KITSAP MOUNTAINEERS

BASIC CLIMBING COURSE

Class #2 and Field Trip #2

BASIC CLIMBING -CLASS #2
ROPES, ANCHORS, AND BELAYS

CLASS #2 Topics
Belaying
Rappeling
Field Trip #2 Preparation

Assigned Reading (complete prior to Class #2)	
Assigned Reading: Freedom Of The Hills Subject	
Belaying	Ch 10
Rappeling	Ch 11
Texas Prusik	Ch 18, p 394-395, 408-411
Additional Resources	

Basic Climbing Course - Class #2 Study Guide
Belaying, Rappeling, and Prusiking

1. Practice tying knots. Know when to use each.
2. Know how to tie into a rope both at the end and in the middle
3. What is meant by opposite and opposed carabiners?
4. Is it ever OK to remove the braking hand from the rope while belaying?
5. Explain what is a fall factor of 2.0. Why is that an issue?
6. What does SRENE mean?
7. What is a fireman's belay?
8. Learn the voice commands associated with climbing.

Basic Voice Commands

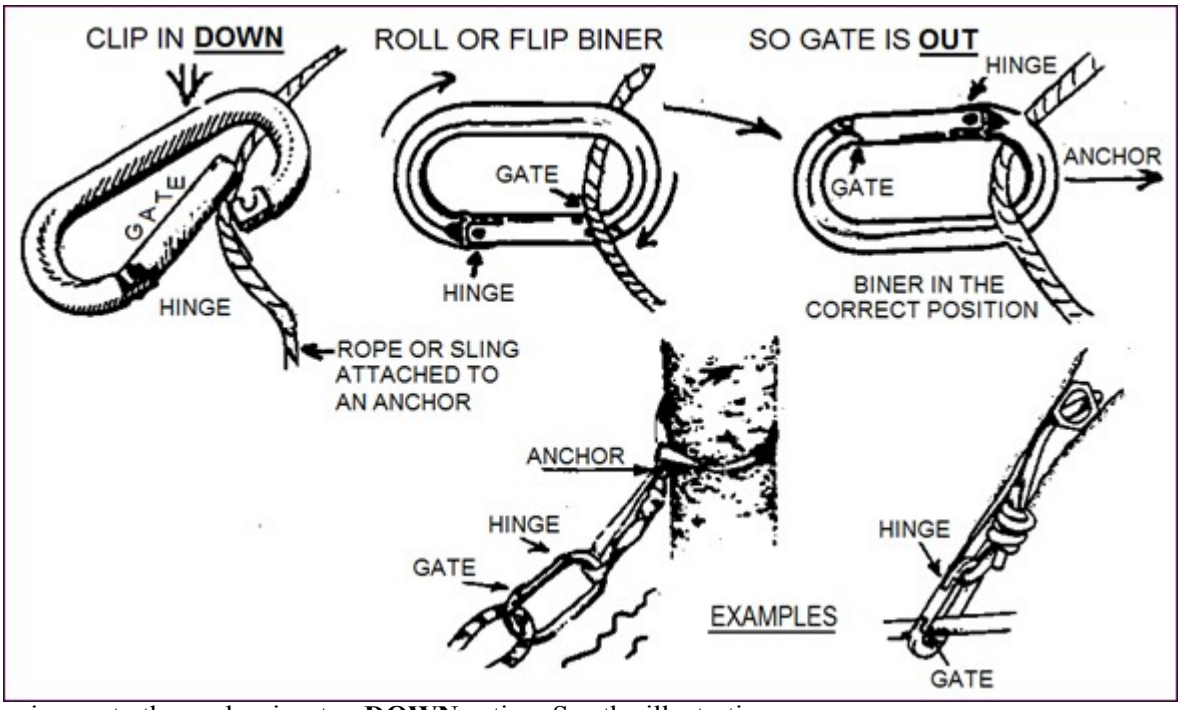
The standard climbing signals will be introduced. These will be used throughout the course and your climbing days. Study the following signals plus what they mean and where they are used.

