

A photograph of a snowy mountain peak under a clear blue sky. Three climbers are visible on the slope, and a large crevasse is on the right side of the image.

Winter Mountaineering
& Advanced Crevasse Rescue

STUDENT HANDBOOK

Updated January 2025

Contents

Course Schedule	4
Introduction	5
Cancellation Policy	5
Participation Criteria	6
Level 1 Avalanche Training	6
Graduation Requirements	7
Graduation Checklist	7
Rope Leaders on Basic Climbs	7
Course Curriculum	8
Mindset 1: How can I protect my followers? [Travel Techniques]	8
Mindset 2: How can I manage a multitude of crevasse rescue scenarios as a solo rescuer? [Solo Crevasse Rescue]	8
Mindset 3: What can our single rope team do to assist in the rescue of an injured climber? [Small Party Rescue]	8
Mindset 4: How can we handle an unplanned overnight? [Winter Overnights]	9
Mindset 5: What should I be thinking about as a rope lead? [Rope Lead Mentorship]	9
Course Structure	10
Online Self-Paced Learning Modules	10
Field Trips (FT)	10
Experience Trips (ET)	10
Volunteer Day	11
Gear Needs	12
Required Gear	12
Harness	12
Helmet	12
Rappel Extension Alternatives	12
Belay Device	13
Carabiners	13
Cordelette	13
Pulley	13
Prusik	13
Slings/Runners	13
Ice Axe	14
Crampons	14
Picket	14
Ice Screw	14
Recommended Gear	14
Petzl Micro/Nano Traxion & Tibloc (Highly recommended)	14
Tool with Hammer	14
Field Trip Content	15

Field Trip 1	15
Mindset	15
Course Leader Thoughts	15
Skills Covered	15
Field Trip 2	18
Mindset	18
Course Leader Thoughts	18
Skills Covered	18
Field Trip 3	25
Mindset	25
Course Leader Thoughts	25
Skills Covered	25
Field Trip 4	31
Mindset	31
Course Leader Thoughts	31
Skills Covered	31
Experience Trip Content	40
Experience Trip 1 (Winter Overnight & Emergency Preparedness)	40
Focus:	40
Destination:	40
Tentative Schedule:	40
Experience Trip 2 (Early Season Glacier)	40
Focus:	40
Destination:	40
Tentative Schedule:	40
Experience Trip 3 (Late Season Glacier)	40
Focus:	40
Destination:	41
Physical Conditioning	41
Seminars & Clinics	41
Continuing Education and Volunteer Opportunities	42
Mountaineers Intermediate Modules	42
Mountaineers Advanced Courses	42
Volunteer	42
Additional Credentials	42
Club Standards	43

Course Schedule

Date*	Field / Experience Trip
Fri Jan 10 Fri Jan 17 Fri Jan 24	Basic Alpine Skills Refresher
Wed Feb 5	WMCR Kickoff
Tue Feb 11 Wed Feb 12 Tue Feb 18 Wed Feb 19	FT #1 - Protecting Your Follower
Thu Feb 13 Fri Feb 28	Optional Practice Night
Tue Feb 25 Wed Feb 26 Thu Feb 27 Tue Mar 4	FT #2 - Crevasse Rescue Nuances
Wed Mar 5 Thu Mar 6 Fri Mar 7 Tue Mar 11	Mandatory Practice Night
Wed Mar 12 Thu Mar 13 Fri Mar 14 Tue Mar 18 Wed Mar 19	FT #3 - Practicing Solo Crevasse Rescue Scenario
Sun Mar 23 Sun Mar 30 Sat Apr 5 Sun Apr 6	FT #4 - Small Party Rescue
Sat/Sun Mar 8/9 Sat/Sun Mar 15/16 Sat/Sun Mar 22/23	ET #1 - Winter Overnight & Emergency Preparedness
Sat-Mon May 10-12 Sat-Mon May 17-19 Sat-Mon May 24-26	ET #2 - Early Season Glacier Travel & Mentorship
Sat Sep 13 Sun Sep 14 Sat Sep 27 Sun Sep 28	ET #3 - Late Season Glacier Travel

2025 Winter Mountaineering & Advanced Crevasse Rescue

Tue Apr 22 Thu Apr 24 Tue May 20 Thu May 22	Basic Field Trip Instructing - Day 1 (Magnuson Park)
Sun Apr 27 Sat May 3	Basic Field Trip Instructing - Day 2 (Snoqualmie Pass)

* if more than one date/session scheduled, students are only expected to attend one

Introduction

Welcome to the Winter Mountaineering and Advanced Crevasse Rescue (WMCR) module of the Intermediate Alpine Climbing program. The course is a combination of classroom, online, and field instruction to equip you with the skills and experience required to safely plan and execute winter glaciated mountaineering trips. Participants will gain proficiency in safe traveling techniques on steep and glaciated terrain, systems for 2-person travel, trip planning, and the execution of rescues. The course goes beyond basic crevasse rescue and covers a variety of scenarios, including solo crevasse rescue. Once you graduate, you are eligible to become a rope leader on glacier climbs for the Mountaineers.

Cancellation Policy

Participation in the course can be canceled for a full refund minus a \$50 cancellation until January 7th. See the [Mountaineers Cancellation and Refund Policy](#).

Participation Criteria

In order to participate in the course, the following criteria should be met:

1. Have membership in The Mountaineers
2. Basic technical skills and AIARE Level 1 training
 - a. Completion of the Basic Alpine Climbing Course, Basic Glacier Travel Course, or an equivalent qualification
 - b. Wilderness First Aid certification or an equivalent medical training
 - c. Proficiency in Wilderness Navigation or an equivalent course
 - d. Completion of AIARE Level 1 avalanche training (must be finished prior to the Winter Mountaineering Experience Trip, but not necessarily at the time of application)
3. Previous scrambling and climbing experience
 - a. At least 2 basic glacier climbs and ideally, at least 2 winter scrambles, snowshoeing or backcountry skiing trips. These experiences should demonstrate your comfort with steep snow slopes and exposure to heights.
4. Fitness
 - a. Ability to hike Mount Si to the bottom of the haystack in under 2 hours or Mailbox Peak in under 2.5 hours with a 35 lbs pack (30 lbs for people weighing less than 130 lbs) in the Aerobic Zone.
5. Commitment to volunteerism
 - a. 24+ hours of volunteering commitment in the past year at the Mountaineers or outside
 - b. Ability to help with the Basic Climbing Courses at glacier/snow-related field trips during the course year (at a minimum)

Level 1 Avalanche Training

Level 1 Avalanche Training certified by the American Institute for Avalanche Research and Education (AIARE) is required for all snow-related activities. This training is done independent from the Winter Mountaineering & Advanced Crevasse Rescue course. AIARE-certified training is offered at least once per year by the Seattle Mountaineers. Students may take their AIARE-certified training from other organizations as well. AIARE Level I equivalent certification such as from the Canadian Avalanche Association (CAA) or National Ski Patrol (NSP) is accepted. AIARE Level 1 is required for all snow- and ice-related modules within the Intermediate Climbing program and must be completed before the first winter mountaineering Experience Trip of this course.

If you took the Level 1 Avalanche Training outside the Mountaineers, please email your certificate to info@mountaineers.org and CC the course leader to request the badge for your profile.

Graduation Requirements

In order to graduate with the Winter Mountaineering & Advance Crevasse Rescue badge, students must complete all online learning modules, attend all required field trips, and display competency at experience trips.

Graduation Checklist

- Basic Alpine Skills Refresher (2:1 or 3:1, prusiking, etc.)
- FT #1 - Protecting Your Follower
- FT #2 - Crevasse Rescue Nuances
- FT #3 - Practicing Solo Crevasse Rescue Scenario
- FT #4 - Small Party Rescue
- AIARE 1
- Online Self-Paced Learning Module: Glacier Travel Considerations
- Online Self-Paced Learning Module: Planning and Leadership
- ET #1 - Winter Overnight & Emergency Preparedness
- ET #2 - Early Season Glacier Travel & Mentorship
- ET #3 - Late Season Glacier Travel
- Fitness Evaluation
- Volunteer Day

Rope Leaders on Basic Climbs

Course graduates earn the [Glacier Climb Rope Leader](#) badge, qualifying them to participate as rope leads on Basic Glacier Climbs. Glacier rope leads are expected to:

- Demonstrate technical competence, interpersonal skills and good judgement.
- Show up prepared as if they were leading the climb. This includes having all the gear needed for the climb, detailed knowledge of the climbing route as well as the descent, ability to navigate on and off trail, knowledge of potential hazards and how to mitigate them, and more.
- Be courteous, patient and humble, and generally display good expedition behavior.
- Assist the climb leader in organizing and managing the climbing party, route finding, setting up rappels, accounting for whereabouts of students, resolving conflicts, etc.
- Understand the [Climbing Activity Standards](#).

Course Curriculum

This course is designed to help students critically evaluate conditions and to build students' ability and confidence in responding to any number of situations that could be encountered on glacier trips. Rather than outlining a list of "steps" to follow in a specific situation, course activities will equip students with a range of tools or skills that can be employed depending on the situation or conditions encountered. Throughout the course, instructors will encourage students to problem solve using the skills they have learned.

