# Connecticut Fire Academy
# Recruit Firefighter Program

## Reference Materials

# Unit 10
# Firefighting Rope & Knots

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This Recruit Firefighter Program handout does not replace information found in the programs two reference books; *Jones & Bartlett's*, Fundamentals of Firefighting and Fundamentals of Technical Rescue. Additional information may be provided during deliveries of the Connecticut Fire Academy's Rescue Technician – CORE course, and/or Rescue Technician certification programs.

The information provided in this handout covers material required psycho-motor skills for attaining proficiencies at Firefighter I and Rope Technician knots and hitches. Recruits should use this material develop their skills and knowledge for Firefighter I and Rope Technician Training and Practical Skills Examinations. This handout should be retained for future reference and use during the Connecticut Fire Academy's Rescue Technician programs.

**Rescue Rope Maintenance**

Inspection:

- Inspect life safety and utility rope before and after each use.
- Look for damage to outer core. Feel for soft spots.
- Exposure of inner core fibers.
- Core can be damaged without sheath damage due to shock load.
- Excessive fuzziness in one or more spots on the rope (some fuzziness is expected under normal usage wear and tear).
- Irregularity in shape or weave of rope.
- Discoloration (excessive exposure to sunlight or chemicals).
- Foul smell.
- Abrasions and stiffness.

Rope Logs:

- Rope logs are required for each piece of life safety rope and should be maintained throughout the working life of the rope.

Cleaning:

- Follow manufacturer's guidelines for specific cleaning requirements.
- Cool water and mild liquid detergent are a good generic cleaning solution for general use but always keep in mind to rinse the rope thoroughly after each washing.

Storage:

- Can be coiled or placed in a rope bag.
- Clean dry compartment.
- Keep away from direct contact with chemicals of any type or the vapors and fumes from battery acids and hydrocarbon fuels.

**NOTE: Downgrade rope to utility status or discard it if any one or a combination of any of the above problems exists. The 2002 ASTM F1740-96 can be used as a reference for rope inspections and determination for removal from service as a life safety rope.**

**Cautions on Rope Use**

**Sheath Abrasion Damage** - Take special care to protect your rope from abrasion. Sheath damage is the most common cause of early rope retirement. This damage occurs most often when your rope comes into contact with rough or sharp edges of equipment. Man-made structures, such as buildings or towers, also pose a high risk for damaging or cutting ropes due to the probability of sharp objects. Rope will be severely damaged if subjected to rough surfaces or sharp edges.

Pulleys must be free to rotate and should be of proper size to avoid excessive wear. Rope grabs, ascenders and similar devices will damage and weaken the rope and should be used with extreme caution.

Always use a rope pad between the rope and surfaces with which the rope may come in contact. Improperly padded or unpadded ropes are subject to excessive or premature abrasion and failure. Avoid stepping on your rope and do not drag rope over rough ground - Besides the potential of cutting, stepping on a rope will grind dirt into the core which will cause internal abrasion. A ground cloth should be used to keep the rope from being in direct contact with dirt or grit. Keep your rope clean - Dirt or grit will shorten the life of your rope by increasing internal and external abrasion.

Wash your rope occasionally in cold water with small amounts of mild soap only. Rinse the rope in several baths of clean cold water to remove soap. Agitate the rope while in the water bath to aid in the removal of soap residue. A fabric softener used in the proper proportion to the amount of wash water may be used. Rinse thoroughly after the fabric softening solution is applied. The rope must be air dried by loosely coiling and hanging in the shade away from direct sunlight or other heat sources.

**DO NOT USE BLEACH OR BLEACH SUBSTITUTES! DO NOT DRY ROPE IN A DRYER!**

**Open Flame and High Temperatures** - Do not expose any rope to flame or high temperature as it will melt or burn causing failure. Carry and store the rope so it is protected against flame and high temperatures. The melting point of Type 6 nylon is 419 to 430 degrees Fahrenheit. The melting point of polyester is 500 degrees Fahrenheit.

**Accidental Dynamic Loading** - Working load limits are not applicable when rope is subject to significant dynamic loading.

Whenever a load is picked up, stopped, moved, or swung, there is an increased force due to dynamic loading. The more rapidly or suddenly such actions occur, the greater this increase force will be. In extreme cases, the force put on the rope may be two, three, or even more times the normal load involved. If an accidental dynamic loading does occur the rope must be retired and destroyed.

