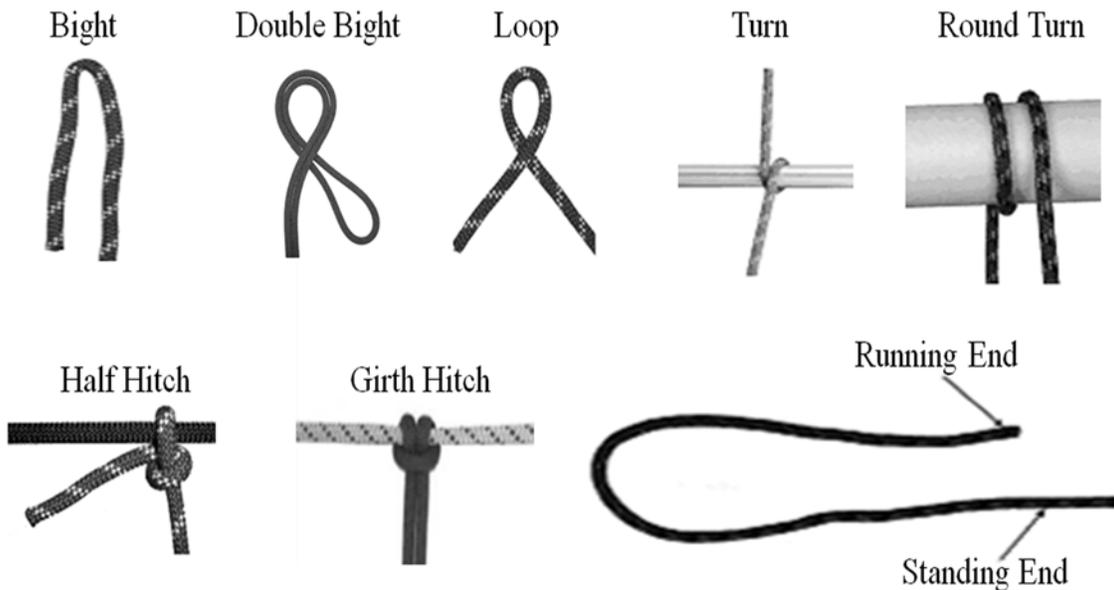


## SECTION V. Terminology:

*When using ropes, understanding basic terminology is important. The terms explained in this section are the most commonly used in military mountaineering.*

- (a) **Bight:** A bight of a rope is a simple bend of rope in which the rope does not cross itself.
- (b) **Double Bight:** A bend in a doubled rope where none of the strands cross.
- (c) **Loop:** A loop is a bend of a rope in which the rope does cross itself.
- (d) **Turn:** A turn wraps around an object, providing 360-degree contact.
- (e) **Round Turn:** A round turn wraps around an object one and one-half times. A round turn is used to distribute the load over a small diameter anchor (3 inches or less). It may also be used around larger diameter anchors to reduce the tension on the knot, or provide added friction.
- (f) **Half Hitch:** A half hitch is a loop that runs around an object in such a manner as to lock or secure itself.
- (g) **Girth Hitch:** A bight around an object securing the standing ends. It is used to attach a runner to an anchor or piece of equipment.
- (h) **Running End:** A running end is the loose or working end of the rope.
- (i) **Standing End:** The standing end is the static, stationary, or nonworking end of the rope.



(j) **Lay:** The lay is the direction of twist used in construction of the rope.



(k) **Pigtail:** The pigtail (tail) is the portion of the running end of the rope between the safety knot and the end of the rope. All pigtails will be a minimum of 4 inches long.

(l) **Dress:** Dress is the proper arrangement of all the knot parts, removing unnecessary kinks, twists, and slack so that all rope parts of the knot make contact.

## **OVERHAND KNOT**

**Purpose: To be used as a safety knot.**

### **Tying the Knot:**

Step 1: Take the running end of the rope and form a loop.

Step 2: Place the running end through the loop.

Step 3: Dress the overhand knot down to the knot that it is securing.

### **Checkpoints**

- ✓ **A locking bar that secures the running end to the standing end.**
- ✓ **Minimum 4-inch pigtail.**



**WATER KNOT:** (Class 1, Joining Knot):

**Purpose:** Used to join the ends of tubular webbing.

**Tying the Knot:**

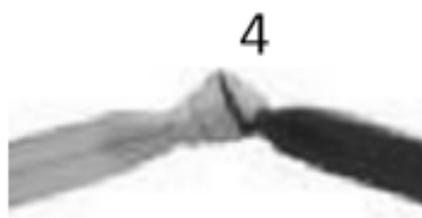
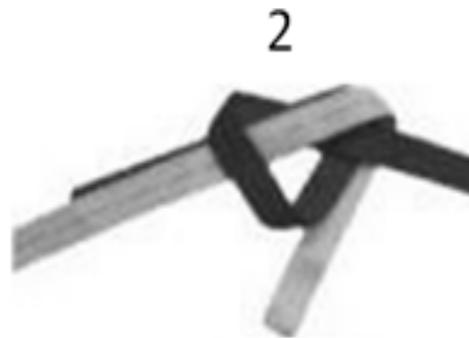
Step 1: Tie an overhand knot in one end of the webbing with the webbing in the left hand.

Step 2: Route the other end of the webbing back through the overhand knot from running end to standing end, following the course of the original overhand knot. Do not allow the webbing to become twisted within the knot.

Step 3: Dress the knot.

**Checkpoints**

- ✓ **Two pieces of webbing running side by side in the shape of an overhand knot.**
- ✓ **The running ends are on opposite ends of the knot and on the same side of the standing ends.**
- ✓ **There are no twists in the webbing.**
- ✓ **Minimum 4" pigtails.**



## AUTOBLOCK KNOT

**Purpose: To attach a moveable rope or webbing to a fixed rope that is easy to release.**

### **Tying the Knot:**

Step 1: Join a utility rope to form an endless loop, about 24 inches. You may use a standard length runner of tubular webbing. Offset the joining knot. Form a 4 inch bight on the opposite end from the joining knot. Wrap the long portion of the endless loop around the rope a minimum of 3 times on a double rope and 4 times on a single rope.

Step 2: Snap both bights into a carabiner.

### **Checkpoints**

- ✓ **A minimum of four turns around the rope.**
- ✓ **Both bights are in the carabiner.**
- ✓ **The joining knot is offset and out of turns.**



## WEB WRAP

**Purpose: To attach a moveable piece of webbing to a fixed rope.**

### **Tying the Knot:**

Step 1: With an endless loop of webbing, form a 4 inch bight. Ensure the knot is offset and opposite the bight.