This course will encourage students to adopt five *mindsets* you may assume throughout your mountaineering adventures. Adopting these mindsets will help students think through the appropriate response to a given situation. Corresponding skills covered in the course are listed along with these five mindsets below:

Mindset 1: *How can I protect my followers? [Travel Techniques]*

- Snow anchors
- Steep snow pitching considerations
- Modern methods of belaying and lowering
- Escaping the belay

Mindset 2: *How can I manage a multitude of crevasse rescue scenarios as a solo rescuer? [Solo Crevasse Rescue]*

- Two-person travel
 - Rope setup
 - Traveling techniques
 - Solo crevasse rescue
- Advanced crevasse rescue
 - Equalizing anchors
 - Higher mechanical advantages and efficiencies (5:1, 6:1, and 7:1, optionally 9:1) for hauling/raising systems than taught in the Basic curriculum (2:1 or 3:1)
 - Attending to an unconscious climber (rappelling and ascending the rope)

Mindset 3: *What can our single rope team do to assist in the rescue of an injured climber? [Small Party Rescue]*

- Scene size-up
- Making and executing a plan

- Releasable hitches
- Converting raising to lowering and lowering to raising
- Passing knots
- Administering aid and patient care
- Transporting an injured climber on glacier or gentle terrain

Mindset 4: How can we handle an unplanned overnight? [Winter Overnights]

- Emergency shelters
- Second day traveling plans in consideration to avalanche terrain in absence of knowledge on weather and avalanche forecast

Mindset 5: What should I be thinking about as a rope lead? [Rope Lead Mentorship]

- Leading a rope team on glacier climb
- Finding and navigating crevasses
- Techniques for rope management and moving efficiently
- Working with Basic students and peers

Course Structure

The course uses four methods of education: online self-paced learning modules, skills nights, field trips, experience trips, and a day of volunteering with another course.

Online Self-Paced Learning Modules

We will be using the co-assemble platform to track your at-home learning before our in-person meetings, so we again have a common background established to either come with questions and see the new skills unfold or have a medium to come back to and refresh our knowledge to possibly get a bigger picture understanding of the same.

There are two main learning modules:

- Glacier Travel Considerations (due Friday, April 18, 2025)
- Planning and Leadership (due Friday, April 18, 2025)

Field Trips (FT)

These activities are held at the Seattle Program Center to learn technical skills. These field trips will happen on any day, whether it is rainy, snowy, sunny, or windy. We will make accommodations to take care of one's well-being. If for some reason this is not feasible, we will work together to align our schedules and make it work for you. Your flexibility is appreciated here.

- FT 1 - Protecting your follower:
(Optional to those who took Int. Rock Modules) Anchors, Top site belays and lowering, belay escape
- FT 2 - Crevasse Rescue Nuances:
Equalizing anchors and mechanical advantages, rappel to ascension techniques
- FT 3 - Practicing Solo Crevasse Rescue Scenario:
Full crevasse rescue practice on unconscious fallen climber
- FT 4 - Small Party Rescue:
Rescuer setup with patient care, lowering and Raising of a patient with rescuer, and moving injured climber over technical terrain

Experience Trips (ET)

Experience Trips are activities in which you actually get to go out and play in the snow/glacier. There are three experience trips, and each has its own objectives. The first two are planned as overnight trips.

- ET1 - Winter Overnight & Emergency Preparedness:
Building emergency shelters, winter camping, winter gear use, winter travel, rope setup for 2, 3, or 4 person rope teams, and emergency preparedness considerations such as transporting a

patient on snow.

- ET2 - Early Season Glacier Travel & Mentorship:
Navigating crevasses, traveling on steep slopes, crevasse rescue in real crevasse (hopefully), trip planning execution and mentorship to navigate and plan for a destination (Sherman Peak or Colfax Peak in Mount Baker Wilderness Area)
- ET3 - Late Season Glacier Travel:
Navigating late season crevasses, rope leading & management, use of ice-screws, rescue practice in real crevasses if needed

Volunteer Day

Volunteers are the heart and soul of our community at The Mountaineers. Part of this course is preparing you to be a leader for The Mountaineers. One way to start exhibiting this is through volunteering with courses from which you have graduated, such as the Basic Alpine Climbing. You should sign up to volunteer at a Basic Alpine Climbing Course field trip or share other courses with which you are currently volunteering.

Gear Needs

Required Gear

Harness

Features shall include:

- The double-back, light buckle and fastening strap are easy to operate—even with gloves—and make this harness comfortable to wear when walking or suspended
- Adjustable leg loops
- 2 gear loops
- A single tie-in point
- Retainers on each leg loop to let you carry an ice screw

Winter travel does include steep snow pitches, and during the course, students can expect to spend about 40-50 mins hanging on the rope while the other students practice rescue on the roof. Please choose your layers wisely.

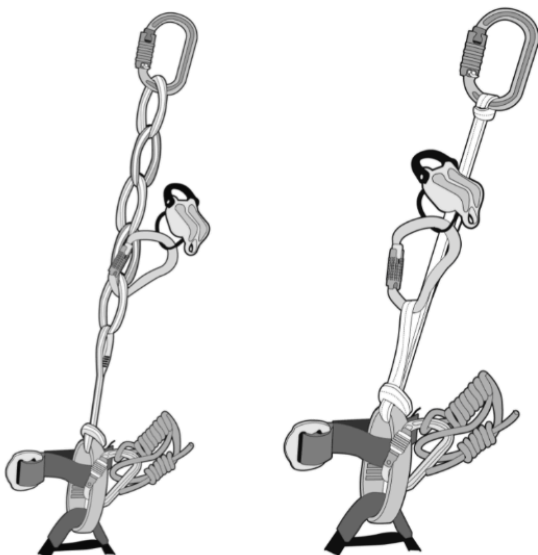
Helmet

Features shall include:

- Low profile, ventilated helmet
- UIAA standard protection
- If touring, it shall be suited for ski touring
- Front of helmet designed for integration of ski goggles
- Rear elastic is compatible with ski goggle headbands
- Headband can be adjusted easily, even with gloves on

Rappel Extension Alternatives

Rappel extensions can be made out of a sling; avoid carrying PAS (gear that has single use) on glacier climbs.



Belay Device

The best belay device is an ATC with a guide mode function that has a large hole for using it in an assisted brake mode and a smaller hole on the other side of the tube to assist in rescue for loaded strands.



Carabiners

We recommend carrying 5-6 locking carabiners and enough non-locking carabiners to organize your gear as needed. When rigging a hauling system without a pulley, it is important to consider a round stock carabiner. I-beam stock has the least efficiency.

Cordelette

Two cordelettes made from ~6 meters each of 6 or 7 mm nylon cord, or 5mm tech cord.



This can be used for following situations:

- Extending the anchor/equalizing the second anchor
- Block and tackle releases on loaded ropes
- Create releasable Munter Mule Overhand
- More in other rock/rescue modules

Pulley

You are strongly encouraged to read the technical manual of your pulley and note its efficiency. Some pulleys are meant to be about 90% efficient while others can be pretty low.

Prusik

Two prusiks made of 6 mm nylon cord or 5mm tech cord long cord tied with double fisherman knot for 6mm or triple fisherman knot for 5mm cord. There are also pre-sewn hero loops and prusiks that are suitable for this course. Note that hollow blocks may not provide friction when wrapped on glacier rope because they tend to get iced up.

Slings/Runners

A combination of shoulder-length and 120cm long slings and having a variety of materials to use is beneficial.

- Note that a Chest Harness & Texas Prusiks are **not** required: We recommend leaving chest harnesses and texas prusiks at home and improvising to work with slings, which are multi-use materials that we already carry up the mountain.

Ice Axe

A regular ice axe, rated for basic glacier travel.

Crampons

A regular 10-point crampon would suffice, although some winter mountaineering trips include steep snow travel where front point crampons may be beneficial when snow is hard and icy.

Picket

Features shall include:

- ~22 inches long
- V-shaped preferred but others work as well
- Stainless steel strike plate
- If picket has a cable runner, it must be rated to ~8kN and it's worth investing in a removable cable

Ice Screw

A 22cm long screw is very beneficial for glacier climbs. It is often needed to protect yourself and perform crevasse rescue, especially on late-season glacier climbs.

Recommended Gear

Petzl Micro/Nano Traxion & Tibloc (*Highly recommended*)

These devices ease the use of adding a friction hitch on a loaded strand. The Tibloc gets locked to move the rope in one direction and micro traxion acts as both a pulley and a progress capture for your hauls.



These devices do bite into the rope, so it is important to ensure they aren't used repetitively on the same section of rope.

Tool with Hammer

Adze vs. Hammer:

Mountaineering axes have an adze, which can be used for step cutting, digging, and chopping. When climbing technical ice or mixed routes, a hammer is often preferred over an adze. Some climbers carry one adze tool and one hammer tool, and some tools have modular heads that allow for customization.



Field Trip Content

Field Trip 1

Mindset

- How can I protect my followers?