**Exceeding Working Load Limit** - Do not overload rope.

Exceeding the Working Load Limit (WLL) of a rope can cause permanent damage to a rope. This damage may not be apparent to the naked eye. Ropes that have been overloaded should be retired. Always use proper rappelling and belaying techniques – Fast rappels, bounding or swinging, positioning the rope over a sharp edge, dynamically loading a low elongation/static rope are some example of uses which damage your rope and/or cause failure. Any belay or rappel device puts sharp bends in a rope and will contribute to potential abrasion your rope receives. Avoid worn out belay devices as they have the potential to cut your rope. Fast rappels will cause excessive heat from friction that will damage your rope. This heat will melt the sheath fiber causing a glazing or stiffening effect, which dramatically shortens the life of your rope. Always take care to rappel and lower loads slowly and in control at all times.

**Chemical Contamination** - Protect your rope from exposure to harsh chemicals. Exposure to chemicals will cause failure that can result in injury or death. DO NOT allow your rope to come into contact with any compounds containing acids or alkalis, oxidizing agents, phenol or bleaching compounds. Be especially careful to avoid contact with battery acid.

Knots are an important part of the rope system. It is vital for firefighters to be able to tie knots correctly and maintain proficiency in knot tying. Knots include bends, bights and hitches.

Firefighter and Rescue knots should have the following qualities:

- Easy to tie
- Easy to identify
- Once tied correctly, they remain tied
- They have the required strength for the task
- They have minimal effect on the rope strength

## Knots, Bends & Hitches

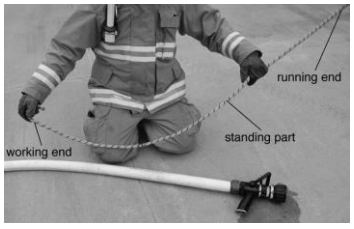
Knots, bends and hitches are prescribed ways of fastening lengths of rope or webbing to objects to each other. Rescuers should know how to tie at least nine basic knots and how to apply them.

- Hitches, such as the clove hitch and Prusik hitch are used to attach a rope around an object or another rope. A hitch is defined by the rope being tied around an object such that when the object is removed, the knot will come undone.
- Knots, such as the figure eight or bowline, are organized methods of fastening rope to an object itself.
- Bends, such as the figure eight bend and water knot, are used to join two ropes and webbing, respectively, together.
- Safety knots, such as the overhand knot, are used to secure the ends of rope to prevent them from coming untied.

## Terminology

Specific terminology is used to refer to the parts of rope in describing how to tie knots.

- The Working End is the part of the rope used for forming the knot.
- The Running End is the part of the rope used to for lifting or hoisting a load.
- The Standing Part is the rope between the working end and the running end.




- A Bight is formed by reversing the direction of the rope to form a U-bend with two parallel ends.
- A Loop is formed by making a circle in the rope.
- A Round Turn is formed by making a loop and then bringing the ends of the rope parallel to each other.


Bight


Loop


Round Turn

## Dressing Knots

A knot should be properly "dressed" by tightening and removing twists, kinks and slack from the rope. The finished knot should be firmly fixed in position. The configuration of a properly dressed knot should be evident so that it can be easily inspected. All loose ends should be secured by safety knots to ensure that the primary knot cannot be released accidentally.

Note: The curriculum for Rescue Technician may not require that all knots be backed up. The Recruit Firefighter Program requires that all firefighting knots shall be backed up with additional overhand knots formed with the tail of the firefighting or rescue knot. In these instances, a longer tail will need to be left once the rescue knot is tied, dressed, and set to provide enough material to tie the back- up knots.

## Overhand Safety Knot *Require Firefighter Knowledge*

A safety knot is used to secure the remaining working end of the rope or webbing to the standing part of the rope, also referred to as an overhand, stopper or keeper knot. It provides a degree of safety by securing the loose working end of the rope and prevents that end of the rope from slipping back through knot and untying. The safety knot should be tied approximately 1 inch from the finished primary knot.

Take the loose end of the rope, beyond the knot, and form a loop around the standing part of the rope.

Pass the loose end of the rope through the loop.

Tighten the safety knot by pulling on both ends at the same time.

