National Cave Rescue Commission
Level 3 Student Preparation Guide

NCRC requires all students demonstrate basic skills prior to participation. Level 3 students will be tested on knot tying, single rope techniques (SRT) and retention of Level 1 and 2 rigging skills. Criteria are included in this package. Scoring is based on safety and efficiency.

No Retraining offered. One retest will be allowed on ONE knot, SRT, and ONE rigging station.

Entrance Skills for Level 3 Students

Knots

Tie the following with 11 mm rescue rope unless otherwise noted: 20 minutes.
Figure Eight on a Bight
Figure Eight Follow Through
Double Figure Eight Knot
Bowline with safety (Yosemite acceptable)
Münter Hitch & tie-off
Butterfly Knot
Clove Hitch with safety
Trucker's Hitch & tie-off
Ring Bend (Water Knot) in webbing
Double Overhand Bend (Double Fisherman's Knot, Barrel) in 8mm cord
Prusik Hitch (3 wrap) in 8 mm cord on rescue rope

Personal Vertical System and SRT

Ascend 10 meters, passing a knot, down climb two meters, change over to rappel and descend, passing a knot. Start with gear in pack; on rappel demonstrate a hard lock off. 20 minutes

Level 1 & 2 Rigging Skills

1:1 with progress capture
3:1 with internal progress capture
4:1 with progress capture on a separate rope
Fixed brake lowering system
Munter hitch belay
Tandem triple wrap prusik belay with radium load release hitch

Practicing for NCRC Entry Testing

For each skill, criteria state performance expectations, outline the core components, and provide evaluation standards. ***Read the criteria carefully*.** Illustrations of knots, vertical systems, and rigging components are included in this package. Reproducing these examples should work for you, however *any safe and functional technique that meets all of the criteria is acceptable*. Simple solutions are encouraged.

Using the Criteria and Score Sheets.
Each component is evaluated for safety, effectiveness and efficiency, then scored 2, 1, or 0.

2 (If there are multiple criteria, all must be met to earn a 2)
Safe & Efficient

1
Safe & Functional (some examples of inefficiency are listed, others may apply)

0 (If there are multiple criteria, any scores zero)
Unsafe or Not Functional – any zero represents a critical failure or safety problem.

You may find it helpful to make copies of the practice score sheet to evaluate your preparation.

NCRC Seminar, Required Personal Equipment

Personal equipment must be in safe, usable condition and marked to identify the owner. Equipment deemed unsafe or unacceptable during check-in must be replaced prior to the student's continued participation in the course.

CLIMBING HELMET
UIAA or CE approved mountaineering style helmet with three (or more) point suspension, and non-elastic chinstrap

THREE SOURCES OF LIGHT
All capable of allowing you to exit the cave. At least two should be electric and two helmet-mountable.

BOOTS
Sturdy, rubber soled

RUGGED CLOTHING

SIX LOCKING CARABINERS
Independent of your ascending or descending systems

DESCENT DEVICE
Any of the following types of devices are acceptable:
1. standard rack
2. four-bar Micro rack with a hyper-bar (4 bars total)
3. bobbin with safety carabiner *(Bobbin is a generic term for devices like the Petzl Stop. You can use any of the commercially available brands/models.)*
4. "Rescue Eight" with ears

SEWN SEAT HARNESS

ASCENDING SYSTEM
Must be a functional working system that includes:
1. at least two gripping points of attachment to the seat harness
2. a mechanical ascender attached to the seat harness that can be manipulated with one hand
3. a tether attached to the seat harness with a carabiner (non-lock OK) on the free end, independent of an ascender

Note: we strongly encourage use of a caving ascending system that employs mechanical ascenders. Frog, Mitchell, Texas, and Rope Walker systems are common examples. While you might be able to get by with an improvised system, a well-tuned caving system will be better suited to seminar activities. Examples of systems are illustrated in pages 6 and 7, and can be purchased from caving vendors.

GLOVES
Must have leather palms and full fingers

WATER BOTTLES
Two quarts recommended

SMALL, PERSONAL FIRST AID KIT
Optional, but recommended

SMALL, HEAVY-DUTY PACK
Used to carry personal gear around underground

2 – 20 FT PIECES OF 1-INCH TUBULAR WEBBING

WET SUIT & PERSONAL FLOATATION DEVICE *(Required for Level 3 only)*

L3 Knot Tying Criteria

Level 3 candidates must score at least 24 of 28, with no zero in any category. No retraining offered. Level 3 candidates will be permitted to retest one knot.

Tie the following with 11 mm rescue rope unless otherwise noted. 20 minutes

Figure Eight on a Bight
Figure Eight Follow Through
Double Figure Eight Knot
Bowline with safety (Yosemite tie off acceptable)
Münter Hitch & tie-off
Butterfly Knot
Clove Hitch with safety
Trucker's Hitch & tie-off
Water Knot (Ring Bend) in webbing
Double Fisherman's Knot (Double Overhand Bend) in 8mm cord
Prusik Hitch (3 wrap) in 8 mm cord on rescue rope

Acceptable safety knots include: overhand, two half hitches, half a double fisherman's

Knots
2 (both must apply)
Knot tied correctly and dressed, with at least 4" of tail and bights smaller than 4";
Safety, if required, is secure, dressed and correctly oriented
1
Knot not dressed; Bights are larger than 4";
Required safety would allow slippage before engaging or is inappropriately oriented
0 (either scores zero)
Knot or safety is tied incorrectly; Tails are less than 4";
Required safety is insecure or absent

Tie-off
2
Munter and Trucker's Hitches are securely and efficiently tied off and released under load
1
Loaded Hitch is safely but inefficiently tied off or released (i.e., load slips more than 4" during tie-off; loaded hitch is difficult to release)
0
Loaded Hitch is not safely or securely tied off or released

Time
2
All knots tied correctly in less than 10 minutes
1
All knots tied correctly in 10 – 20 minutes
0
Exceeds 20 minutes to tie all knots correctly

