

# Commack Fire Department

## CFD Probationary Firefighter Basic Lesson Plan

### Topic: Introduction to ropes and Knots

#### Class # 10

- **Level of Instruction**
  - Probationary Firefighter
- **Equipment Needed**
  - Static Kernmantle rope shorts
  - 1" Tubular webbing shorts
  - 6' hook
  - Irons
- **Resources Needed**
  - Computer/Smartboard
  - CFD Probationary manual
  - animatedknots.com
- **Terminal Objective**
  - Firefighter's will demonstrate how to properly tie all of the knots listed within the manual to 100% accuracy
- **Enabling Objectives**
  - Firefighter will learn what type of rope is used for each application
  - Firefighters will learn what each knot is called
  - Firefighters will learn how to identify which knot is needed for particular task
- **Lesson Outline:**
  - Introduction to ropes
    - Kernmantle
    - General use
    - Technical use
    - Escape
  - Terminology
    - Knot
    - Bight
    - Loop
    - Round turn
    - Working end
    - Standing end
  - Steps in tying a knot
    - Dress
    - Load
    - Safety

- Types of knots
  - Safety
    - Overhand knot
    - Barrel know
    - **Figure 8 knot \* (county knot)**
  - Loops
    - Figure 8 on a bight
    - Double loop figure 8
    - **Bowline \* (county knot)**
    - Butterfly
    - **Handcuff knot \* (county knot)**
  - Hitches
    - **Clove hitch \* (county knot)**
    - Tensionless hitch
    - Girth hitch
    - Munter hitch
  - Bends
    - Double fisherman
    - Figure 8 bend
    - Square knot
    - Water knot (webbing)

- **Summary**

- Knot tying is a perishable skill, the only way to perfect it is to practice and practice often. For the county exam you will need to perfect the *figure 8, clove hitch, bowline and handcuff knot*. While perfecting these knots will get you to pass the test they will not get everything done on the fireground. It is your responsibility to stay up on all of these knots in this lesson plan. Remember, not all rope is created equal, aside from knowing and understanding knots, it's also your responsibility to understand rope, where it can be found and the limitations they have. PRACTICE, PRACTICE, PRACTICE! For tips on how to tie any of these knots refer to [animatedknots.com](http://animatedknots.com).



# COMMACK FIRE DEPARTMENT TRAINING DIVISION



## Ropes & Knots

Knowing and understanding ropes and knots is a versatile skill that can be applied in many ways on the fireground or rescue scene. Whether it is for securing objects that create dangerous conditions, hauling tools or lifesaving efforts, ropes and knots are the key components to any of these jobs. Before actually utilizing these skills it's important to understand some terminology and ratings associated with ropes and knots. When it comes to selection it's important that you are not only using the right knot for the job but that you have the correct rope that can handle the load as well. There are many types of ropes and knots out there, not everyone is rated or specific to rescuing.

**Not all rope is created equal:** While selecting the proper knot for the task is important, it is only half of the job. The first half is ensuring that you have the correct rope that can handle the load. Throughout our rigs or even within your pockets you will find different types of rope. Not every rope you will find has the same rating, so it is important to understand a few things prior to rope selection.

There are [3 different classes of life safety rope](#) which are determined by MBS (maximum breaking strength, all of these types of ropes can be found within our department in different places. These ropes are different diameters of nylon static kernmantle rope. Nylon Static Kernmantle meets the standard for NFPA 1983 for life safety rope.

- "Static" means it has minimum stretch (less than 6%).
- "Kernmantle" describes the rope design
  - o 'KERN' or CORE holds 85% of the rope's strength
  - o 'MANTLE' or SHEATH holds the other 15% of the rope's strength.

**Technical use:** Designed for light-use loads and escape. Technical use loads are classified as 300lbs and have an MBS of 4,496 lbf (foot pounds of force)/ 20Kn. **(3/8" found on the stokes baskets and SKEDs pre-rigged as bridals)**

**General use:** Designed for general-use loads, light-use loads and escape. General use loads are classified as 600lbs and have an MBS of 8,992 lbf (foot pounds of force)/ 40 Kn. **(1/2" Static Kernmantle lifesaving rope located on 2-11-9 in rope rescue compartment in walk-in labeled "main line", "safety" or "lifeline".)**

**Escape:** Designed for immediate self-rescue of a single fire or emergency service person from a life-threatening situation. Escape loads are classified as 300 lbs. **(40' length of 7.5mm FireTech2 rope located on each interior freighter as part of their Emergency Escape System. MBS 5,732 lbf/ 25.5 Kn)**

Aside from the 3 ropes described above you will also find *search rope bags, personal search rope and work line*. **All of these ropes or any additional ropes you might find on the rig should be used exactly in the manner that they are labeled and should never be used for lifesaving efforts.** While many of these ropes are rated static kernmantle rope that fall into one of the three classes described above, their intended function is for something else, meaning its care and maintenance might not be up to the standard of lifesaving rope.

**Terminology:** These are some of the different terminologies you will hear associated with knots.

**Knot-** Fastening made by tying together pieces of rope

**Bight-** U-shaped bend in a rope: the open loop in a rope formed when it is doubled back on itself

**Loop-** Turn in a rope that crosses itself to create a closed loop

**Round-turn-** Full wrap of rope around an object so that both ends emerge from the same side

**Working end-** Portion of the rope used to make all of the bends, AKA. "running" or "loose" end

**Standing end-** Portion of the rope that is stationary when tying a knot

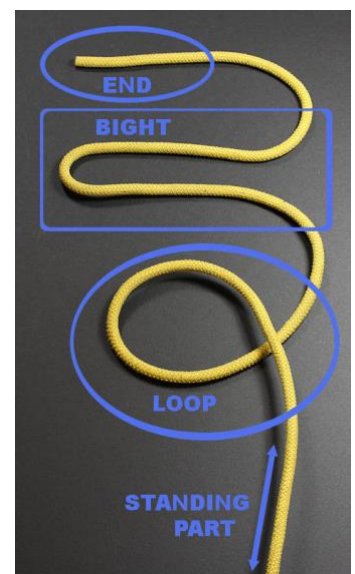
**Steps in knot tying:** Get in the habit of saying in your head **"DRESS, LOAD, SAFETY"**.

