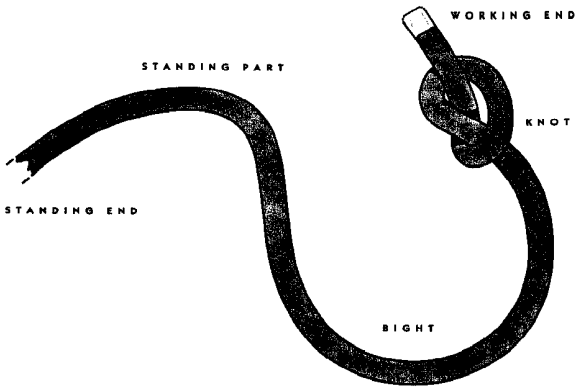
STEAMBOAT SPRINGS
FIRE DEPARTMENT

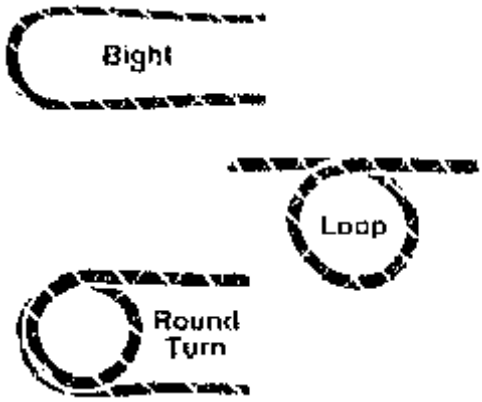
TRAINING BULLETIN
ROPE 1
March, 1999

KNOTS AND HITCHES[1]

NOMENCLATURE

Hitch	A temporary method of securing an object, fastened so it can be readily undone (i.e., Half Hitch)
Bend	Tying of the ends of two ropes to make a continuous rope
Knot	Tying of the parts of one or more ropes so that they will not slip
Bight	Formed by making a bend in the rope
Loop	Side of bight crossed over or under standing part.
Round Turn	End of rope continued around top of loop until running and working ends are parallel.
Working End	The part of the rope which is used in tying the knot
Standing Part	The unused portion of the rope





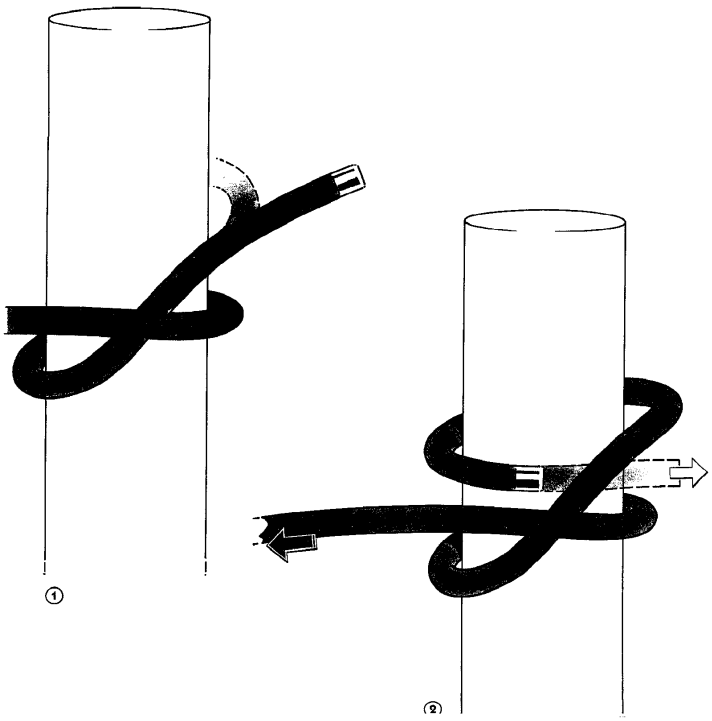
REQUIRED KNOTS / HITCHES

1/2 Hitch
Clove Hitch
Munter Hitch
Family of 8's
Water knot
Double Fisherman's Knot (Prusik)
Fisherman's Knot (as safety)

[1] Portions adapted from CMC Rope Rescue Technician, January, 1997.