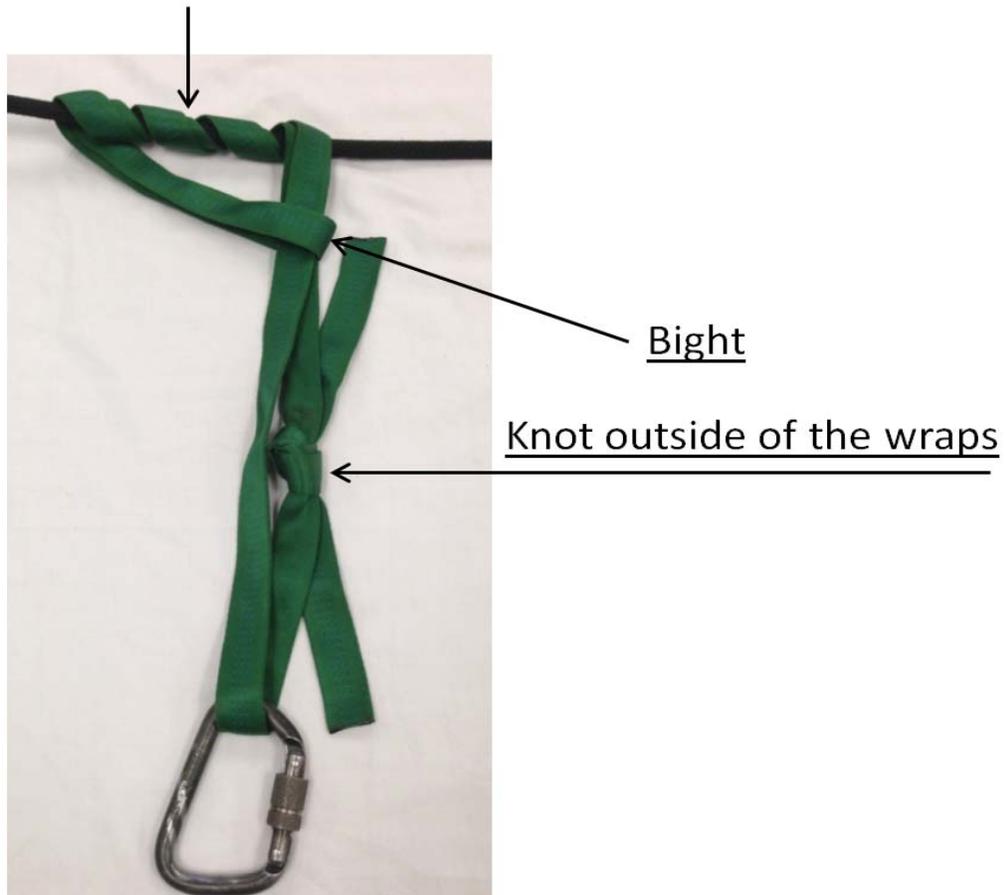
Step 2: Wrap the rest of the webbing around the rope a minimum of three times. Wrap more times if the rope is wet or icy.

Step 3: Pass the rest of the webbing through the original bight and dress the knot down.

### **Checkpoints**

- ✓ **A bight locked over a minimum of three turns.**
- ✓ **The knot is offset from the loop and completely out of wraps.**

Minimum of three wraps



**SQUARE KNOT:** (Class 1, Joining Knot).

**Purpose:** The square knot is used to join the ends of two ropes of equal diameter together while under tension.

**Tying the Knot:**

Step 1: Holding one running end in each hand, place the running end in your right hand over the one in your left hand.

Step 2: Pull it under then back over the top of the rope in your left hand.

Step 3: Place the running end in your left hand over the one in your right hand and repeat as in Step 2.

Step 4: Dress the knot down and safety it off with an overhand knot on each side of the knot.

**Checkpoints**

- ✓ **Two interlocking bights.**
- ✓ **The running ends are on opposite ends of the knot and on the same side of the standing end.**
- ✓ **Minimum 4” pigtails after the overhand safeties.**



**FIGURE OF EIGHT BEND:** (Class 1, Joining Knot):

**Purpose: To join ends of two ropes of equal or similar diameter no more than 5 mm difference in diameter.**

**Tying the Knot:**

Step 1: Grasp the top of a 2' bight.

Step 2: With the other hand grasp the running end and make a 360 degree turn around the standing end.

Step 3: Place the running end through the loop you have just formed thus creating an in-line Figure of Eight.

Step 4: Route the running end of the other rope back through the Figure of Eight starting from the original ropes running end. Trace the original knot to the standing end.

Step 5: Dress the Knot down.

**Checkpoints**

- ✓ **Two ropes running side by side in the shape of a figure eight.**
- ✓ **The running ends are on opposite ends of the knot and on opposite sides of the standing ends.**
- ✓ **Minimum 4' pigtails and no twists.**



**BOWLINE:** (Class 2, Anchor Knot):

**Purpose: To tie the end of a rope around an anchor point when you have alternating tension, or to form a fixed loop in a rope.**

**Tying the Knot:**

Step 1: Bring the running end of the rope around the anchor point from right to left. If the anchor point is less than 3” make a round turn around the anchor, right to left, top to bottom.

Step 2: With your right thumb facing towards you form a loop in the standing part of the rope by turning your wrist clockwise. Lay the loop to the right. Secure the loop with your left thumb and forefinger.

