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Knot Basics

A knot is a *bond* formed by tying a rope to itself, to another rope, or to an object. Knots are used for general purposes by nearly everyone and in special situations by many groups including campers, truckers, sailors, and climbers.

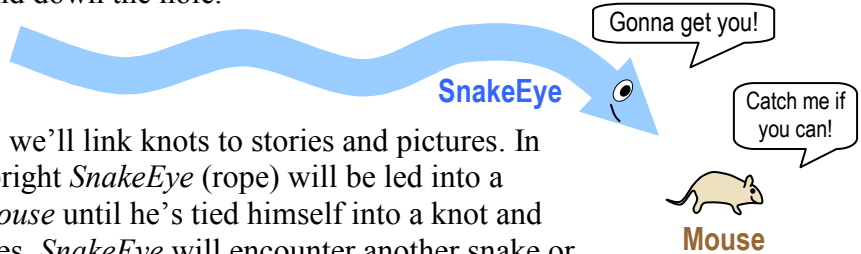
Tying a knot properly can be a challenge. A slight variation here or there can render a knot useless or in danger of slipping. And it's not always obvious which knot to use for a given situation.

It's also tough to describe how to tie a knot. Try explaining to children how to tie their shoelaces—*without* showing them. Similarly, written instructions can be hard to follow. They're not always clear and terminology differs. Even accompanying diagrams may be confusing.

Naturally, it's easier to *watch* a knot being tied. But if the video or animation is poorly done, or goes too quickly, you're still likely to be bewildered.

Fortunately, there's a way to make knots easier to learn *and* remember. Perhaps the most-easily recalled, seldom-tied knot is the *bowline*. Why? Because it's linked to a visual story: "Make a hole. The rabbit comes up the hole, around the tree, and down the hole."

We remember stories and pictures!



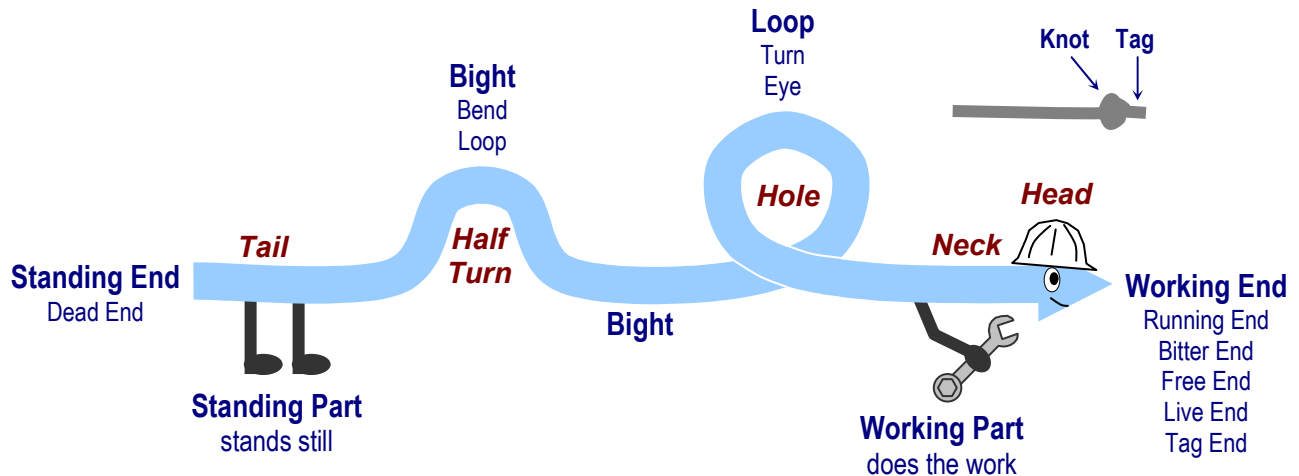
So, in the following series of lessons, we'll link knots to stories and pictures. In some cases, the friendly but not too bright *SnakeEye* (rope) will be led into a series of turns by his clever buddy *Mouse* until he's tied himself into a knot and can't continue the chase. In other cases, *SnakeEye* will encounter another snake or an object. But sometimes he'll simply contort his body to show off his flexibility. In this lesson, we'll examine *SnakeEye's* many shapes and capabilities.