Knots

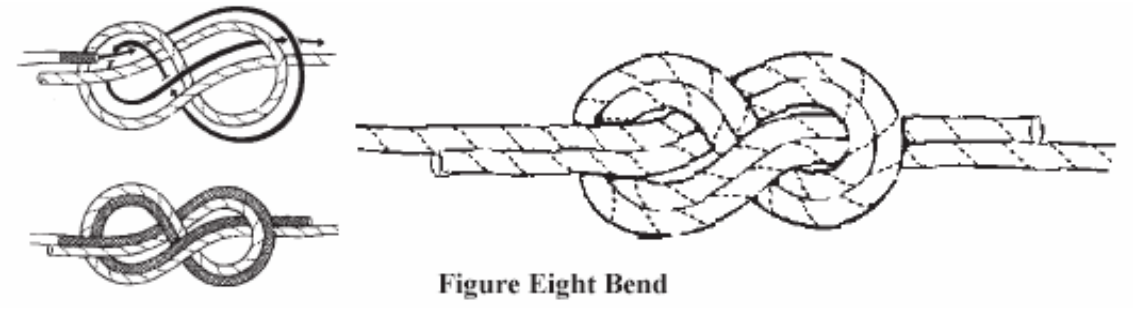


Figure Eight Bend

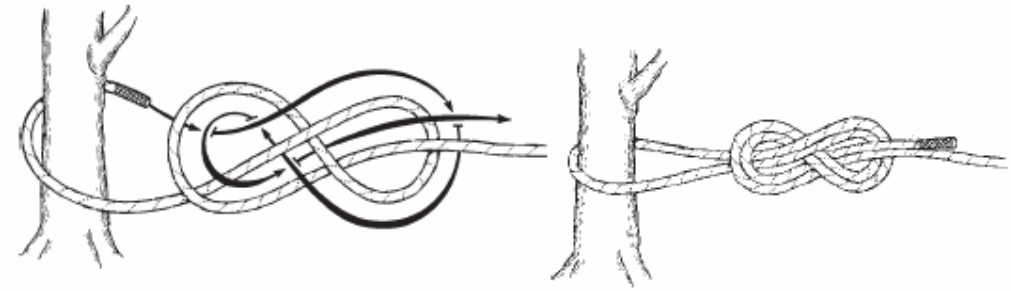
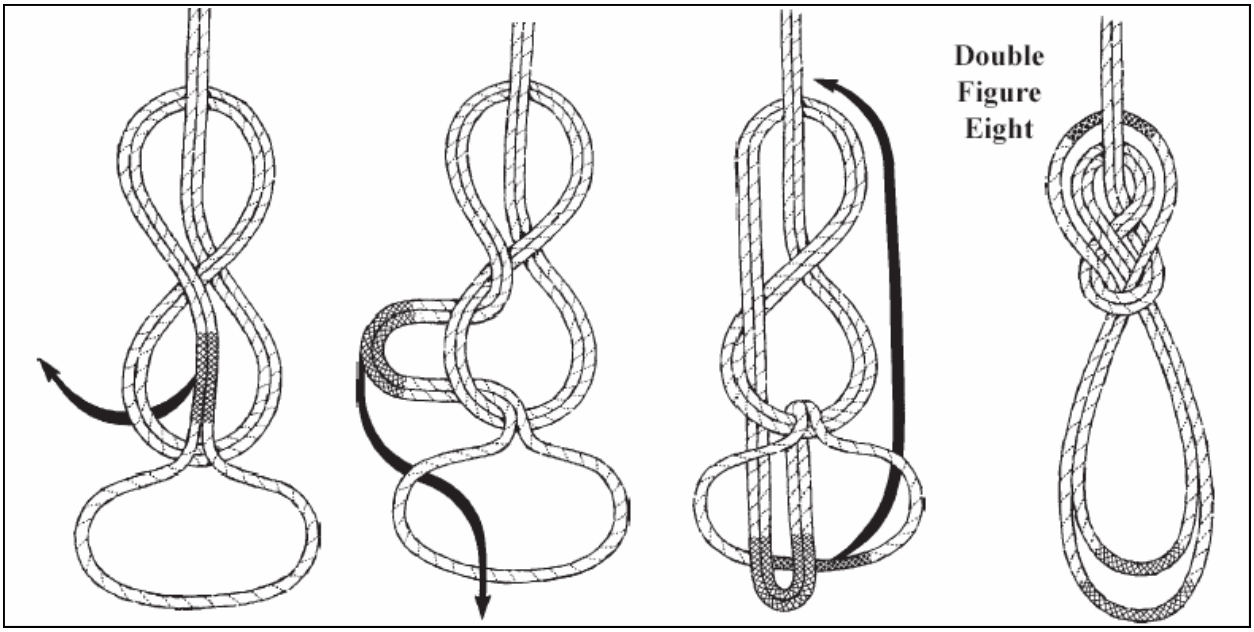
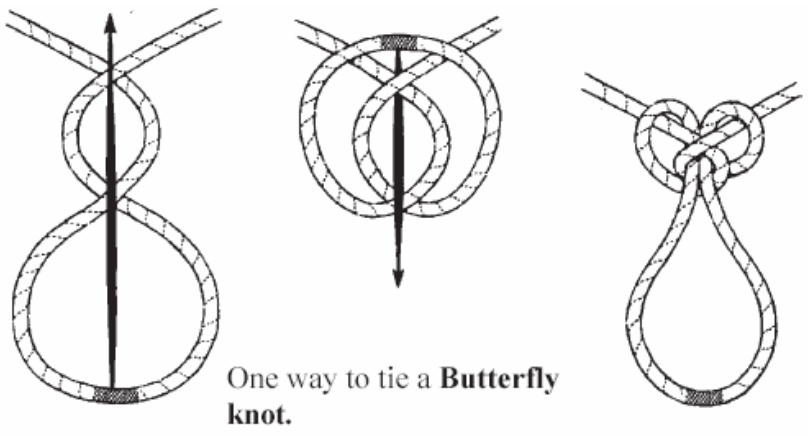


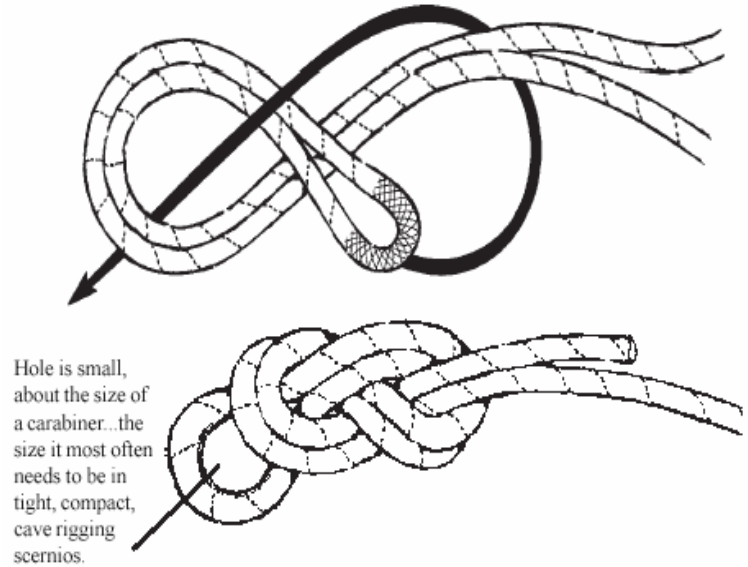
Figure Eight Follow-through

Knots – *To earn the maximum score, knots must be properly dressed*.
Bowlines and Clove hitches, which could slip or capsize, require safeties.
Any trucker's hitch will do, it needn't include carabiners, multiple wraps, etc.