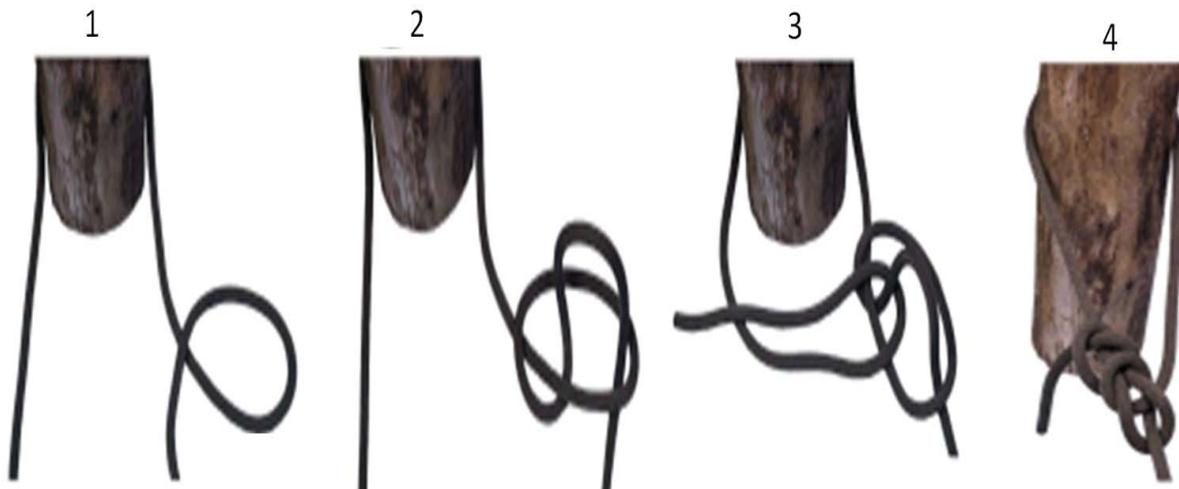
Step 3: With your right hand, reach down through the loop and pull up a bight from the standing part of the rope. Insure that the standing part is towards you. Secure the bight with your right hand and release the grasp of the left.

Step 4: Place the running end of the rope (on your left) through the bight from left to right and bring it back onto itself. Hold the running end loosely, dress the knot down by pulling on the standing end.

Step 5: Safety the Bowline with an overhand knot.

**Checkpoints**

- ✓ **A bight around the standing end of the rope held in place by a loop.**
- ✓ **The running end of the bight is on the inside of the fixed loop.**
- ✓ **Minimum 4” pigtails after the overhand safeties.**



**CLOVE HITCH (End of the Rope):** (Class 2, Anchor Knot):

**Purpose: To anchor the end of the rope under tension.**

**Tying the Knot:**

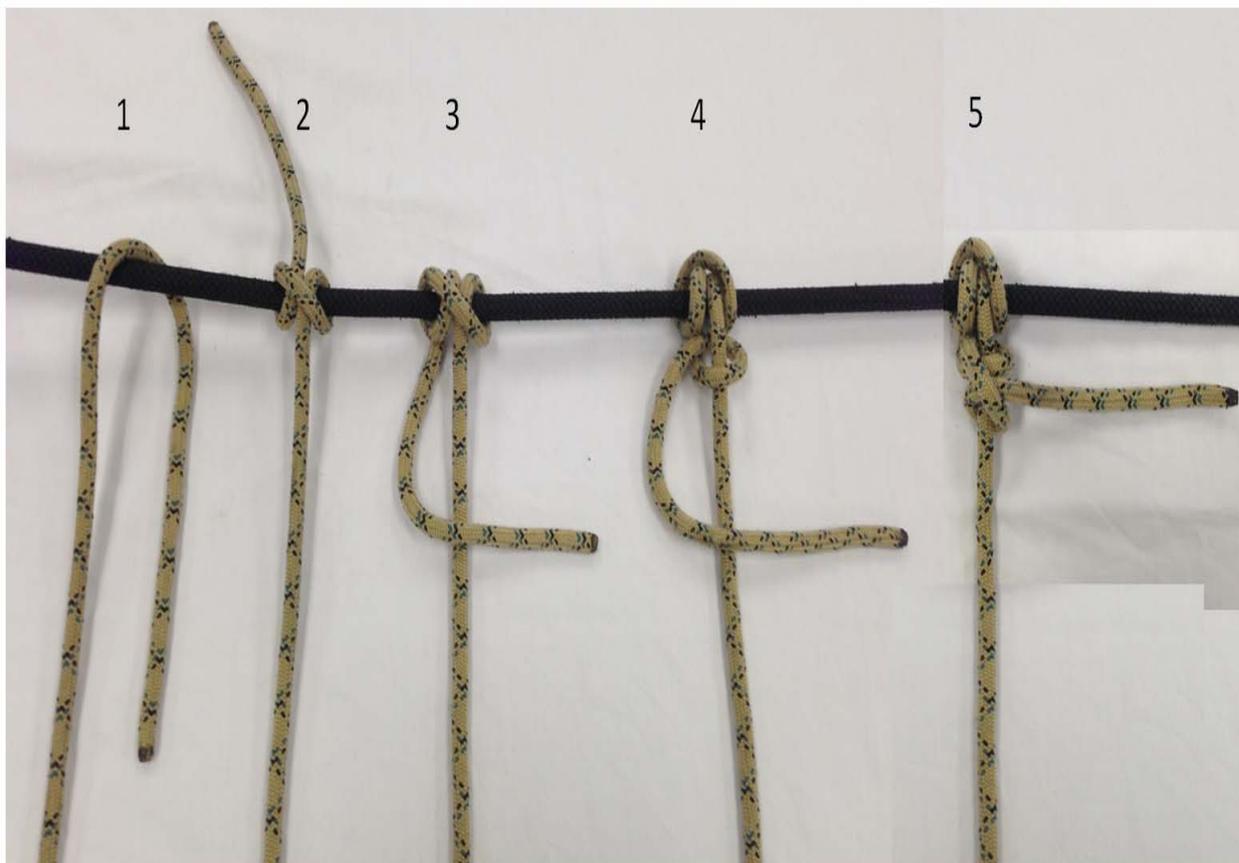
Step 1: Make a turn around the anchor point, right to left. Bring the rope over the standing part and down continuing around the anchor forming a diagonal locking bar. Wrap the running end around the anchor point and pass it through the diagonal locking bar.

Step 2: Dress the knot down.

Step 3: Safety the knot with two Half Hitches.

