

LESSON ONE

FIREFIGHTER II

Rescue

DOMAIN: COGNITIVE / PSYCHOMOTOR

LEVEL OF LEARNING: COMPREHENSION /
APPLICATION

MATERIALS

IFSTA Essentials 5th edition or Jones and Bartlett Fundamentals of Fire Fighter Skills 2nd Edition or Delmar Firefighter's Handbook 3rd Edition; overhead projector or laptop computer and multimedia projector; transparencies; slide projector and screen; assorted sections of cribbing; hydraulic rescue tools, (eg. Hurst, Amkus, etc.); pneumatic rescue tools; assorted chains; lifting tools, such as air bags; air cylinders; assorted jacks; porta-power units; pulling tools, such as heavy duty come-a-longs; winches; assorted hand tools; power and lighting equipment; electrical equipment; glass removal equipment; IFSTA video, "Advance Rescue."

NFPA 1001 JPR, 2008 edition

6.4.1 Extricate a victim entrapped in a motor vehicle as part of a team

Junior Member Statement:

Junior Member training activities should be supervised by qualified instructors to assure that the cognitive and psychomotor skills are completed in a safe and non-evasive manner. While it is critical that instructors be constantly aware of the capabilities of all students both mentally and physically to complete certain tasks safely and successfully, the instructor should take every opportunity to discuss with departmental leaders and students the maturity and job awareness each participant has for the hazards associated with fire and rescue training.

TERMINAL OBJECTIVE

The firefighter II candidate shall correctly identify various pieces of equipment commonly used for vehicle extrication and describe their use.

ENABLING OBJECTIVES

1. The Firefighter II candidate shall correctly identify and describe the operation of emergency power and lighting equipment.
2. The Firefighter II candidate shall correctly identify and describe the function of powered and manual hydraulic tools.
3. The Firefighter II candidate shall correctly identify and describe the function of non-hydraulic jacks.
4. The Firefighter II candidate shall correctly identify and describe the function of pneumatic powered tools.
5. The Firefighter II candidate shall correctly identify and describe the function of lifting and pulling tools.
6. The Firefighter II candidate shall correctly identify and describe the function of and safety rules of high, low and medium pressure air bags.

LESSON ONE

FIREFIGHTER II

Rescue

MOTIVATION

The effectiveness and professionalism displayed by firefighters responding to vehicle accidents and how well they are prepared depend on the amount and degree of training the individual receives. A hands-on working knowledge of all tools and equipment is vitally necessary to being properly prepared. Firefighters should realize that using this equipment must become second nature to them. They will be confronted with many situations where improper use of a tool could cause further injury to the patient or themselves. Firefighters should know how and why a particular tool works, when to use it, what it will do, and most importantly, its limitations.

NOTE: The above equipment list in the materials section represents only an assortment of generic extrication equipment available to the authority having jurisdiction. It is the responsibility of the instructor to have a good working knowledge of the equipment and techniques covered in this unit. The instructor should familiarize himself or herself with the operational characteristics of the extrication equipment used by the authority having jurisdiction.

PRESENTATION

ENABLING OBJECTIVE #1

The Firefighter II candidate shall correctly identify and describe the operation of emergency power and lighting equipment.

1. Discuss the operational characteristics of lighting equipment, auxiliary electrical equipment, and power plants.

Reference:

J&B Fundamentals 2nd edition, pages 555-558

IFSTA Essentials 5th edition, pages 330-333

PRESENTATION

ENABLING OBJECTIVE #2

The Firefighter II candidate shall correctly identify and describe the function of powered and manual hydraulic tools.

1. Discuss the advantages of powered hydraulic tools.
2. Identify and discuss the operational, safety and maintenance characteristics of the following power and manual hydraulic tools according to the manufacturer's recommendations.
 - a) Spreaders.
 - b) Shears.
 - c) Combination spreader / shears.
 - d) Extension rams.
 - e) Porta-power.
 - f) Manual hydraulic jack.