**1-Dress:** Keeping the ropes free of twists- with legs running side by side

**2-Load:** Once tied, the knot should be pulled tight to avoid accidental movement when line is loaded.

**TEST LOAD BEFORE LIFE LOADING!**

**3-Safety:** Refers to securing any loose ends. Loose ends (tails) should be secured using another knot (a safety knot)

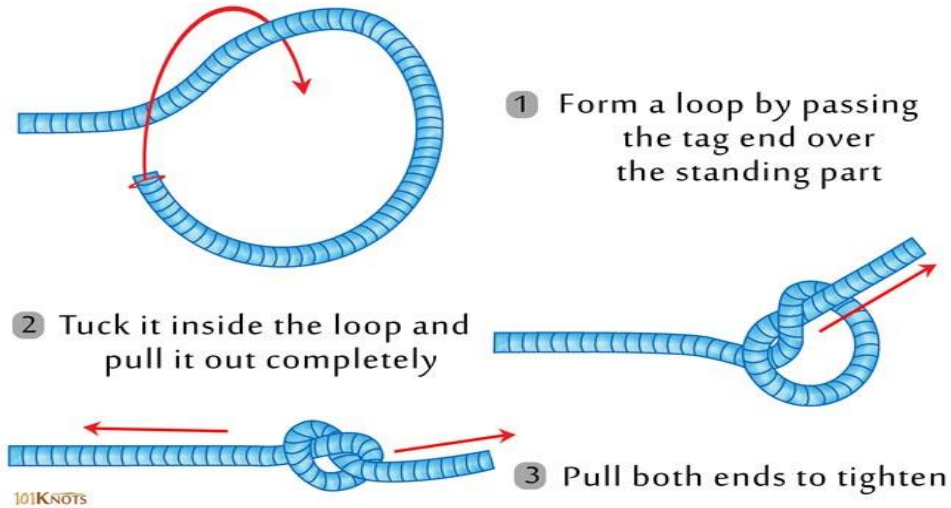


**Types of knots:** There are 4 types of knots that we are going to be referring to: Safety, Loops, Hitches and Bends.

**1-Safety-**Secures loose ends or stops rope from moving through a device.

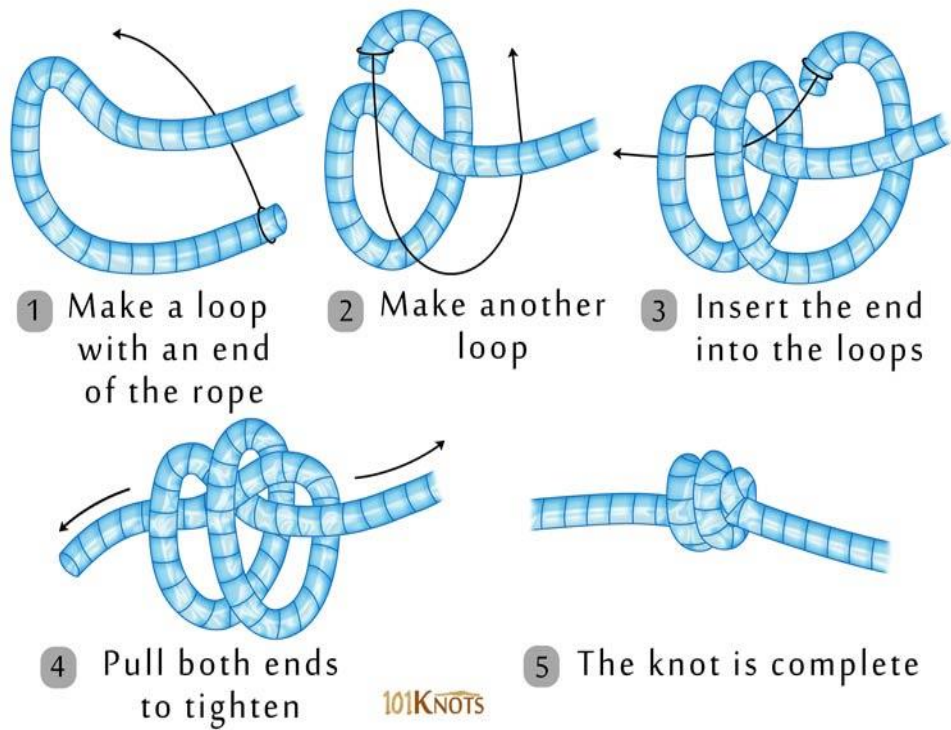
**Overhand Knot:** Used as a safety knot to secure loose ends.

