assist (3:1)

Useful if a climber is close to the anchor and struggling through a crux. This haul has a 3:1 mechanical advantage but a lot of drag through the plaquette. Start by belaying the climber in plaquette mode.

- 1) Lower a pulley on the brake rope to the climber.
- 2) Climber clips pulley (locker) to their belay loop.
- 3) Both climber and rescuer pull.
- 4) The plaquette acts as progress capture.

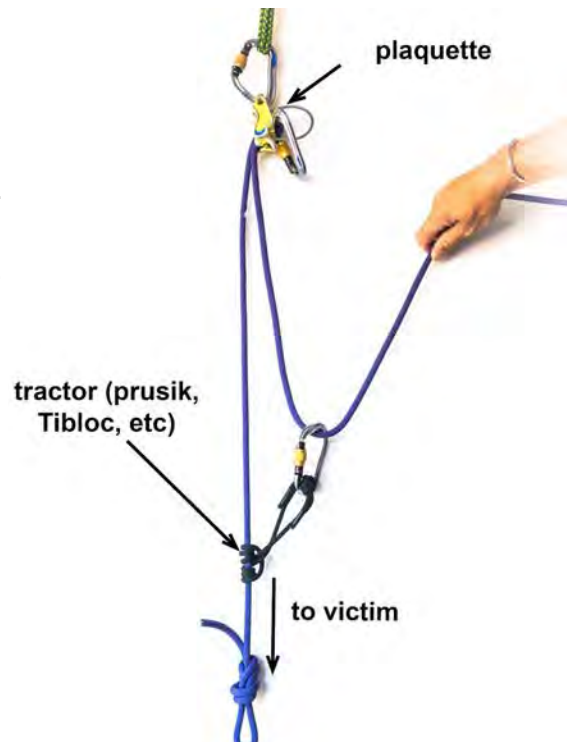




Haul Climber Assist 3:1

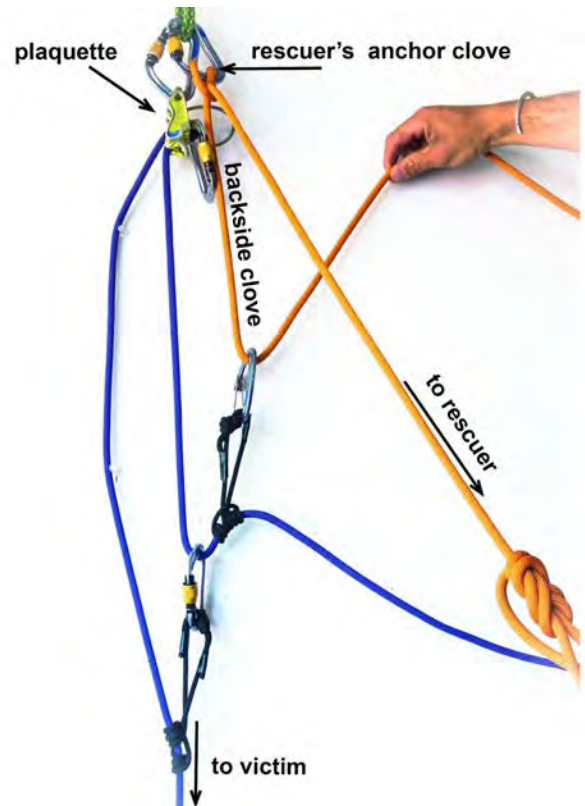
This haul is useful if the climber needs help through a crux.

- 1) Add a tractor (prusik, Tibloc, etc) to the loaded rope.
- 2) Clip brake rope onto a locker on the tractor.
- 3) The plaquette acts as progress capture as you haul.



Haul Climber Assist 6:1

- 1) Add a second tractor onto the pulling rope of the 3:1.
- 2) Clip the backside clove through a carabiner at the second tractor. Or, clip a double shoulder-length sling to the anchor and pass the sling a carabiner on the second tractor.
- 3) Haul while minding the tractor.