Course Leader Thoughts

- This FT is optional for those who have taken Single/Multi-Pitch Trad or Self Rescue Courses.
- Prusik belaying and other means taught in Basic, such as carabiner-axe belay and hip belay, work on glaciated terrain with gentler slopes and either require the belayer to be ready to self-arrest or have themselves anchored.
 - Using Ice-Axe as an anchor placed vertically into the firm lacks protection for falls due to the leverage of the sling that is hitched in the eye at the top of the shaft.
 - Pickets make a good anchor (more on this at Experience Trips)
- For steep terrain often encountered in winter mountaineering or ice climbing trips, prusik belays and carabiner-axe belays are incompetent to hold the slip/fall.
 - Hip belays or belaying from a harness using a belay device on less steep terrain works best (more on this at Experience Trip #1)
 - Belaying in guide mode from the top works best if the terrain is steep where the device can be isolated from the snow surface.
- Skills to be taught:
 - Anchor building (bolts used for practice can be ice screws or pickets)
 - Belaying and lowering techniques
 - Escaping the belay

Skills Covered

1. **Anchor building with EARNEST principles:**

Equalized

Angle (less than 90, about 45-60 ideally)

Redundant

No **E**xtension (actually minimize extension to what is okay for a given situation)

Strong (discuss the strength, redundancy is at times not required for example slings when connected to the anchor or a well-rooted tree that is >12 inches wide or a boulder that is wedged in and doesn't vibrate on hits)

Timely

Anchor Types:

- a. Two point

- (i) Powerpoint; (ii) Quad; (iii) Sliding-X with limiting knots
- b. Single point
 - (i) Tree ; (ii) Large boulder ; (iii) Single T-slot picket

Reference Material: Rob Busack's Youtube Video ([A Primer on Climbing Anchors](#))

2. Munter hitch

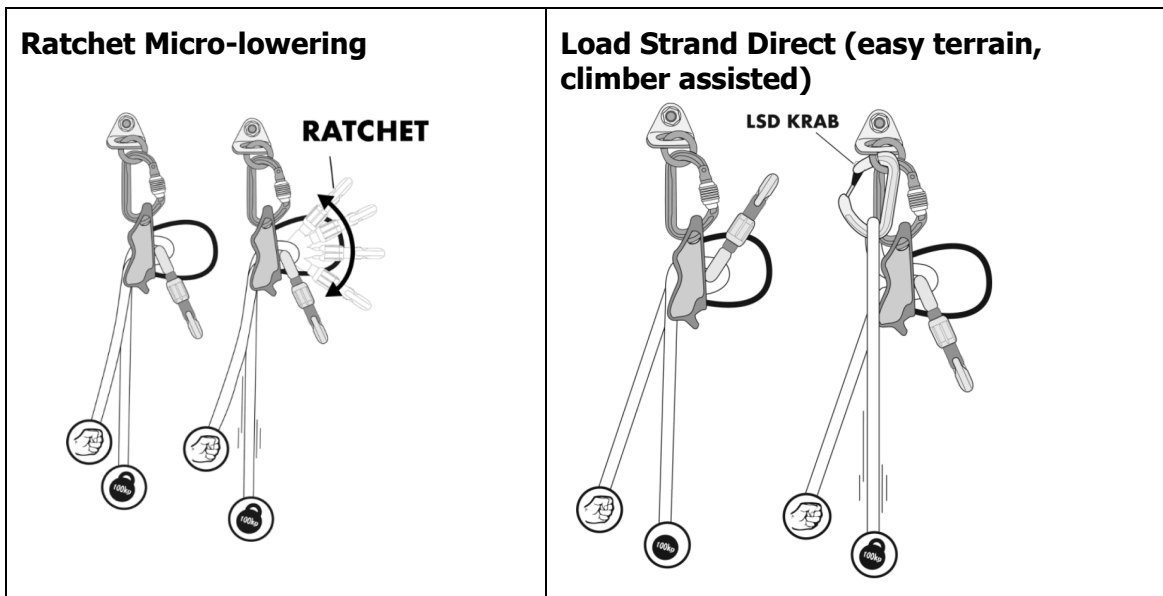
- a. Belaying and lowering (always use third hand)

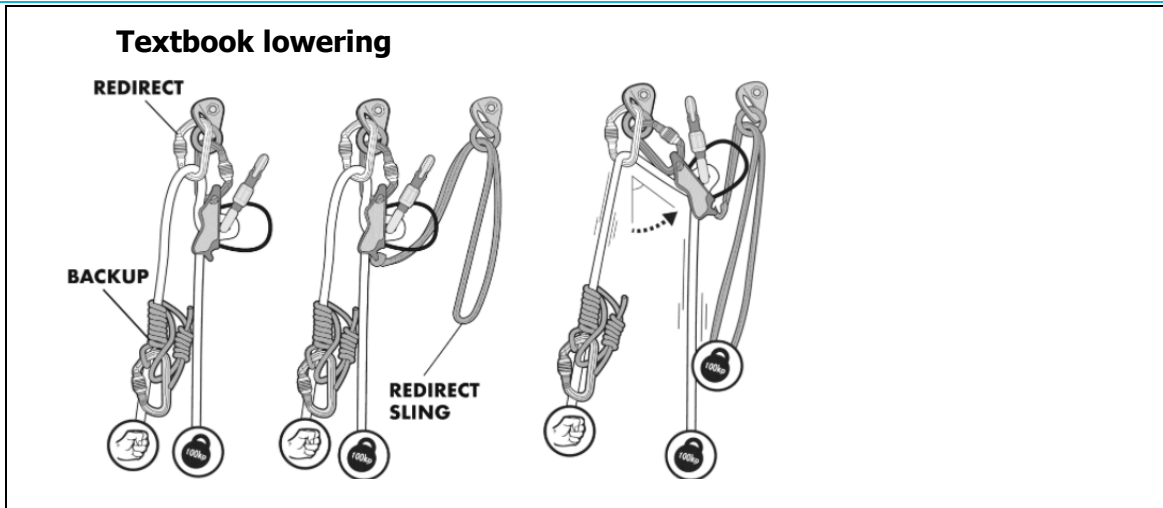
3. Belay device in guide mode

- a. Belaying and Lowering when belaying using a device in guide mode
 - i. Ratcheting
 - ii. Load Strand Direct
 - iii. Textbook lowering

Reference Material:

- YouTube Videos:
 - [Transitions: Belaying From the Top](#)
 - [Lowering from the top](#)
- Sketches:





4. Escaping the belay

Scenario: Belayer attached to anchor using a sling and is belaying their follower who needs rescuing) using a belay device on their harness.



Reference Material:

California Climbing School's YouTube Video ([How to do a Belay Escape](#))

Note the following on the video:

1. There is a lot of rope available to escape. When not available the students should know how to use the cordelette to escape.

Field Trip 2

Mindset

- How can I manage a multitude of crevasse rescue scenarios as a solo rescuer?

Course Leader Thoughts

- In Basic, students are introduced to either drop loop (2:1) and/or Z-pulley (3:1) rescue systems but have a minimal understanding of...
 - equalizing anchors or
 - pros/cons of these hauling systems or
 - how to address an unconscious climber or
 - how to improve the hauling system when lacking resources (rope length or climbers available, when either a middle climber needs rescuing or the rescue rope isn't long enough due to stretch, or when there's no team around for help/assistance)
- Skills covered with an understanding that we focus on above-mentioned components of crevasse rescue:
 - Equalizing anchors.
 - Converting 2:1 to 6:1 and 3:1 to 6:1
 - Converting from Rappel to Ascension (this skill practice can be skipped by those who took Self Rescue courses)

Skills Covered

1. Equalizing Anchors

a. Backing up

This method involves simply connecting a second anchor to the carabiner of the first one. The connection should have essentially no slack, so that if the first anchor fails or shifts, the weight transfers to the second anchor immediately without generating a shock load.

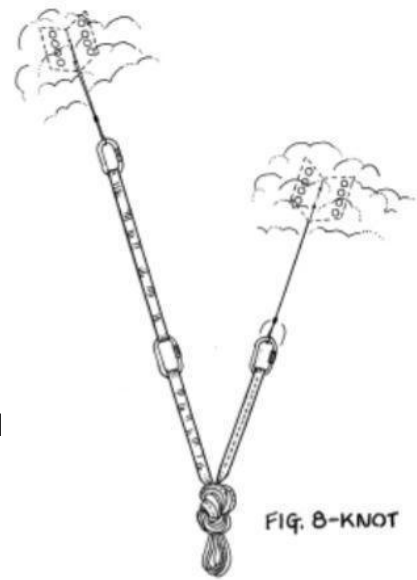
This simple system is fine for linking two flukes or two vertical picket placements or when building a backup anchor before loading the primary anchor by equalizing the anchors.



b. Equalizing

Distributing a load between a pair of anchors can more than double the reliability of the overall anchor. Although webbing works fine, this is a good place to use a cordelette.