## Overhand Knot Instructions



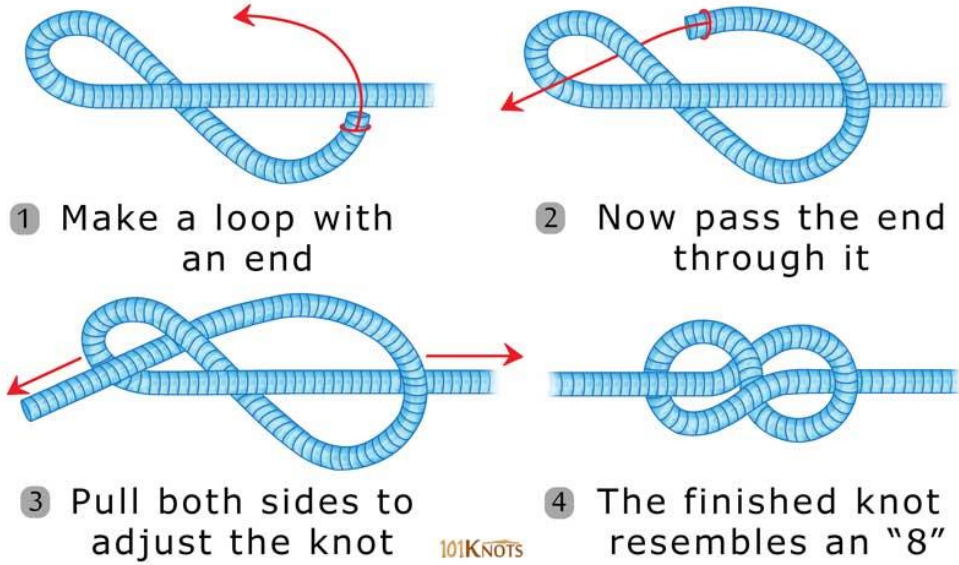
**Barrel Knot:** Used as a safety knot to secure loose ends primarily on hitches.

## Barrel Knot Instructions



**Figure-8 stopper knot\*:** Used to stop rope end from moving through a device.

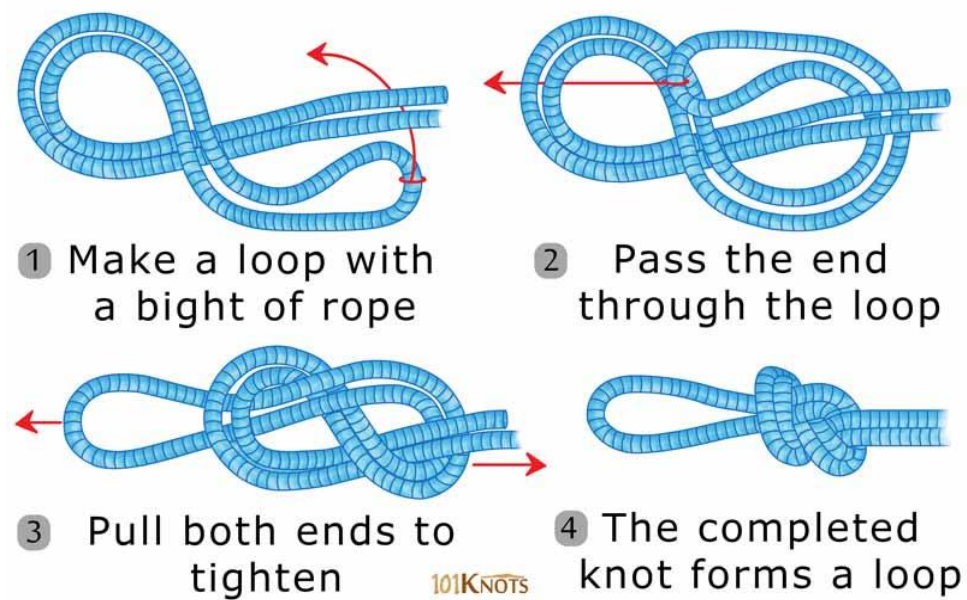
## Figure 8 Knot Instructions



**2- Loops-** Any knot that creates a closed loop for attachment

**Figure 8 on a bight:** Anchor knot that creates a single loop that will not slip. It can be attached to components of a rescue system with carabiners.

## Figure 8 on a Bight Instructions



Double loop figure 8: Anchor knot that provides more load-bearing surface area due to its two-loop configuration.

## Tying a Double Figure 8 Knot

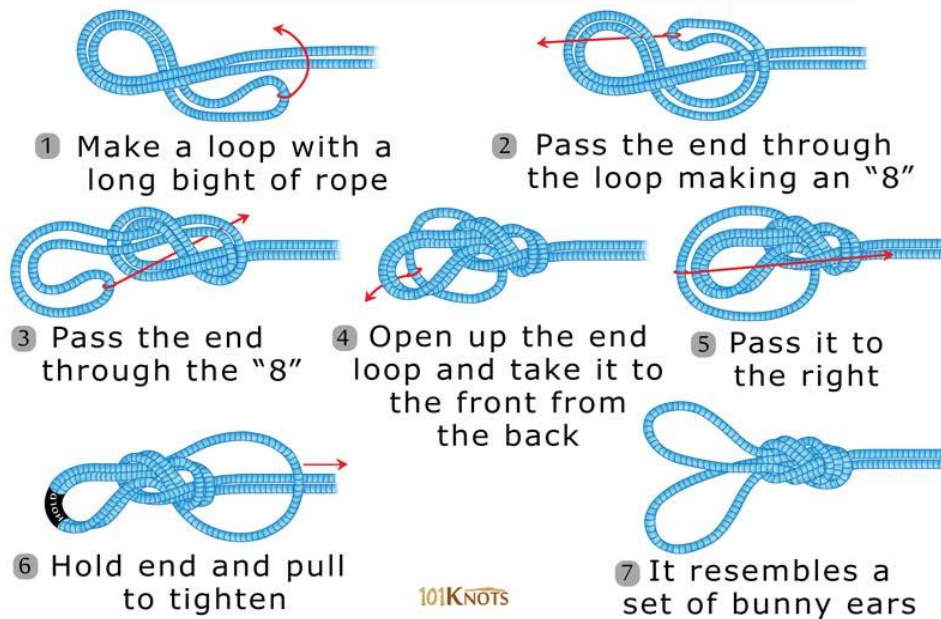
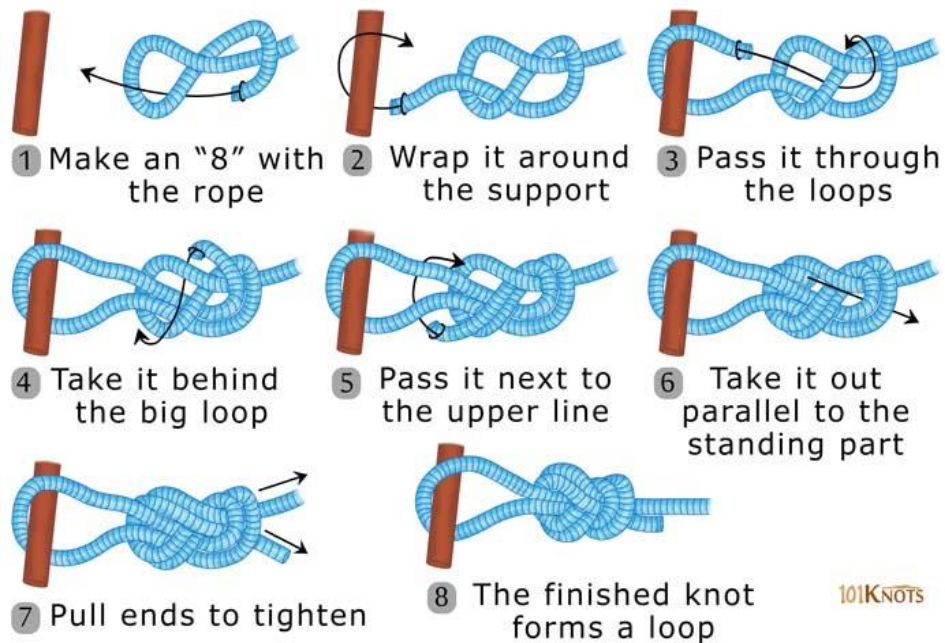