Test whether you have tied a safety knot correctly by sliding it on the standing part of the rope. A correctly tied rope will slide.

**Firefighting Hitches** *Require Firefighter Knowledge*

Hitches are knots that are formed when the rope is wrapped around an object. They are used to secure the working end of the rope to a solid object.

**Half Hitch** *Require Firefighter Knowledge*

A half hitch is a stabilizing knot used to secure tied tools, equipment or an object.

Grab the rope with your palm facing away from you.

Rotate your hand so your palm is facing you. This will make a loop in the rope.

Pass the loop over the end of the object.

Finish the half-hitch knot by positioning it and pulling tight.

**Clove Hitch** *Require Firefighter Knowledge*

The clove hitch is a self-tightening hitch used to attach a rope to tool, anchor point or object. It will generally hold well if tensioned is applied to either end of the rope or to both ends simultaneously; however, a preferred "direction of pull" should be minded. When a clove hitch is tied, if it is pulled one way, the rope crosses over the body of the knot, keeping it tight and secure. If the knot is pulled in the opposite direction, the rope does not cross over the body of the knot and the clove opens, becoming less secure. It is preferred to use a safety knot when possible.

There are two different methods to tying a clove hitch. A clove hitch tied in the open or "thrown" is used when the knot can be formed and then slipped over the end of the object. If the object is too large or too long to slip the knot over one end, the clove hitch can be "tied" around the object.

**Throwing a Clove Hitch** (Open Object) *Require Firefighter Knowledge*

Starting from left to right on the rope, grab the rope with crossed hands with the left hand positioned higher than the right.

Holding onto the rope, uncross your hands. This will create a loop in each hand.

Slide the right-hand loop behind the left-hand loop.

Slide both loops over the object.

Pull in opposite directions to tighten the clove hitch. Tie a safety knot in the working end of the rope.

**Tying a Clove Hitch** (Around an Object) *Require Firefighter Knowledge*

Place the working end of the rope over the object.

Make a complete loop around the object, working end down.

Make a second loop around the object above the first loop. Pass the working end of the rope under the second loop, above the point where the second loop crosses over the first.

Tighten the knot and secure it by pulling on both ends.

Tie a safety knot in the working end of the rope.

**Bowline Knot** *Require Firefighter Knowledge*

A Bowline is a knot that allows the rescuer to form a non-slipping loop of any desired size. It can be tied to create a loop that can slip over objects or tied so that it captures an object within its loop.

Make the desired sized loop and bring the working end back to the standing part.

Form another small loop in the standing part of the rope, with the section close to the working end on top. Thread the working end up through this loop from the bottom.

Pass the working end over the loop, around and under the standing part, and back down through the same opening.

Tighten the knot by holding the working end and pulling the standard part of the rope backward.

Tie a safety knot in the working end of the rope.

**Figure Eight Knot** *Require Firefighter Knowledge*

A figure eight is a basic knot used to produce a family of other knots, including the figure eight on a bight ad the figure eight with a follow through.

Form a bight in the rope.

Loop the working end of the rope completely around the standing part of the rope.

Thread the working end back through the bight.

Tighten the knot by pulling on both ends simultaneously.

**Figure Eight Bend Knot** *Require Firefighter Knowledge*

The figure eight bend, or tracer 8, is used to join two ropes together.

Tie a figure eight near the end of one rope.

Thread the end of the second rope completely through the knot from the opposite end.

Pull the knot tight.

Tie a safety knot on the loose end of each rope to the standing part of the other.

**Figure Eight on a Bight Knot** *Require Firefighter Knowledge*

The figure eight on a bight knot typically creates a secure non-slipping loop at the working end of the rope. The loop can be used to attach the end of the rope to fixed object or a piece of equipment, tie a life safety rope around a person, or to create loops for anchoring systems. The loop may be tied to any size- from an inch to several feet in diameter. If enough rope is present the knot can also be used to create non-slipping loops in the middle of the rope as well.

Form a bight and identify the end of the bight as the working end.

Holding both sides of the bight together, form a loop.