1. "On Belay?" (climber)
2. "Belay On" (belayer)
3. "Climbing" (climber)
4. "Climb" (belayer)
5. "Up Rope" (climber)
6. "Watch Me" (climber)
7. "Take" [preferred to "Tension"] (climber)
8. "Slack" (arms length) (climber)
9. "Off Belay" (climber)
10. "Belay Off" (belayer)
11. "Falling!" (climber)
12. "ROCK!! ROCK!! ROCK!!" (anyone)
13. "Rope" (person about to throw rope for rappel)
14. 14. "On Rappel" (rappeller)
15. "Off Rappel" (rappeller)

The Proper Use of Carabiners

CLIP IN DOWN - N - OUT: This term applies to clipping carabiners into an anchor and serves as a mnemonic to help ensure carabiners are clipped in correctly. To clip in DOWN - N - OUT:

The carabiner is held in the hand with the gate opening toward the fingers and the gate hinge toward the palm.



Clipping on to the anchor is a top **DOWN** action. See the illustration.

Once clipped in, the carabiner is rolled or flipped over so the gate is **OUT**. Also notice that the hinge end of the gate is toward the anchor.

What Constitutes a Properly Clipped-in Carabiner?

* **THE GATE OPEN END IS DOWN (away from the anchor):** This allows clipping rope or slings into the carabiner with minimum chance of it becoming disconnected from the anchor.

THE GATE IS OUT (OR UP): **That is, when you look at a clipped-in carabiner the gate should be facing** out (or up) **from the rock face, the ground, etc.** REASON: **So the gate has less chance of being accidentally opened by ground contact and coming unclipped.**

CHEST SLINGS AND TEXAS PRUSIK

Chest Sling: Using the 9-ft piece of one-inch tubular nylon webbing, tie a chest harness. Depending on your size, you may need as little as 6 ft or as much as 9 ft. Tie the loop with the water knot, but do not cut the webbing until you are absolutely sure the sling is the right length to fit you. There should be sufficient "tails" to permit adjustment for clothing, such as for a cold night on a crevasse or on a warm sunny day.

Pack Sling: Use a single runner for the pack sling.

Tying The Texas Prusik: The Texas Prusik consists of two prusik slings, the foot sling and the harness (or seat) sling. Both Texas Prusik slings can be made from a 25 foot length of 6-mm perlon, which will be long enough for anyone under seven feet tall.

Tying The Foot Sling/Prusik: The foot sling is a length of perlon with figure-8 loops at each end and a figure-8 loop in the middle. Using the 25' piece of perlon, tie the foot sling follow these steps:

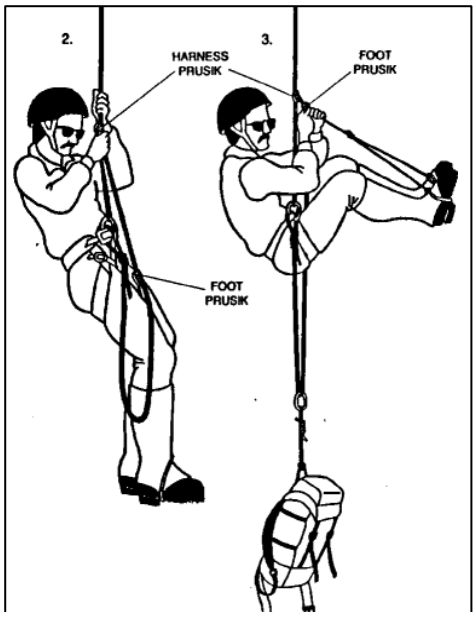
1. Measure 24 inches from one end of the 25 foot piece of 6-mm perlon –fold this 24" section back on itself (you will have a 12" loop section) and tie a figure-8 loop knot in this 12" section so that the finished loop from the knot is about 2 1/2 inches long and the tail is about 4" (after the knot is dressed and tensioned).
2. From above the loop, pull a bight of perlon through the loop. Slip the bight over one boot and pull on the long end to cinch up the loop. Holding the loose portion of the perlon in your hand, move your hand upward until it is at waist level. Double the remaining perlon back with the top of loop at waist level and tie a Figure-8 knot in the perlon (located just above the crotch) to get a 10 – 11 inch loop.
3. Adjust this Figure-8 loop to obtain the dimensions in step 2 above.
4. Using the portion of the leg prusik sling you have already tied as a guide, measure down the remaining portion of perlon and tie another Figure-8 loop so that the lengths are identical. Leave an 8-inch tail in case adjustment may need to be made later; and cut and seal the perlon. Use the remainder to tie the Harness sling (next step).

Tying The Harness (seat) Sling/Prusik: Using the 6-mm perlon material left over from the foot slings, tie the ends together with a double fisherman's knot per the following steps.