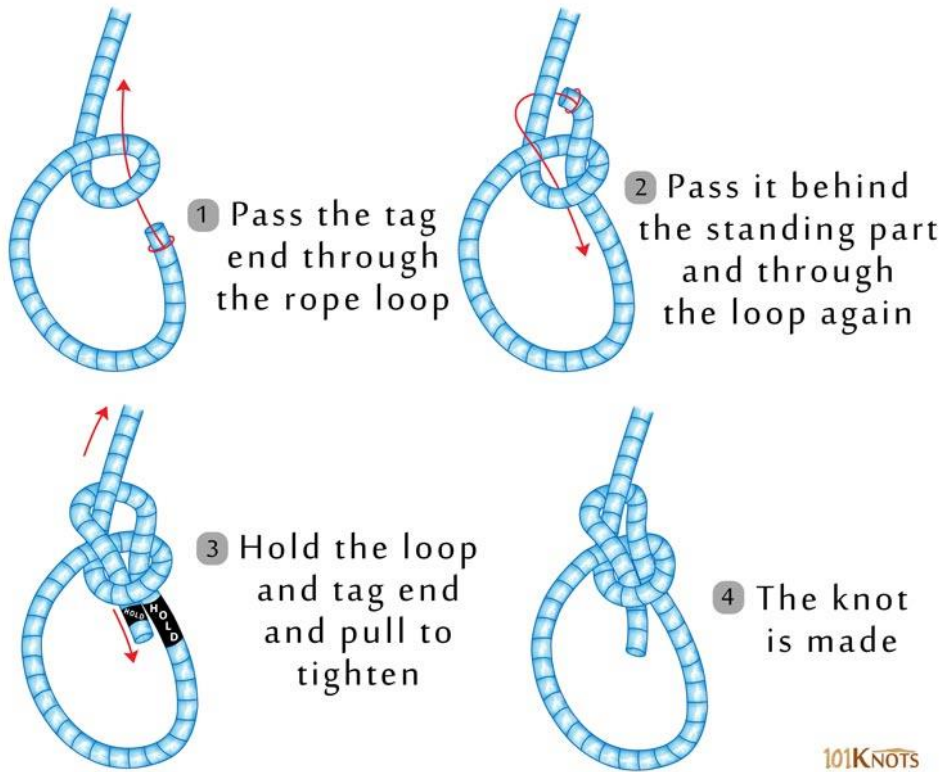
Figure-8 follow through: Anchor knot that can be tied around and anchor or a "closed end" object.

## Figure 8 Follow Through Tying Steps



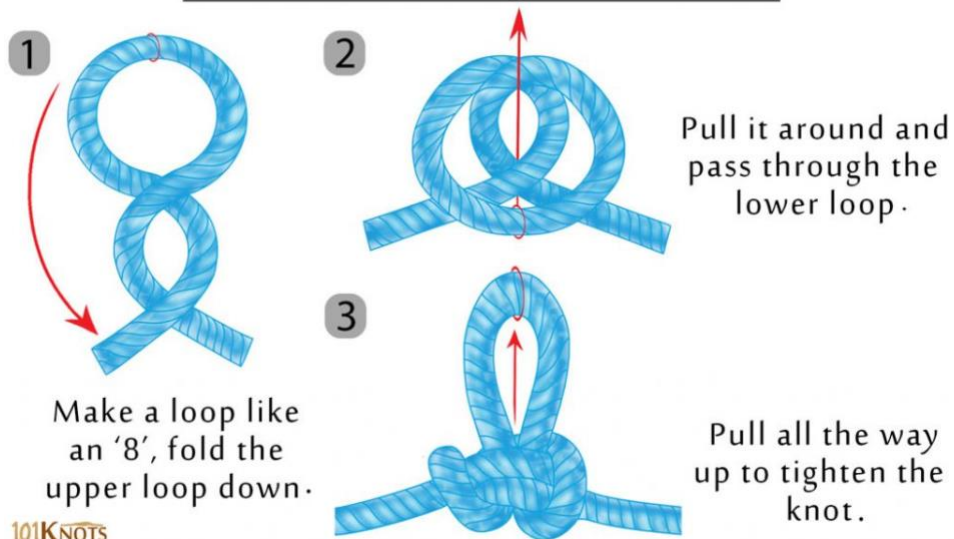
**Bowline knot\***: Anchor knot tied around a substantial object.

