



Knots for Cavers

Knots, Hitches, Bends, and Splices

Step By Step Instructions
For tying knots for Caving

Knot Requirements – by Slide Edge Color

Required Knots

Additional Knots

Credits

The photography and illustrations in this presentation are the creation and property of Grog LLC:

<http://www.animatedknots.com>

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The text slides were created from the *Basic Vertical Class* materials of the Vertical Section of the NSS.

Nomenclature

Rope Terms:

- **Working end** (where the knot is)
- **Standing line** (middle part, hanging free)
- **Running end** (free end of the rope)

Nomenclature

Knot types:

- **Knot** - Tied configuration that doesn't move or slip.
- **Hitches** - Tied configuration that ties around an object or a rope. When the object or rope is removed, the tie falls apart.
- **Bends** - Tied configuration between two ends of a rope(s).
- **Splices** - Interwoven strands (decorative macramé is also here).
- **Stopper** - A knot that is affixed to a rope that causes no slippage.

Nomenclature

Knot Terms:

- **Body** (main part of the knot)
- **Loop** (turn of rope that crosses itself)
- **Bight** (doubled loop, doesn't cross itself)
- **Tail** (free end of the rope after the knot)
(4 X the rope diameter)

What Makes a Good Knot?

- **Friction** - Makes the knot hold.
- **Dressing** - Aligning the rope through the knot (increases friction).
- **Alignment** - Keeping the knot in the direction of forces.
- **Procedure** - Tie it, Dress it, Stress it.

Strength of Knots

- **Sharp bends** weaken the rope
(A bend of 4 times the rope diameter causes minimal loss of strength).
- **Constriction or girthing** (like a barrel knot) holds the rope.
- **"Backing up" a knot** (keeps free end from loosening the tie).
- **Efficiency Table** (approximate retention of rope's strength).

Ties to Learn (Efficiency)

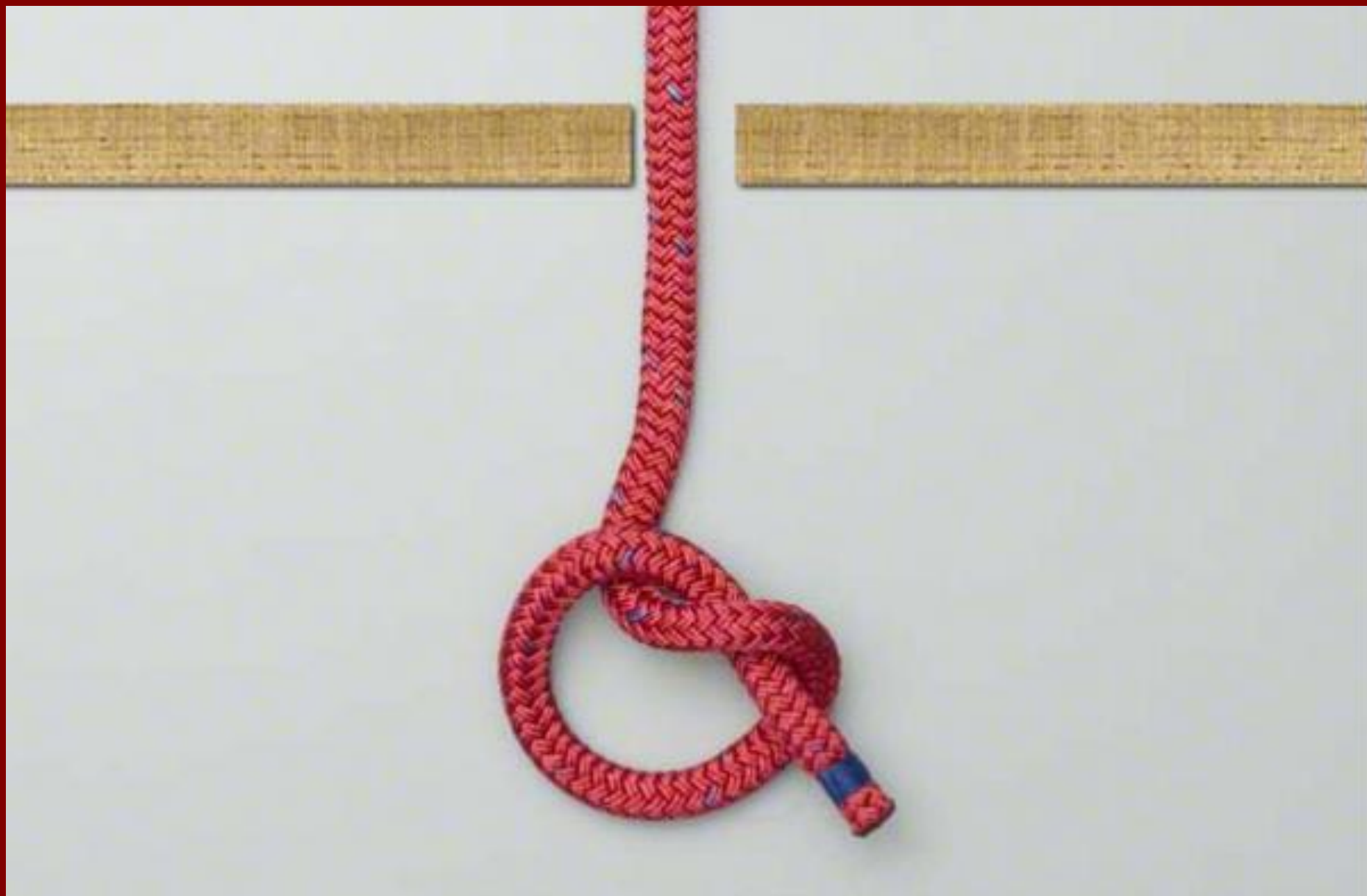
Figure Eight	75-80%
Figure Nine	80-85%
Overhand Bend	50%
Double Overhand Bend	65-70%
Triple Overhand Bend	80+%
Ring Bend (Water Knot)	55%
Bowline	70-75%
Butterfly knot	60-65%
Prusik Knot	80%