1. With the remaining length of perlon, loosely tie the two ends together with a double fisherman's knot.
2. Adjust the double fisherman's knot to size the sling so when clipped into the harness locking carabiner it will reach your forehead when pulled tight. Tighten the double fisherman's knot.
3. Do not cut any of the extra material off until you have tried to use the Texas Prusik and know what the right length is for you.

This method uses two slings. The foot sling goes to each foot, and the harness (or seat) sling goes to the seat harness. The slings are attached with prusik knots to the climbing rope before you start walking on the glacier. Some believe it is easier to prusik up the ropes if the two prusik knots are tied onto the climbing rope in opposing directions.

The harness sling is the furthest sling away from the climber when placed on the rope. It clips to the harness with a locking carabiner. When falling into a crevasse, ideally the climbing rope will be clipped through the chest harness carabiner to prevent you from going upside down. The downside of this is it provides a pulling force higher on your body if a rope mate should happen to fall, and stopping them in self arrest may be harder.



The foot sling is placed on the rope below the harness sling with the foot loops being placed in a pocket or tied into a small hanging bundle with Velcro.

The Texas Prusik is much harder to use while wearing a pack, therefore the pack will be removed before prusiking. A strong attach point on the pack must be located. Usually this point is the haul strap, if the pack has one. The attach point must be strong enough to withstand the pack falling several feet without breaking. Tie your pack sling or a single runner to the attach point with a girth hitch. You must be able to reach your pack sling or the runner while in the crevasse.

This is how to use the Texas Prusik after a fall into a crevasse (refer to illustration):

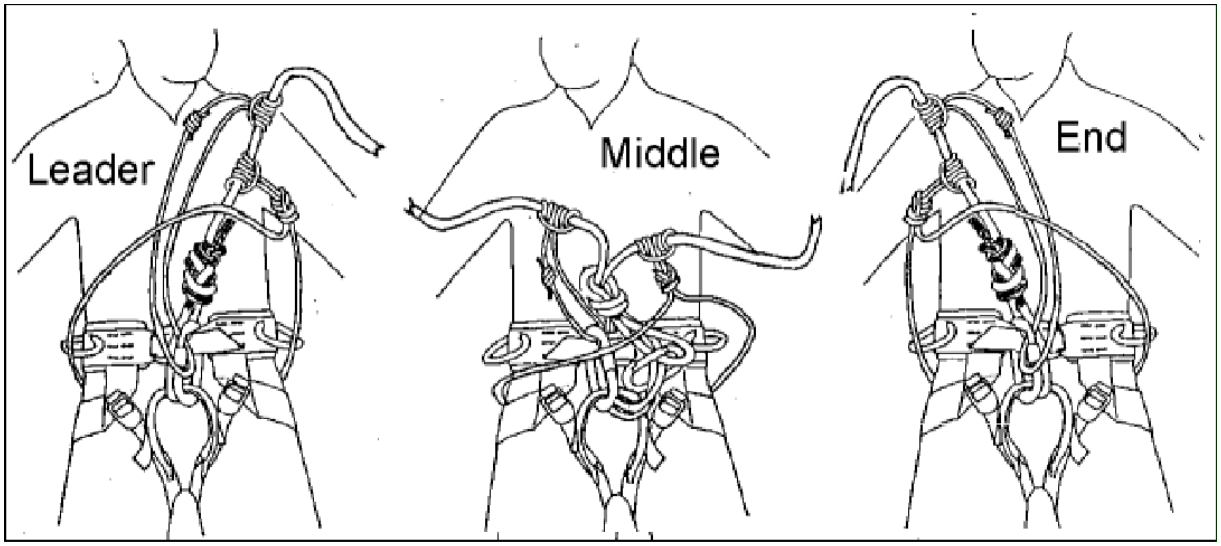
1. Clip a carabiner to the pack sling/runner which is attached to the pack. Then clip the carabiner to the rope above the harness tie-in knot and below the prusik knots.
2. Remove and gently lower your pack (do net let it drop since this will provide extra stress to the anchor system). Be sure to straddle the runner going to the pack with your legs.
3. Slide the harness prusik knot as high as it will go, unclip the climbing rope from your chest harness, and clip the harness sling into the chest harness carabiner.
4. Remove the foot loops from your pocket (or hanging Velcro ball) and slip one over each boot. Cinch up on the slip knots.
5. Grab the climbing rope as high as you can with both hands, and while pulling up slightly bring both feet underneath your buttocks in one smooth motion.
6. Keeping one hand on the climbing rope above the harness sling/prusik, loosen the prusik knot attached to the harness sling.
7. Stand up in the foot slings, sliding the prusik knot attached to the harness sling up the rope as you rise until the harness sling is taut. Note: You use only your leg muscles to stand up and do not climb the rope with your arms!
8. Sit down in the seat harness, putting all your weight on the seat sling/prusik.
9. Loosen the prusik knot attached to the foot sling and slide it up the rope while raising your feet.
10. Once again, bring both feet underneath your buttocks and keep repeating the process.