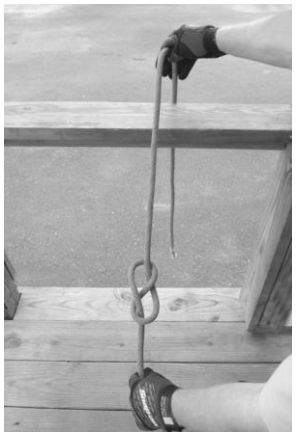
Feed the working end of the bight back through the loop.

Pull the knot tight.

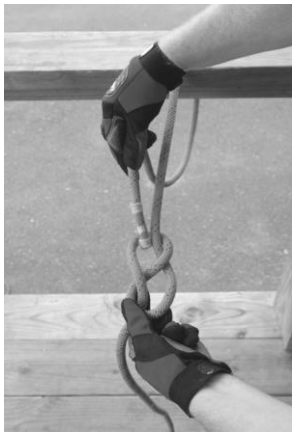
Secure the loose end of the rope with a safety knot.

**Figure Eight Follow through Knot** *Require Firefighter Knowledge*

A figure eight with a follow-through knot creates a secure non-slipping loop at the end of the rope allowing the working end to be wrapped around an object or passed through an opening before the loop is formed.



Tie a simple figure eight in the standing part of the rope, far enough back to make a loop. Leave this knot loose.



Thread the working end through the opening or around the object, and bring it back through the original figure eight know in the opposite direction.

Once the working end has been threaded through the knot, pull the knot tight.

Secure the loose end with a safety knot.

**Becket Bend or Sheet Bend Knot** *Require Firefighter Knowledge*

The single or double Becket bend, or sheet bend, knot is used to tie ropes of the different diameters together. When tying ropes of different diameters together using this system, the bight should always be placed in the rope with the larger diameter.

Form a bight at the working end of the larger rope.

Thread the working end of the smaller rope up through the bight.

Loop the smaller rope completely around both sides of the bight. Pass the working end of the smaller rope between the original bight and under the second rope.

Tighten the knot.

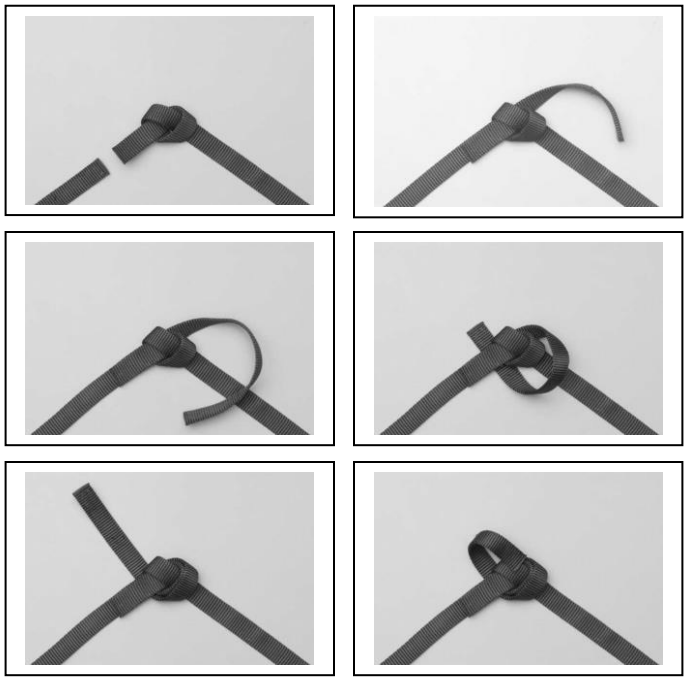
Tie a safety knot in the working end of each rope.

**Water Knot** *Rescue Application*

The water knot is used to join webbing of the same or different sizes together. When a single piece of webbing is used and the opposite ends are tied to each other, a loop or sling is created. These loops can be used for a variety of purposes, including the formation of anchors and the construction of load-releasing hitches.

In one end of the webbing, approximately 6 inches from the end, tie an overhand knot.

Finished Knot



From the terminal end of the first knot, follow the formation of the knot.

**Munter Hitch** *Rescue Application*

A Munter hitch is great for lots of applications. It can be used for lowering objects or taking up tension. Once tied around an object (usually a carabineer) the friction created can capture and hold tension in a line, or enable the lowering of a person or object. Be mindful of the rope on rope friction and the load. One feature of the Munter hitch is that the rope can be pulled from either ends and it will still function properly. Although the hitch can be tied around any stationary object; it is typically tied around a carabineer that is attached to an anchor. Similar to the clove hitch, the knot can be tied or thrown.