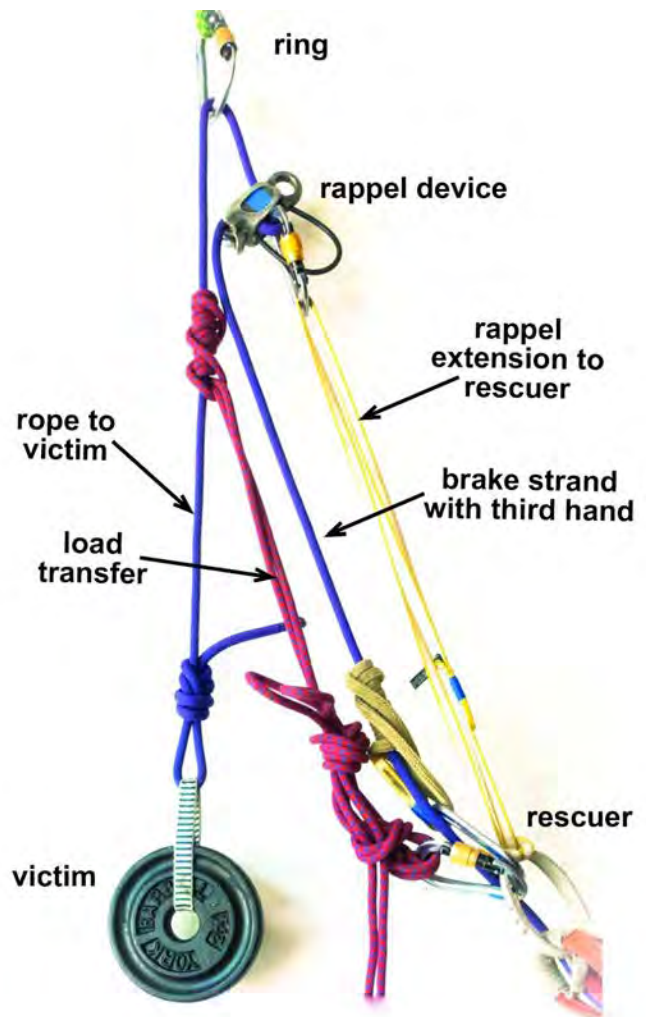


9. Counterbalance Rappel

The counterbalance is often the first rappel on a multi-stage rappel rescue to bring the rescuer and victim together. After the initial counterbalance rappel, use the tandem rappel for the remaining rappels.

Situation: Injured follower who is less than half a rope length away. You're belaying a follower from the anchor in plaque mode. The follower gets injured and you need to rappel to the victim and continue down.

- 1) Add a blocking knot.
- 2) Rig rappel extension and third hand.
- 3) Rig a load transfer with a cordelette between a klemheist on the loaded rope to a MMO at the anchor.
- 4) Ratchet plaque brake carabiner to transfer load onto cordelette.
- 5) Clip the victim's rope to the anchor with a locker (becomes the rap ring).
- 6) Rig rappel device by unclipping plaque ear from anchor, slide device down rope, clip to extension in plate mode.
- 7) Give yourself slack from your clove.
- 8) Load rap line.
- 9) Move load transfer locker at anchor to belay loop by either muscling loose the klemheist or loosening the MMO.
- 10) Unclove self from anchor.
- 11) Rap to the next anchor while pulling the victim down with cordelette.

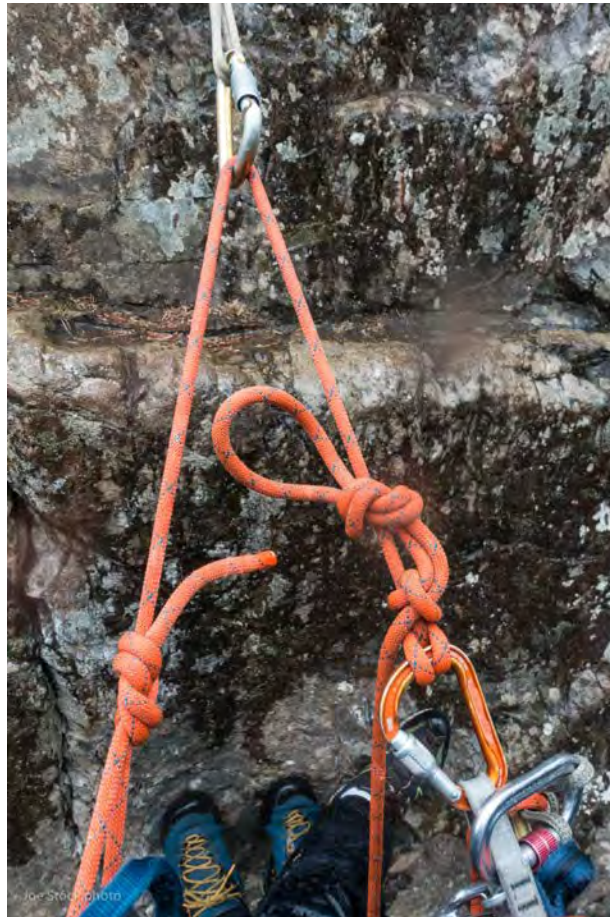




10. Load Releasable Anchor

This is for transferring the victim to and from the anchor without lifting them up. Continuing from the counterbalance steps above:

- 1) Build a new anchor.
- 2) Untie yourself from the end of the rope and tie onto the victim's harness.
- 3) Clip victim's new rope to a locker (becomes the ring) at the anchor.
- 4) MMO the rope from the victim's new knot onto a locker at your waist.
- 5) Rap down to load this new counterbalance.
- 6) Remove rappel, third hand and cordelette to the victim.
- 7) Untie victim's original tie in and pull rope.





11. Tandem Rappel

The tandem rappel is the main way to get an injured climber down. A spider is used to connect the victim and the rescuer to a single rappel device. A spider can be a double shoulder-length sling from the rescuer's extended rap device. Continuing from the load releasable anchor steps above:

- 1) Thread rappel rope through a new ring.
- 2) Rig rap device and hands free.
- 3) Rig spider from victim's belay loop to your extended rap device.
- 4) Push the rap device and third hand as far up the rappel rope as possible.
- 5) Undo MMO load releasable anchor to load the spider.
- 6) Remove loose counterbalance rope from anchor. Injured victim can stay tied in if transferring to a new load releasable anchor.