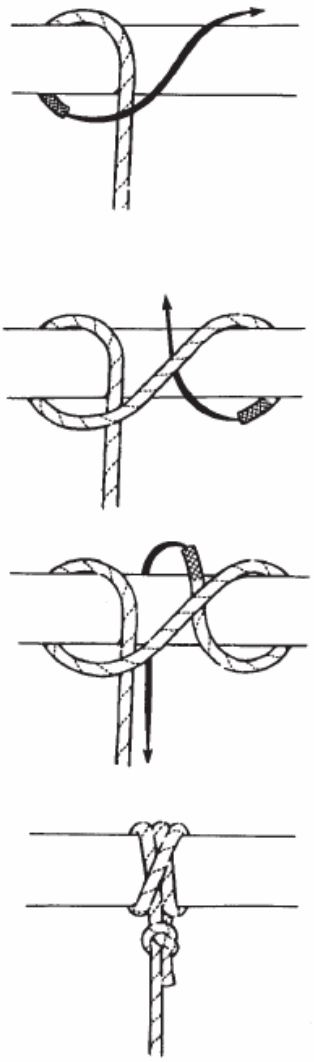


One way to tie a **Butterfly knot.**

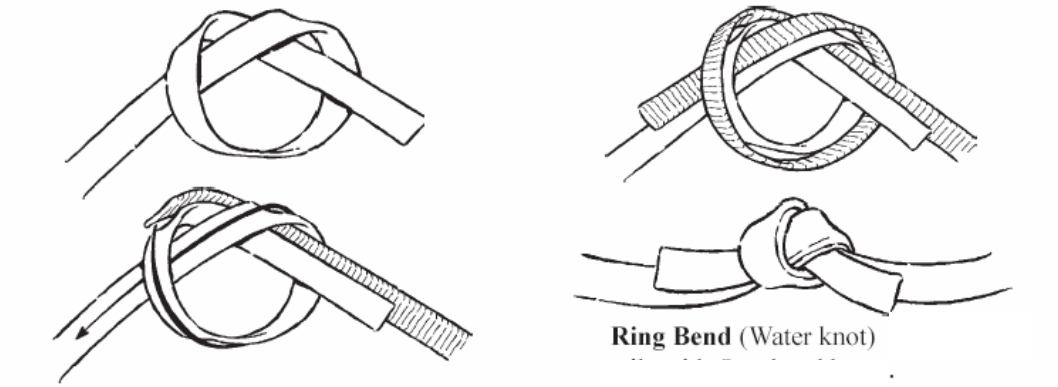


Hole is small, about the size of a carabiner...the size it most often needs to be in tight, compact, cave rigging scernios.

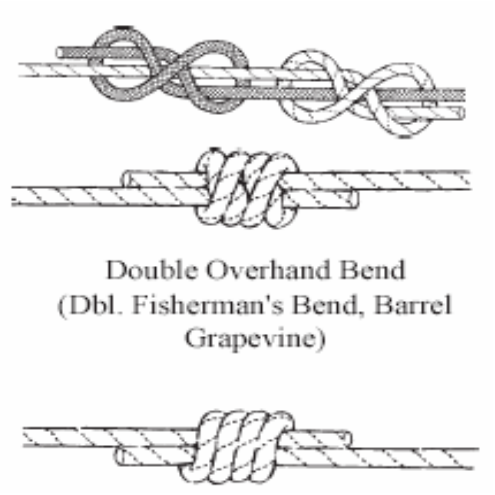
Figure Eight on a Bight



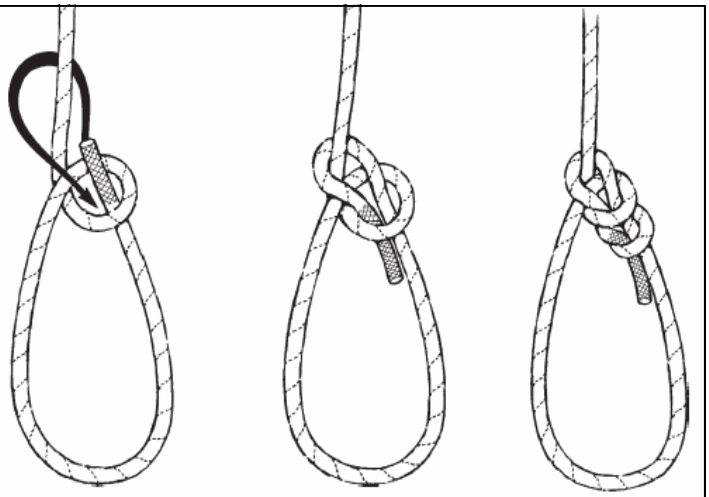
Clove Hitch



Ring Bend (Water knot)

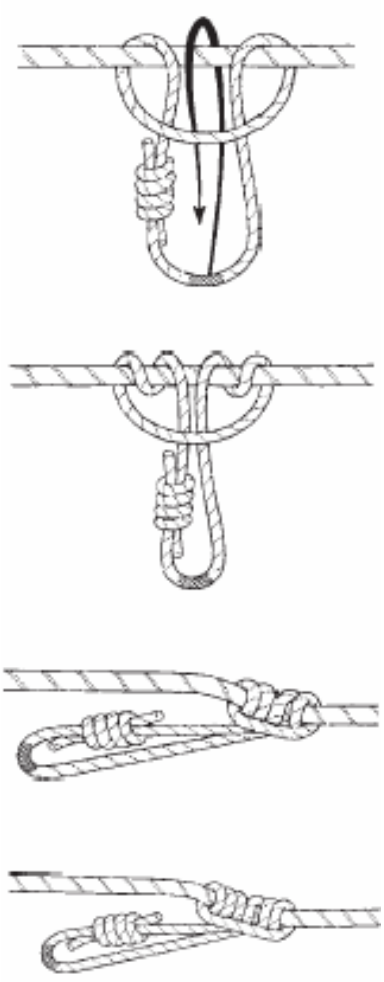


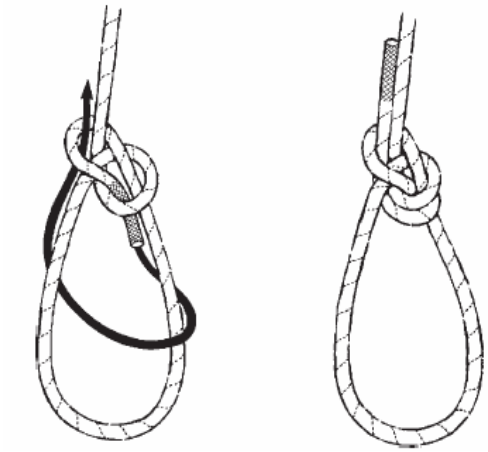
Double Overhand Bend
(Dbl. Fisherman's Bend, Barrel Grapevine)