Reference:

Delmar Handbook 3rd edition, pages 547-549

J&B Fundamentals 2nd edition, pages 219 & 295

IFSTA Essentials 5th edition, pages 335-336

PRESENTATION

ENABLING OBJECTIVE # 3

The Firefighter II candidate shall correctly identify and describe the function of non-hydraulic jacks.

1. Identify and discuss the function of non-hydraulic jacks.
 - a) Bar screw jacks.
 - b) Trench screw jacks.
 - c) Ratchet lever jack.
 - d) Cribbing.

Reference:

J&B Fundamentals 2nd edition, pages 729-730

IFSTA Essentials 5th edition, pages 337-338

PRESENTATION

ENABLING OBJECTIVE # 4

The Firefighter II candidate shall correctly identify and describe the function of pneumatic powered tools.

1. Discuss the function of the air chisel and pneumatic nailer.

Reference:

Delmar Handbook 3rd edition, pages 550-551

J&B Fundamentals 2nd edition, page 733

IFSTA Essentials 5th edition, pages 340-341

PRESENTATION

ENABLING OBJECTIVE # 5

The Firefighter II candidate shall correctly identify and describe the function of lifting and pulling tools.

1. Identify and discuss the various types of lifting and pulling tools.
 - a) Tripods.
 - b) Winches.
 - c) Come-a-longs. Use only the rated handle, never add a cheater bar.
 - d) Chains.
 - e) Block and tackle.

Reference:

Delmar Handbook 3rd edition, pages 547-561

IFSTA Essentials 5th edition, pages 342-346

PRESENTATION

ENABLING OBJECTIVE # 6

The Firefighter II candidate shall correctly identify and describe the function of and safety rules of high, low and medium pressure air bags.

1. Discuss the function of high-pressure airbags.

- a) Neoprene rubber reinforced with steel wire or Kevlar.
 - b) Sizes range from 6"x6" to 36"x36".
 - c) Inflation pressure is approximately 118 psi.
 - d) Load capacity for the air bag is based on the psi x square inches of the bag at a maximum lift of one inch.
 - e) High-pressure bags are designed to lift heavy objects short distances.
 - f) As the bag inflates the surface area of the bag decreases thus decreasing the load capacity.
2. Discuss the function of low and medium pressure air bags.
- a) Larger than high-pressure bags.
 - b) Operate at pressures between 7 and 15 psi designed to lift heavy objects a greater distance than high-pressure bags.
 - c) Some bags can lift objects as high as 6 feet.
3. Discuss safety rules for using airbags at a rescue operation.
- a) Assess the scene hazards and plan the lifting operation before attempting to lift anything.
 - b) Operators need to be well versed in the operational capabilities and the limitations of the equipment.
 - c) Follow the manufacturer's operational recommendation.
 - d) Place bag on a solid lifting foundation.
 - e) Protect bags from puncture. Do not use rigid items such as plywood. Plywood may snap under pressure creating a flying projectile.
 - f) Never work under a load supported only by air bags.
 - g) Box cribbing should have a solid top.
 - h) Do not expose bags to temperatures greater than 220 degrees F (104C).
 - i) Never stack high-pressure bags more than two high.
 - j) Place smaller bag on top and begin slow inflation of bottom bag.
 - k) Do not attempt to stack low or medium pressure bags.
 - l) Multi-cell bags are safer for lifts exceeding two feet.

4. Discuss the components of a block and tackle system and demonstrate rigging two double sheave pulleys.
5. Discuss the safety rules while using a block and tackle system.

Reference:

Delmar Handbook 3rd edition, pages 549-550
J&B Fundamentals 2nd edition, pages 730-731
IFSTA Essentials 5th edition, pages 344-346

NOTE: The information in this unit is presented in a general format. The instructor should have a good working knowledge of the various types of equipment used for extrication. The instructor should be familiar with the set-up, operational characteristics, and the positive and negative safety issues of each piece of equipment and for maintenance. Discuss and demonstrate all the pertinent information about all the various pieces of equipment with the candidates.