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Rope Terminology vs. Snake Anatomy

SnakeEye is labeled below with **Standard / alternate** rope terminology. It's good to know these official terms so that you can understand knot-tying instructions you find elsewhere. But rope terminology can be ambiguous. For example: a *bight* can refer to a curve in the rope or simply to the middle part of the rope; a *bend* can refer to a loop or to the joining of two ropes. And so on.

Therefore, in these knot-tying lessons, we'll generally use simpler **snake anatomy**.



Knot Elements & Categories

To form knots, we'll use 5 elementary building blocks: TH-TH-W (Thu-Thu-Wed)
To help decide which knots to use when, we'll group them in 5 categories: SHL-JB (shil-job).

5 Elements

[TH-TH-W]

1. Turns
2. Holes
3. Twists
4. Hitches
5. Wraps

Turns create Holes, Twists, Hitches, & Wraps as you'll see on the following pages.

5 Categories [SHL-JB]

1. Stoppers

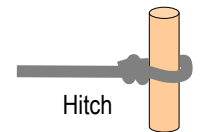
Purpose: Stop rope from slipping through something.
Examples: Overhand knot, Multifold Overhand, Figure 8.



Stopper

2. Hitches

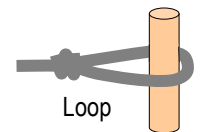
Purpose: Attach rope *tightly* to something.
Examples: Half hitch, Clove hitch, Cow hitch, Tautline hitch.



Hitch

3. Loops

Purpose: Attach rope *loosely* to something.
Examples: Bowline, Double Loop Bowline, Butterfly knot.



Loop

4. Joiners

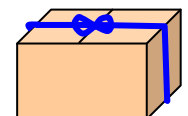
Purpose: Join ropes together. (Rope term: Bend)
Examples: Sheet bend, True Lover's knot, Splice.



Joiner

5. Binders

Purpose: Bind things together.
Examples: Square knot, Constrictor knot, whipping, lashing.

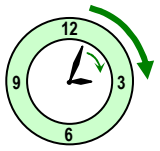


Binder

Individual knots will be shown in subsequent lessons.

Turns

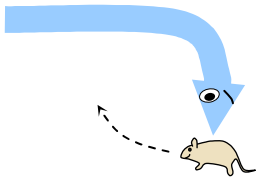
SnakeEye makes *turns* to pursue the elusive Mouse.



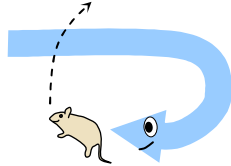
Clockwise Turns

To Do: Get some rope and match SnakeEye's path as he chases Mouse.

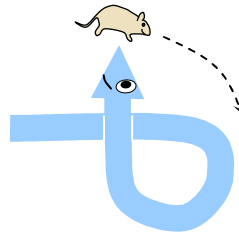
Coming from left



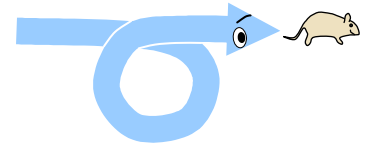
1/4 Turn (90°)



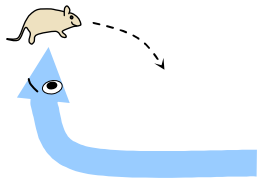
Half Turn (180°)



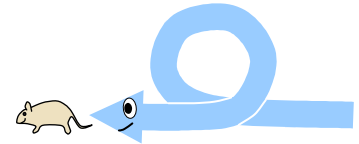
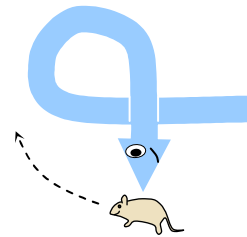
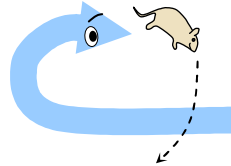
3/4 Turn (270°)



Whole Turn (360°)

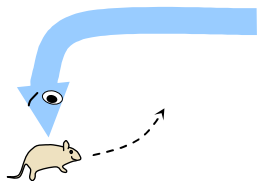


Coming from right

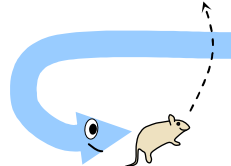


Counterclockwise Turns

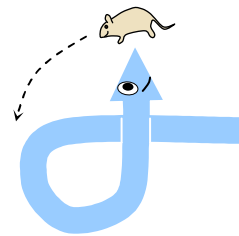
Coming from right



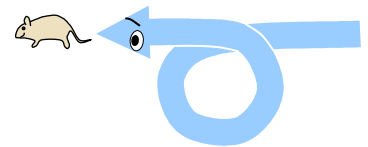
1/4 Turn (90°)