Overhand

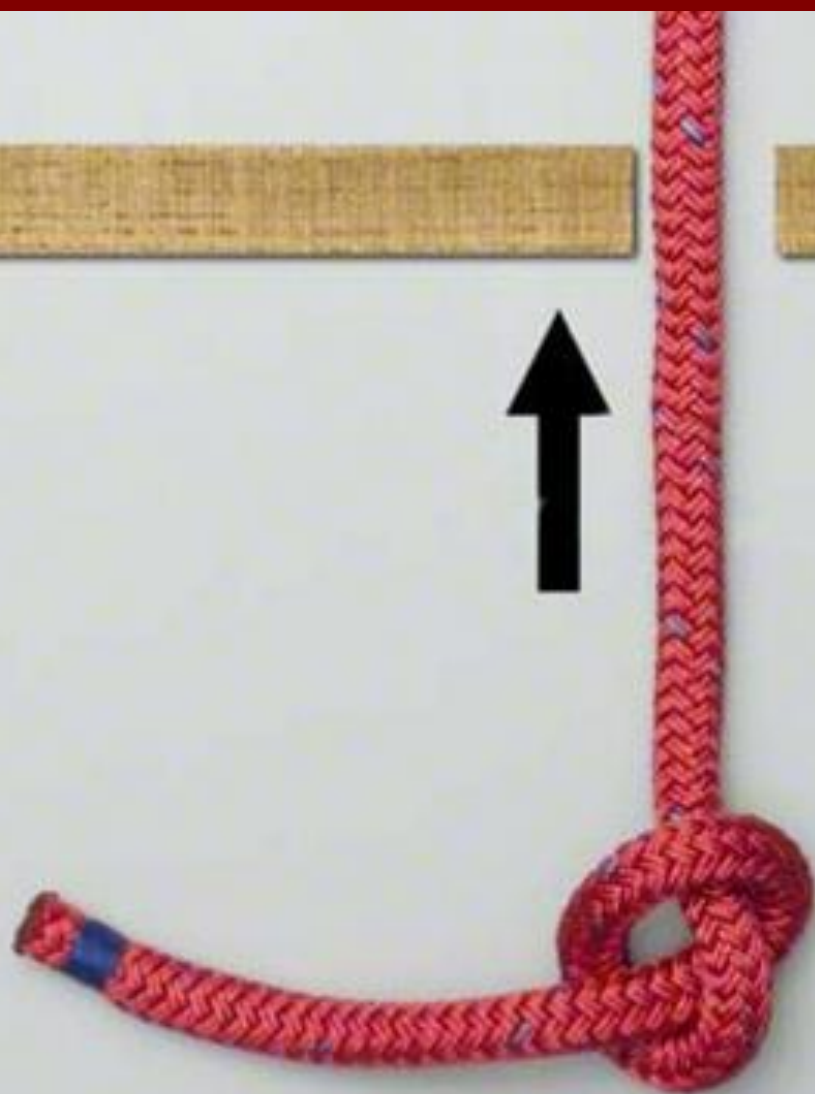
For Securing Ends of the tie.