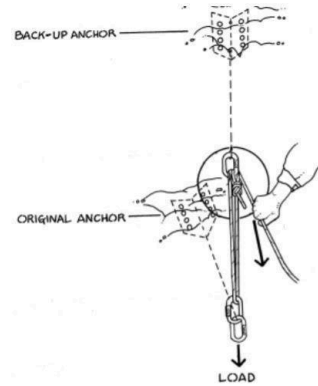
- Clip a cordelette into both anchors.
- Gather both strands of the cord and pull them directly toward the anticipated load, forming a bight.
- Tie this bight into an overhand or figure-eight knot. Now you can clip the load to the resulting loop.
- If the bight and knot are rigged properly, both anchors share the force equally. What makes this method safer is that if one of the anchors fails, that share of the load comes onto the other anchor immediately, preventing a shock loading.
- One concern with this system is that if the load changes direction most of the force shifts onto one anchor. But with most rescue loads you should be able to accurately predict the load's direction.



c. Tensioned backup (Block and Tackle, tied off with Mule+Overhand)

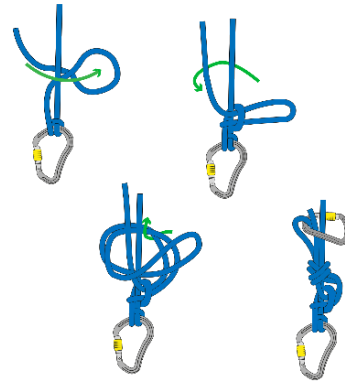
When a primary anchor is already loaded, you can connect the backup with tension so that it shares the load.

- Set a backup anchor "behind and/or away" from the first.
- Run a cord from the carabiner of the backup through a new carabiner on the primary and back toward the backup.
- Pull hard on this runner creating tension between the backup and the load on the primary. Then clip it into the backup's carabiner.
- Repeat the laps between carabiners as needed.
- While maintaining the tension, tie off the runner, the same as for tying off a belay.
- This is an excellent method (also known as block and tackle) to reinforce an anchor for hauling, and for linking one equalized pair with a second equalized pair.



d. Tensioned backup (Munter, tied off with Mule+Overhand)

- This technique is taught in the basics to be hands-free when belaying someone and when the climber needs to rest or in case of an emergency to call for help.
- Whether you tie off a belay device or a Munter hitch, a mule-overhand is a great tool to tie off anything and everything, such as our tensioning backup system.



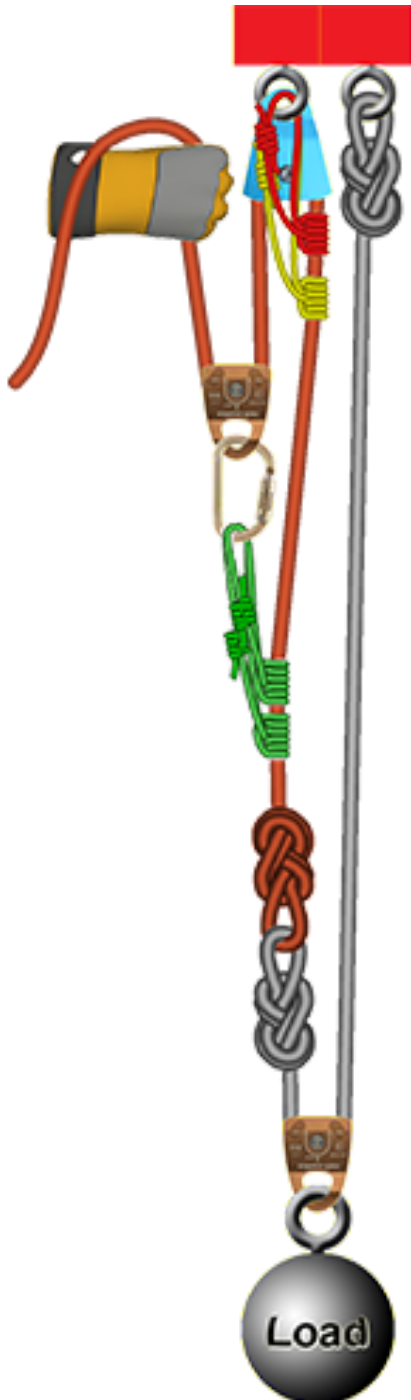
Reference Material: AMGA YouTube Video

([How to Back Up a Snow Anchor for Crevasse Rescue](#))

2. Converting to Higher Mechanical Advantage

Converting 2:1 to 6:1 -

Start with a drop loop when the strand connected to the fallen climber is entrenched and you can have enough rope to do a loop back to the anchor.



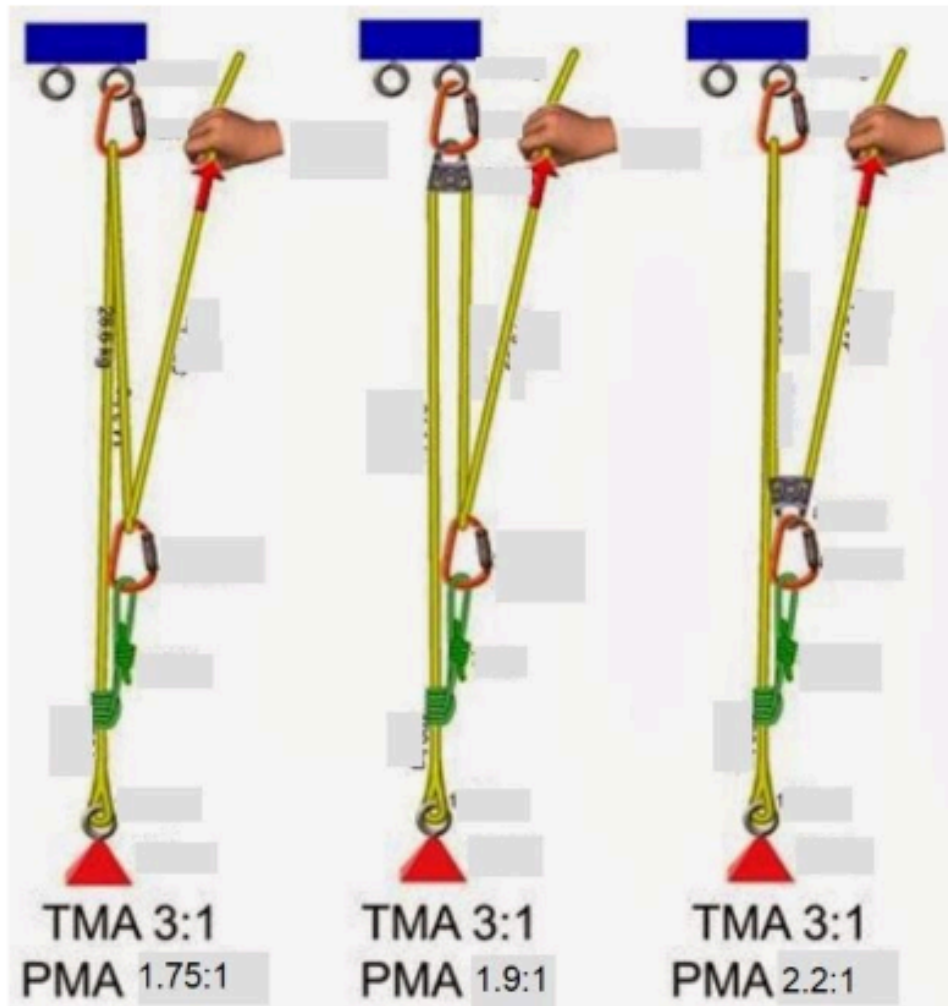
Converting 3:1 to 6:1 -

When the rescue rope isn't enough to return to the anchor (at least over the lip), then start with the other end of the rope or new rope which allows us to start with 3:1 over a prepared lip.



Pulley Efficiency -

- Carabiners are assumed to have 50% efficiency and pulleys at 80% for the numbers stated below the sketch. If we use two pulleys (one at anchor and one at friction hitch), the advantage becomes 2.44:1 for a 3:1 hauling system).
- Rounded carabiners perform better than I-beam stock carabiners.
- Some pulleys are at 90% efficiency while others are 70%.



36

Rule of 18 -

- There is something called the "Rule of 18" that we must adhere to. It's a guide limiting the number of rescuers used to pull on a haul system.
- Here's how it works. Let's take a 6:1 MAS (mechanical advantage system). We'll take the number of rescuers used and multiply that number by the first number in the MAS 6:1. If we have two rescuers we would multiply 6×2 , which equals 12. Twelve is under 18 so we are good. If one or more rescuers were added to the team, we would meet or exceed our rule of 18 ($6 \times 3 = 18$ or $6 \times 4 = 24$).
- Here is an example of why we conform to the "Rule of 18." Your rescue team is performing the rescue of a victim located at the bottom of an overhung crevasse. You've rigged all the necessary rigging, secured a bombproof overhead anchor, and assembled five of your strongest rescuers to perform the raising operation. The MAS you chose to use was a prepackaged 6:1 and the victim weighs approximately 250 pounds. The 6:1 MAS will now take that load and through the magic of physics make it ~42 pounds negating friction in the system. To make this load move we will have to generate a minimum pulling force of 42 pounds. Typically, a human on average can generate a pulling force of 30 pounds easily and with an effort up to 50 pounds -- so two rescuers (with a combined total pulling force of at least 60 pounds) should be able to move this 42-pound load.
- Here is where you will understand why we have the "Rule of 18." We have five rescuers ready to haul this load and five rescuers multiplied by 50 pounds of input force each will generate a pulling force of 250 pounds. If any of the victim's limbs or packaging equipment should become caught on an obstruction during the hauling process, there is a good chance the team above won't feel that resistance, and the result would be minor or severe injuries to the victim and/or gear damage with possible failure.
- Taking this example into account, during your size-up, you will need to calculate the MAS needed based on the fallen climber or "load" amount and the amount of personnel on scene.
- During this size-up, you also need to take into account the amount of rope you will need to use to build your system and also to evaluate the strength of the anchor needed to perform the rescue. Like every rescue operation, proper planning and a solid skill base are a necessity.