APPLICATION

Lay out the tools according to the groupings listed in the enabling objectives. Divide the class into equal groups and have each group visit each station to practice the operations of each tool.

SUMMARY

Review the operational capabilities of each of the tools listed in this lesson plan.

LESSON TWO

FIREFIGHTER II

Rescue

DOMAIN: COGNITIVE / PSYCHOMOTOR

LEVEL OF LEARNING: COMPREHENSION /
APPLICATION

MATERIALS

IFSTA Essentials 5th edition or Jones and Bartlett Fundamentals of Fire Fighter Skills 2nd Edition or Delmar Firefighter's Handbook 3rd Edition; overhead projector or laptop computer and multimedia projector; transparencies; slide projector and screen; assorted sections of cribbing; hydraulic rescue spreader, cutter, and ram (e.g. Hurst, Amkus, etc.); pneumatic rescue tools; assorted chains; lifting tools, such as air bags; air cylinders; assorted jacks; porta-power units; pulling tools, such as heavy duty come-a-long winches; assorted hand tools; power and lighting equipment; electrical equipment; glass removal equipment; wrecked vehicles and a rescue truck.

NFPA 1001 JPR, 2008 edition

6.4.1 Extricate a victim entrapped in a motor vehicle

Junior Member Statement:

Junior Member training activities should be supervised by qualified instructors to assure that the cognitive and psychomotor skills are completed in a safe and non-evasive manner. While it is critical that instructors be constantly aware of the capabilities of all students both mentally and physically to complete certain tasks safely and successfully, the instructor should take every opportunity to discuss with departmental leaders and students the maturity and job awareness each participant has for the hazards associated with fire and rescue training.

TERMINAL OBJECTIVE

The Firefighter II candidate shall correctly demonstrate the safe procedures for gaining access into a vehicle, for the purpose of making contact with a patient and safely removing the patient from the vehicle.

ENABLING OBJECTIVES

1. The Firefighter II candidate shall correctly describe the safety hazards associated with new technology items on vehicles, and how they are likely to affect those present at a motor vehicle accident scene.
2. The Firefighter II candidate shall correctly describe the procedures for conducting a scene size-up and assessing the need for extrication activities.
3. The Firefighter II candidate, working as a member of a team, shall correctly demonstrate proper techniques including safety considerations for stabilizing a vehicle involved in a motor vehicle accident.
4. The Firefighter II candidate shall correctly describe the functions of a Supplemental Restraint System and a Side Impact Protection System.
5. The Firefighter II candidate shall correctly identify in writing the safety considerations for the patient during the extrication process.
6. The Firefighter II candidate, working as member of a team, shall correctly demonstrate removing laminated glass and tempered glass from a vehicle.
7. The Firefighter II candidate, working as member of a team, shall correctly demonstrate the safe removal of a rooftop from a vehicle.
8. The Firefighter II candidate, working as member of a team, shall correctly demonstrate removing the doors from a vehicle.
9. The Firefighter II candidate, working as a member of a team, shall correctly demonstrate displacing the steering wheel.

10. The Firefighter II candidate, working as a member of a team, shall correctly demonstrate displacing the steering column.

11. The Firefighter II candidate, working as a member of a team, shall correctly demonstrate displacing a dashboard.

LESSON TWO

FIREFIGHTER II

Rescue

MOTIVATION

For the fire departments that provide rescue services, response to motor vehicle accidents (MVAs) ranks high regarding volume of responses. With all the automobile manufacturer's safety improvements there is still a high volume of death and disability associated with MVAs. As long as motor vehicles are being manufactured (regardless of how many safety items are mandated to be installed) people will continue to be maimed or killed on America's highways. Firefighters need to constantly keep updating their vehicle extrication skills so a patient entangled in a mass of metal and glass has a better chance of surviving. The basic principles of extrication remain essentially the same. Stabilize the vehicle, gain access to the patient and remove wreckage from around the patient. What has changed is the use of space age materials, chassis designs and extrication equipment. Because of this fact firefighters must continue to upgrade their skills to provide the most effective extrication possible in the least amount of time.