**Checkpoints**

- ✓ **Two turns around the anchor with the diagonal locking bar in the opposite direction of pull.**
- ✓ **The running and standing ends exit the middle of the knot.**
- ✓ **Safety the running end to the standing end with two half hitches.**
- ✓ **Minimum 4" pigtail.**



**ROUND TURN, TWO HALF HITCHES:**(Class 2, Anchor Knot):

**Purpose: Used to tie the end of a rope to an anchor. This knot must have constant tension.**

**Tying the Knot:**

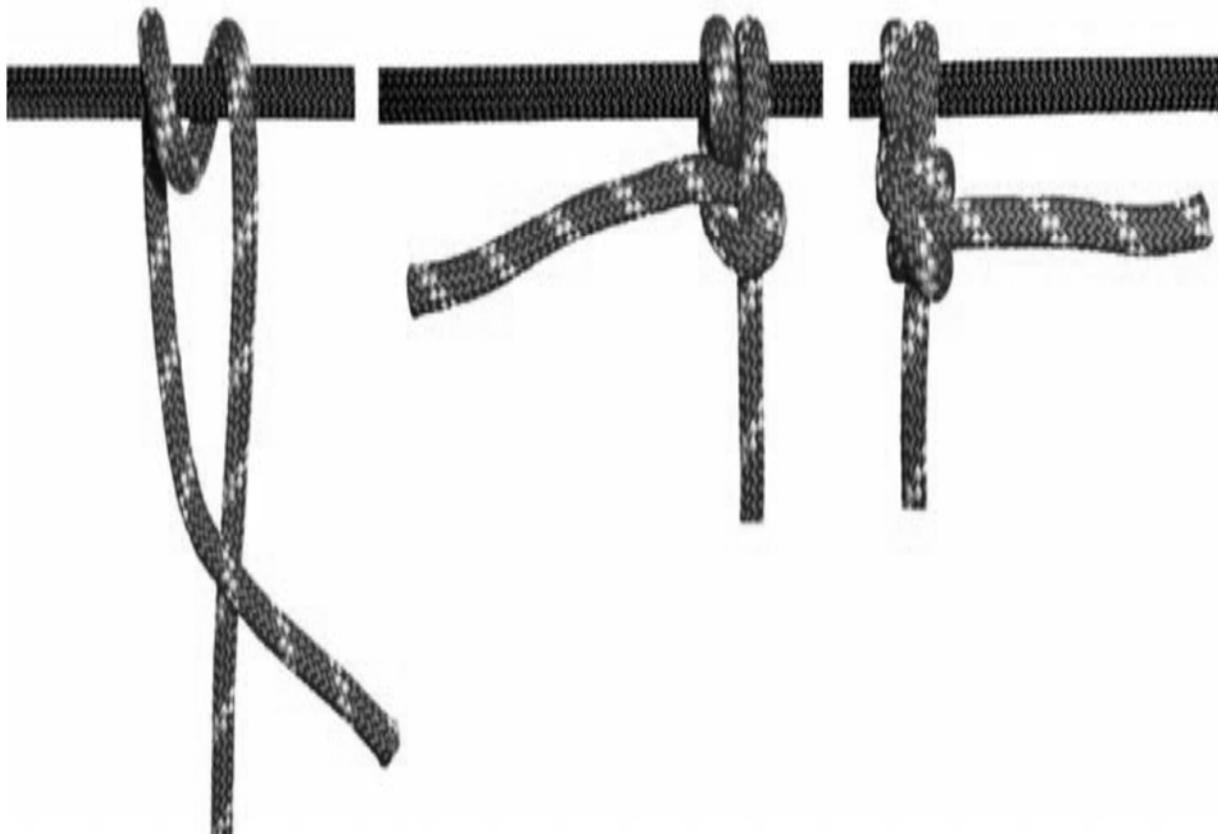
Step 1: Route the rope around the anchor from right to left, top to bottom (must have two wraps in the rear of the anchor, and one in the front). Run the loop around the object to provide 360 degree contact, distributing the load over the anchor.

Step 2: Bring the working end of the rope left to right and over the standing part, forming a half hitch (first half hitch).

Step 3: Repeat Step 2 (last half hitch must have a minimum of 4" pigtail.)

**Checkpoints**

- ✓ **A complete turn around the anchor point with no crosses.**
- ✓ **Two half hitches in place by a locking bar.**
- ✓ **Minimum 4" pigtail.**



**MIDDLE OF THE ROPE CLOVE HITCH:** (Class 3, Middle of the Rope):

**Purpose: To form an anchor in the middle of the rope.**

**Tying the Knot:**

Step 1: Hold the rope in both hands, palms down and approximately 12” apart.

Step 2: With the right hand form a loop away from you and towards you left hand.

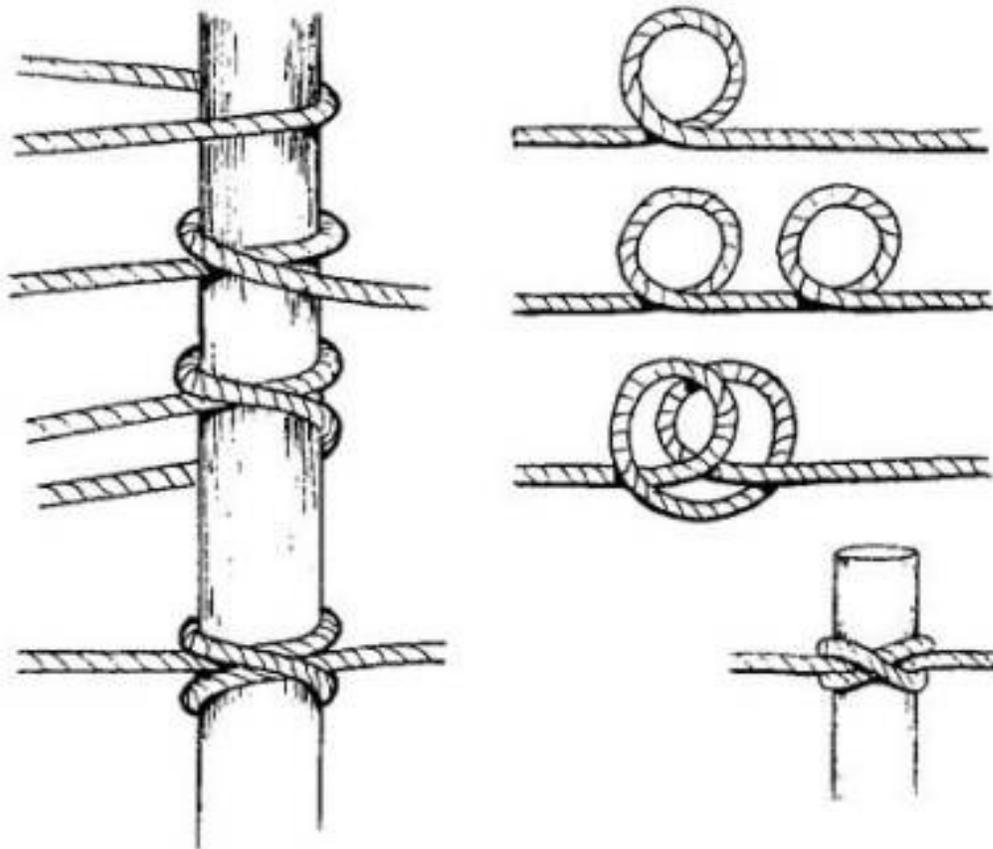
Step 3: With the left hand form a loop towards you and towards you right hand.