## Bowline Knot Directions



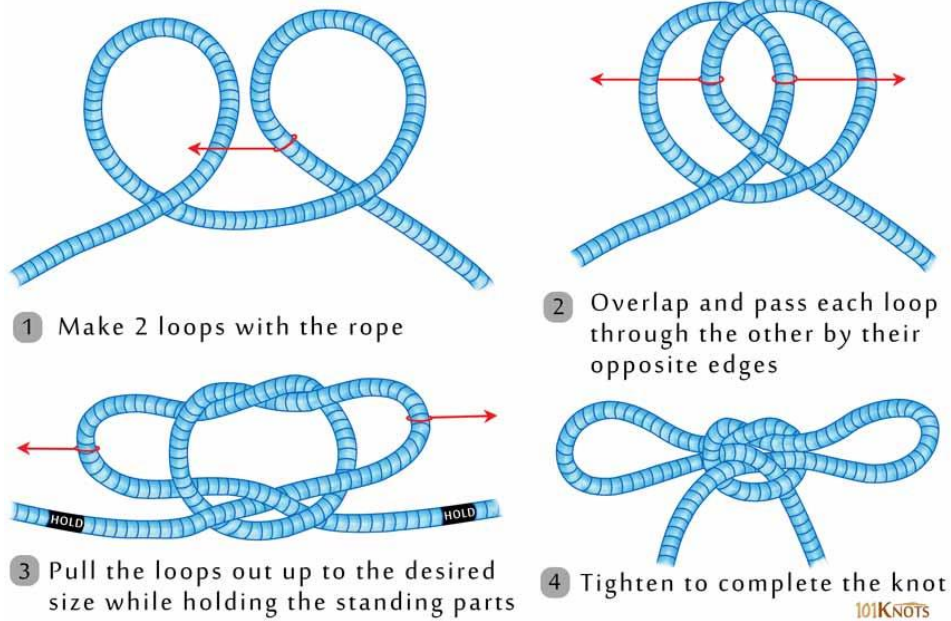
**Butterfly knot**: Bridle knot that provides a mid-line attachment point and it designed to take a 3-directional pull.

## Butterfly Knot



**Handcuff Knot\*:** two loops secured at the center to form a makeshift handcuff, it is often practiced for firefighter/victim removal by utilizing the handcuff knot around ankles or wrists in order to drag the downed victim.

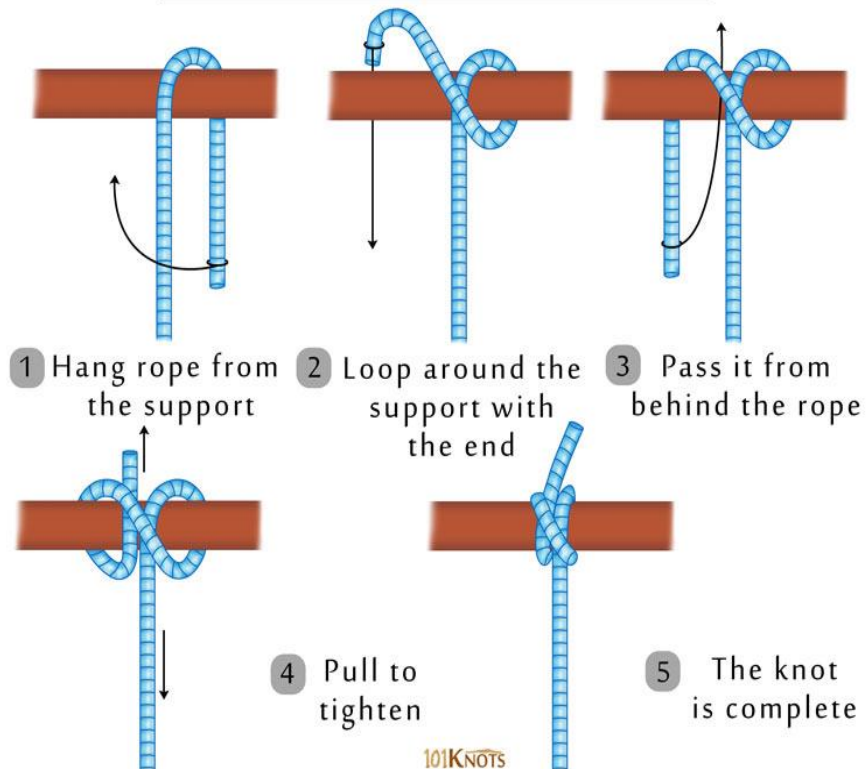
## Handcuff Knot Step By Step



**3- Hitches-** Used to attach a rope/webbing to an object. A hitch binds on a object, if the object is removed the hitch will fall apart.