REFER TO FT#1 PREP FOR DIAGRAMS AND EXPLANATION OF USE OF TEXAS PRUSIK.

ROPING UP FOR GLACIER TRAVEL

Note: Middle climber will tie in with an Alpine Butterfly knot, not with a double bowline as depicted in the diagram above.

KNOTS WILL BE TESTED ON ALL FIELD TRIPS AND MUST BE PASSED BY THE END OF FIELD the Rock 1 Field Trip. PRACTICE, PRACTICE, PRACTICE!!!



Leader: Tied into rope with a Rewoven Figure-8. Lower prusik tied on next to the Figure-8 and the foot loops are tucked into the pockets to keep them out of the way. The upper prusik is tied on and clipped into the locking carabiner. Note the prusiks in the diagram are tied so they oppose each other, but this is not a requirement.

Middle: Tied in with an Alpine Butterfly. One prusik is tied into the rope going to the leader and one is tied into the rope going to the end person. There is no special order. The foot loops are tucked into pockets to keep them out of the way. The prusik loop is clipped into the locking carabiner.

End: The end person is tied in exactly the same way as the leader.

ROPE HANDLING & KNOTS

Knot-tying is an inherent part of climbing, and your safety depends on knowing how to tie knots correctly. The diagrams on the following pages show the knots taught in this course. Practice until you can tie them in the dark, under a cold shower with your biggest gloves on, which is not unlike conditions you may encounter. You will be expected to tie all of these knots under the close scrutiny of your instructor! PRACTICE! PRACTICE! PRACTICE! Review these prior to each and every field trip so time isn't wasted relearning a technique you should know for the first field trip.

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Dressing Knots

This term refers to the practice of ensuring that the rope or webbing used to tie a knot is correctly positioned so the knot material lies cleanly and in correct position in relation to the other strands in the knot. For some knots it is **extremely important** for the knot to be not only properly tied but correctly dressed. Examples are the Prusik knot and the Water knot. Final strength of all knots depends on how well they are dressed. A knot is right when it looks right. It is easy to recognize and it is strongest.

Bowline

The bowline is used to tie a fixed loop at the end of a rope, such as may be used for an anchor. A mnemonic to teach the tying of the bowline is to imagine the end of the rope as a rabbit, and where the knot will begin on the standing part, a tree trunk. First a loop is made near the end of the rope, which will act as the rabbit's hole. Then the "rabbit" comes up the hole, goes round the tree right to left, then back down the hole. An overhand knot is then tied as a backup.

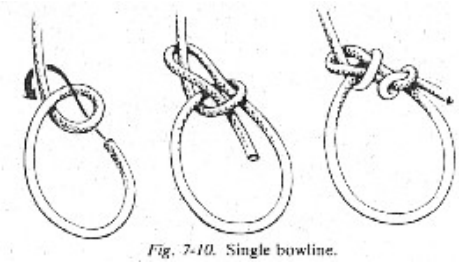
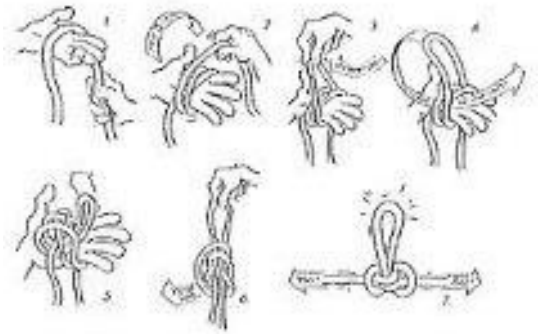


Fig. 7-10. Single bowline.