CLOVE HITCH

Use: Used for temporarily securing the end of a rope. Also used for attaching to and hauling equipment.
Advantages: No major advantages.
Disadvantages: Not totally secure. Should be replaced with other knot if used for any length of time.
Tying: See diagram.



MUNTER HITCH

Use: Used to replace a figure 8 descender or other friction device.
Tying: See diagram.

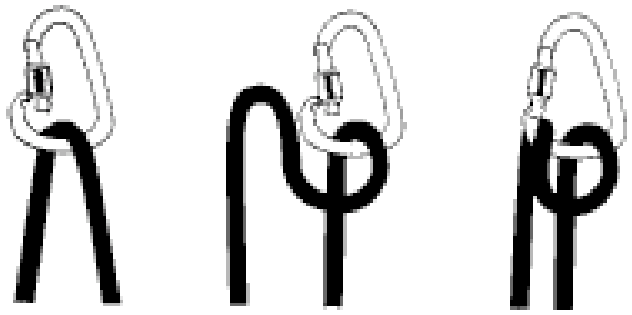


FIGURE 8 KNOT

Use: Knot is typically tied in end of line. Used for stopper and as basis for many variations.
Advantages: Strong.
Tying: Upper loop around the standing part, and the lower loop around the working end. See diagram.

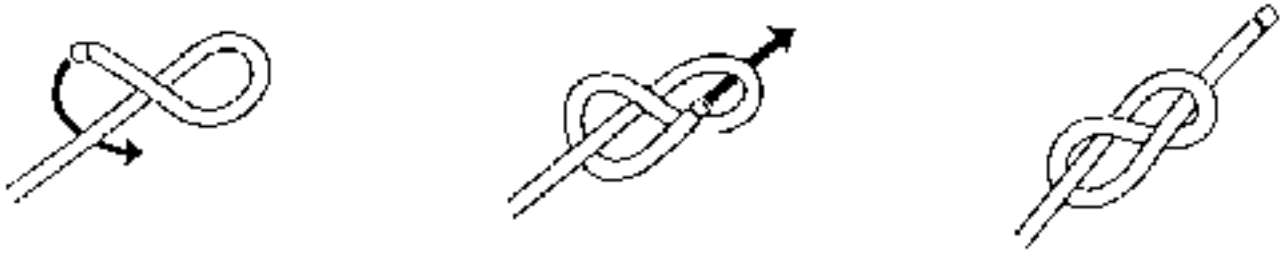


FIGURE 8 FOLLOW-THROUGH

Use: Typically used to create loop in end in line after wrapping around object like attaching to harness.
Advantages: Strong.
Disadvantages: No major disadvantages, but it does take time to properly dress the knot.
Tying: See diagram.

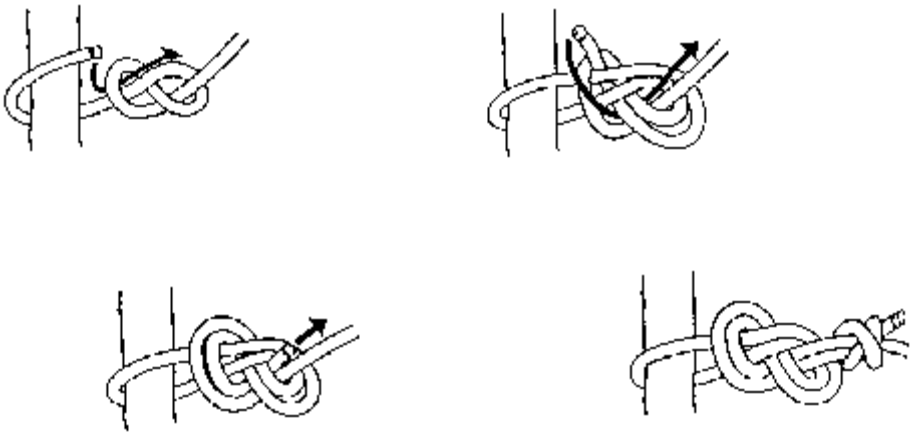


FIGURE 8 ON A BIGHT

Use: Used for creating loop in end of line for attaching to object or person. May be used anywhere on a line.
Advantages: Strong. Simple to tie. Stays secure even with stiff rope.
Disadvantages: Difficult to adjust and untie after loading.
Tying: See diagram.

