Office of the State Fire Marshal
Rope Operations
Objectives

Cognitive Objectives

56-1 Course Introduction

56-1.1 State requirements

A. Prerequisites for the course

i. FF II
ii. TRA

B. Length of course – minimum of 40 hours
C. Successful completion of the course
D. 100% completion of practical skills
E. Passing score on end of course examination
F. Passing score on the State Examination

56-1.2 Applicable Standards

A. NFPA 1983, Standard on Fire Services Life Safety Rope and Components, 2001 Edition
B. NFPA 1670, Standard on Operations and Training for Technical Rescue Incidents, 1999 Edition
C. NFPA 1006, Standard for Rescue Technician Professional Qualifications, 2003 Edition
D. Authority Having Jurisdiction

56-1.3 Required student manual

A. High Angle Rescue Techniques 2nd Edition, Tom Vines and Steve Hudson

56-2 Safety

56-2.1 Identify safety considerations for rope rescue operations. (Students must practice safety techniques during the course.)

A. Edge protection

B. Belays
C. Critical angles
D. Safety checks
E. Communications

56-3 Factors that influence rope rescue operations

56-3.1 Describe examples for each of the following factors that affect rope rescue operations.

A. Human
B. Risks/Benefits
C. Equipment
D. Weight
E. Direction of forces
F. Friction
G. Weather

56-4 Rope

56-4.1 Describe the differences of the following standards and regulations that pertain to rope rescue operations

A. NFPA 1983
B. NFPA 1670
C. NFPA 1006
D. Authority having jurisdiction

56-4.2 Describe the criteria for the selection of rope according to work being performed

56-4.3 Name the following two categories of rope fibers

A. Natural
B. Synthetic

56-4.4 List characteristics of natural and synthetic fibers used to manufacture rope

56-4.5 List advantages and disadvantages of the following natural fibers used to manufacture rope

A. Manila
B. Hemp
C. Sisal
D. Cotton

56-4.6 List advantages and disadvantages of the following fibers

A. Nylon
B. Polyester
C. Kevlar
D. Aramine

56-4.7 Describe the characteristics for the following four types of rope construction

A. Laid
B. Braid
C. Plait
D. Kernmantle

56-4.8 Describe the following NFPA requirements for life safety rope

A. Breaking (tensile) strength of

i. General use
ii. Personal use

B. Diameter of

i. General use
ii. Personal use

C. Rope inspection

56-5 Equipment

56-5.1 Describe the types, intended uses, limitations, care and maintenance of the following rescue software

A. Accessory cord
B. Webbing
C. Adjustable straps
D. Non-adjustable straps
E. Harnesses

56-5.2 Describe the types, intended uses, limitations, care and maintenance of the following rescue hardware

A. Descent control devices
B. Mechanical rope grab devices
C. Ascenders
D. Carabiners
E. Screw links
F. Pulleys
G. Rigging plates

H. Anchor plates
I. Rescue litters

56-5.3 Describe the types, intended uses, limitations, care and maintenance of the following personal protective equipment

A. Helmets
B. Gloves
C. Boots
D. Eye protection
E. Ear protection
F. Other clothing

56-6 Knots

56-6.1 Define the following terms associated with rope

A. Bend
B. Bight
C. Hitch
D. Knot
E. Loop
F. Round turn

56-6.2 List effects knots have on a rope

56-6.3 Describe qualities of good knots, bends, and hitches

56-6.4 Describe typical applications of the following knots, bends, and hitches

A. Figure Eight
B. Figure Eight on a Bight
C. Figure Eight Follow-through
D. Butterfly (Lineman's loop)
E. Double overhand knot
F. Triple Fisherman's Bend
G. Triple-wrap Prusik Hitch
H. Clove Hitch
I. Load Releasing Hitch
J. Overhand Bend (Water Knot, Ring Bend) in webbing

56-7 Anchors

56-7.1 Describe qualities of an anchor

56-7.2 Describe forces that are applied to anchors

56-7.3 Describe process for selecting an appropriate anchor

56-7.4 Explain purposes for directional anchors

56-7.5 Describe components for a load distribution anchor system

56-8 Belaying

56-8.1 Describe the characteristics of a belay system with a Munter Hitch.