Bowline

For Securing Equipment to the rope.

















Structure

Figure Eight

A Strong Knot with Minimal Weakening of Rope.

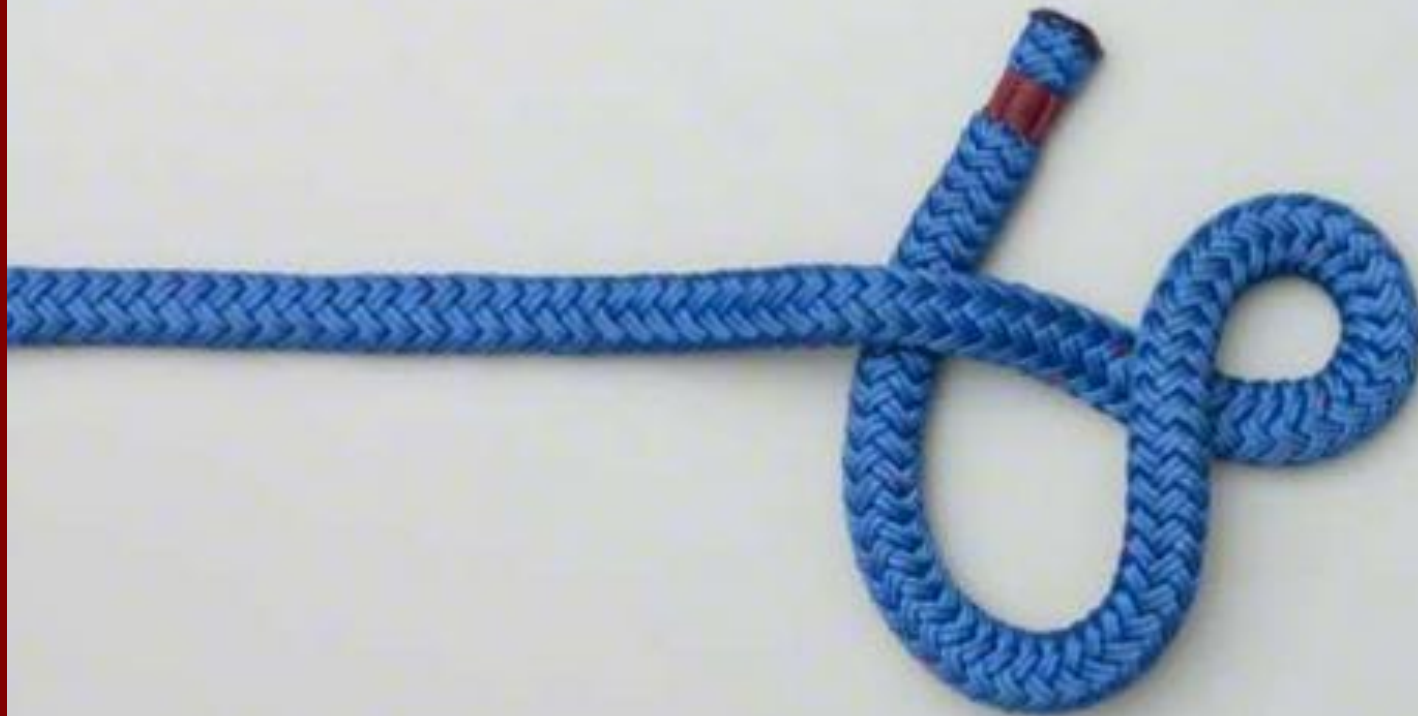
(Use doubled line to make a **Figure Eight Loop** to use at the end of the climbing rope.)