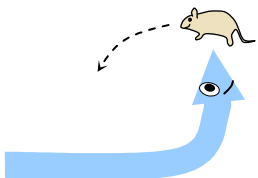
Half Turn (180°)



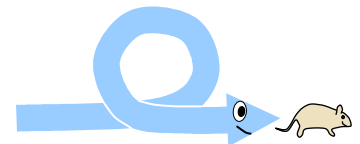
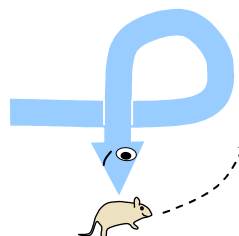
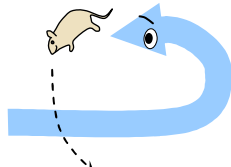
3/4 Turn (270°)



Whole Turn (360°)



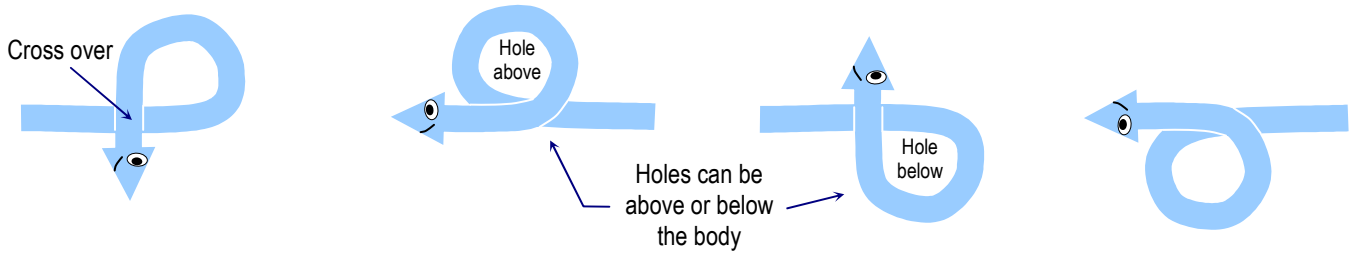
Coming from left



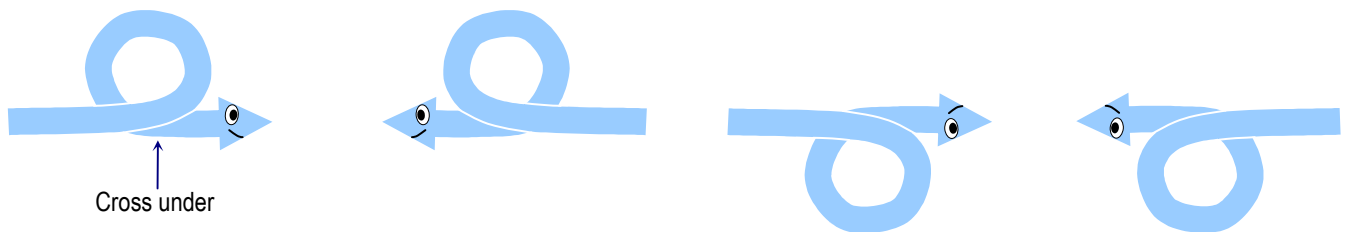
Holes

When SnakeEye makes a $3/4$ or *Whole Turn*, he crosses his body, which forms a Hole.

Overholes: SnakeEye crosses *over* his body [Rope term: Overhand loop]