NOTE: The above equipment list in the materials section represents only an assortment of generic extrication equipment available to the authority having jurisdiction. It is the responsibility of the instructor to have a good working knowledge of the equipment and techniques covered in this unit. The instructor should be familiar with the operational characteristics of the extrication equipment used by the authority having jurisdiction.

PRESENTATION

ENABLING OBJECTIVE #1

The Firefighter II candidate shall correctly describe the safety hazards associated with new technology items on vehicles and how they are likely to affect those present at a motor vehicle accident scene.

1. Describe the safety hazards associated with new technology items on vehicles, and how they are likely to affect those present at a motor vehicle accident scene.
2. Discuss the various types and locations of fuel.
 - a) Propane may be the primary/secondary source of fuel.
3. Discuss the hazards associated with batteries.
 - a) They may produce hydrogen gas.
 - b) There may be a positive ground system.
4. Discuss the dangers associated with hatchbacks.
 - a) They may open violently if cut.
 - b) The hydraulic cylinders pose a threat of explosion during a fire.
5. Discuss the dangers associated with the driveshaft.
 - a) It may explode during a vehicle fire due to the plug being rusty which normally acts as a vent.
6. Discuss the dangers associated with shock absorbers (may explode violently during a fire).
7. Discuss the dangers associated with magnesium engine blocks.
 - a) They produce intense heat during a fire and react violently with water.
 - b) Magnesium may also be found in the wheels
8. Discuss the dangers associated with impact absorbing bumpers that consist of a gas chamber filled with a mixture of inert, nonflammable nitrogen and helium at 150 psi.
 - a) The danger of thrusting forward 3-4 inch to its original position with tremendous force after unit has become jammed in a compressed position upon impact.

- b) Bumpers have traveled as far as 187 feet after having been subjected to heat during a vehicle fire.

Reference:

Delmar Handbook 3rd edition, pages 551-555, 557, 560-561
J&B Fundamentals 2nd edition, pages 724-725

PRESENTATION

ENABLING OBJECTIVE #2

The Firefighter II candidate shall correctly describe the procedures for conducting a scene size-up and assessing the need for extrication activities.

1. Discuss the need for first arriving personnel to initiate a thorough scene assessment.
 - a) Quick scene assessment helps to avoid confusion.
 - b) It clarifies required tasks.
 - c) It can prevent further injury.
 - d) It reduces the risk to on-scene personnel.
2. Discuss the procedures for safely parking the emergency vehicle.
 - a) Park close enough to the scene to allow quick access to equipment.
 - b) Not so close that the vehicle interferes with on-scene activities.
 - c) The vehicle should be positioned to provide a barrier to protect the scene from oncoming traffic.
 - d) If possible keep one lane of traffic open to reduce a bottleneck.
3. Identify what the firefighter should be looking for while approaching the scene.
 - a) Identify traffic hazards.
 - b) Identify how many vehicles.
 - c) Are wrecked vehicle (s) in threat of fire?
 - d) Check for evidence of hazardous materials.
 - e) Check for evidence of damaged utilities or natural gas.

4. Discuss with the students the safety considerations concerning the trunk.
 - a) Check for miscellaneous products.
 - b) Gasoline In non-approved containers.
 - c) Fertilizers - anhydrous ammonia or nitrogen (oxidizer).
 - d) Small propane canisters such as Coleman lanterns and stoves can *BLEVE* during a vehicle fire.
 - e) Explosive devices - blasting caps.

5. Discuss the criteria for determining the need for extrication.
 - a) Assess immediate area around each vehicle.
 - b) Verify the number of patients in or around the vehicles.
 - c) Assess the condition of vehicles.
 - d) Identify the hazardous conditions.
 - e) Assess the extrication needs.
 - f) Triage and treat patients.

Reference:

Delmar Handbook 3rd edition, pages 551-553

J&B Fundamentals 2nd edition, pages 725-733

IFSTA Essentials 5th edition, pages 347, 349-350, 354

PRESENTATION

ENABLING OBJECTIVE # 3

The Firefighter II candidate, working as a member of a team, shall correctly demonstrate proper techniques including safety considerations for stabilizing a vehicle involved in a motor vehicle accident.