3. Converting Rappel to Ascension

- a. One can always resort to Texas prusiking after addressing an unconscious climber in a crevasse, though it should be noted that the chest prusik will need to be modified for its length to make this work manageable.
- b. Since students already know Texas prusiking, this field trip introduces another way to ascend the rope (i.e., by flipping the belay device into a guide made on their harness).
Reference Material: AMGA's Youtube Video ([How to Rappel Into and Ascend Out of a Crevasse](#))
- c. When the students are heavy (more than 200 lbs), ascending by flipping the belay device is not easily managed when needing to balance the weight and remove the slack due to friction (that depends on body weight). There is another system with a Garda hitch (alpine clutch) where they need to detach themselves from the belay device and install this Garda hitch instead of the device to reduce the friction.
Reference Material: Ortovox Safety Academy's YouTube Video on use of Garda hitch (https://youtube.com/clip/UgkxUxcVw27ZDWJSn0xpkaO8y8kkea5_kSbL?si=zWV5L1GsSt0m_dHY)

Field Trip 3

Mindset

- How can I manage a multitude of crevasse rescue scenarios as a solo rescuer?

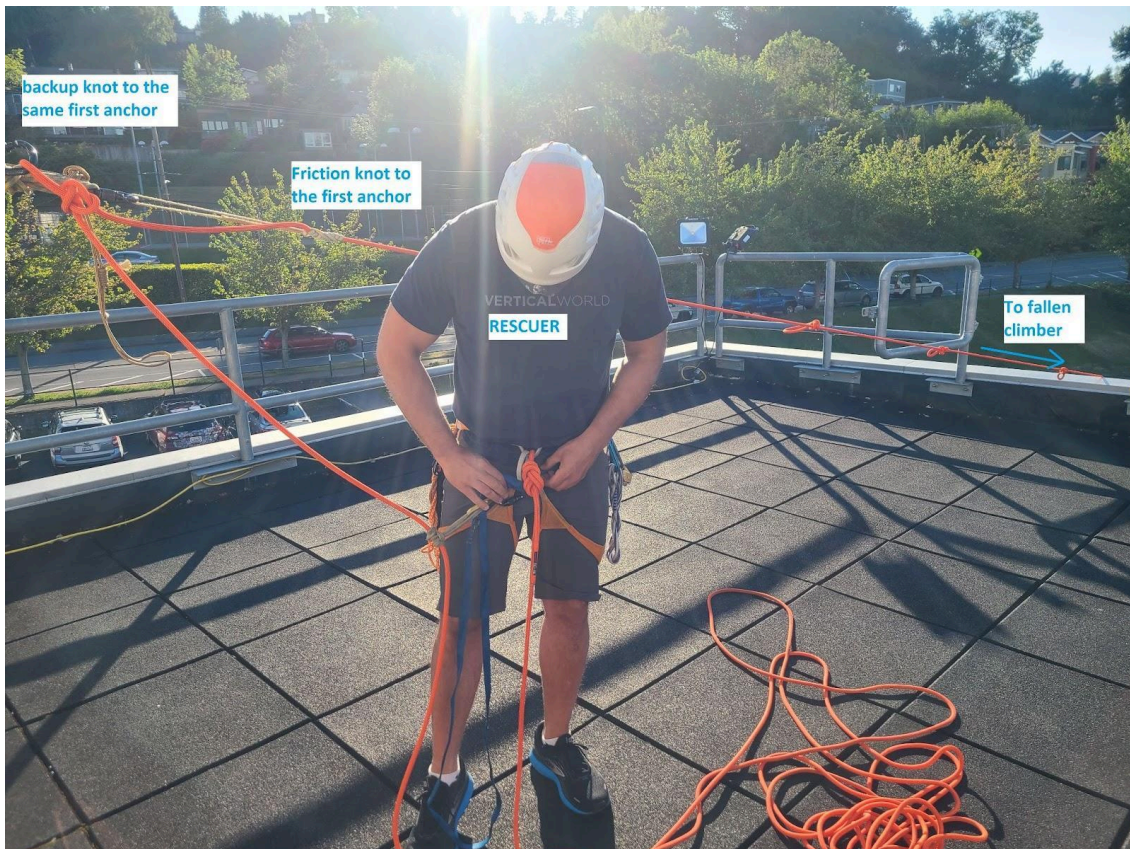
Course Leader Thoughts

- FT3 builds upon FT2 to practice a full crevasse rescue scenario.
- Although students learned in their Basic course how to set up a rope for a 3-person rope team, let's challenge the assumptions and provide logic on how we space between the climbers through discussion. (More on Experience Trip 1)
- Once the discussion is facilitated, divert their minds to learn more about setting up the rope for a 2-person team. (More on Experience Trip 1)
- Execute the Scenario: 2-person rope team that is self-reliant on a crevasse rescue situation of their partner who is unconscious.

Skills Covered

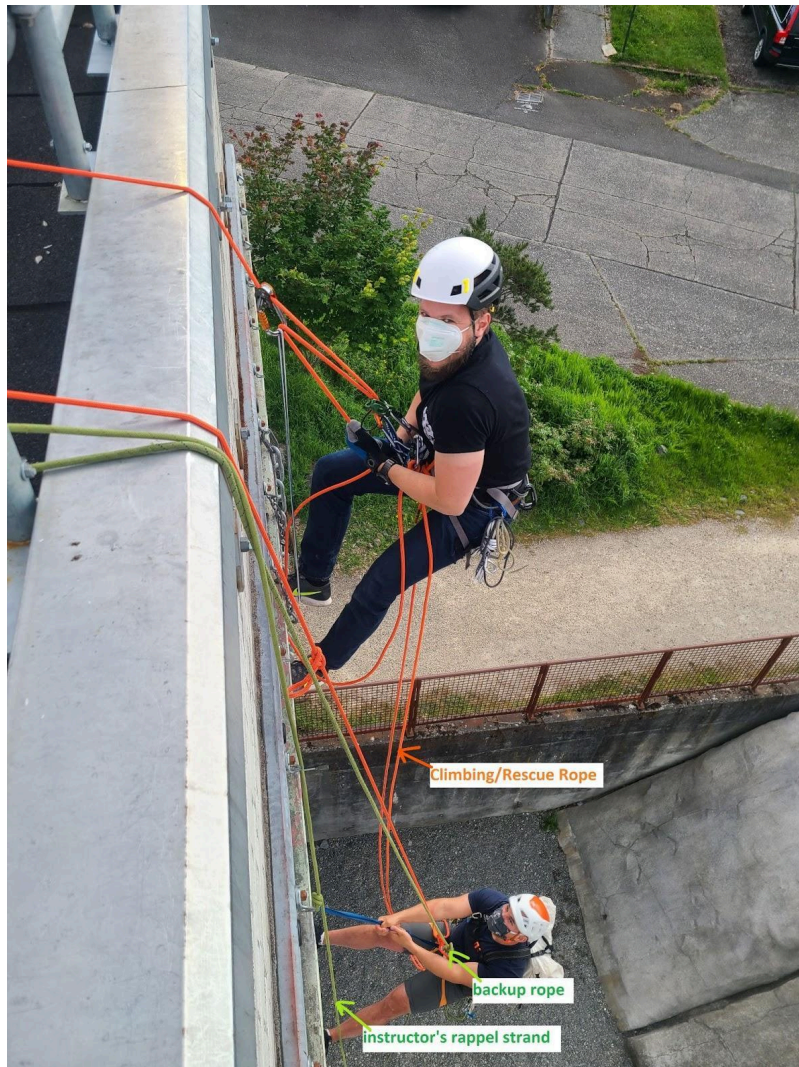
Practice on the North Roof

Each student works by themselves to help a stranded rope team rescue their climbing partner.