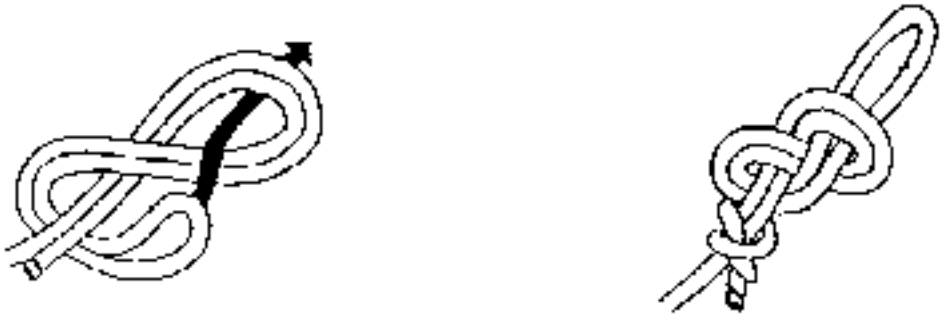
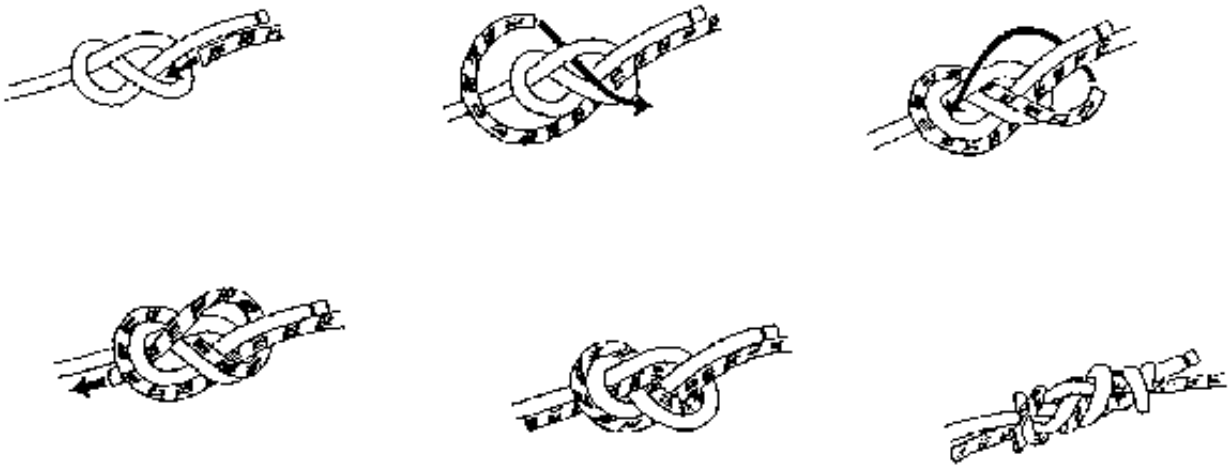