Step 4: Bring the loop in your left hand behind the loop in the right hand.

Step 5: Place both loops over the anchor and pull both ends of the rope in opposite directions.

**Checkpoints**

- ✓ **Two turns around the anchor with a diagonal locking bar.**
- ✓ **The running and standing ends exit the center of the knot.**



**DOUBLE FIGURE OF EIGHT KNOT:** (Class 3, Middle of the Rope):

**Purpose: Used to form a fixed loop in a rope.**

**Tying the Knot:**

Step 1: Form a 12" bight.

Step 2: With the bight, make a 360 degree turn around the standing part of the rope, forming a double loop in your hand.

Step 3: Place the bight through the loop.

Step 4: Dress the knot down.

**Checkpoints**

- ✓ **Two ropes running side by side in the shape of a figure eight.**
- ✓ **The knot forms a fixed loop.**
- ✓ **Minimum 4" pigtails and no twists.**



**MIDDLE OF THE ROPE FIGURE EIGHT SLIP KNOT:** (Class 3, Middle of Rope):

**Purpose: To form an adjustable bight in a rope.**

**Tying the Knot:**

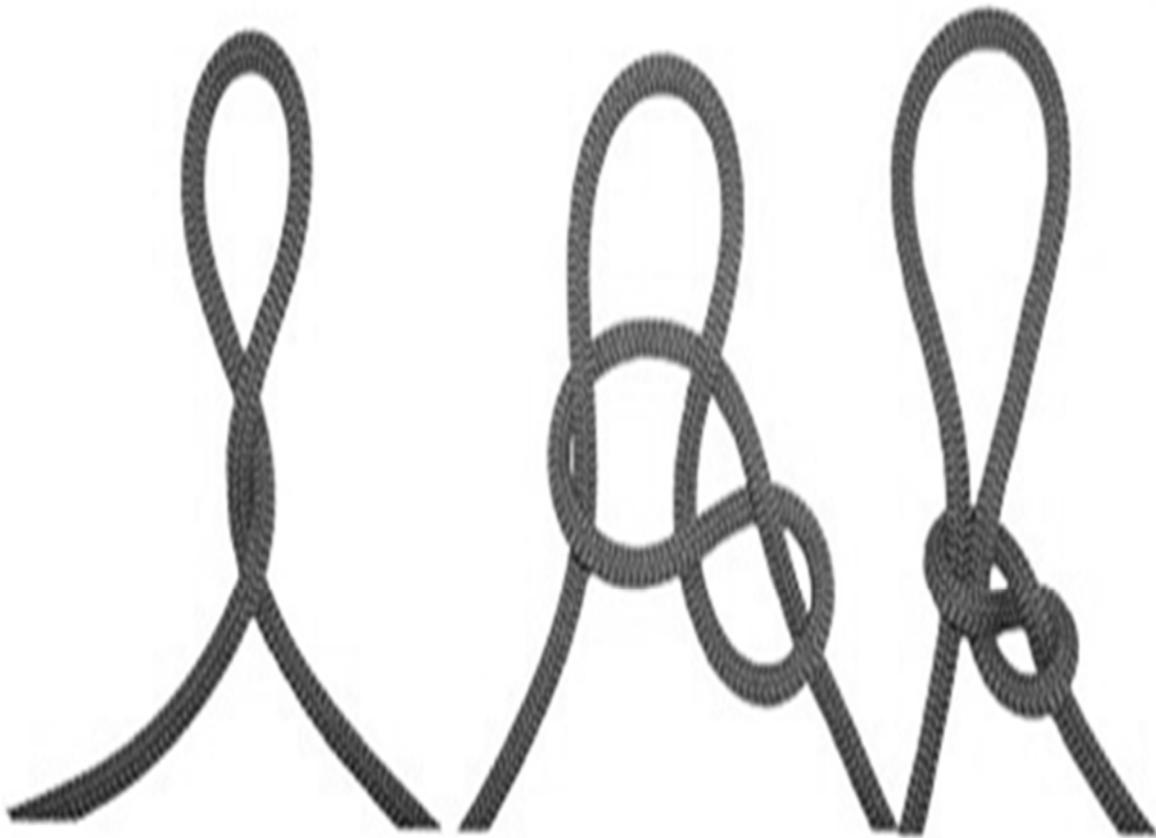
Step 1: Take a bight in the rope holding the closed end; grasp the doubled rope below the bight with the opposite hand. Make two twists in the bight (360 degree) using the top hand.

Step 2: Maintaining the two twists, reach through the loop and pull a bight through the loop in your hand.

Step 3: Dress down the knot.

**Checkpoints**

- ✓ **The knot is in the shape of a figure eight.**
- ✓ **An adjustable bight passes through one loop of the figure eight.**