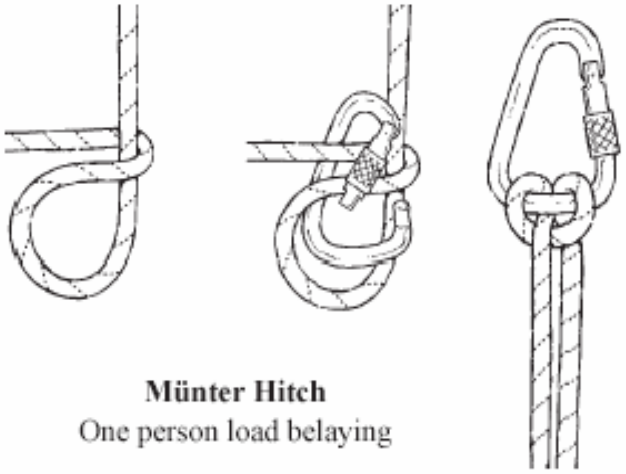
Bowline Knot

Prusik Hitch
(2-Wrap and 3-Wrap)





Bowline with a Yosemite Back-up



Münter Hitch
One person load belaying

Operates with lines together and parallel

L3 Personal Vertical System and SRT Criteria

Level 3 candidates must score at least 14 of 20. A zero in any category fails the test. No retraining offered. One retest permitted (two attempts total.)

Ascend 10 meters, passing a knot, down climb two meters, change over to rappel and descend, passing a knot. Start with gear in pack; on rappel demonstrate a hard lock off.
20 minutes

System
2 (all must apply)
Student independently assembles and dons a safe, efficient system:
System has 2 gripping points of attachment connected to the seat harness;
Includes a mechanical ascender, attached to seat harness that can be manipulated with one hand;
Includes a tether attached to the seat harness with a carabiner (non-lock OK) on the free end, independent of an ascender;
Descender is from the recommended list OR student demonstrates his ability to control a 2-person load
1
System is poorly sized, configured or adjusted;
System includes excessively redundant or unnecessary equipment
0 (any scores 0)
Student is unable to assemble and don system independently;
System does not meet all of the above specifications;
System is not safe: (ie. Buckles not secure, connectors unlocked, substandard hardware, overly worn or damaged or software, knots mis-tied, grossly ill-fitting, etc.)

Ascending
2 (all must apply)
Maintains 2 gripping points of attachment to the seat harness during ascent;
Manages bottom tension without assistance;
Ascends safely and efficiently
1
Requires assistance to manage bottom tension;
System adjustment is off to the degree that it hinders ascent;
System is fitted, but technique requires undue effort
0 (either scores 0)
System does not maintain 2 gripping attachments during ascent;
System does not function practically

Down-Climb
2
Down climbs safely and efficiently
1
Opens ascenders while down climbing;
Unintentionally weights safety strap;
Mis-positions upper ascender more than 1 time
0 (either scores 0)
Commits to a singe point of attachment during weight transfer;
Is unable to down climb

Knot Pass, Ascent
2
Safely and efficiently ascends past knot
1
Takes more than 1 attempt remove or attach ascenders
0
Commits to a singe point of attachment during weight transfer

Change Over
2 (both must apply)
Changes over safely and efficiently;
Maintains 2 points of attachment until descender is loaded and unlocked;
1
Takes more than 1 attempt to off-weight ascender;
Unintentionally weights secondary attachment point
0 (either scores 0)
Fails to demonstrate control of unlocked descender before committing to a single point of attachment;
Fails to change over without assistance

Rappel
2 (both must apply)
Rappels in a controlled manner;
Securely and efficiently locks and unlocks descender;
1
Descender creeps more than 4 inches when loaded
0 (either scores 0)
Does not demonstrate a hard lock off
Fails to maintain control of descent

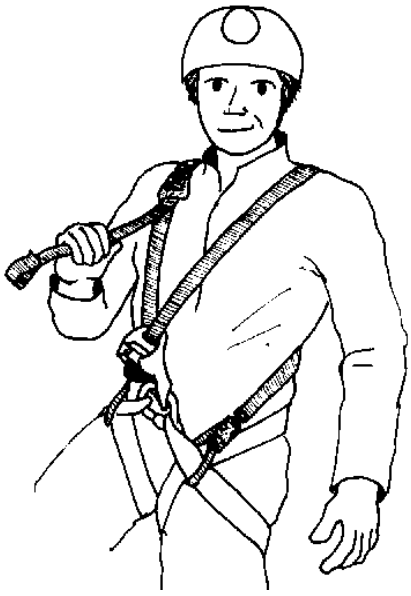
Knot Pass, Descent
2
Safely and efficiently passes knot
1
Unintentionally hangs on safety strap;
Takes more than 1 attempt to off-weight equipment
0 (either scores 0)
Commits to a singe point of attachment during weight transfer;
Is unable to pass the knot

Personal Protective Equipment
2 (both must apply)
Wears helmet at all times in the fall zone and on rope;
Wears gloves at all times while handling moving rope
0
Fails to wear helmet or gloves as specified above

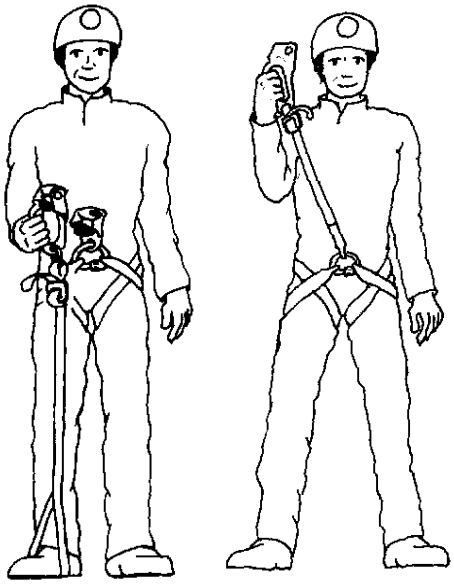
Safety
2 (both must apply)
Leaves the fall zone when possible
Does not drop anything
1
Remains in the fall zone unnecessarily
Warns “Rock!” if he drops anything while on rope
0
Drops anything while on rope without warning “Rock!”