**Tying a Munter Hitch** (Around a Carabineer) *Rescue Application*


Pass the rope through the open carabineer


Form a loop over the standing part of the rope

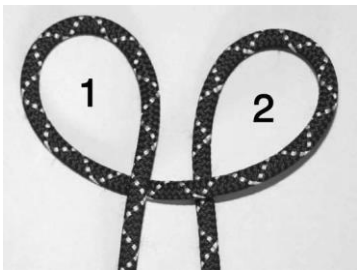

Pass the loop through the open carabineer


Position the loop to the basket part of carabineer


Close and lock the carabineer


Position the running part of under the standing part of the rope. This will be used to control the friction.

**Throwing a Munter Hitch**



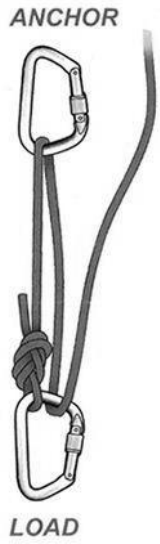
Form two opposite loops


Fold and hold the two loops so they face each other.

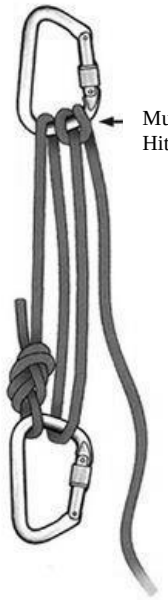

Clip the carabineer through the two loops.

**Radium Load Release Hitch** *Rescue Application*

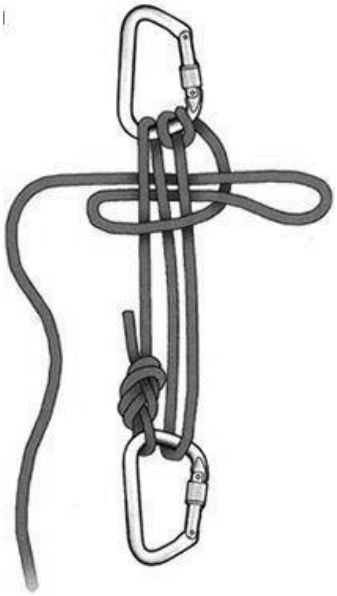
The Radium Load Releasing Hitch use a 3:1 mechanical advantage and a Munter hitch to safely transfer the load. This combination provides for a smooth transfer with little effort on the part of the operator. The Hitch constructed using 8 feet of 8-9mm cordage.



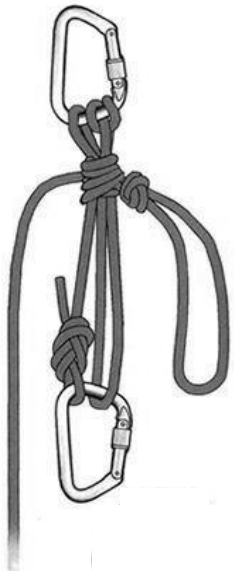

Tie a figure 8 on bight in one end of the cord. The bight should be only large enough for the carabineer to slide through. This will be the load side of the load release hitch.




Tie a Munter Hitch on the Anchor Carabineer. The Standing end of the cord should be the Gate side of the Carabineer.



Form a bight to cinch a Half Hitch around the body nearest to the Munter.



Finish by forming an Overhand around the Body of the Hitch and tying a Stopper knot on the Bight.

## **Double Loop Figure Eight Knot** *Rescue Application*

The double –loop figure eight, or rescue 8, is used when there is a desire for greater strength in the loop itself, when constructing a self-equalizing anchor system where loops of two different sizes are needed, or when it is desirable to incorporate a ring directly into the knot.

Form a bight approximately 18 inches on the working end of the rope

Loop the working end of the rope completely around the standing end of the rope.

Lay the working end of the rope over the bight created when you looped the rope. Similar to creating a figure 8 on the bight, do not pass the rope through.

Pass your hand through the loop created in Step 1 and grab the working end of the rope (both pieces) through the bight created in Step 2.