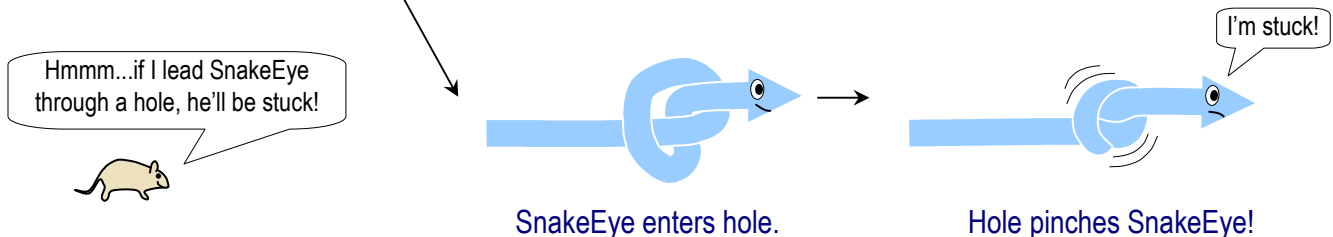
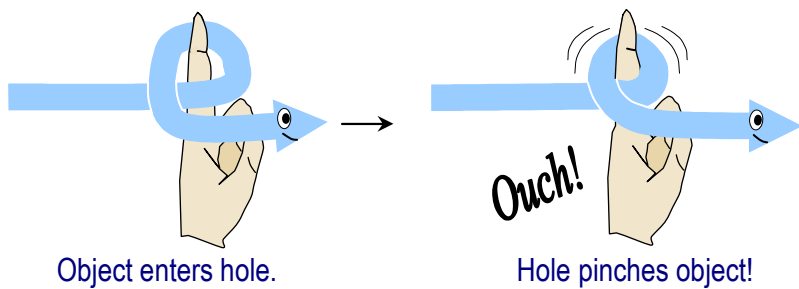
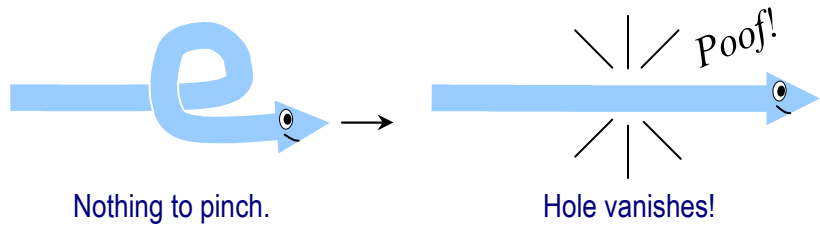
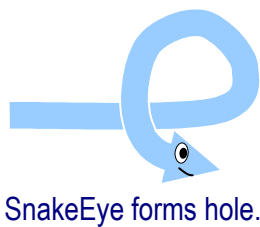


Underholes: SnakeEye crosses *under* his body [Rope term: Underhand loop]



Pinching Holes

To make most knots, holes must have something to “pinch,” either an object or the rope itself.

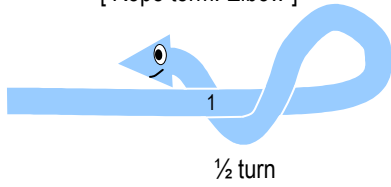


Twists

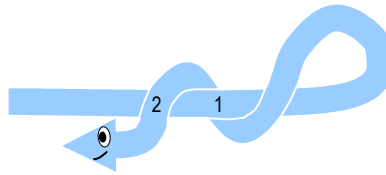
When SnakeEye makes *Half Turns* around his body, he creates Twists.

Outside Twists: Out of hole

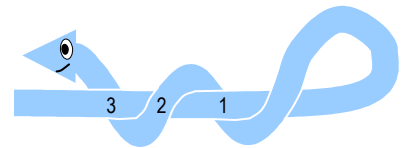
Single Twist
[Rope term: Elbow]



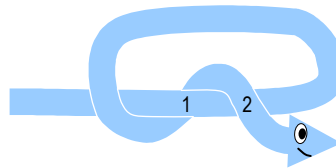
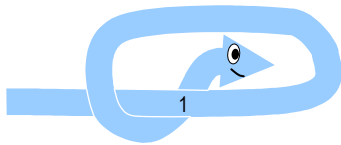
Double Twist



Triple Twist



Inside Twists: Into hole

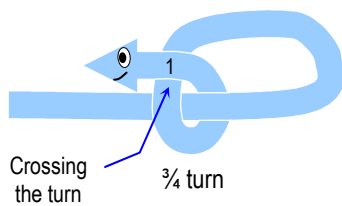


Hitches

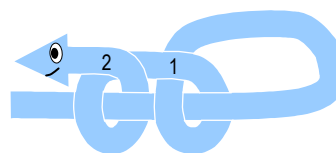
When SnakeEye makes *3/4 Turns* around his body, then crosses the turn, he creates Hitches.