12. Belay Escape and Ascend

Escaping the belay means you are belaying a leader or follower from your waist and need to remove yourself from that belay. The belay escape occurs in two different situations: leader belay escape and alpine belay escape. **In this exercise**, you are belaying the leader from a belay device at your waist. When the leader falls, either lower them to the belay, or ascend to them if they're over halfway out.

- 1) Tie off the belay plate.
- 2) Clip blocking knot into belay loop.
- 3) Add footloop by Klemheisting a cordelette above the belay device.
- 4) Convert plate to plaquette by clipping the device ear to your belay loop and unclipping the belay plate from your belay loop.
- 5) Remove belay device tie off.
- 6) Ascend rope while adding new blocking knots.
- 7) Transition to rappel
 - a) tether to victim
 - b) rig rap extension and hands free
 - c) stand in footloop to convert plaquette to plate on an extension





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Course Wrap Up

- Practice again within 10 days.
- Carry rescue gear with you when climbing routes that are more than half a rope length.
- Take a first aid course. Preferably a Wilderness First Responder course.
- Practice each year.
- Dial these skills and take another course such as Rigging for Rescue's Self Rescue and Small Team Response course.
- While out climbing, think through worse case scenarios and what you would do.

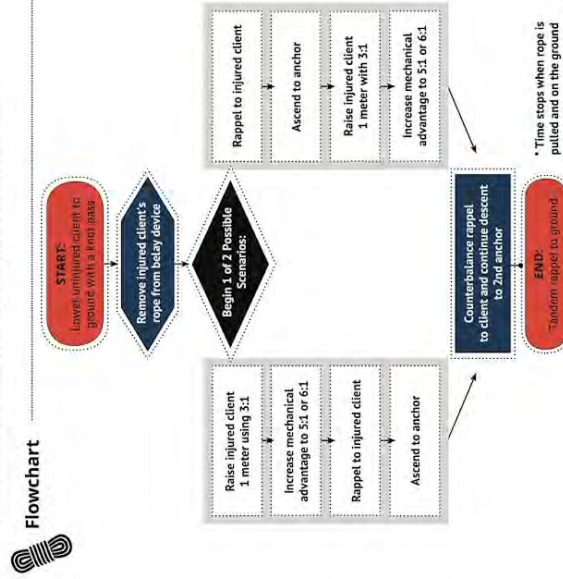


AMGA Rock Rescue Drill

Scenario [cont.]

- 7 **Counterbalance rappel to the injured client and continue to a lower anchor**
 - One locking carabiner or two non-locking carabiners must be left as a "rappel ring."
 - The rope must run cleanly through the anchor with no twists or kinks.
 - The guide must attach to the injured client's rope with a friction hitch to guard against a damaged rope below.
- 8 **Attach guide and client to the lower anchor with a load releasable system**
 - The lower anchor will likely be at a hanging stance and the injured client will not be able to unweight the system at any point.
- 9 **Rappel to the ground using a tandem system**
 - The lower anchor will have a fixed rappel ring and no carabiners can be left.

Flowchart



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RESCUE SKILLS ASSESSMENT Rock Rescue Drill

50
MIN

Scenario



Allowed Equipment:

- 5 locking carabiners
- 6 non-locking carabiners
- 1 cordelette
- 1 auto-blocking belay device
- 4 slings (any size from pulleys up to 48" slings)
- 1 locker and belay device found on the injured client
- 2 ropes

The guide is belaying two clients directly off of the anchor using an auto-blocking belay device. The first client is injured and cannot unweight the rope. The second client is uninjured and can unweight the rope prior to initiating the knot pass.

NOTES: All lowers and rappels must have closed systems and effective backups on the brake strand. All rappels must be extended. A friction hitch on the load strand is not an acceptable backup at any point during this scenario.

Steps

- 1 **Lower the uninjured client to the ground with a knot pass**
 - The uninjured client cannot unweight the rope during the knot pass.
 - Any knot pass can be used except passing a knot through a loaded Munter.
 - 2 **Remove the injured client's rope from the auto-blocking plate**
 - This can be done before or after lowering the uninjured client to the ground.
- Steps 3-6 can be performed in 2 different orders based upon instructor's discretion*
- 3 **Raise the injured client 1 meter using a 5:1 mechanical advantage**
 - All raising systems must have an effective backup with no more than 1 meter of slack in the system (i.e. the client cannot drop more than 1 meter if there is a failure in the progress capture device).
 - The ratchet can be any combination of gear from the equipment list.
 - 4 **Increase the mechanical advantage to a 5:1 or 6:1 (as directed by the instructor) and raise an additional 1 meter**
 - 5 **Rappel to the injured client**
 - 6 **Ascend back to the original anchor**
 - The auto-blocking belay device may be used in auto-blocking mode, but it cannot be treated as a "hands free" system and must be backed up.
 - While ascending, no more than 2 meters of slack can exist between each backup.
 - Backups must be clipped with a locking carabiner to the belay loop.



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