1. Discuss the various procedures for stabilizing vehicles.
 - a) Resist temptation to physically test the stability of the vehicle.
 - b) The vehicle should be stabilized vertically and horizontally.
 - c) The use of cribbing, jacks, and air bags are the most common forms of stabilization.
 - d) Use step cribbing.
 - e) Use box cribbing, cross tie cribbing.
 - f) Avoid placing any body parts under the vehicle while placing any stabilizing devices.

Reference:

Delmar Handbook 3rd edition, page 553

J&B Fundamentals 2nd edition, pages 729-731

IFSTA Essentials 5th edition, pages 350-353

PRESENTATION

ENABLING OBJECTIVE # 4

The Firefighter II candidate shall correctly describe the functions of a Supplemental Restraint System and a Side Impact Protection System.

1. Identify the two types of firing systems that can activate an air bag deployment.
 - a) Electrically.
 - b) Mechanically.

2. Describe how the electrical firing system works.
 - a) It receives energy from vehicle battery.
 - b) It activates through a system of electronic sensors installed on the vehicle.
 - c) Sensors have a limited supply of reserved energy that may activate deployment of the air bag even with the battery disconnected.

3. Describe how mechanical firing system works.
 - a) The system is independent of the battery.
 - b) It can activate without the aid of a battery.
 - c) Disarmament of this system may require disconnection between the sensor and the air bag inflation unit.

4. Discuss the two methods that will prevent accidental firing of the electric type system.

5. Discuss the necessary precautions to take during an incident with fire in an airbag-equipped car.
 - a) Use normal rescue and fire extinguishing procedures.

6. Discuss the precautions needed for incidents with a deployed airbag.
 - a) Wear gloves and safety glasses.

- b) Protect your eyes, patient's eyes and patient's wounds from contact with the residual dust produced by a deployed air bag.
7. Wash hands with mild soap and water after handling a deployed air bag.
- a) Otherwise, use normal rescue procedures.
8. Discuss with the students that for incidents when an air bag is not deployed they should use the following precautions.
- a) Disconnect or cut the negative battery cable, or both cables if possible.
 - b) Disconnect the air bag harness connector if possible.
 - c) If you cannot disconnect the air bag harness connector, then wait the prescribed deactivation period.
 - d) Essential patient care activities may be carried out so long as you do not place your body or any objects on the air module, or in what would be the deployment path of the air bag.
 - e) Wear PPE while working around a non-deployed air bag.
 - f) Do not cut the steering column until after you have disconnected the air bag harness connector or waited for the prescribed deactivation period.
 - g) Do not cut or drill into the air bag module.

Reference:

Delmar Handbook 3rd edition, page 554

IFSTA Essentials 5th edition, pages 354-355

PRESENTATION

ENABLING OBJECTIVE #5

The Firefighter II candidate shall correctly identify in writing the safety considerations for the patient during the extrication process.

1. Discuss the various access routes for getting into a vehicle.
- a) Through doors.
 - b) Windows.

- c) By compromising the body of the vehicle.
- 2. Briefly discuss the importance of following local medical protocol during the initial assessment and treatment phase.
- 3. Discuss the importance of removing wreckage away from the patient as opposed to trying to force a patient through an opening.
- 4. Identify the various parts of a vehicle that may have to be pushed, pulled, cut or dismantled.
 - a) Steering wheel.
 - b) Seat.
 - c) Pedals.
 - d) Dashboard.
- 5. Define the term packaging.
- 6. Discuss the importance of addressing the following:
 - a) Cover sharp edges.
 - b) Create a large opening as an egress route for the patient.
 - c) Protect patient from sharp edges and debris
 - d) Patient should be removed from the vehicle smoothly.