Outside Hitches: Out of hole

Single Hitch
[Rope term: Half hitch]

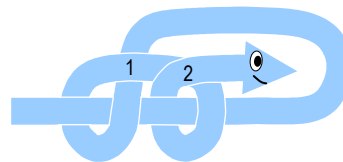
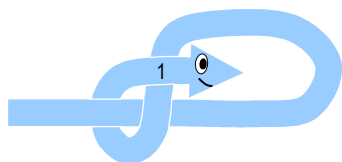


Double Hitch
[Rope term: Double Half hitch]



Observe that hitches also make **holes** around SnakeEye's body

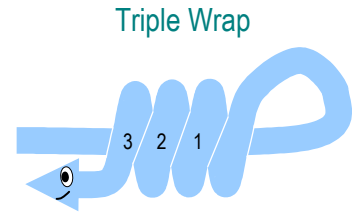
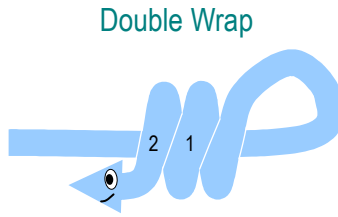
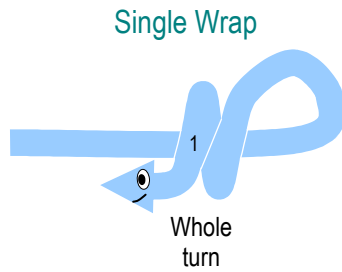
Inside Hitches: Into hole



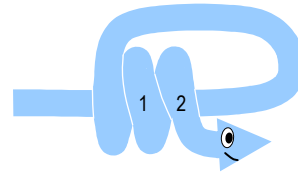
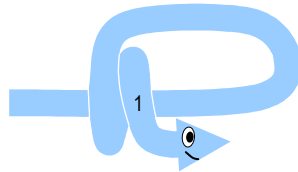
Wraps

When SnakeEye makes *Whole Turns* around his body, he creates Wraps.

Outside Wraps: Out of hole



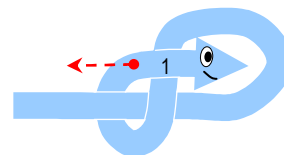
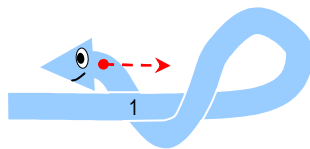
Inside Wraps: Into hole



Wraps make
holes
around
SnakeEye's
body

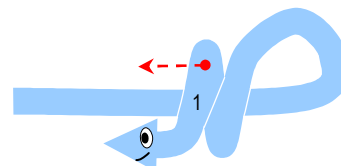
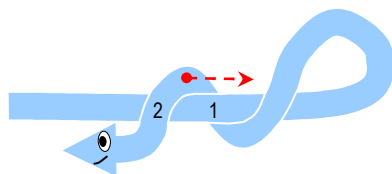
Transformations

Some rope shapes can be transformed into other shapes.



Bringing a Twist back on
itself makes a Hitch.

Undoing a Hitch
makes a Twist.

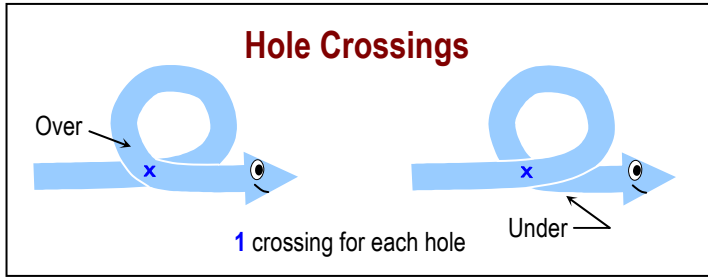


Pushing a Double Twist
together makes a Single Wrap.

Undoing a Single Wrap
makes a Double Twist.