Time Limit
2
Completes exercise from gear in pack to off rope in less than 8 minutes
1
Completes exercise in 8-20 minutes
0
Takes longer than 20 minutes

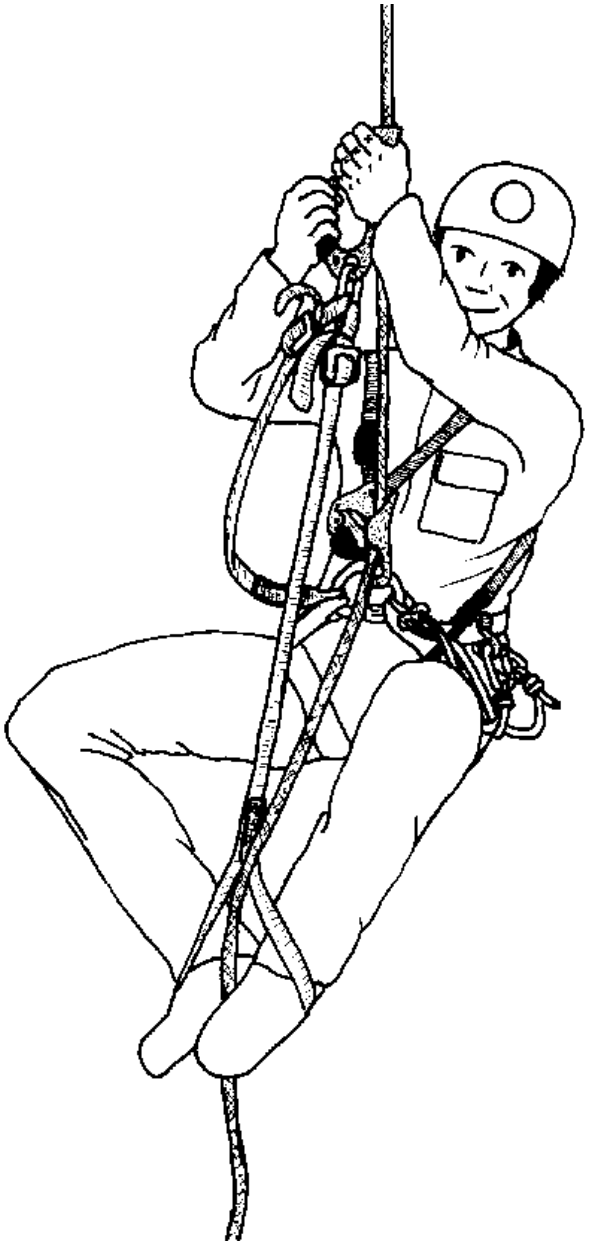
Frog System



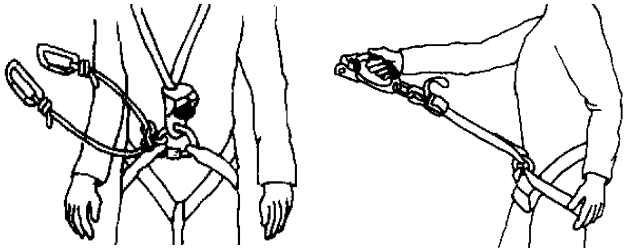
A chest ascender attached to the seat harness is held up with a chest harness.



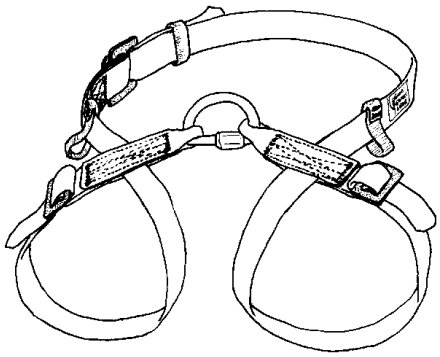
An upper ascender has a footloop and is attached to the seat harness with a safety strap.

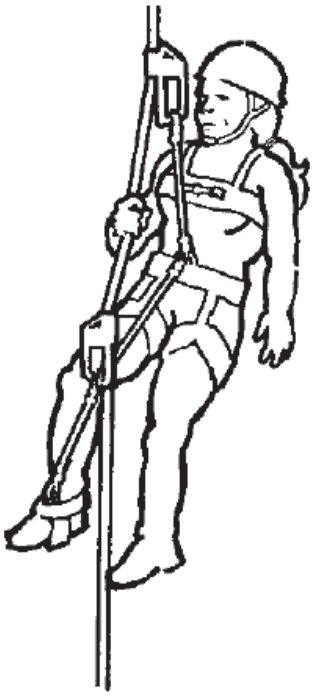


A low-attach caving seat harness is recommended .

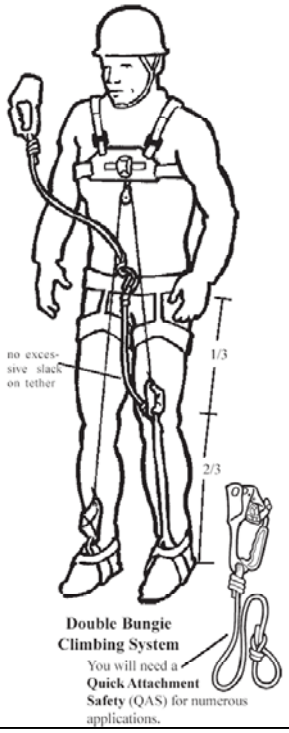


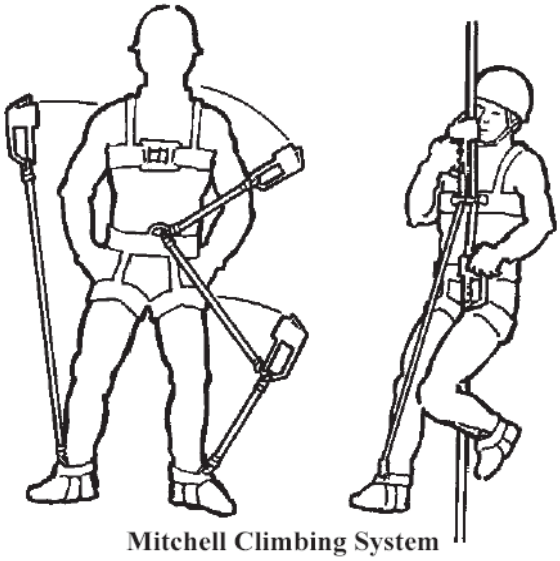
Cowstails and an extra prusik, or an additional ascender are required for the seminar.