**MIDDLE OF THE ROPE PRUSIK:** (Class 3, Middle of the Rope Knot):

**Purpose: To attach a movable rope to a fixed rope.**

**Tying the Knot:**

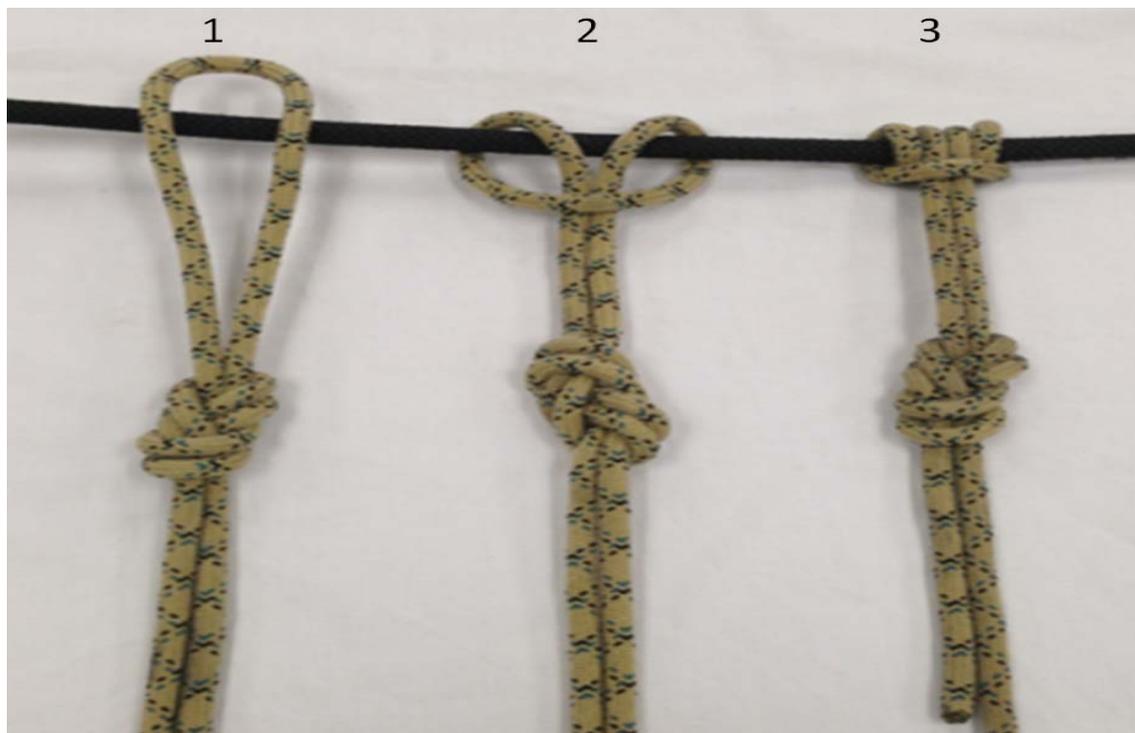
Step 1: Tie a Double Figure of Eight in the rope, making a 10"-12" loop. Place the loop over the fixed rope so that the closed end of the loop is 4-6" below the fixed rope and the double figure of eight is close to you.

Step 2: Reach down through the loop and pull both running ends through the loop and continue around the anchor with the figure of eight, passing it again through the original loop. You will now have two round turns on the fixed rope and a locking bar running perpendicular to them.

Step 3: Dress the wraps and locking bar down to make sure they are tight and not twisted.

**Checkpoints**

- ✓ **Two round turns with a perpendicular locking bar.**
- ✓ **With a double figure eight stabilizing the knot no more than 6" away from the prussic.**
- ✓ **The ropes between the prussic and double figure eight have equal tension.**



**TWO LOOP FIGURE EIGHT KNOT:** (Class 4, Special Knot):

**Purpose: Used to form two adjustable fixed loops in a rope.**

**Tying the Knot:**

Step 1: Form an 18" bight.

Step 2: Bring the bight 360 degrees around the doubled standing end.

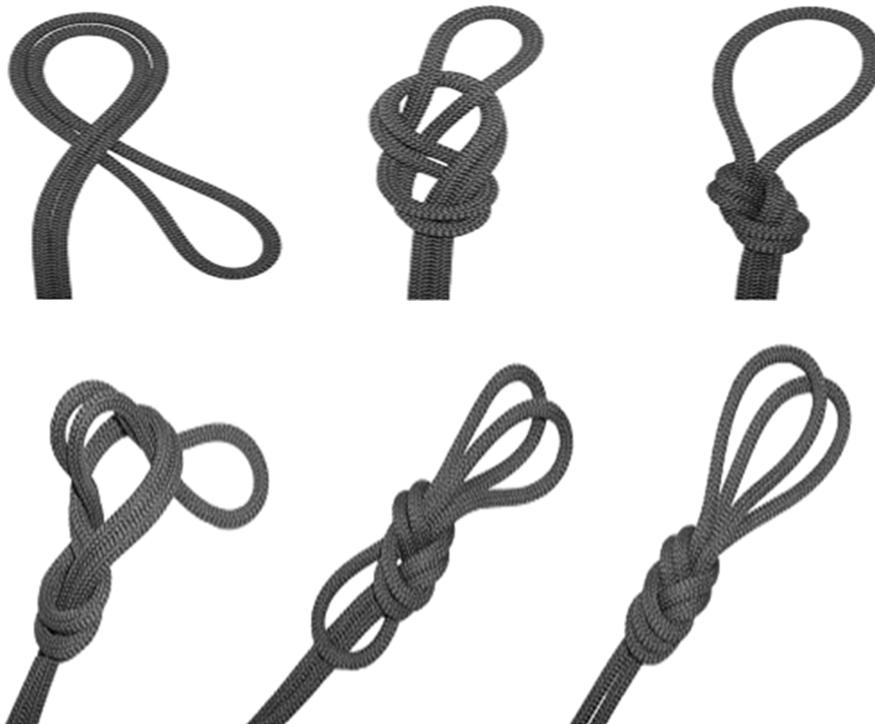
Step 3: Holding the bight, form a doubled bight and place it through the loop you have just formed.

Step 4: Hold the double bight, placing the original bight over the knot, forming a common locking bar on the bottom of the double figure eight knot.

Step 5: Remove all unnecessary twists and crossovers. Dress the knot down.

**Checkpoints**

- ✓ **Two ropes running side by side in the shape of a figure eight.**
- ✓ **The knot has two adjustable fixed loops.**
- ✓ **The loops are adjustable by means of a common locking bar at the bottom of the knot.**
- ✓ **Minimum 4" pigtails and no twists.**



**FIGURE OF EIGHT RETRACE:** (Class 4, Special Knot):

**Purpose: To tie the climbing rope around a fixed object or harness.**

**Tying the Knot:**

Step 1: Grasp the top of a 2' bight.

Step 2: With the other hand grasp the running end (short end) and make a 360 degree turn around the standing end.

Step 3: Place the running end through the loop you have just formed.