Reference:

Delmar Handbook 3rd edition, pages 553-562
J&B Fundamentals 2nd edition, pages 733-743
IFSTA Essentials 5th edition, pages 355-356

PRESENTATION

ENABLING OBJECTIVE # 6

The Firefighter II candidate, working as member of a team, shall correctly demonstrate removing laminated glass and tempered glass from a vehicle.

- 1. Discuss the characteristics of laminated glass.
 - a) Manufactured from two pieces of glass.
 - b) Bonded together with a thin piece of plastic.
 - c) Used for windshield and some rear windows.
 - d) Impact produces long pointed shards of glass.

- e) The plastic reduces the amount of glass that becomes airborne.
 - f) Tends to make removal of windshield safer and faster.
2. Discuss the procedures and the preferred equipment for removing laminated glass.
- a) Ax.
 - b) Reciprocating saw.
 - c) Handsaw with coarse blade.
 - d) Create purchase holes in upper corners of windshield.
 - i) Use selected cutting tool to cut down both vertical sides of windshield.
 - e) Third cut is completely across bottom of windshield.
 - f) Pull bottom of windshield out and up over roof.
 - g) Placed severed windshield under vehicle or outside hot zone.
3. Discuss the characteristics of tempered glass.
- h) Use for side windows and some rear windows.
 - i) Single sheet of glass.
 - j) Fractures into small pieces.
 - k) Can cause laceration problems to victims and rescuers.
4. Discuss the procedures and the preferred equipment for removing tempered glass.
- l) Spring loaded center punch.
 - m) Pointed striking tool.
 - n) Strike side windows (furthest away from patient) in a lower corner.
 - o) Brace hand holding center punch.
5. Discuss methods of controlling broken tempered glass.
- p) Self-adhering contact paper.
 - q) Commercial spray aerosol.

Reference:

Delmar Handbook 3rd edition, pages 554-555
J&B Fundamentals 2nd edition, pages 733-736, 739-740
IFSTA Essentials 5th edition, pages 357-358

NOTE: Always wear full protective gear when working in and around a wrecked vehicle. Cover all persons inside vehicle with protective covering while breaking glass or displacing vehicle parts from around patient.

PRESENTATION

ENABLING OBJECTIVE # 7

The Firefighter II candidate, working as member of a team, shall correctly demonstrate the safe removal of a rooftop from a vehicle.

1. Demonstrate the partial removal of a roof with hand tools and power tools.
 - a) Cut both 'A' posts and both 'B' posts.
 - b) Create a hinge point at back of roof.
 - c) Fold roof back over trunk.
 - d) Secure roof to rear bumper in the event of high winds.

2. Discuss alternate methods of displacing a roof.
 - a) Total removal by cutting all A, B and C posts.
 - b) Side flap.

Reference:

Delmar Handbook 3rd edition, pages 554-559
J&B Fundamentals 2nd edition, pages 741-743
IFSTA Essentials 5th edition, page 359

APPLICATION

Set up an exercise where the students will get an opportunity to participate in a practical activity using the techniques demonstrated. Have the students use a variety of extrication tools such as hacksaws, air chisels, hydraulic cutters, or reciprocating saw to accomplish the tasks. Demonstrate how the corner posts are cut as low as possible to prevent emergency service personnel from having to work around a sharp obstruction, and are covered with a section of discarded fire hose. The windshield is removed prior to this evolution.

PRESENTATION

ENABLING OBJECTIVE # 8

The Firefighter II candidate, working as member of a team, shall correctly demonstrate the safe removal of doors from a vehicle.