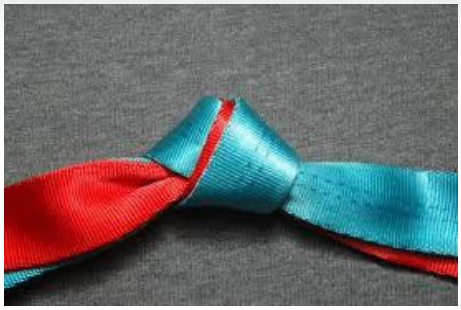
Alpine Butterfly

The Alpine Butterfly is used primarily to tie a middle climber into the rope. Wrap the rope around your hand twice. At the end of the turn one, position the rope close to your fingertips. Continue around and complete turn two back near our thumb. Pick up the turn near your fingertips. Wrap it around the other two turns. Slide the knot off your hand and tighten by pulling on the loop and the ends



Water Knot

The water knot is used to attach webbing ends together. Start the knot by tying an overhand knot in one of the ends. Then, using the other end, feed the rope back through the knot following the path of the first rope in reverse. We will use this knot in the basic course to tie runners. Runners are loops made from 1-inch tubular nylon webbing. This knot must be **checked just before every use** to ensure you have at least a palm width of webbing for tails. Ensure Knot is dressed correctly and mark initial and date on the tails.



Prusik Knot ENSURE KNOT IS DRESSED CORRECTLY!

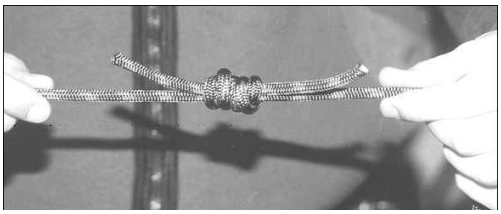
The prusik knot provides the climber with a practical means of ascending the climbing rope. Additionally, it can be used with a loop of perlon on the climbing rope (it then can be used for a Leader Tie-off). Under tension, the prusik knot grips the climbing rope; with the tension removed the knot can easily be slipped along the rope. In the Basic Course, it is used extensively in conjunction with crevasse rescue and on fixed lines. As shown in detail D, the knot can be loosened by pushing toward the knot along the length of the rope. Conversely, a straight out pull will tighten the knot. Two wraps will not hold on a kernmantle rope—three must be used. If the rope is narrow or icy a fourth wrap may be necessary.

Figure-8 Loop (not shown here)
The Figure-8 Loop is a simple way of making a loop anywhere on a rope. It is a very strong knot and yet it does not jam under load. It is one of the fastest and easiest to tie of all mountaineering knots. ENSURE KNOT IS DRESSED CORRECTLY! Tie a back up knot with the loose end.

Rewoven Figure-8

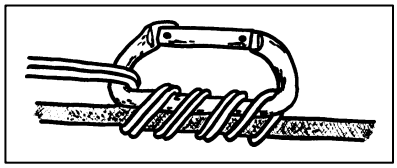
The Rewoven Figure-8 is used to tie a climber into the end of a rope. By tying the Figure-8 in this manner though, it is possible to use this knot to fasten the rope to trees, metal rings, and most importantly, to continuous loops of webbing. Because of its strength, simplicity, and ease of checking, this knot is used to attach the end of the climbing rope to the climber's seat harness. When completed, this knot looks exactly like the Figure-8 Loop. Tie a back up knot with the loose end. ENSURE KNOT IS DRESSED CORRECTLY!

Double Fisherman's knot



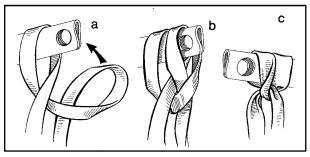
For joining two ropes together for a rappel, or tying a leader tie-off, the double fisherman's/grapevine is superior in strength and security to most other knots. It locks tightly when tied in rope or webbing—so tightly in webbing, indeed, that it may be nearly impossible to untie when the webbing is needed for some other purpose. If it doesn't fit together evenly, it is not tied correctly.

Bachman Knot



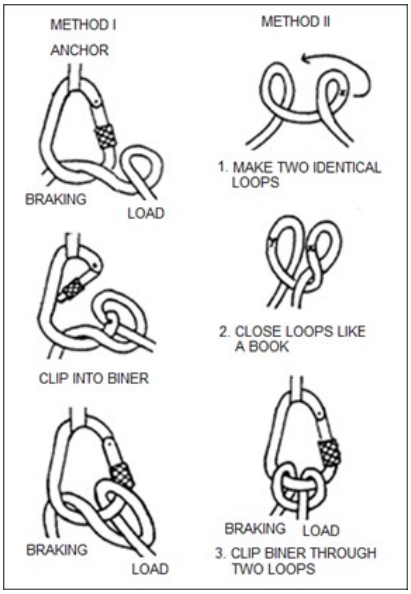
This knot is used for a self-tending anchor on the "Z" pulley system used for crevasse rescue. (See Crevasse Rescue Field Trip notes.) Additionally, it can be used with a loop of perlon on the climbing rope (it then can be used for a Leader Tie-off). Note that the carabiner is backward compared to that in *Freedom*. This is to help speed its application in crevasse rescue.