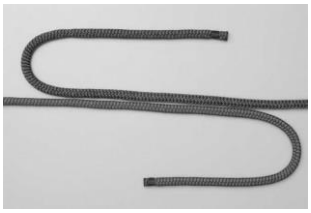
Pass the loop over the loop created in Step 4 and on to the top of the knot.

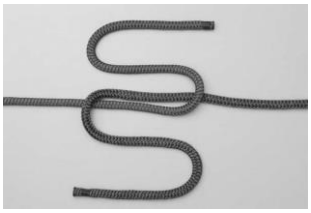
Tighten the knot by pulling on both ends simultaneously.

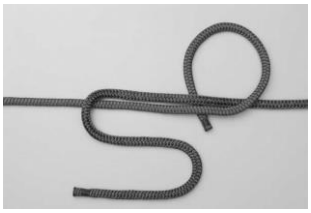
When you pull the knot tight, it will have the shape of a figure eight with a double loop on the working end.

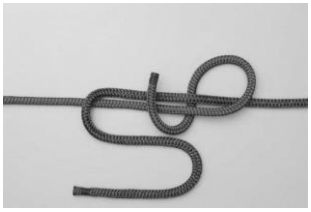
**Double Fisherman's or Barrel Knot** *Rescue Application*

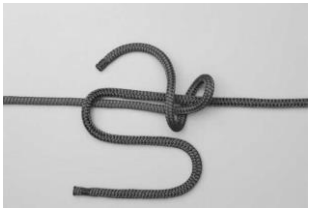
The double fisherman's knot is used to create a Prusik loop but may also be used to join two ropes of equal or unequal diameter. A single fisherman's knot can also be used a safety knot. Because it is an "adjustable" self-tightening knot is one of the few that does not require a safety knot.

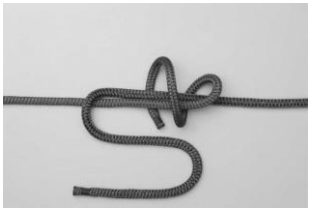

Set the two ends together.

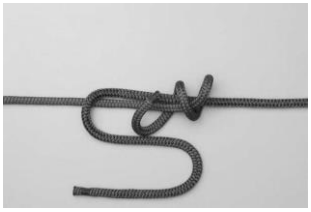

Each end pointing in opposite directions.

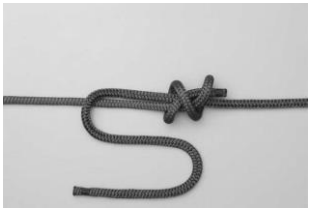

Pass one end under both ropes.

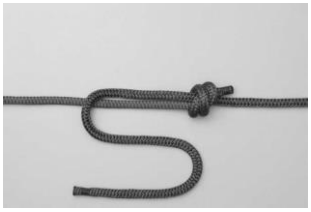

Begin to wrap the two ropes.


Wrap around both ropes twice.


This will form two loops.


Pass the end back through the loops.


Dress the loops and knot.


Pull the knot tight.


Tie the same knot on the opposite end.

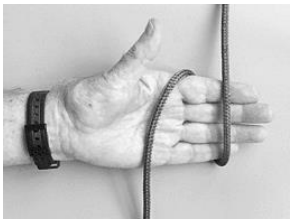

Make sure both sides of the knot sit against each other (if they don't, untie one end, and try wrapping it in the opposite direction.


Pull on both ropes tight to cinch the two knots against each other.

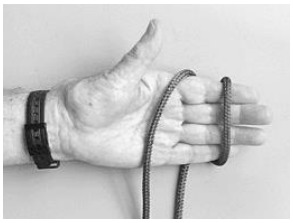
**Butterfly Knot** *Rescue Application*

The butterfly knot is used to create a non-slipping loop or loops in the middle of the rope. This can advantageous when a second connection point is needed for additional safety for the rescuer or victim.

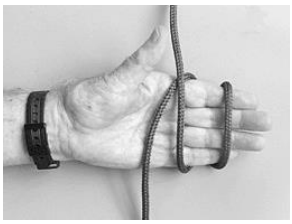
Form a bight over a hand



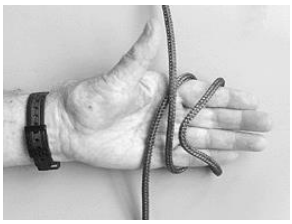
Using the rope from behind the palm, form loop over the hand.