**Clove hitch\*:** Adjustable anchor hitch often tied to round anchor points (can also tie with webbing).

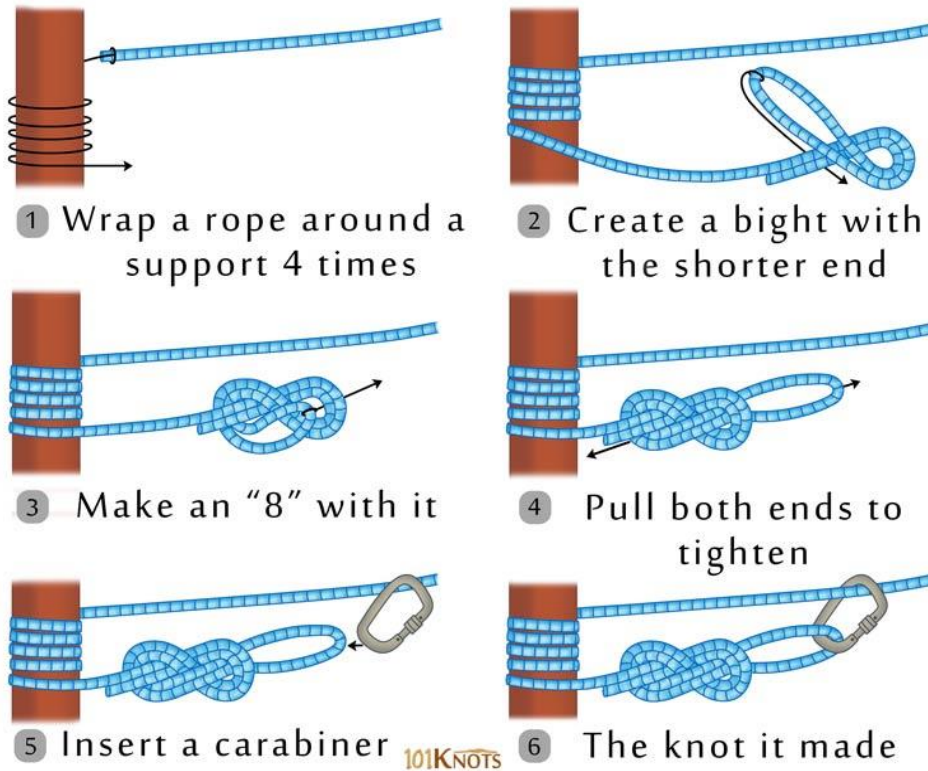
## Clove Hitch Tutorial





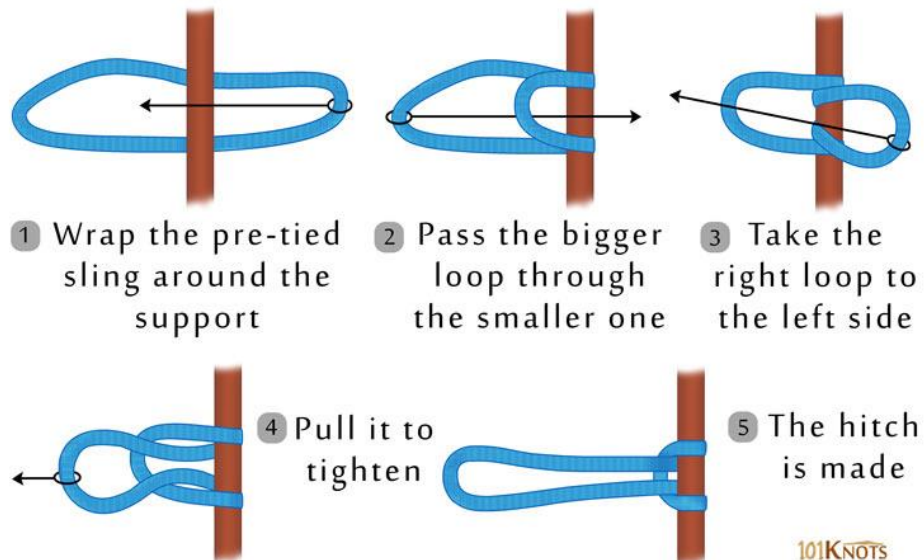
**Tensionless hitch:** Most efficient means of anchoring a rope as long as it's wrapped around a secure anchor at least 4 times the diameter of the rope (minimum of 3 wraps and finished with a knot).

## Tying a Tensionless Hitch



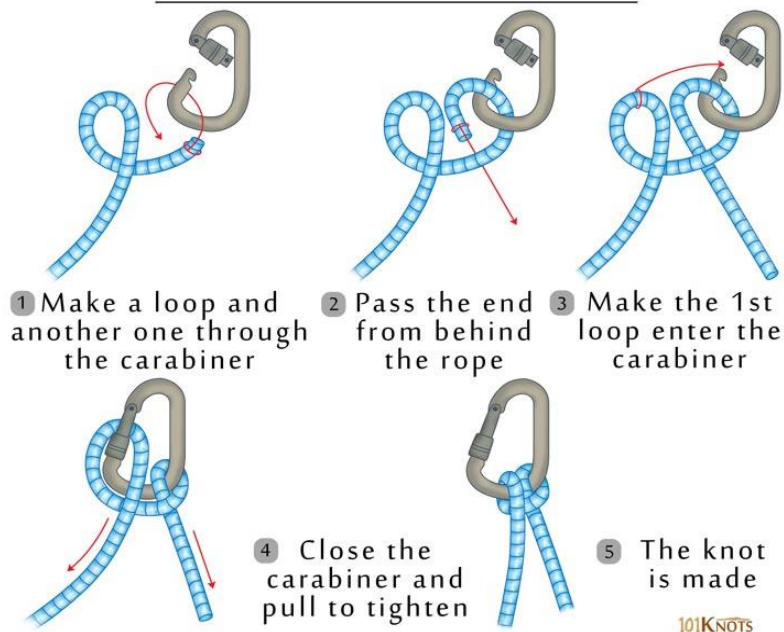
**Girth hitch:** Used to anchor rope or webbing as a "choker".