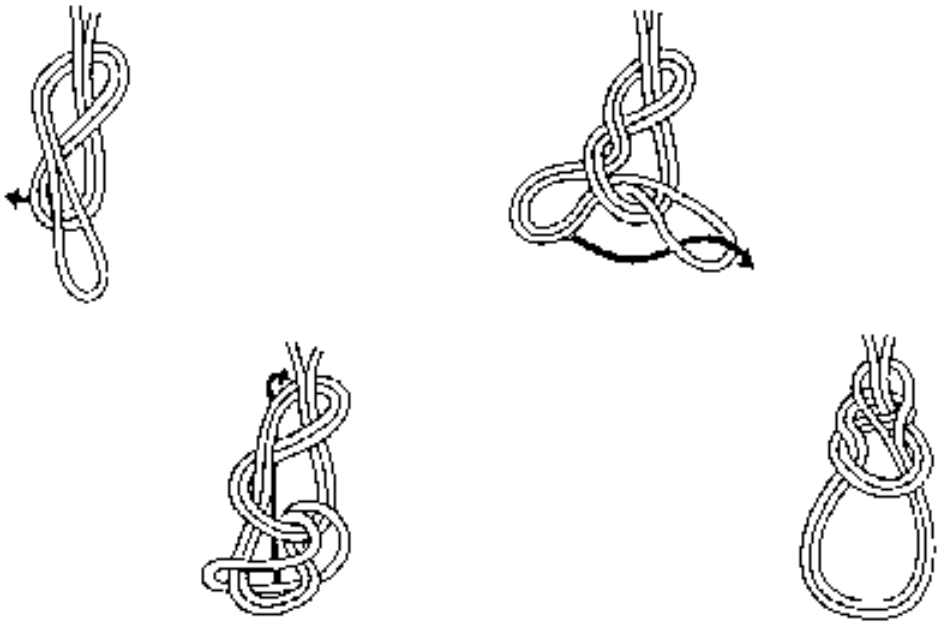
FIGURE 8 BEND

Use: Used to attach two equal pieces of rope together.
Advantages: Strong.
Disadvantages: No major disadvantages.
Tying: Tie figure 8 in end of rope. Take other rope end and follow back through existing knot. Be sure to leave adequate ends for creating backup (safety) knots. See diagram.



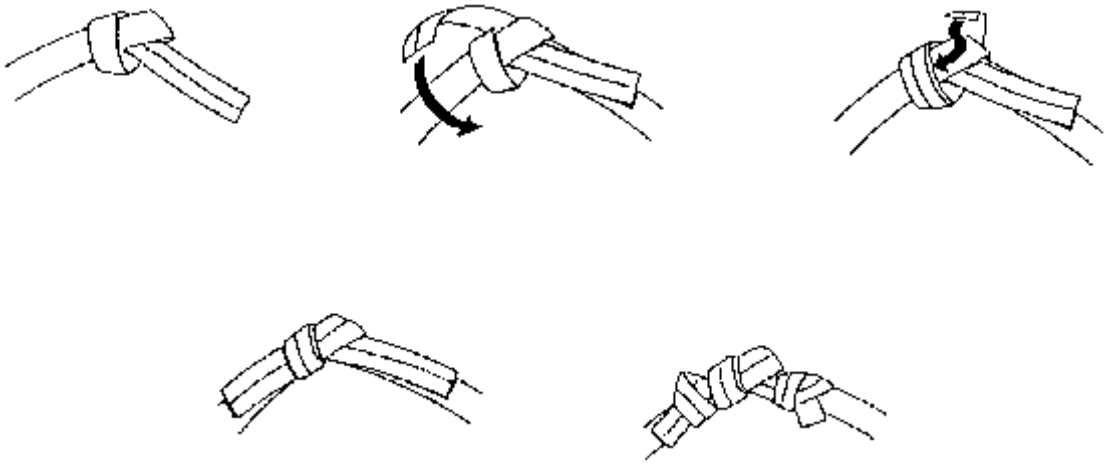
DOUBLE FIGURE 8 or RESCUE 8

Use: Used for attaching to and hauling equipment.
Advantages: Increased strength from splitting load between two loops.
Disadvantages: No major disadvantages, but it does require more practice than other figure 8 knots.
Tying: See diagram.