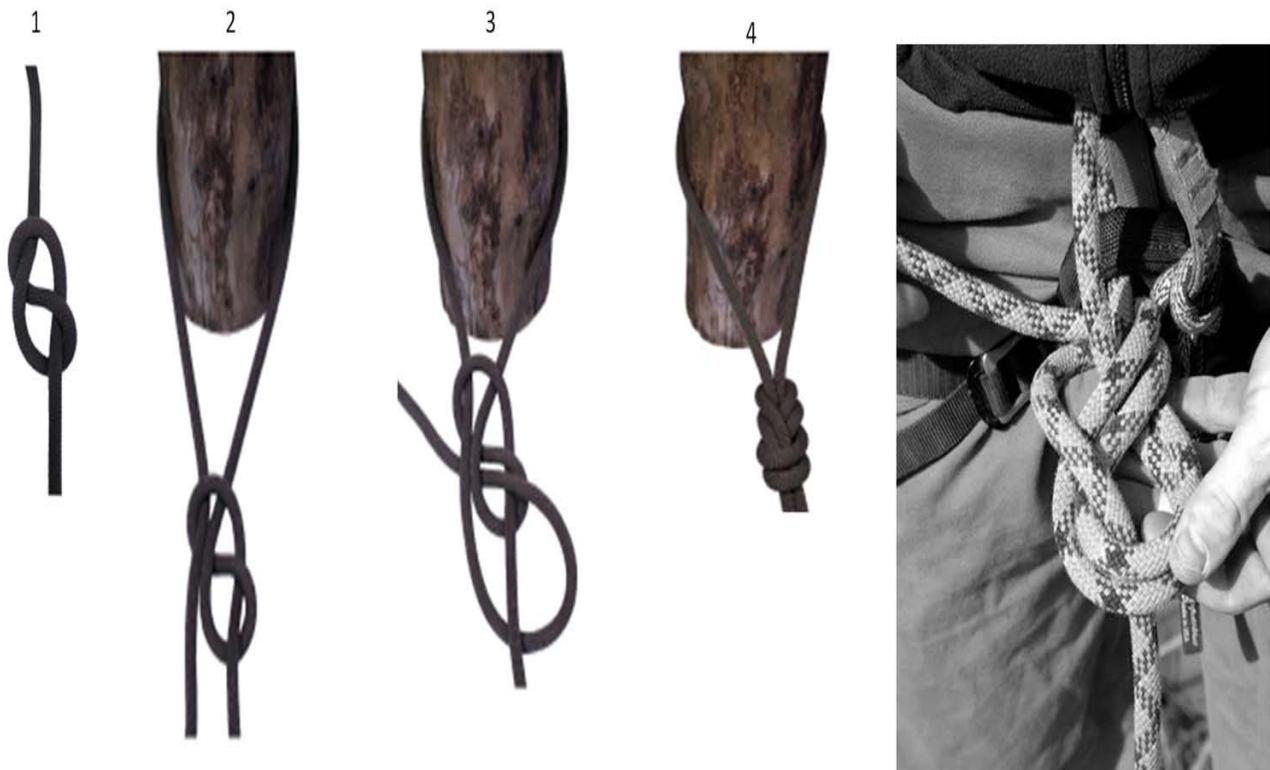
Step 4: Place the running end around the anchor point or harness.

Step 5: Route the running end back through the figure of eight tracing the original knot to the standing end.

Step 6: Dress the knot.

**Checkpoints**

- ✓ **Two ropes running side by side in the shape of a figure eight.**
- ✓ **The knot will form a fixed loop around a fixed object or harness.**
- ✓ **Minimum 4" pigtails and no twists.**



**THREE LOOP BOWLINE:** (Class 4, Special Knot):

**Purpose: To form three fixed loops in a rope. Normally used as an anchor knot.**

**Tying the Knot:**

Step 1: Form a bight in the middle of the rope. Bring the bight around the anchor point from right to left. Make a round turn around the anchor point if the anchor point is less than 3” in diameter.

Step 2: With your right thumb facing towards you, form a double loop in the standing part by turning your wrist clockwise. Lay the loops to the right.

Step 3: With your right hand, reach down through the loop and pull up a double bight from the standing part of the rope. Ensure that the standing parts are towards you.

Step 4: Place the running end (bight) of the rope through the doubled bight from left to right and bring it back onto itself. Hold the running end loosely, dress the knot down by pulling on the standing part.

Step 5: Safety the knot with a doubled overhand knot.

**Checkpoints**

- ✓ **Two bights around the standing ends, held in place by two loops.**
- ✓ **The running end of the bight is on the inside of two fixed loops.**
- ✓ **Minimum 4” pigtail after the double overhand knot.**



**END OF ROPE PRUSIK:** (Class 4, Special Knot):

**Purpose: To attach a moveable rope to a fixed rope at the end of a rope.**

**Tying the Knot:**

Step 1: With the running end make a round turn around the standing part of the fixed rope, working to your right.

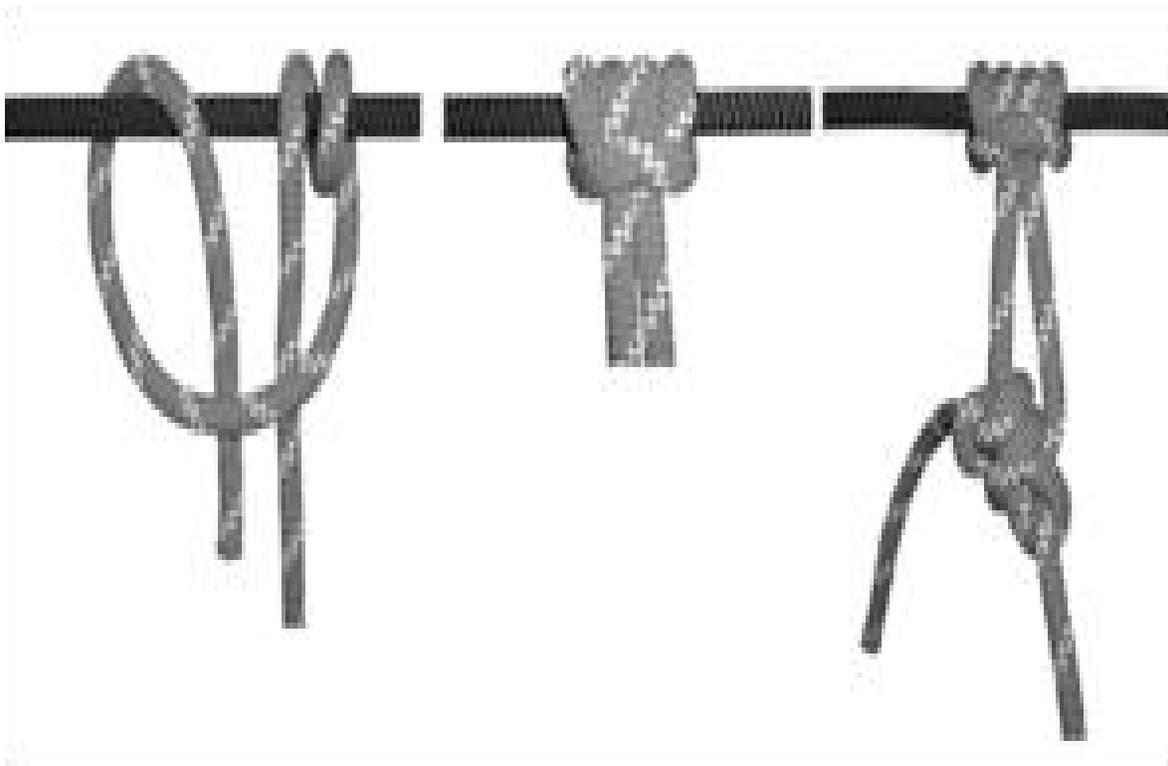
Step 2: With the running end, come back over the standing part and under the fixed rope.