Texas Climbing System





Mitchell Climbing System

A note about Vertical Systems

You will need to come prepared with a working ascending system. You will be asked to demonstrate your ability to use it. Because you are assuming the role of a rescuer you may need to upgrade your system to include two griping points of attachment to your seat harness.

There are many ascending systems that work, there are far more that do not work. Included here are illustrations of four proven systems. If you are unsure, make your system look like one of these. *If you have any questions about your system, contact your lead evaluator.*

Concerning Change-Overs

As defined by NCRC, you must maintain at least two points of attachment between your seat harness and the rope or rigging UNTIL you demonstrate control of your unlocked descender. When changing over, this means that you must weight and unlock your descender BEFORE removing your safety connection. (You may lock off the descender after you have demonstrated control, remove your ascender, then unlock it again to rappel.)

<u>If you are weighting your safety strap rather than your descender when changing from ascent to descent, there are several possible solutions:</u>

- Rig the descender as high as possible
- Lock off the descender with no slack
- Be certain the lock off is secure
- Lower your upper ascender as far as possible before standing up
- Shorten your frog footloop (but long enough to lock your knees when standing).
- Once your weight is on the descender, lower your ascender before unlocking
- Do not allow rope to slip through the descender when unlocking
- Lengthen the safety strap to your upper ascender
- Shorten the connection between your seat harness and descender

NCRC Rigging Guide

Build and operate the following, using life support anchors and equipment:

Level 1 Exit Skills *Passing score is 7 of 10 with no zero in any category.*

1:1 with progress capture on a separate rope
2:1 with progress capture on a separate rope
3:1 with internal progress capture
Fixed Brake Lower
Munter Hitch Belay
Tandem Triple Wrap Prusik Belay
Radium Load-Release Hitch

Level 2 Entry Skills *Passing score is 5 of 10 with no zero in any category.*

1:1 with progress capture on a separate rope
2:1 with progress capture on a separate rope
3:1 with internal progress capture
Fixed Brake Lower
Munter Hitch Belay
Tandem Triple Wrap Prusik Belay
Radium Load-Release Hitch

Level 2 Exit Skills *Passing score is 7 of 10 with no zero in any category.*

Compound 4:1 with progress capture on a separate rope
Tandem Triple Wrap Prusik Belay
Radium Load-Release Hitch

Level 3 Entry Skills *Passing score is 7 of 10 with no zero in any category.*

1:1 with progress capture on a separate rope
2:1 with progress capture on a separate rope
3:1 with internal progress capture
Compound 4:1 with progress capture on a separate rope
Fixed Brake Lower
Munter Hitch Belay
Tandem Triple Wrap Prusik Belay
Radium Load-Release Hitch

Rigging components are not timed, but aim for 10 minutes or less each.
Build working systems, as if you were in a life support situation.
Be prepared to demonstrate operation of each component as listed.

Scoring

Each item will be evaluated with its specific criteria and with the general criteria for equipment, anchoring, knots and operation, listed on the last page.

Each component is evaluated for safety, effectiveness and efficiency, then scored 2, 1, or 0.

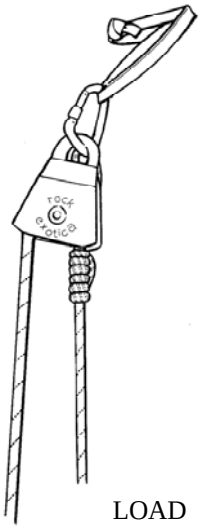
2 (If there are multiple criteria, all must be met to earn a 2)
Safe & Efficient

1
Safe & Functional (some examples of inefficiency are listed, others may apply)

0 (If there are multiple criteria, any scores zero)
Unsafe or Not Functional – any zero represents a critical failure or safety problem.

Illustrations and criteria follow. Read the criteria carefully.

1:1 with progress capture



This 1:1 may be used as progress capture for other haul systems.

2 Functions safely & efficiently (both must apply)

MA of the system is correctly identified;

Progress capture is appropriate and efficient

1 Safe & functional, but inefficient

MA is functional but inefficient (e.g. unnecessary friction or drag, working room for the haul team is not maximized);

Progress capture is inefficient (e.g. causes significant deflection of haul line or loss of progress; requires an additional rescuer)

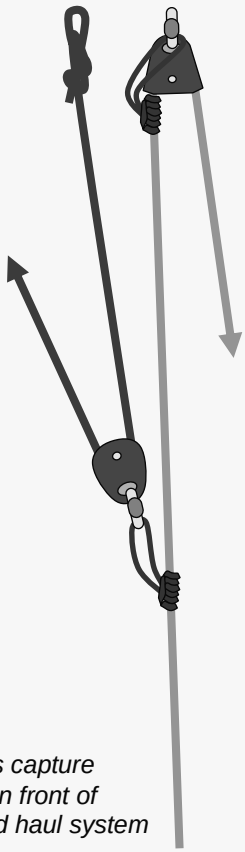
0 Unsafe or not functional (any scores 0)

MA of the system is incorrectly identified;

MA system is unsafe or unworkable;

Progress capture is ineffective or omitted

2:1 with progress capture



Progress capture may be in front of or behind haul system

2 Functions safely & efficiently (all must apply)

MA of the system is correctly identified;

MA system is correctly and efficiently applied to the haul line;

Progress capture is appropriate and efficient

1 Safe & functional, but inefficient

MA system is inefficient (e.g. unnecessary friction or drag, haul distance requires frequent resets);

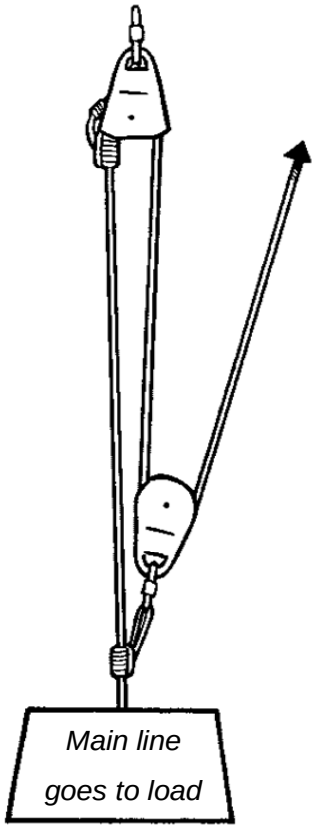
Progress capture is inefficient (e.g. significant deflection of haul line or significant loss of progress)