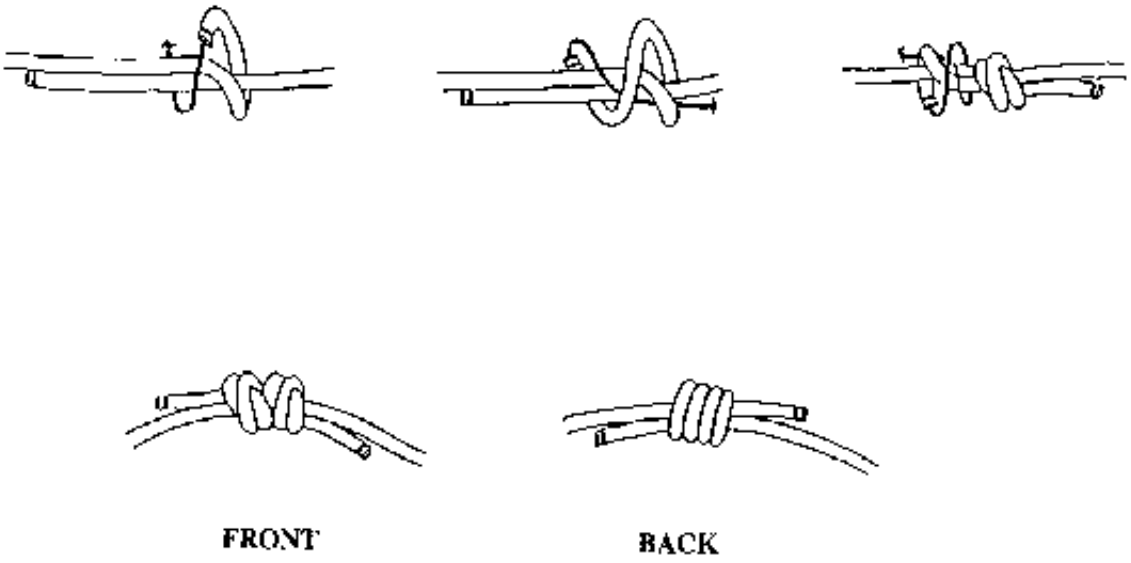
WATER KNOT

Use: To tie two lengths of webbing together or one piece into a loop.
Tying: See diagram. Pull hard to set knot. Ends need to be long enough to allow for overhand knots to be used as safety.



DOUBLE FISHERMAN'S KNOT

Use: Used for joining ropes of equal diameter or for creating slings. The single fisherman's knot is used as a safety knot
Advantages: Does not slip, come loose or jam. Can be easily untied, even when under tension.
Disadvantages: If tied with stiff rope, it could possibly work loose.
Tying: See diagram.



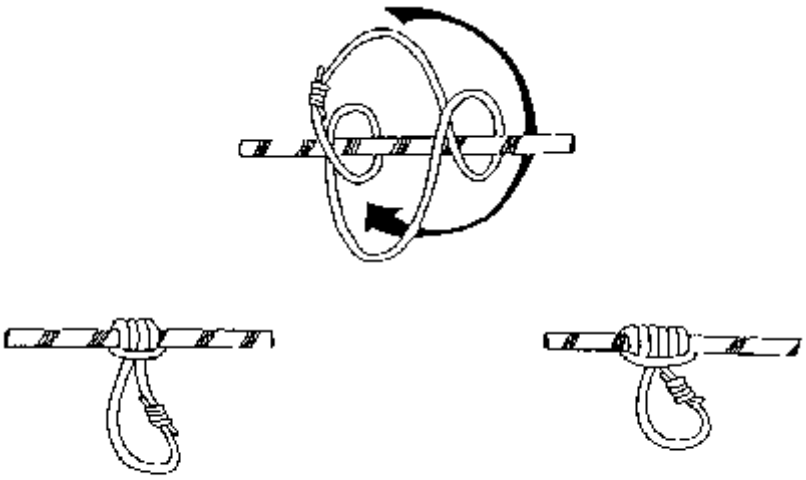
PRUSIK KNOT

Use: Used to attach slings to a rope so that they slide smoothly when the knot is loose but hold firm when a side load is imposed. Although the knot does not always slide easily, once the load is in place it can be released by removing weight and freeing the coils in the sling. A three wrap prusik is preferred for rescue systems.