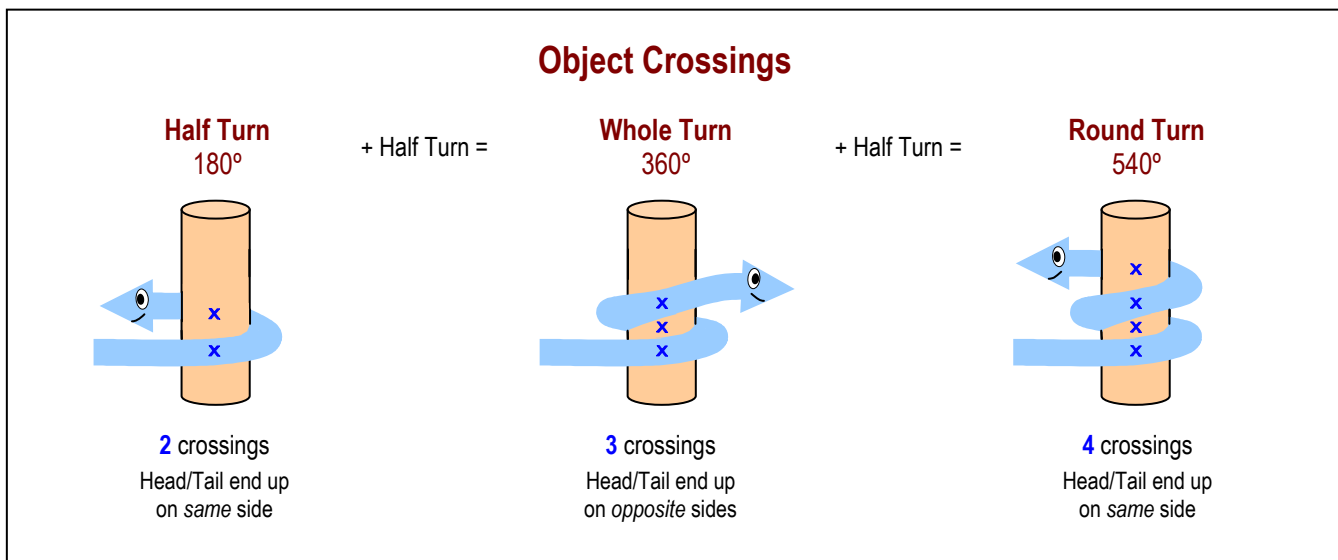
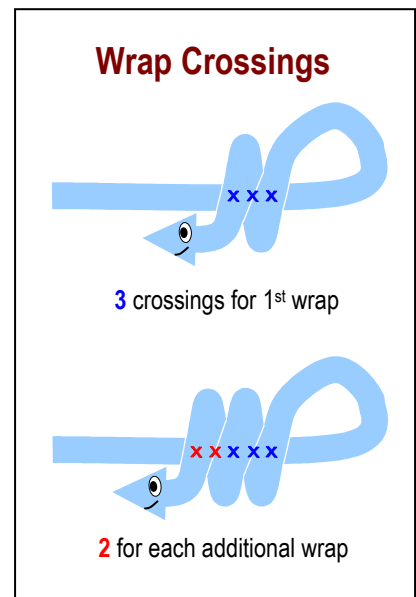
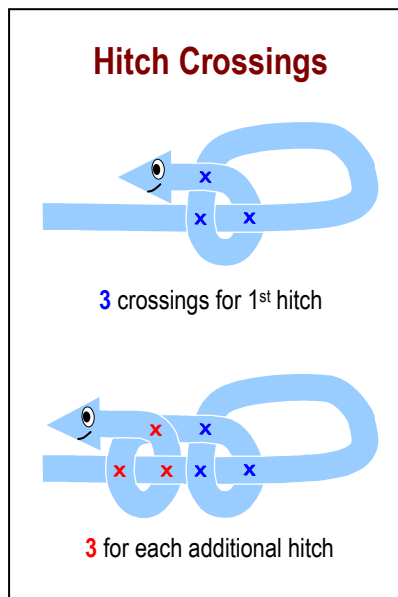
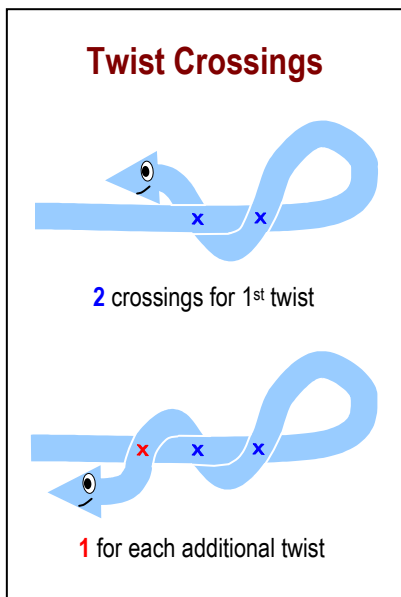
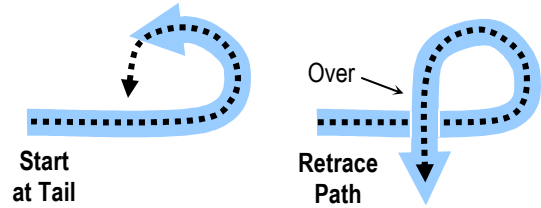
Crossings

Crossings occur when SnakeEye crawls *over* or *under* his body or an object.