Stranded rope team

- A rope team of 2 climbers; divided the rope into 5 lengths, with both climbers carrying $\frac{2}{5}$ of the rope (aka rescue rope).
- The person holding the fall has set up the anchor and has transferred the fallen climber's weight to it on a prusik with a backup knot.
- The fallen climber is unconscious and his partner is hesitant to rap down into the crevasse (lacking trust in his anchor-building ability and has also injured his arm while arresting the fall)

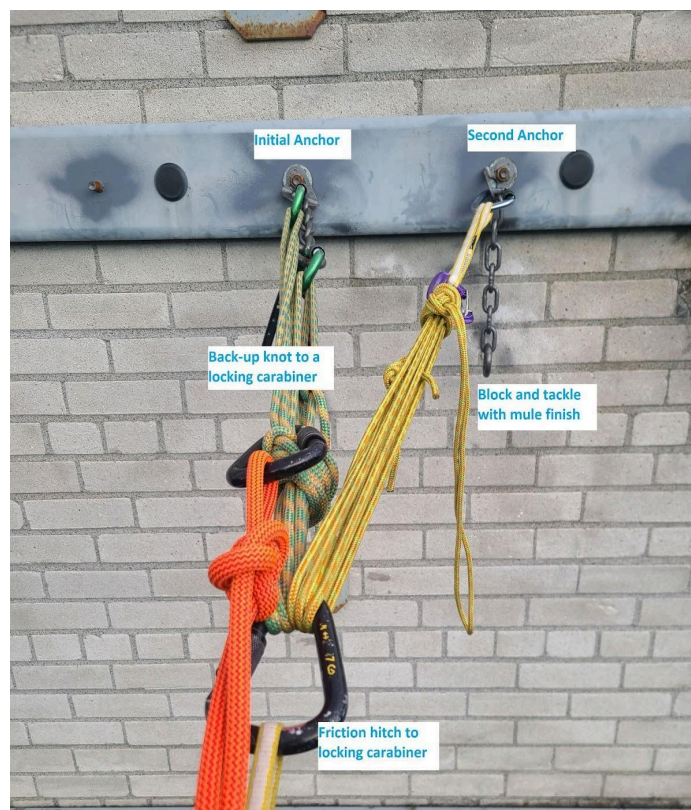


Safety of fallen climbers

- The fallen climber will be tied into 2 ropes.

- One of the ropes will be tied to the anchor 12 m from their tie-in point (butterfly knot) with $\frac{2}{5}$ of the rope (rescue coil) in his backpack or on his shoulder (kiwi coil).
- The fallen climber will also be tied into the second rope with a rewoven figure 8 (different color rope); when ready, they will be lowered on this rope using a munter until the first rope is loaded. The munter is then tied off with a mule overhand.
- An instructor can assist the fallen climber/rescuer on the wall by rapping down on a different strand to them during the rescue as needed.

Equalizing Anchors



Communication between the rescuer and the stranded climber

- It is important to establish communication throughout the process with the stranded climber.

Safely approach the crevasse (edge of the roof), and establish communication with the fallen climber

- The fallen climber is unconscious and hence provides no response, which confirms the finding as communicated with the stranded rescuer

Make a plan to quickly assist a fallen climber who does not respond and may require emergency first aid

- Build another anchor and equalize the load between the existing and the new anchor.
- Consider rappelling to an unresponsive fallen climber as the quickest way down. Both using a belay device or a munter hitch to rappel down are accepted.
- Check the fallen climber for any immediate attention for first aid.
- Set up your drop-loop onto the fallen climber's belay loop before ascending back up to the anchor (assuming the loaded strand is badly entrenched in the snow). Various ascension methods are accepted such as flipping the belay device in guide mode or garda hitch method accompanied by a friction hitch above the belay device/garda hitch to act as chest prusik; or any other creative way to efficiently switch from rappelling to ascension.

Raising systems

Note: If the loaded rope is entrenched into the snow, you may choose to abandon the loaded rope for the raise. This may require extra rope; either from a second rope team, or planned for by a single rope team with the end climbers carrying extra rope.

- After setting up the drop loop (2:1), the rescuer feels the need to improve the mechanical advantage to haul the fallen climber out of the crevasse.
- Any hauling system is acceptable.
- Bonus points: If you can state the steps...
 - to help the unconscious climber get over the lip
 - on how to secure the rescued climber
 - to check the integrity of the rope

Important Note:

- This scenario doesn't cover for instance a variety of snow conditions and the impact from the presence of other rope teams.
- Most real-life crevasse falls can be minimized by proper rope handling and good arrest, and typically won't need a hauling system.





Field Trip 4

Mindset

Small Party Rescue. Moving the fallen or injured climber away from technical terrain to camp or non-technical area to be evacuated by helicopter or large group rescue team heading up the non-technical approach trail or taking them to the care facility. One rope team (2-4 individuals) is available to assist in the rescue. Prepare to have the mindset to self-rescue when traveling in the backcountry. Call for help if needed, but do not expect or demand it.

Course Leader Thoughts

- Winter Mountaineering or otherwise, we encounter weather that was not forecasted and at times driven by summit fever. Such a push in deteriorating weather can cause unforeseen situations starting with dehydration to injuries.
- Whether it is our team facing the rescue situation or other parties, being on the mountain and realizing the incident has occurred, it becomes our moral duty to help others.
- Perform a scene size-up and your capability to help others before jumping in.
- Scenario: A team of 2-4 coming across another rope team in need of the rescue of their partner in a crevasse, who is unconscious and needs medical attention and is moved to non-technical terrain to receive assistance from a large group rescue team triggered from SOS/911.

Skills Covered

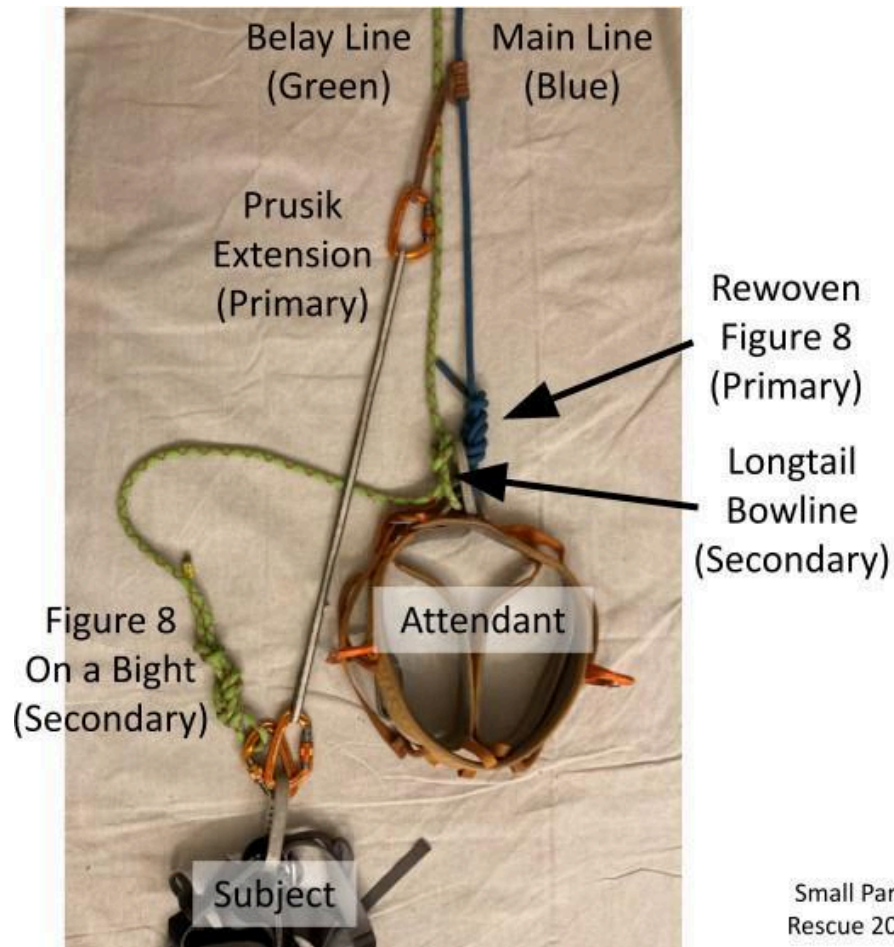
1. Improvised Harnesses

- a. [Swiss Seat Harness](#)
- b. [Improvised Harness #1](#)
- c. [Improvised Harness #2](#)

2. Rescuer-Attendant Tie-In and Patient Care

a. When Rappelling to the Fallen Climber

- Once you are a little below the subject to take care of them, tie a back-up knot below your rappel system.
- Within the next few feet below your backup knot, do a figure of eight on a bight and clip it to the subject's harness. Now you both are connected to the new rope.
- If and when your team will haul both you and the subject, once you do the first aid, the subject will be below you with this setup. In order to avoid this, take a sling or a cordelette to have them above you at all times. This attachment can be to your rappel setup or to a friction hitch above you (as shown in the picture)
- Note: In the picture, please assume that the blue rope is not there and the friction hitch shall be on the green rope



b. If Being Lowered to the Fallen Climber

- Connect yourself to a butterfly a few feet off from the tail.
- Have a figure-of-eight knot ready at the end of the tail to be able to connect to the subject's harness.
- subject's harness.
- Once you are just below the subject, do the rest similar to when you would do when you have rappelled to the subject.

c. Patient Care

- Doing patient care when hanging in the crevasse or when raised/lowered together; Improving blood circulation in the legs and not having them go upside down; also to create a platform to monitor them for the remainder of the rescue.
- Be sure to get close to the patient; the patient, if unconscious, should be in tripod position to help maneuver them on the cliff if both you and the patient are to be raised. You want to ensure that the patient doesn't hit anything while being raised and risking further injury
- Use their chest harness (if present already) or improvise to use your or their slings and to connect the shoulder straps to the high point as shown below (left and middle sketch).
- It also may be useful to pad their legs and pass a sling around it and connect to the same high point (as shown in the right sketch)