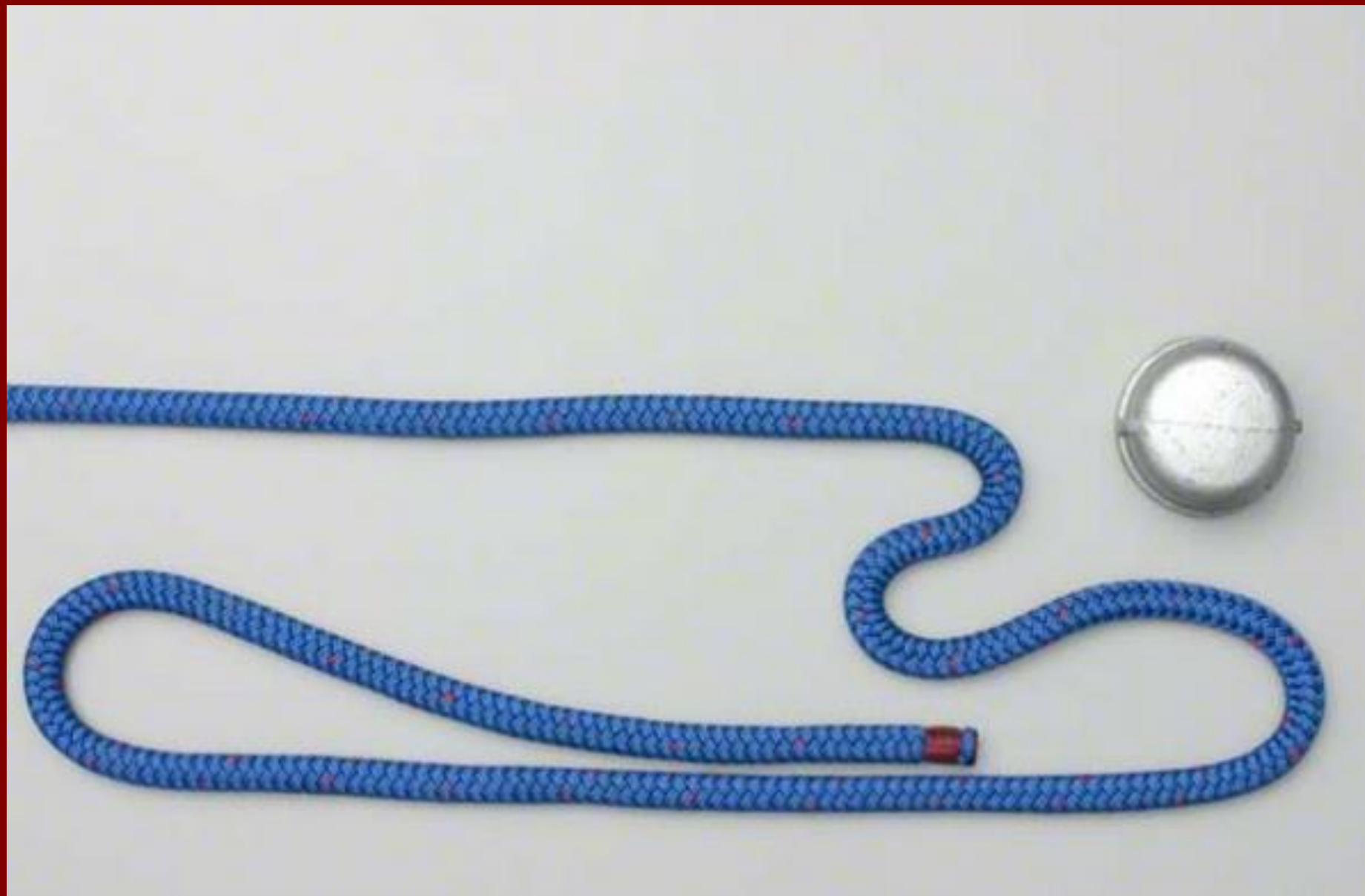




Structure

Figure Eight Follow-Through

A Workhorse Knot
(makes a strong loop; used to tie
the Rope around a fixed anchor).





















Dressed

Water Knot

(Ring Bend)

A Workhorse Knot
(Used for tying rope and webbing together;
Especially good for tying rope or
webbing of dissimilar sizes).

Water Knot (Ring Bend) Tying:

- Tie a loose overhand knot in the end of the strap.
- Thread the other strap in the reverse direction following the exact path of the first overhand knot.
- Pull the knot tight.

Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys

A close-up photograph of a woven strap, likely made of nylon or polyester, featuring a red and blue color scheme. The strap is knotted in the center, with a red section on the left and a blue section on the right. A red loop is attached to the blue section, extending upwards and to the right. The background is a plain, light-colored surface.

Use Arrow Keys

A red and blue braided rope is shown against a white background. The rope is tied in a knot, with the blue section forming the main body of the knot and the red section forming the loops. The text "Use Arrow Keys" is overlaid in the bottom left corner.

Use Arrow Keys



Use Arrow Keys

A close-up photograph of a red and blue woven strap tied in a knot. The strap is made of a woven material, likely nylon or polyester, and is shown against a plain white background. The knot is a reef knot (square knot), which is a common nautical knot. The red and blue colors are clearly visible and distinct. The text "Use Arrow Keys" is overlaid in the bottom left corner.

Use Arrow Keys



Use Arrow Keys



Use Arrow Keys

Double Overhand Bend (Grapevine Bend)

The Double Fisherman's (Grapevine Bend) is the way to join two ends of a line to form a Prusik Loop and is also an excellent and reliable way of joining two climbing ropes.

Double Fisherman's, or Grapevine Bend, Knot Tying:

Overlap the two ends. Wrap one end around both ropes two full turns. Then pass this end back through these turns and pull tight. Next pass the other end two full turns around both ropes. Pass this end back through and pull tight. Pull on both ropes to tighten the two knots against each other.



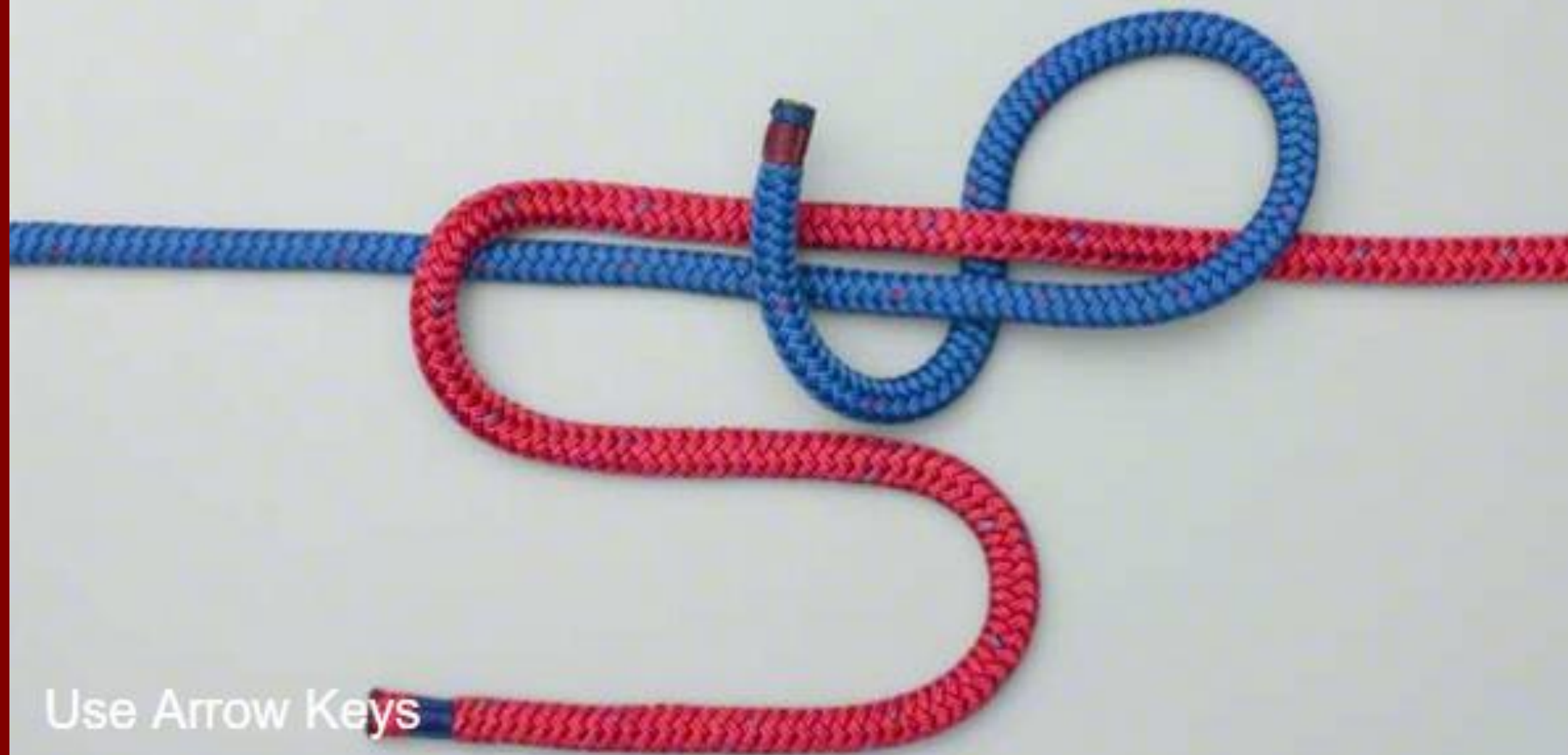
Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys







Use Arrow Keys





Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



The Back View of the Double Fisherman's is extremely neat and symmetrical. When ropes of the same color are used, it appears that four identical loops encircle the junction.

Butterfly (Loop)

(Lineman's Loop)

What is now known as the Alpine Butterfly provides a secure loop in the middle of a piece of rope. Load can be safely applied: from the loop to either end of the rope; between the two ends with the loop hanging free; or to the loop with the load spread between the two ends.

Alpine Butterfly Loop (Lineman's Loop) Tying:

Wrap the rope around your hand twice. At the end of turn one, position the rope close to your fingertips. Continue around and complete turn two back near your 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.



Use Arrow Keys

A close-up photograph of a person's hand holding a blue rope. The rope is looped around the index and middle fingers. A small red arrow key is visible on the rope. The background is a plain white surface.

Use Arrow Keys

A close-up photograph of a person's hand holding a blue rope with a red and white braid pattern. The rope is looped around the index and middle fingers, with the thumb and ring finger also visible. The background is a plain, light-colored surface. The text "Use Arrow Keys" is overlaid in the bottom left corner.

Use Arrow Keys



Use Arrow Keys

A close-up photograph of a person's open palm facing upwards. A blue rope with a white and red braided pattern is held across the hand. The rope forms a loop that passes over the index, middle, and ring fingers, then crosses itself over the palm, and finally passes under the thumb. The background is a plain, light-colored surface.

Use Arrow Keys

A close-up photograph of a person's open palm holding a blue rope. The rope is looped around the fingers in a specific sequence: it goes around the index finger, then the middle finger, then the ring finger, and finally the pinky finger. The rope crosses itself multiple times, creating a complex pattern. The background is a plain, light-colored surface.

Use Arrow Keys

A close-up photograph of a person's open palm holding a blue braided rope. The rope is looped and crossed in a specific pattern: it starts from the bottom left, goes up and over the index finger, then crosses itself to go under the middle finger, then loops around the ring finger, and finally crosses to go under the pinky finger before extending to the right. The rope has a distinct blue and white woven texture with small red flecks. The background is a plain, light-colored surface.

Use Arrow Keys

A close-up photograph of a person's open palm holding a blue rope. The rope is looped around the fingers in a specific pattern: it goes around the index finger, then the middle finger, then the ring finger, and finally the pinky finger. The rope crosses itself in the center of the palm. The background is a plain, light-colored surface. The entire image is framed by a red border.

Use Arrow Keys

A blue rope with a woven texture and small red flecks is tied in a reef knot (square knot) on a white background. The knot is symmetrical and features four distinct loops. The rope extends from the bottom left and bottom right corners of the frame.

Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys

Prusik Knot (Hitch)

The knot requires a "Prusik Loop". Its principal use is allowing a rope to be climbed - ascending or "*Prusiking*". Two Prusik loops are alternately slid up the static rope: a long Prusik loop reaches the climber's foot – to allow leg power for ascending, and a second short Prusik loop is attached to the harness – to allow sitting.

Prusik Knot (Triple Sliding Hitch) Tying:

Use a piece of cord formed into a loop. Pass the knot around the rope three times inside the loop. Make sure the turns lie neatly beside each other and pull the knot tight.

Use Arrow Keys





Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys



Use Arrow Keys

Practice your knots until you can
tie them in the dark (blindfolded)
... you may have to.

Climb Safely !!!