Continue the loop around the hand to a round turn.



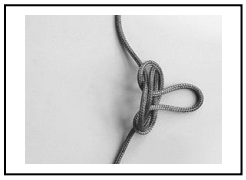
Form a second bight between the loop and strand closest to the thumb.

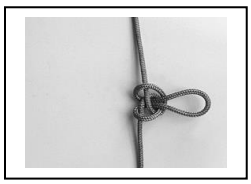


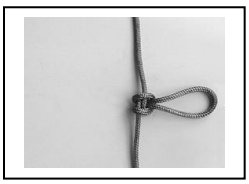
Begin to pull the loop nearest the fingers back to the palm of the hand.

Continue to pull over the round turn,

Fold and push the loop under the round turn. Slide the fingers out from knot.







Dress and Tighten the Knot

## Firefighting Knot Application & Equipment Hoisting

### Hoisting of an Axe

Tie the end of the hoisting rope around the handle near the head using either a figure eight on a bight or a clove hitch.

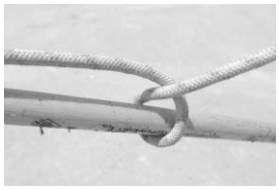
Using a clove hitch.

Place the standing part of the rope parallel to the axe handle.

Use one or two half hitches along the axe handle to keep the handle parallel to the rope. Communicate with the fire fighter above that the axe is ready to raise.

### Hoisting of a Pike Pole

Place a clove hitch over the bottom of the handle and secure it close to the bottom of the handle. Leave enough rope below the clove hitch for a tag line.



Place a half hitch around the handle above the clove hitch to keep the rope parallel to the handle.

Slip a second half hitch over the handle and secure it near the head of the pike pole.

Communicate with the fire fighter above that the pike pole is ready to raise.

### Hoisting of a Ladder

Tie a figure eight on a bight to create a loop, approximately 3 or 4 feet in diameter, which is large enough to fit around both ladder beams.

Pass the rope between two beams of the ladder, three or four rungs from the top. Pull the end of the loop under the rungs and toward the tip at the top of the ladder.

Place the loop around the top tip of the ladder.

Pull on the running end of the rope to remove slack. Attach a tag line to the bottom rung for stabilization.

## Hoisting of an Exhaust Fan or Power Equipment

Tie a figure eight knot about 3 feet (1 m) from the working end of the rope.

Loop the working end of the rope around the fan handle and back to the figure eight knot.

Secure the rope by tying a figure eight with a follow-through by threading the working end back through the first figure eight in the opposite direction. Attach a tag line to the fan for better control. Communicate with the fire fighter above that the exhaust fan is ready to hoist.

## Hoisting of a Charged Hose Line

Make sure the nozzle is completely closed. Use a clove hitch, 1 or 2 feet behind the nozzle, to tie the end of the hoisting rope around a charged host line. Use a safety knot to secure the loose end of the rope below the clove hitch.

Make a bight in the rope even with the nozzle shut off handle.

Insert the bight through the handle opening and slip it over the end of the nozzle. When the bight is pulled tight, it will create a half hitch and secure the handle in the off position while the charged hose line is hoisted. Communicate with the fire fighter above that the hose line is ready to hoist.

## Hoisting of an Un-Charged Hose Line

Fold 3 feet of hose back on itself and place the nozzle on top of the hose.

Make one or two half hitches in the rope and slip it over the nozzle. Move the half hitch along the hose and secure it about 6 inches from the fold.

Tie a clove hitch near the end of the rope, wrapping the rope around both the nozzle and the hose. The clove hitch should hold both the nozzle and the hose.

Communicate with the fire fighter above that it is ready to hoist. Hoist the hose with the fold at the top and the nozzle pointing down. Before releasing the rope, the fire fighters at the top must pull up enough hose so that the weight of the hanging hose does not drag down the hose.