Clove Hitch



This is a quick knot for clipping into a carabiner attached to an anchor. With this knot, it is easy to adjust rope length between the belayer and the anchor without unclipping.

Münter Hitch



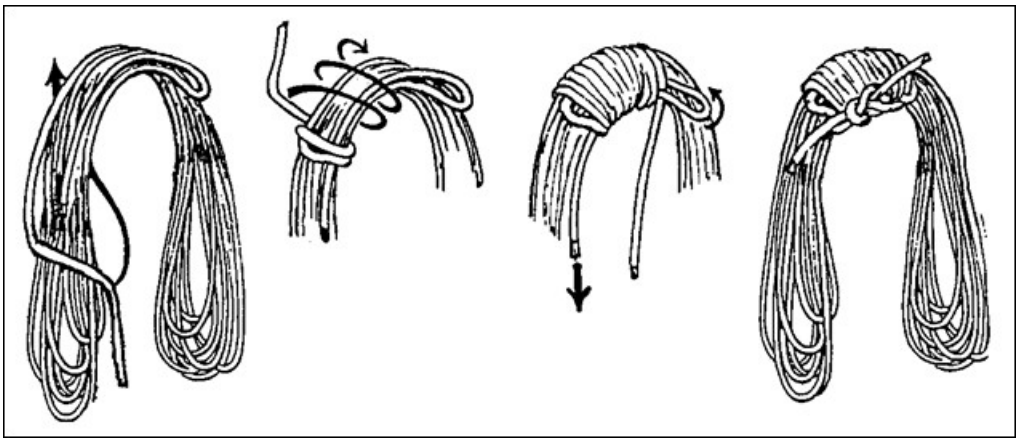
This knot is a BELAY KNOT. Note: that the large opening of the "pear-shaped" carabiner allows the knot to reverse or roll when going from taking in rope to locking up under load. There are two different methods of tying the knot.

Method 1 is on the left side: step 1- make a loop, step 2 - clip in a carabiner, step 3 - lock gate.

Method 2 is on the right side: step 1 - make 2 identical loops, step 2 - close loops like a book, step 3 - clip carabiner through two loops.

Rope Coiling Diagram - Another Method

Used to coil a rope so that it can be transported easily. The diagram shows how to tie a rope off to carry on top of pack.



Refer to the Knots section of Chapter 9 in The Freedom of the Hills, 9th Edition (pages 154-163). You can also find animated illustrations of most of these knots at the web site *www.animatedknots.com*.

- FIELD TRIP #2 PREP
Knots, Belaying, Rappeling & Prusiking

FIELD TRIP #2 PREP	
Time:	See Administrative Section – Basic Climbing Course Schedule and confirm on Mountaineers website or with Lead Instructor Duration: Approximately 6 hours
Location:	Kitsap Cabin
Purpose:	▪ Have seat harness checked and approved ▪ Practice knots ▪ Construct leader tie-off, chest harness, and slings ▪ Construct and size your Texas prusiks ▪ Learn and practice ascending a rope with Texas prusik ▪ Learn and practice belays using belay device and Munter hitch ▪ Learn and practice escaping the belay ▪ Learn and practice rappel using belay device ▪ Learn and practice rappel using carabiner brake
Prerequisites:	▪ Attend class #2 ▪ Read Class 2 reading assignments
Assignments:	▪ Read *the Freedom of the Hills*: Belaying. Ch 10 Rappeling Ch 11 Texas Prusik Ch 18, p 394-395, 408-411 ▪ Practice ▪ Read Basic Reference Material for Class 2 and Field Trip 2 ▪ Practice beforehand tying required knots: 1. Water Knot 2. Double Fisherman's Knot 3. Girth Hitch 4. Munter Hitch 5. Clove Hitch 6. Rewoven Figure Eight 7. Figure 8 on a Bight 8. Double Bowline 9. Bowline 10. Butterfly Knot 11. Prusik Hitch 12. Klemheist Hitch 13. Autoblock