3. Converting to Higher Mechanical Advantages

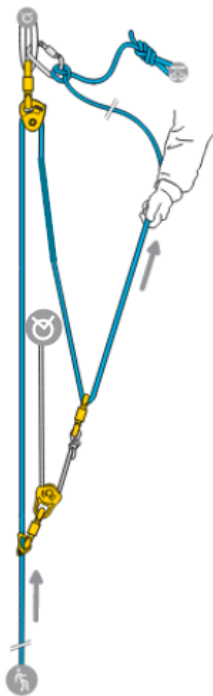
Converting 3:1 to 6:1



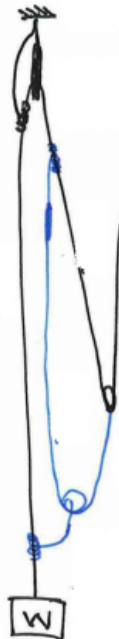
Converting 3:1 to 9:1



5:1 Hauling System



7:1 Hauling System



- [Converting from a 3:1 to 6:1 \(example is a rock climb, but same basic tenets apply for glacier\)](#)

Calculating mechanical advantage using the T-System & efficiencies

Video references:

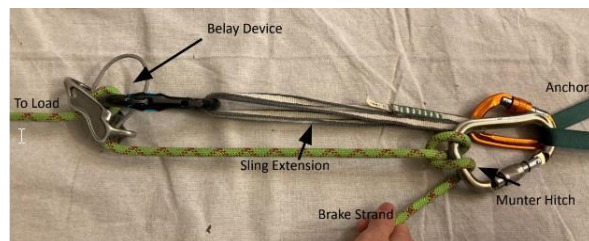
- [Mechanical Advantages: Counting Tensions and Estimating System Efficiency Part 1](#)
- [Mechanical Advantages: Counting Tensions and Estimating System Efficiency Part 2](#)

4. Lowering Two People at a Time

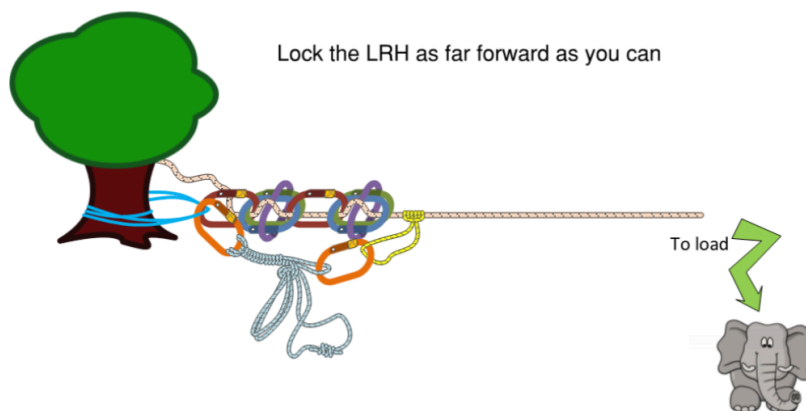
a. Technique #1: Using a monster / super munter

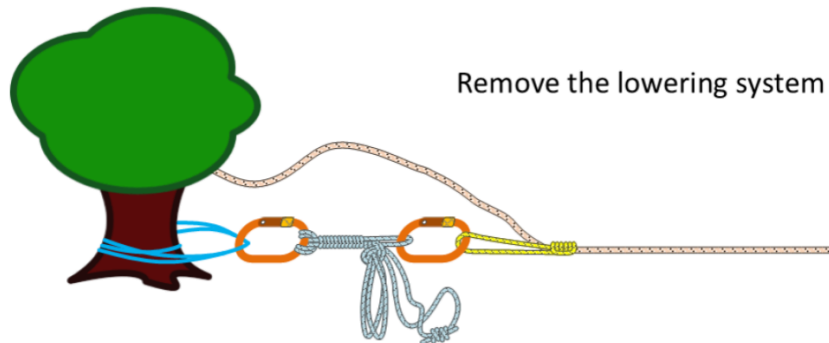
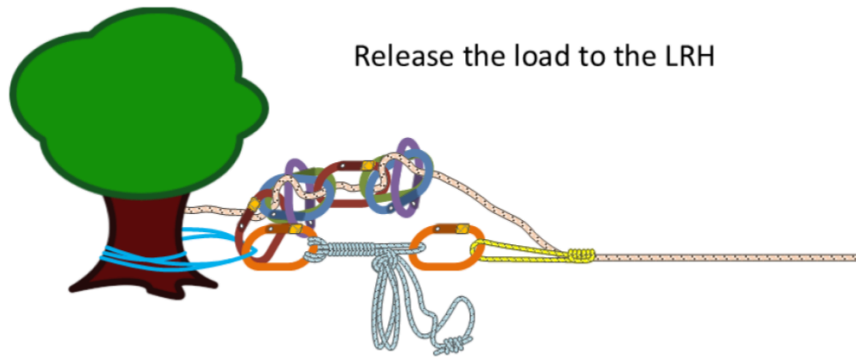


b. Technique 2: Adding a second system to your existing lowering system used to lower one individual



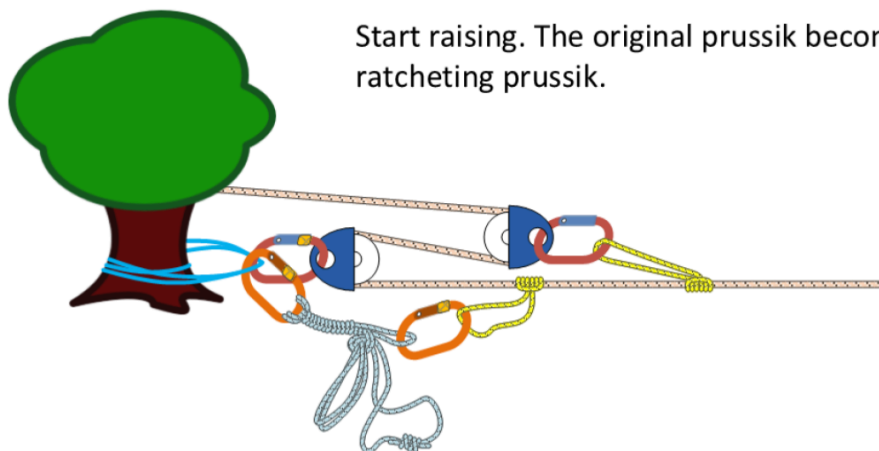
c. Converting a Lowering System to a Raising System





Note: it is **HIGHLY** recommended you close the system with a clove hitch backup before completely removing the lowering system

Set up the raise using the loose end of the rope. A 3:1 is shown here. Change it to 5:1 or 9:1 based on your load and pulling force.