## Material References:

Jones & Bartlett; **Fundamentals of Fire Fighting Skills, 3rd Edition**
Jones & Bartlett; **Fundamentals of Technical Rescue**
IFSTA; **Fire Service Search & Rescue, 7th Edition**
**Animatedknots.com**
Colorado Technical Rescue; **Rope Rescue**

Commission on Fire Prevention and Control, Certification Division

## Practical Skill Sheets References:

**Important:** * denotes Critical Task - Failure of this task mandates failure on the entire objective

### NFPA 1001 - Firefighter I Skills

**5.3.20A Tie Knots and Hoist Tools**
- * Selects correct rope
- Verbalizes correct knot for the task
- * Ties correct knots to hoist tools / hose
- * Ties knot in proper location
- Hoists tools / hose successfully
- Ties tag lines (when applicable)

CFPC; NFPA 1001 (2013)

**5.3.20B Knot Selection and Tying**
- * Selects correct rope
- Ties Clove Hitch with overhand safety knot
- Ties Half Hitch
- Ties Figure of Eight on a Bight with overhand safety knot
- Ties Becket (Sheet) Bend with two overhand safety knots
- Ties Bowline
- Ties Figure of Eight with follow through

CFPC; NFPA 1001 (2013)

**5.5.1D Rope Maintenance**
- * Inspects rope in a manner consistent with training
- Bundles / coils / bags rope
- Stores rope in proper location
- Documents results

CFPC; NFPA 1001 (2013)

### NFPA 1006 – Rescue Technician – CORE Skills

**5.5.1A Ropes & Rigging (Knot Tying)**
- Eight figure (8) on a bight
- Butterfly Knot
- Follow through figure eight (8)
- Water Knot (webbing)
- Prussik triple wrap hitch
- Figure eight (8) bend
- Double Fishermen's knot
- Clove hitch
- Figure eight (8) knot or stopper eight (8)

CFPC; NFPA 1006 (2008) CORE

**5.4.1B Maintenance – Rope, Rigging Tools and Harnesses**

Rope
- Demonstrate inspecting, maintenance and storage of rope
- Verbalize cues for damaged rope: (feeling-looking for damage, deformity, discoloration, cuts)
- Verbalize cleaning procedures (warm water, mild soap, rinse, air dry out of the sunlight)

Rigging Tools and Harnesses
- Demonstrate inspecting, maintenance and storage
- Verbalize clues for damaged items: (cracks, displacement, distortion, discoloration) and ways to confirm integrity (x-ray)
- Verbalize cleaning procedures (warm water, mild soap, rinse, air dry out of the sunlight)
- Demonstrate completion of logs and records for Rope, Rigging Tools and Harnesses
- Demonstrate procedures to remove an item out of service
- Follow all department's SOGs

CFPC; NFPA 1006 (2008) CORE

## Firefighter – Full Body Hasty Harness

The firefighter hasty Harness will be utilized by the Recruit for the purpose of providing an attachment point for Safety Belays. The harness shall be worn by the Recruit when performing initial Ladder climbing dismounting and mounting, Fireground Survival and Rescue Technician skills. Recruits are to be prepared with Harness adjusted to the proper length and properly to don the harness when directed. The Harness will be adjunct with the Recruit Firefighter Program Auto-Lock Carabineer.

1. Start with at least 20’ of webbing and adjust the length as you go through the steps, if necessary, to fit your body. Tie the ends of the webbing together with a water knot. Make sure the knot is fixed and doesn’t loosen when pressure is applied.
2. Hold the webbing in a wide circle behind you with the knot in the middle of your back centered along your spine. The side of the webbing circle parallel to the knot should be resting on the back of your knees.


3. Bring the ends of the webbing around to your front on both sides so that you have a loop on your right and left. Bring the looped ends together into one hand.

4. Pull the lower band of the webbing that is accessible between your legs up and in front of you. Pass the looped ends of the webbing through loop coming up between your legs.

5. Pass your right arm through the right looped end of the webbing and the left arm through the left loop. Make sure the webbing is up around your shoulders.

6. Connect the loops of webbing around your arms with a carabiner. The carabiner should be behind you, across your shoulders.


7. Pull the band of webbing horizontally across your abdomen and hook a carabiner around it. Lock the carabiner around the webbing. Turn the carabiner to twist up any slack in the harness. Move the webbing around and keep twisting until the strap is tight around your waist. Once tight clip the carabiner back to the center web.

https://www.youtube.com/watch?feature=player_detailpage&v=AQHlIASNTCQ

# Reference Materials

# Unit 10
# Firefighting Ropes & Knots

**Connecticut Fire Academy** **Recruit Firefighter Program**

Revised December 19, 2015