Step 3: Come over the fixed rope and make a round turn working towards the right, bringing the running end through the locking bar.

Step 4: Dress the knot down and stabilize the Prussic with a bowline and an overhand safety.

**Checkpoints**

- ✓ **Two round turns with a perpendicular locking bar.**
- ✓ **Stabilized with a bowline and an overhand safety no more than 6" from the prussic.**
- ✓ **The ropes between the prussic and bowline have equal tension.**
- ✓ **Minimum 4" pigtail.**



**MUNTAR HITCH:** (Class 4, Special Knot):

**Purpose:** To form a mechanical belay.

**Tying the Knot:**

Step 1: Hold the rope in both hands, the right palm up and the left palm down.

Step 2: With the right hand form a loop away from you.

Step 3: Without twisting the rope in the left hand bring it up directly behind the loop in your right hand.

Step 4: Place the bight that you have formed around the rope into the carabineer. Lock the carabineer.

**Checkpoints**

- ✓ **A bight passing through a locked carabineer.**
- ✓ **The closed end of the bight is around the standing or running end.**



**RAPPEL SEAT:** (Class 4, Special Knot):

**Purpose: Used to make a harness for climbing or rappelling.**

**Tying the Knot:**

Step 1: Find the middle of the rope, make a bight.

Step 2: Determine which hand you will break with and place the bight on the opposite side just above the hip.

Step 3: Reach around your back and secure a single strand of rope. Bring the rope around to your front and make one wrap over the rope in your left hand. Make another wrap over the rope in your right hand and tighten. This creates a loop around your waist.

Step 4: Pass the two ends between your legs, ensuring they do not cross.

Step 5: Pass the two ends over the top of the waist loop bisecting you pocket flaps (ensure running ends come out towards the center of your buttocks). Squat, secure the two running ends and tighten the seat.

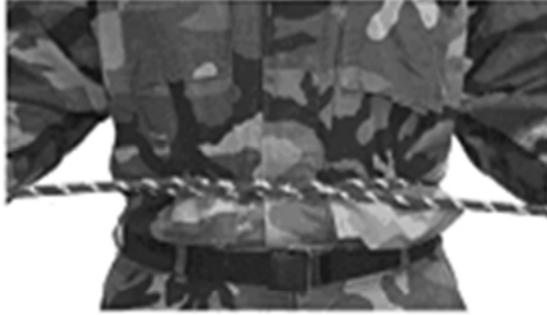
Step 6: From the center of your buttocks, bring each rope over the leg loops just created (creating a half hitch on both hips).

Step 7: Bring the rope on your brake side across your front to your non-brake side hip and secure the two ends with a square knot, safety the knot with an overhand knot on each side. Tuck all excess into a pocket. Must have a minimum of 4" pigtail.

**Checkpoints**

- ✓ **Two overhands around the body, above the hips.**
- ✓ **Ropes not crossed between the legs.**
- ✓ **A half hitch on each hip over the waist rope.**
- ✓ **Square knot on guide hand side.**
- ✓ **Minimum 4" pigtail after overhand safeties.**

RAPPELSEAT



**BOWLINE ON A COIL:** (Class 4, Special Knot):

**Purpose: Used to secure a climber to the end of a climbing rope.**

**Tying the Knot:**

Step 1: With the running end, place 3' of rope over your right shoulder. The running end is to your back.

Step 2: Starting at the bottom of your ribcage, wrap the standing part of the rope around your body and down in a clockwise direction four to eight times.

Step 3: With the standing portion of the rope in your left hand, make a clockwise loop towards you. The standing portion is on the bottom.

Step 4: Insuring that the loop does not come uncrossed, bring it up under the coils between the rope and your body.

Step 5: Using the standing part, bring a bight up through the loop. Grasp the running end of the rope in your right hand. Pass it through the bight from right to left and back on itself.

Step 6: Holding the bight loosely, dress the knot down, by pulling on the standing end.

Step 7: Safety the bowline with an overhand around the top single coil, then tie an overhand around all coils, leaving a minimum of 4" pigtail.

**Checkpoints**

- ✓ **A minimum of four wraps around the body not crossed.**
- ✓ **A bight held in place by a loop.**
- ✓ **The loop must be underneath all wraps.**
- ✓ **Centered on the middle-line of the body.**
- ✓ **Minimum 4" pigtail after second overhand knot.**

BOWLINE ON A COIL



A



B



C



D



E

## **BUTTERFLY COIL WITH FARMER'S TIE OFF:** (Class 4, Special Knot):

**Purpose: To prepare a climbing rope for carrying on the body.**

### **Tying the Knot:**

Step 1: Back feed the doubled rope until you have the approximate center bight.

Step 2: Place the center bight over your head and drape it in front, over your shoulder so it hangs no lower than your waist.

Step 3: With the rest of the doubled rope in front of you make doubled bights placing them over your head in the same manner as the first bight, ensuring as you alternate from side to side (right to left, left to right) while maintaining equal length bights.

Step 4: Continue coiling until you have approximately two arms length of rope left. Carefully remove the coils from your neck/shoulders holding the center in one hand.

Step 5: With the two ends, wrap the coils a minimum of three times ensuring the first wrap locks on itself.

Step 6: Pass a doubled bight from the two loose ends up through the apex of the coils, pull the two loose ends through the doubled bight and dress it down.

Step 7: Place the butterfly coil on your back. Separate the two loose ends. Bring one over your right shoulder and one over your left shoulder. Continue down under your arms and across your back. Ensure the rope crosses over the coils. Secure the two ends in front with a square knot without overhand safeties.

### **Checkpoints**

- ✓ **Coils uniform and even no greater than 6" difference.**
- ✓ **A minimum of three turns around the coils with the first one locking on itself.**
- ✓ **A double bight through the top of the coils, securing the standing ends and dressed down.**
- ✓ **A minimum of one wrap around the body and coils tied off with a square knot and no safeties.**
- ✓ **Minimum 4" pigtail.**

**BUTTERFLY COIL WITH FARMER'S TIE OFF**