0 Unsafe or not functional (any scores 0)

MA of the system is incorrectly identified;

MA system is unsafe or unworkable;

Progress capture is ineffective or omitted



3:1 with progress capture

2 Functions safely & efficiently (all must apply)

MA of the system is correctly identified;

MA is efficiently incorporated into the haul system;

Progress capture is an integral part of the haul system

1 Safe & functional, but inefficient

MA of the system is incorrectly identified;

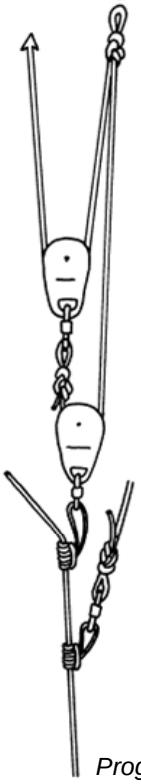
MA system is inefficient (e.g. unnecessary friction or drag, haul distance requires frequent resets);

Progress capture is inefficient (e.g. significant loss of progress)

0 Unsafe or not functional (either scores 0)

MA system is unsafe or unworkable;

Progress capture is ineffective or omitted



Progress capture may be in front of or behind haul system

4:1 w/ progress capture

2 Functions safely & efficiently (all must apply)

MA of the system is correctly identified;

Haul distance in lower V is maximized;

MA system is correctly and efficiently applied to the haul line;

Progress capture is appropriate and efficient

1 Safe & functional, but inefficient

MA system is inefficient (e.g. unnecessary friction or drag, haul distance requires frequent resets);

Haul distance is limited when system collapses before lower V is fully utilized;

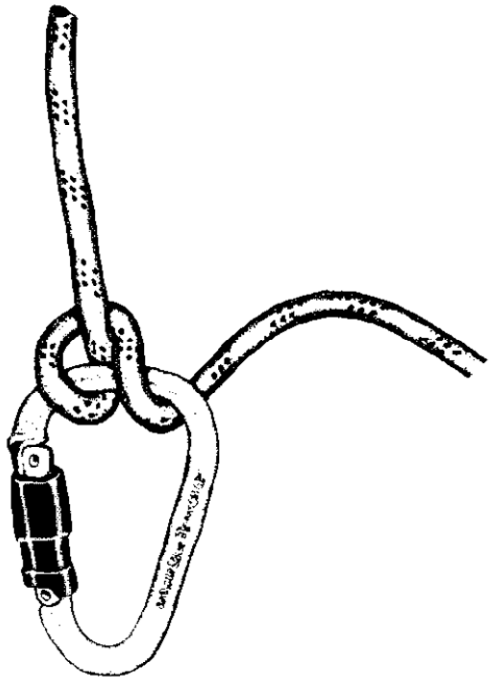
Progress capture is inefficient (e.g. significant deflection of haul line or significant loss of progress)

0 Unsafe or not functional (any scores 0)

MA of the system is incorrectly identified;

MA system is unsafe or unworkable;

Progress capture is ineffective or omitted



Munter Hitch Belay

2 Functions safely & efficiently (both must apply)

Munter Hitch is properly tied and functions efficiently;

Munter is locked off safely and efficiently

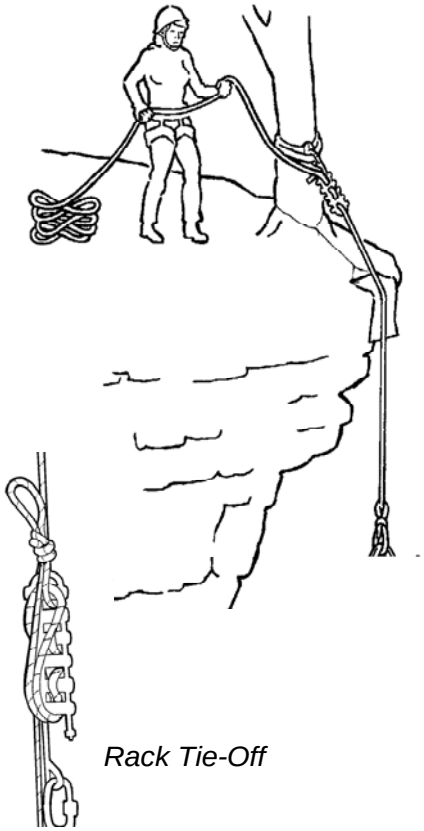
1 Safe & functional, but inefficient

Munter functions inefficiently (ie. carabiner is too small or the wrong shape for the hitch to roll freely);

Lock-off is safe but inefficient

0 Unsafe or not functional

Munter Hitch is unsafe, not functional or omitted



Rack Tie-Off

Fixed Brake Lower

2 Functions safely & efficiently (both must apply)

Descender is appropriately chosen, reeved correctly, and locked off before use;

All rope and equipment are applied efficiently

1 Safe & functional, but inefficient

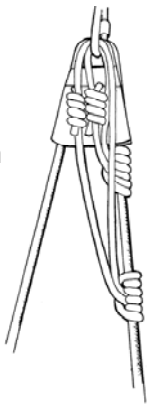
Lowering system is rigged inefficiently (ie, operator / rope position, etc.)

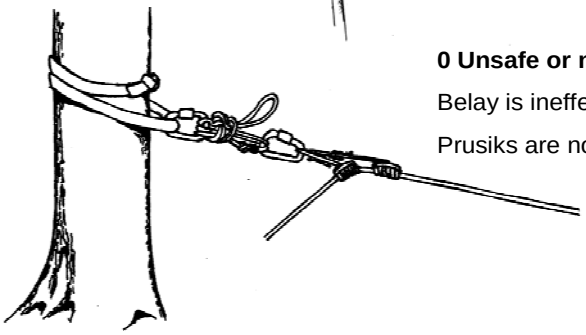
0 Unsafe or not functional

Descender is inappropriate, incorrectly applied, or not secured properly

Tandem Triple Wrap Prussik Belay

Raising Configuration





2 Functions safely & efficiently (both must apply)

Belay functions safely and efficiently for both raising and lowering;