56-9 Descending

56-9.1 Describe characteristics of a rescuer descent system with a fixed rope in a low angle environment

56-10 Ascending

56-10.1 Describe characteristics of a rescuer ascent system with a fixed rope in a low angle environment

56-11 Lowering

56-11.1 Describe characteristics of a lowering system with a fixed six-bar brake bar rack

56-12 Hauling

56-12.1 Describe characteristics of a mechanical advantage hauling system

56-12.2 Describe haul system commands

56-13 Hasty Harness

56-13.1 Describe intended uses of a hasty harness with an attachment point above the person's center of gravity

56-14 Patient Packaging

56-14.1 Describe procedures for packaging a patient using the following:

A. Short / half boards
B. Long boards

i. Rigid
ii. Semi-Rigid

C. Rescue Litter (Stokes)

56-15 Litter Basket Movement

56-15.1 Describe functions of litter team members in a low angle environment

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Practical Objectives

56-16 Given a summary of a system safety check, a rope rescue scenario, rope rescue equipment, the student shall demonstrate working knowledge and the ability to conduct a system safety check with 100 % accuracy.

56-17 Given a summary of the following knots, bends and hitches, rope rescue equipment, the student shall demonstrate working knowledge and tie the following knots, bends, and hitches with 100 % accuracy within the allotted time.

56-17.1	**Figure Eight**
56-17.2	**Figure Eight on a Bight**
56-17.3	**Figure Eight Follow-through**
56-17.4*	**Butterfly (Lineman's loop)**
56-17.5*	**Double Overhand Knot (Half of a double Fisherman's Bend)**
56-17.6	**Triple Fisherman's Bend**
56-17.7	**Triple Wrap Prusik hitch**
56-17.8	**Load Releasing Hitch with Munter Hitch**
56-17.9	**Overhand Bend (a.k.a Water Knot, Ring Bend) in webbing**
56-17.10	**Clove Hitch**
56-17.11	**Munter Hitch**

56-18 Given a summary of the following sling configurations, rope rescue equipment, the student shall demonstrate working knowledge and construct the following sling configurations with 100 % accuracy within the allotted time.

56-18.1	**Loop**
56-18.2	**Basket**
56-18.3	**Basket wrap**

56-19 Construct the following anchor systems

- **56-19.1 Tensionless Hitch**
- **56.19.2 Two-point load distribution *(self-adjusting)***
- **56-19.3 Three-point load distribution *(self-adjusting)***

56-20 Demonstrate the construction of a belay system with a Munter Hitch

56-21 Demonstrate the ability to belay (with a Munter Hitch) a person being vertically lowered a minimum of 20'.

56-22 Demonstrate the ability belay (with a Munter Hitch) a person being vertically raised a minimum of 20'.

56-23 Demonstrate the ability to construct a fixed rope system

56-24 Demonstrate descending a fixed rope system using a mechanical device in a low angle environment

56-25 Demonstrate ascending a fixed rope system using a mechanical device in a low angle environment

56-26 Demonstrate the construction of a lowering system with a fixed brake bar rack

56-27 Demonstrate lowering a person with a fixed brake bar rack in a low angle environment

56-28 Demonstrate lowering a person with a fixed brake bar rack in a vertical environment a minimum of 20'.

56-29 Demonstrate the construction of the following mechanical advantage hauling systems

- **56-29.1 3:1 Z Rig (In-line)**
- **56-29.2 3:1 attached to the main line**
- **56-29.3 4:1 Piggy back (attached to the main line)**
- **56-29.4 4:1 in-line (block and tackle)**

56-30 Demonstrate the use of the following mechanical advantage hauling systems in a vertical environment with a minimum of three sets hauling and readjusting (re-setting) the system

- **56-30.1 3:1 Z Rig (In-line)**
- **56-30.2 3:1 attached to the main line**
- **56-30.3 4:1 Piggy back (attached to the main line)**
- **56-30.4 4:1 in-line (block and tackle)**

56-31 Demonstrate the ability to convert a mechanical advantage system using a load releasing hitch from raising to lowering

56-32 Demonstrate the construction of a hasty harness with an attachment point above the person's center of gravity so as to prevent inverting

56-33 Demonstrate the ability to immobilize a person on a full body board for transport in a litter basket

56-34 Demonstrate the packaging of a person in a litter basket

56-35 Demonstrate the ability to function as a litter attendant in a low angle environment

56-36 Demonstrate the ability to direct a team using a hauling system to raise a person over an edge.

56-37 Demonstrate the ability to direct a team using a lowering system to lower a person over an edge.

56-38 Demonstrate the ability to be lowered over the edge of a roof, a parapet, and/or a railing in an environment involving a free space a minimum of 20'.

56-39 Demonstrate the ability to be raised over the edge of a roof, a parapet, and/or a railing in an environment involving a free space a minimum of 20'.