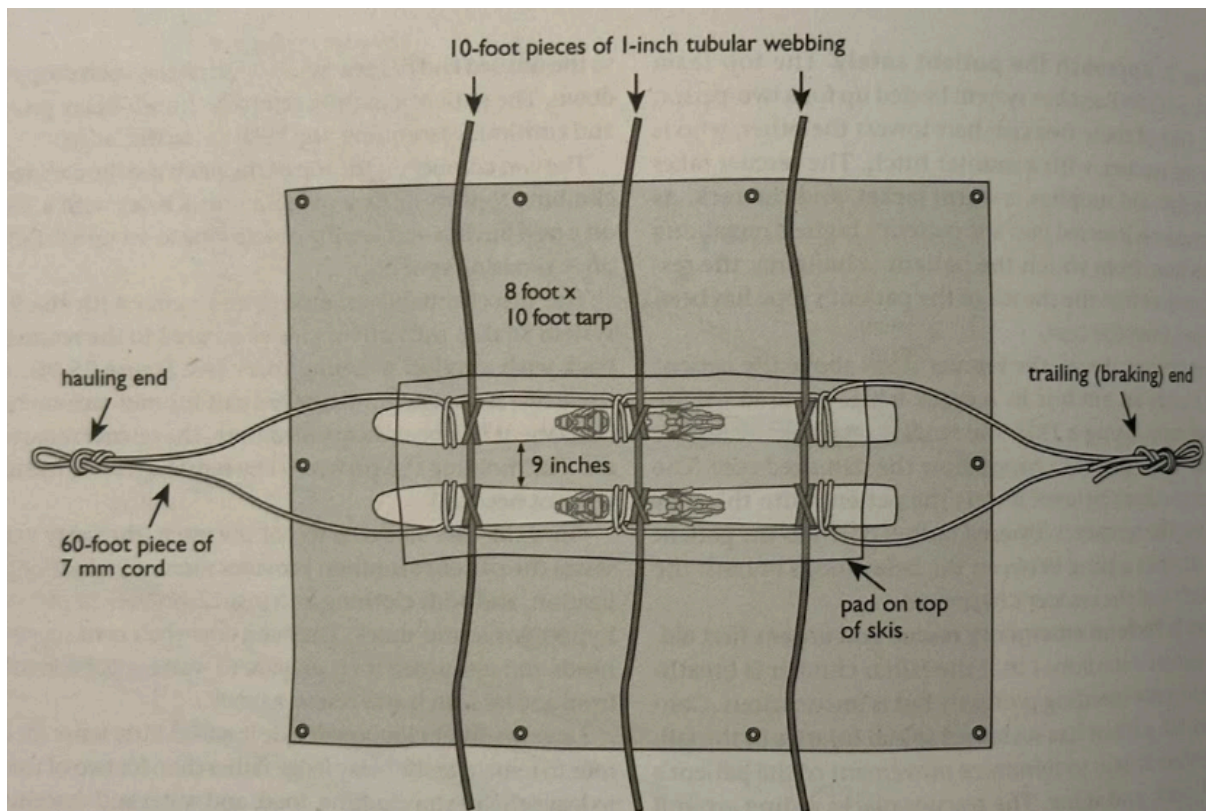


5. Patient Transport

- When an injury occurs, the party may be miles from the trailhead
- The party may decide to evacuate the patient to a better location to await outside assistance
- Your party may need to improvise with typical gear carried by the group:
 - Tarp
 - Bivy Sack
 - Tent
 - Rain Fly
 - Skis
 - Webbing/Cordelette/Slings
 - Sleeping Pads/Bags
 - Warm clothing
- Provide support for the patient's head, torso and pelvis
- Place layers of sleeping pads, clothing, and sleeping bags in the tarp with the patient to protect from heat loss and bumps from the ground
- Place the patient on top of the padding, wrap the tarp around them, and secure it with cordelette.
- Tie the hauling and trailing ends of the improvised litter to members of the party
- When ready to transport, try to follow the fall line as much as you can; traversing/switchbacking can be difficult
- Use the trailing line to brake the litter on steeper slopes, or lower the patient with a lowering system (munter, etc)

a. Standard Rescue Litter and Improvised Litter with Skis and a Tarp:





b. Shelter in Place with Tarp and Snow Cave:



c. Video Resources for patient transport:

- [Rescue Tarp](#)
- [Tarp Drag](#)
- [Tarp Pickups](#)
- [Rope Litter](#)

6. Communication and Decision Making Dynamics

Ask questions to help ensure you get the right picture of the situation/scenario and see if you have the skills to assist.

- Is the fallen climber okay?
- Does the team attached to the fallen climber feel competent to perform the rescue?
 - If not, what help or assistance could be beneficial?
- If you decide to assist, discuss with your team the need to build a new anchor system and or trusting their anchor, same for the rope.
 - If you decide to use their anchor system and rope, most of the skills are similar to FT3, except that we can go over the patient care when hanging in the crevasse.
- If you decide to build a new anchor and use your own rope to rescue the fallen climber, this FT assumes this scenario and walks you through different parts of the rescue.
 - Once the anchor is built, you can decide to rappel down on the new rope or be lowered. Since we won't be using their rope, it is crucial that we have a system to connect the fallen climber to our (new) rope. **See Rescuer-Patient / Attendant-Subject Tie-in.**
 - Getting to the subject and caring for them takes time. After attending to the immediate first aid needs, it may be helpful to improve blood circulation in their legs and if they are upside down, to make them upright. **See Patient Care.**

- Communication with the team at the anchor when ready to be hauled.
- Your team at the anchor can now prepare to set up a hauling system and raise you both over the crevasse lip and get you to the anchor. **See lowering to raising conversion and also 5:1; 7:1 or 9:1 hauling systems.**
- Once everyone is at the anchor, the next step would be to see if further assistance is needed to move the subject to the camp or back to the trailhead. In a dry environment, we would need a litter, but in snow covered areas (most likely in winter or back to the camp/trail network in summer) we could devise a backcountry sled using a tarp. **See transporting a patient in guide tarp.**
- At times, you may encounter steep slopes to traverse or to travel down. With a patient in a sled, it may be wise to lower the patient to better control their movement over precarious terrain. It would also be wise to have someone attending to the patient while being lowered. **See lowering 2 people at a time.**

Experience Trip Content

Experience Trip 1 (Winter Overnight & Emergency Preparedness)

Focus:

- Emergency Shelters / Winter camping
- Winter gear use
- Emergency preparedness including patient transport
- Rope set-up and short-roping practice
- Winter Travel

Destination:

- Paradise

Tentative Schedule:

- Day 1: Constructing snow shelters, with opportunity to sleep in snow caves if conditions allow
- Day 2 [to be held indoors if weather bad]: rope set-up and short-roping; winter travel and use of emergency sleds

Experience Trip 2 (Early Season Glacier)

Focus:

- Spring/summer glacier conditions
- Practicing rope lead & rope management
- Traveling on steep slopes
- Navigating crevasses
- Crevasse rescue
- Introduction to Ice Screws
- Mentorship & Trip planning

Destination:

- Mount Baker/Easton Glacier

Tentative Schedule:

- Day 1: Arrival at camp, small group discussions (leadership, communication style, fitness level, summit bid)
- Day 2: Team arrest, navigating crevasses, steep snow cramponing, use of ice screws, crevasse rescue practice
- Day 3: Summit bid

Experience Trip 3 (Late Season Glacier)

Focus:

- Late season glacier conditions
- Practicing rope lead & rope management
- Navigating crevasses

- Crevasse rescue, if needed
- Use of Ice Screws

Destination:

- Mount Rainier/Lower Nisqually Glacier

Physical Conditioning

You need not be a competitive athlete or marathon runner to succeed in this course, but being in your personal best shape will increase your chance for success and will maximize your enjoyment in the alpine. A climber in poor condition may slow the party enough to prevent ever reaching the summit, or even jeopardize party safety. Inadequate conditioning also can contribute to a loss of alertness and an inability to respond properly to the demands of the environment.

There is no conditioning evaluation for this course but in order to succeed in the second Experience Trip and as a rope lead for glacier climbs you should maintain adequate fitness. At a minimum, be able to hike with a full day pack (20% of body weight but no less than 25 pounds and no more than 50 pounds) up the Mt. Si trail to the boulders (4 miles, 3400' gain) in under 2h. If you want to go on more strenuous climbs, two consecutive hikes of Mt. Si or equivalent in one day are a good measure for your fitness. Having completed such a hike will be a great perk when you apply for a strenuous trip.

If you would like more info on building an appropriate training plan, talk to an instructor, work with a personal trainer who specializes in mountain sports (Seattle has many), and check resources from [Uphill Athlete](#) and other books and websites.

Seminars & Clinics

If you are looking to expand your leadership role within the organization, consider taking the [Foundations of Leadership Course](#) and working towards [Climb Condition Leader](#) and [Snow Climb Conditioner Leader Badges](#).

The Climbing Committee also offers seminars and clinics that are not part of the Intermediate Course but may be valuable adjuncts to your alpine education. Watch for them on mountaineers.org and the Climbing Highlights e-newsletter which all Basic students receive. Some of such seminars and clinics include:

- Beta & Brews: This seminar provides beta on some alpine climbs in the Washington Cascades. These are scheduled once a month in Fall/Winter/Spring months.
- Leader Development Series: There are numerous seminars that engage students and leaders to develop soft skills that help us all on trips. This helps those who have an inclination to instruct at trips or plan to be a leader one day whether it is a private trip or for The Mountaineers.

- Basic Refresher Clinics: These clinics offer a great refresher session where past year Basic graduates can get together and practice some skills that they could be a little rusty on before going out on climbs

Continuing Education and Volunteer Opportunities

Mountaineers Intermediate Modules

- Single Pitch Trad
- Multi Pitch Trad
- Alpine Ice
- Rock Self Rescue I & II

Mountaineers Advanced Courses

- Water Ice
- Backcountry Touring + SkiMo
- Advanced Alpine Rock
- Aid and Big Wall Climbing
- Denali Expedition Seminar

Volunteer

- Mountaineers Courses
- SAR
- Outdoors for All

Additional Credentials

- AIARE 2
- PSIA
- AMGA/IFMGA
- WFR

Club Standards

The Mountaineers have agreed on [Member Code of Ethics](#) and [Standards of Participant Conduct](#).

- Act ethically and respectfully to contribute to a safe and engaging learning environment;
- Engage with all other members with integrity and honesty;
- Follow Mountaineers policies, including behavioral policies and procedures, such as the Member Code of - Ethics and Problem Behavior policies;
- Treat people with dignity, respect and compassion to foster a trusting environment free of harassment, intimidation, and unlawful discrimination;
- Will raise any safety concerns as they arise to ensure a safe environment for all;
- Not harass, bully, threaten or discriminate against any member through any means

The Mountaineers is a heavily volunteer-driven organization and most leaders are volunteers. It is expected that leaders, in any capacity:

- Have the necessary skills and experience to competently manage the risks associated with activities they lead and/or instruct for both themselves and others;
- Act for the benefit of The Mountaineers and furthering the mission and goals of the organization;
- If relevant, share any conflicts of interests, real or apparent, that may compromise objectivity when representing The Mountaineers during any activities like volunteer selections or investigations;
- Promote relationships based on mutual respect, fairness and openness;
- Not use a position of authority within the organization for inappropriate coercion of another individual;
- Ensure fair and inclusive hiring, promotions, or appointments for all positions, including of volunteers;
- Complete incident reporting accurately, honestly, and promptly