## Girth Hitch Instructions



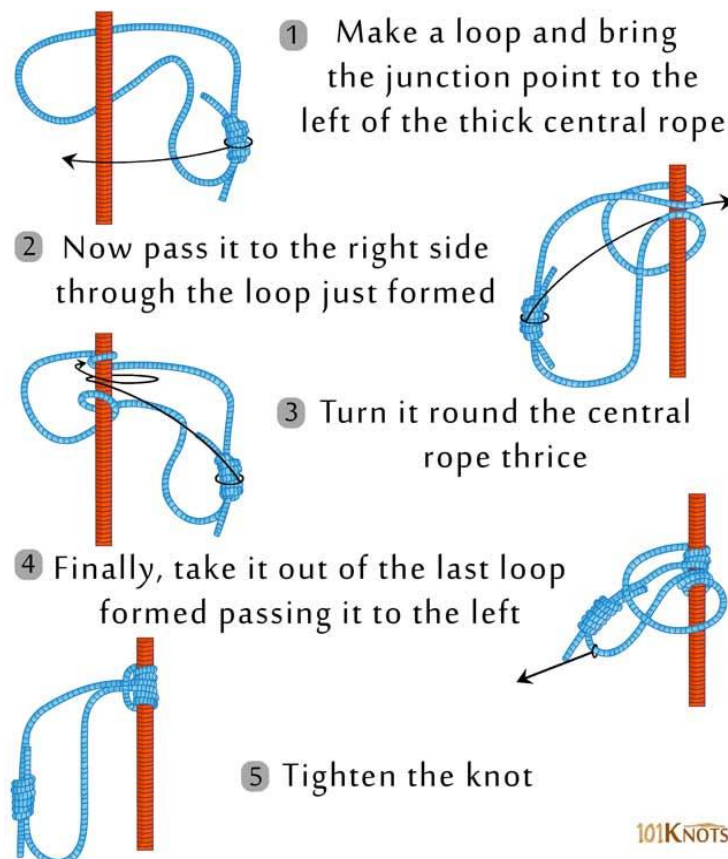
**Munter hitch:** "Belay hitch" allows belayer to catch a falling load.

## Tying a Munter Hitch



**Prusik hitch:** Smaller diameter accessory cord wrapped around a larger diameter rope, the prusik acts like a rope grab and used for hauling, ascending and self rescue.

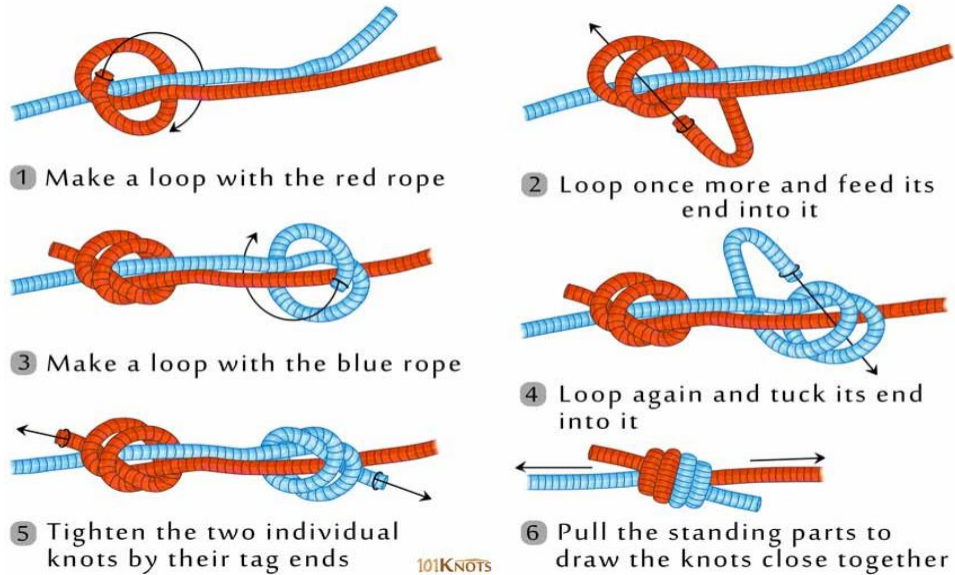
## Prusik Knot Instructions



**4- Bends-** Used to join two ropes.

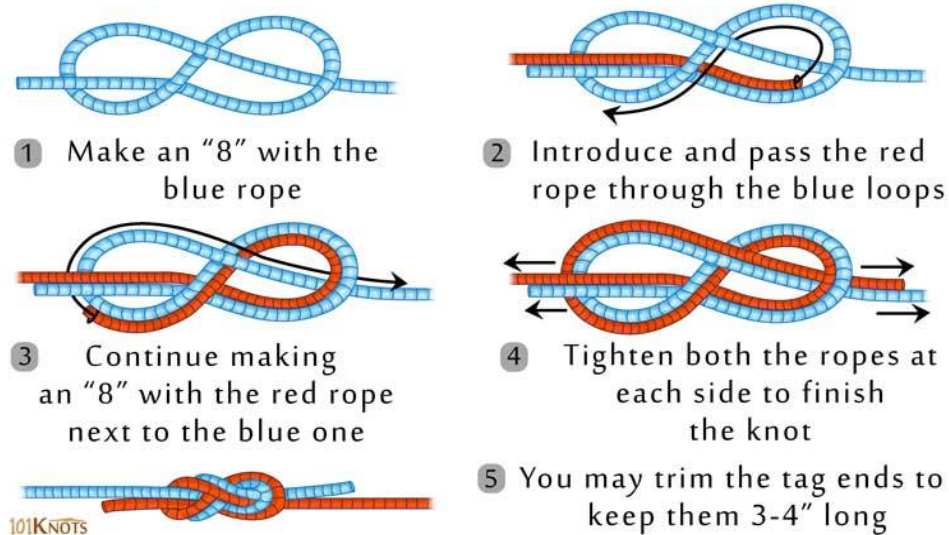
**Double fisherman:** Used to join two ropes of equal diameter together for *load-bearing applications*.