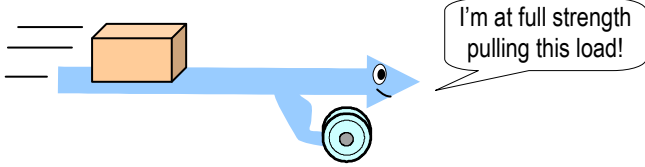


Over or Under?

To determine whether an existing crossing is over or under his body, *mentally* retrace SnakeEye's path starting from his TAIL.

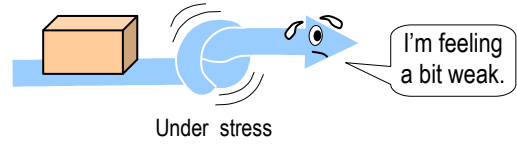


Knot Strength



A straight rope has 100% strength because all its fibers are lined up and bear a load equally. However, putting a knot in a rope can reduce its strength as much as 50%.

When a rope turns to form a knot, the fibers on the outside are stretched while the fibers on the inside are compressed. This produces unequal stress which weakens the rope and can cause friction and heat under load.



Every crossing produces a point of contact where friction can occur. This can lead to failure when the knot is under a fluctuating load, for example, a boat tied to a dock as the tide ebbs and flows.

Dressing A Knot



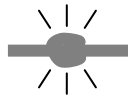
Undressed

To maximize the strength of a knot and prevent it from coming unraveled or binding improperly, it's important to "dress" or align its parts to minimize stress and friction.



Dressed

Jamming & Capsizing



Knots that have a tendency to tighten or "jam" under load or when wet can be very difficult to untie.



Knots that unravel or "capsize" under load are dangerous. Some knots can be purposely capsized to untie them.

Your Turn



Match each knot shape with its picture.

1) ___ Half Turn

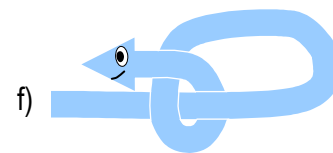
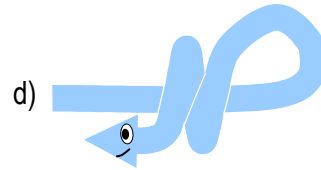
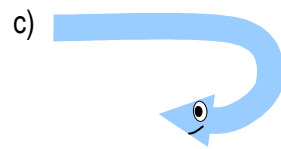
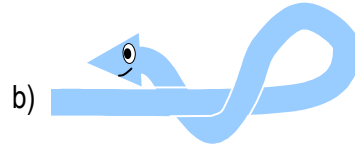
2) ___ Overhole

3) ___ Underhole

4) ___ Twist

5) ___ Hitch

6) ___ Wrap



True or False

7) _____ To decide if a Crossing is over or under, retrace the path from the *tail*.

8) _____ In a Whole Turn (360°), the head and tail end up on the *same* side.

9) _____ Hitches and Wraps also form holes around the rope body.

10) _____ Knots add strength to a rope.

Match each knot category with its picture.

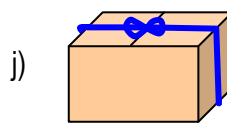
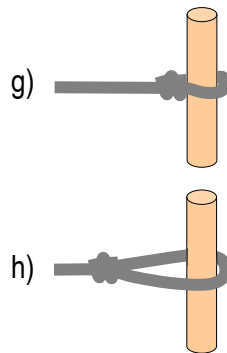
11) ___ Stoppers

12) ___ Hitches

13) ___ Loops

14) ___ Binders

15) ___ Joiners



Knot Links

Animated Knots by Grog
www.animatedknots.com

Wikipedia – Knots
<http://en.wikipedia.org/wiki/Knot>

Answers: 1c, 2a, 3e, 4b, 5f, 6d, 7T, 8F, 9T, 10F, 11k, 12g, 13h, 14j, 15i