Prusiks are appropriately chosen, constructed, and applied

1 Safe & functional, but inefficient

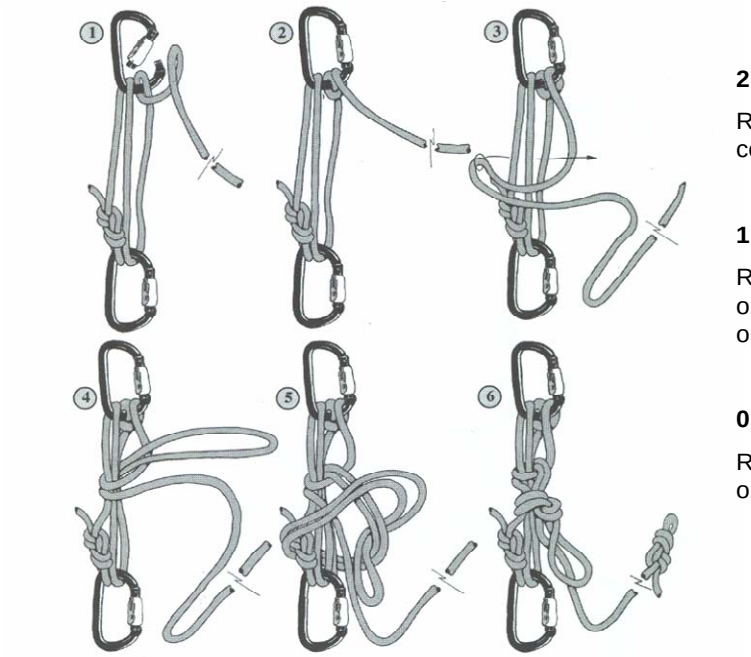
Belay is inefficient (e.g. raise w/o PMP, prusiks bind in PMP, extra wraps create excessive friction);

0 Unsafe or not functional (either scores 0)

Belay is ineffective, unsafe or omitted;

Prusiks are not correctly chosen, constructed or applied

Radium Load Releasing Hitch



2 Functions safely & efficiently

Radium Load Release Hitch is correctly constructed and positioned

1 Safe & functional, but inefficient

RLRH is inefficient (ie: munter binds on carabiner, wraps create >3:1 MA; operator must travel with hitch)

0 Unsafe or not functional

RLRH is unsafe, not functional or omitted

General Criteria for Rigging

Each item will be evaluated with the following:

Equipment
2
Equipment is life support and efficiently applied
1
Equipment is appropriate but applied inefficiently
0
Equipment is not life support or is inappropriately applied

Anchoring Techniques
2 (both must apply)
Anchoring techniques are adequate for life support;
Anchors are appropriately and efficiently located
1
Anchors are inappropriately or inefficiently located (e.g. position of devices, lines or equipment causes operational interference, etc.)
0 (either scores 0)
Anchoring techniques are inadequate for life support;
Anchor position does not allow safe working room

Knots
2
Knots are correctly tied, dressed, safetied, oriented, and appropriate for the application
1
Knots are incorrectly tied, dressed, or oriented and/or are inappropriate for the
0
Knots lack required safeties or otherwise represent a threat to life or equipment

Operation
2 (all must apply)
Student demonstrates safe, efficient operation of all system components:
- Efficiently hauls, sets, resets, and backs down MA systems;
- Lowers in a controlled manner, efficiently locking and unlocking the descender under load;
- Operates the belay for both raise and lower maintaining appropriate tension;
- Catches an unexpected load with belay, releases belay, and resets belay system;
- Manages rope in so it pays in and out smoothly;
- Uses and responds appropriately to standard commands

1
Student operates the system safely, but inefficiently. For example:
- Operates haul system in a manner that significantly reduces MA;
- Maintains control while lowering, but locking & unlocking is inefficient;
- Belay hampers efficiency of the working system (e.g. unintentionally engages belay, calls for “stop” or “slow” to keep in time with system;
- Captures load safely but inefficiently (e.g. excessive slack in the progress capture line, etc.);
- Is unable to release the loaded belay without using another system to transfer the weight;
- Requires assistance with rope management or must stop to correct a rope problem;
- Uses non-standard commands, but operates system appropriately

0 (any scores zero)
Student fails to safely lift or lower the load;
Does not identify and correct for excessive slack in belay line;
Fails to catch a fall safely;
Incorrect use or response to standard commands creates operational or safety breakdown

Practice Score Sheet

Knots

2	1	0	Time	Start _____	Finish _____	Total _____
2	1	0	Figure 8 Bight			
2	1	0	8 Follow through			
2	1	0	Double Loop 8			
2	1	0	Butterfly			
2	1	0	Munter Hitch			
2	1	0	Munter Tie-Off			
2	1	0	Bowline w/safety knot			
2	1	0	Trucker's Hitch			
2	1	0	Trucker's Hitch Tie-Off			
2	1	0	Prusik Hitch			
2	1	0	Clove Hitch w/safety knot			
2	1	0	Water Knot			
2	1	0	Double Fisherman's Knot			

Vertical & SRT

2	1	0	Time	Start _____	Finish _____	Total _____
2	1	0	System			
2	1	0	Ascending			
2	1	0	Down-Climbing			
2	1	0	Knot Pass, Ascent			
2	1	0	Change Over			
2	1	0	Rappel			
2	1	0	Knot, Descent			
2	1	0	PPE			
2	1	0	Safety			

1:1 with Progress Capture

Evaluator _____			Score _____
2	1	0	1:1
2	1	0	Equipment
2	1	0	Anchoring
2	1	0	Knots
2	1	0	Operation

Fixed Brake Lower

Evaluator _____			Score _____
2	1	0	Fixed Brake Lower
2	1	0	Equipment
2	1	0	Anchoring
2	1	0	Knots
2	1	0	Operation

2:1 w/ Progress Capture

Evaluator _____			Score _____
2	1	0	2:1
2	1	0	Equipment
2	1	0	Anchoring
2	1	0	Knots
2	1	0	Operation

Munter Hitch Belay

Evaluator _____			Score _____
2	1	0	Munter Belay
2	1	0	Equipment
2	1	0	Anchoring
2	1	0	Knots
2	1	0	Operation

3:1 Z-Rig

Evaluator _____			Score _____
2	1	0	3:1
2	1	0	Equipment
2	1	0	Anchoring
2	1	0	Knots
2	1	0	Operation

Tandem Triple Wrap Prusik Belay

Evaluator _____			Score _____
2	1	0	T3WP Belay
2	1	0	Equipment
2	1	0	Anchoring
2	1	0	Knots
2	1	0	Operation

Compound 4:1 w/ Progress Capture

Evaluator _____			Score _____
2	1	0	4:1
2	1	0	Equipment
2	1	0	Anchoring
2	1	0	Knots
2	1	0	Operation

Radium Load Releasing Hitch

Evaluator _____			Score _____
2	1	0	RLRH
2	1	0	Equipment
2	1	0	Anchoring
2	1	0	Knots
2	1	0	Operation