## Double Fisherman's Knot Instructions



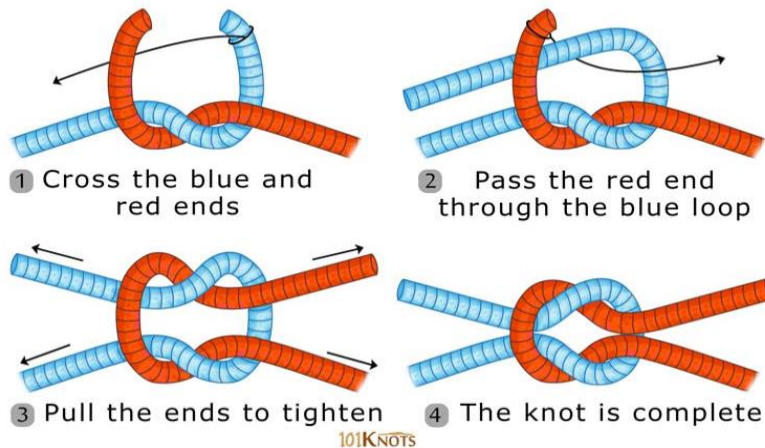
**Figure 8 bend:** Used to joining two ropes of equal diameter together for *load-bearing applications*.

## Figure 8 Bend Instructions



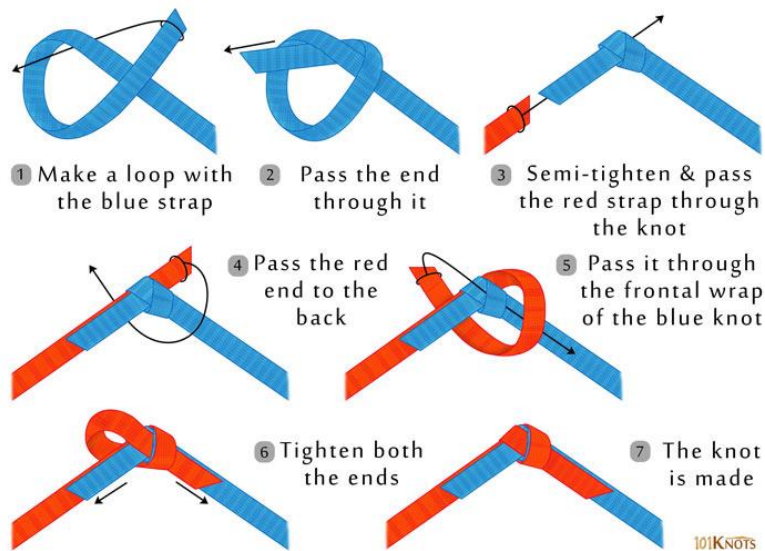
**Square knot:** Used to bind two ropes together *NOT* for load-bearing applications.

## Square (Reef) Knot Instructions



**Water knot:** Preferred method for joining two pieces of webbing together.

## Water Knot Instructions



**Summary:** Knot tying is a perishable skill, the only way to perfect it is to practice and practice often. For the county exam you will need to perfect the *figure 8*, *clove hitch*, *bowline* and *handcuff knot*. While perfecting these knots will get you to pass the test they will not get everything done on the fireground. It is your responsibility to stay up on all of these knots in this lesson plan. Remember, not all rope is created equal, aside from knowing and understanding knots, it's also your responsibility to understand rope, where it can be found and the limitations they have. PRACTICE, PRACTICE, PRACTICE! For tips on how to tie any of these knots refer to [animatedknots.com](http://animatedknots.com).



# Commack Fire Department

## Training Division



<b>Badge#</b>	<b>Name:</b>
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<b>Date</b> _ / _ / _
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### ROPES AND KNOTS

TASK	Pass	Fail	COMMENTS
<b>ROPES TERMINOLOGY</b>			
Identifies technical use rope and its application			
Identified general use rope and its application			
Identifies escape rope and its application			
Identifies the WORKING END of the rope			
Identifies the STANDING END of the rope			
Successfully demonstrates how to form a BIGHT in the rope			
Successfully demonstrates how to form a LOOP in the rope			
Successfully demonstrates how to form a ROUND TURN in the rope			
Properly verbalizes the general steps in knot tying (Dress, Load, Safety)			

TASK	Pass	Fail	COMMENTS
<b>SUCCESSFULLY TIES THE FOLLOWING SAFETY'S</b>			
Overhand knot			
Barrell knot			
Figure 8 knot			

<b>TASK</b>	<b>Pass</b>	<b>Fail</b>	<b>COMMENTS</b>
<b>SUCCESSFULLY TIES THE FOLLOWING LOOPS</b>			
Figure 8 on a Bight			
Double Loop Figure 8			
Figure 8 Follow Through			
Bowline			
Butterfly Knot			
Handcuff Knot			

<b>TASK</b>	<b>Pass</b>	<b>Fail</b>	<b>COMMENTS</b>
<b>SUCCESSFULLY TIES THE FOLLOWING HITCHES</b>			
Clove Hitch (Open)			
Clove Hitch (Closed)			
Tensionless Hitch			
Girth Hitch			
Munter Hitch			
Prusik Knot			

<b>TASK</b>	<b>Pass</b>	<b>Fail</b>	<b>COMMENTS</b>
<b>SUCCESSFULLY TIES THE FOLLOWING BENDS</b>			
Double Fisherman			
Figure 8 Bend			
Square Knot			
Water Knot			

**PASSED ALL SKILLS**

Evaluator:	Signature
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Written: 9/2022

Version #1

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