Advantages: Easily attach slings to a rope to be used for breaks or climbing devices.

Disadvantages: May slip if rope is wet or icy.

Tying: See diagram.



TWO WRAP PRUSIK THREE WRAP PRUSIK

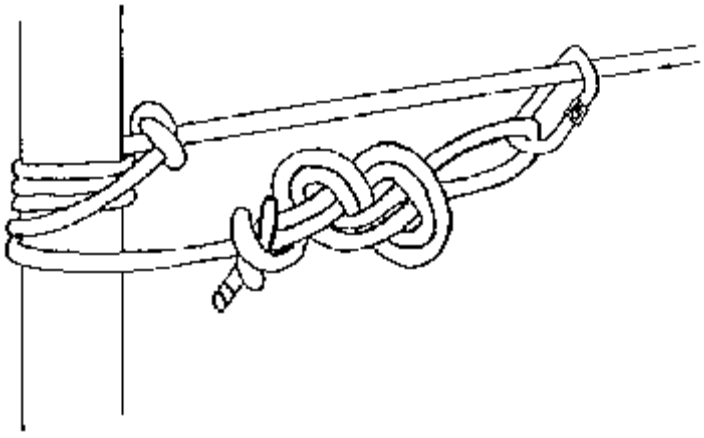
HIGH STRENGTH TIE-OFF

Use: Allows user to tie off the end of a rope without the strength reducing effects of a knot. This tie-off's ability to hold depends on number of wraps as well as the strength and friction of anchor used (usually a tree or post).

Advantages: Typically no strength loss as with knots.

Disadvantages: No major disadvantages.

Tying: Wrap around an anchor several times (anchor should be round versus square). To finish, tie an overhand knot back onto main line then a figure 8 loop in the end and clip loop around the rope. See diagram.

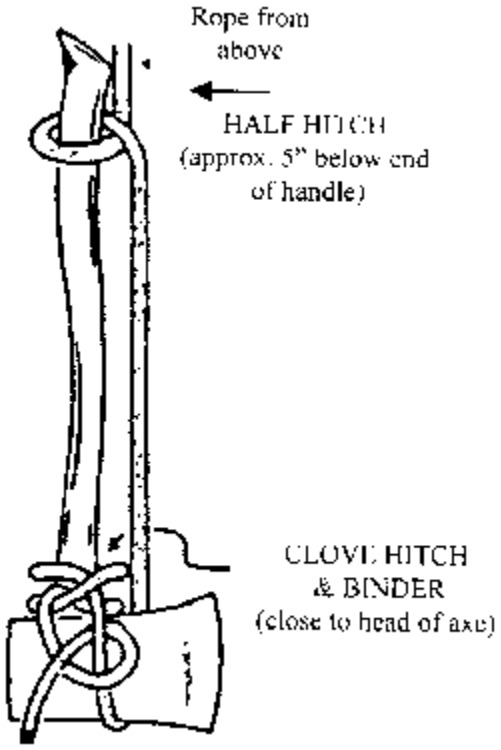


HITCHES USED TO HOIST AND LOWER TOOLS AND EQUIPMENT

AXE

Tie a clove hitch and safety on handle close to blade. Bring working end of rope around blade and up to handle end. Tie a half hitch on handle.

The axe is hoisted and lowered in the vertical position with the handle up.



HALLIGAN TOOL

Tie a clove hitch and safety on halligan tool close to fork. Bring working end of rope through fork and up to adz end. Tie half hitch under adz end.

Halligan tool is hoisted and lowered in the vertical position with hook up.

Tie a clove hitch and safety on handle. Bring working end of rope up and tie a half hitch under hook.

The hook is hoisted and lowered with the hook end up.