1. Demonstrate techniques for safely opening a door using a leaf spring or comparable type of metal.
 - a) Chisel an opening around the door handle and trip the locking mechanism.
 - b) Using an air chisel, perform the same technique as described in 1a.
2. Discuss the need to disable or remove passive restraint systems.
3. Discuss how door hinges may be stamped steel or cast iron in construction. They may break suddenly without warning as opposed to bending when a force is applied.
4. Caution students that rivets which hold hinges in place may travel with the velocity of a bullet when broken off.
5. Demonstrate opening a door with a hydraulic spreader at the handle side of the door.
 - a) Create a purchase point above or below the striker bolt (Nader pin) using a forcible entry prying tool.
 - b) Place spreader in purchase point and activate spreader forcing the locking mechanism off the striker bolt (Nader pin).
 - c) Secure the door.
6. Demonstrate total removal of a door starting at the door handle.
 - a) Perform the same techniques as described in 5 a through c.
 - b) Create a purchase point at the upper and lower hinge points on the door using a forcible entry prying tool staying above or below the hinges.
 - c) Starting at the top hinge, insert hydraulic spreader into purchase point.
 - d) Activate spreader forcing the hinge off of the quarter panel. Watch your feet.
 - e) Insert hydraulic into lower hinge purchase point

- f) Activate spreader forcing lower hinge off of the quarter panel.
7. Demonstrate total removal of a door starting at the hinges.
- a) Techniques are the same as listed in 6 a-f.
 - b) Start at top hinge, move to door handle, finish at lower hinge.

Reference:

Delmar Handbook 3rd edition, pages 557, 560-561

J&B Fundamentals 2nd edition, pages 735-738

NOTE: Although the exterior sheet metal of vehicles has changed drastically in the past twenty years, little has changed with regards to how the door locking mechanisms operate. Essentially, emergency service personnel are looking for four separate mechanisms, which will remain virtually the same on all major manufacturers of vehicles. The Inside door lock, the outside door lock, the Inside door handle and the outside door handle are the four items that emergency service personnel must become familiar with and how they operate. It is largely a matter of trial and error as to exactly how each works, but emergency service personnel must become familiar with the location and have a general working knowledge of door latching mechanisms in a generic sense.

APPLICATION

Set up an exercise where the students will get an opportunity to participate in a practical activity using the techniques demonstrated. Allow candidates to practice opening a door using hand tools and a hydraulic spreader. Allow the candidates to practice removing a door using the door handle first method and the hinge first method.

PRESENTATION

ENABLING OBJECTIVE # 9

The Firefighter II candidate, working as a member of a team, shall correctly demonstrate displacing the steering wheel.

1. Demonstrate the proper techniques including safety considerations for extricating an entrapped or pinned patient of a motor vehicle accident by displacing the steering wheel.
2. Discuss the dangers associated with front wheel-drive vehicles that have rack-and pinion steering systems that typically consists of a two-piece shaft coupled by two universal joints, a jacket assembly, and a two-piece shroud.
3. Discuss how forces generated during the displacement of a steering wheel forward, in a horizontal pulling motion, can cause the portion of the steering wheel closest to the floorboard to be lowered and actually trap or further injure the patient. It can be pulled so far as to snap the column in two.
4. Discuss displacing a tilt steering wheel by attaching a hydraulic spreader between the steering wheel and passenger side chassis.
 - a) Place the spreader in an open mode and lay it on the hood.
 - b) Secure chain to steering column and attach it to the spreader.
 - c) Secure a second chain to the front chassis on the passenger side of the vehicle and attach it to the spreader.
 - d) Displace the steering wheel and column simultaneously by closing the spreader.
 - e) This technique pulls the steering assembly diagonally away from the patient.

Reference:

J&B Fundamentals 2nd edition, page 740

NOTE: Some vehicles (e.g., a Pontiac Fiero) have an entire console (speedometer and instrumentation) that tilts as the steering wheel is tilted. Other vehicles (e.g., Ford Ranger pick up trucks) are equipped with a tilt mechanism that articulates at a point near the firewall. These particular mechanisms do not pose as great a threat as the standard tilt mechanism in so much as it would be impossible to wrap a chain below the hinge.

APPLICATION

Set up an exercise where the students will get an opportunity to participate in a practical activity using the techniques demonstrated. Have the students displace a steering wheel.

PRESENTATION

ENABLING OBJECTIVE #10

The Firefighter II candidate, working as a member of a team, shall correctly demonstrate displacing the steering column.

1. Demonstrate how steering columns can be displaced at a diagonal angle by using a hydraulic ram and pressing against the transmission hump or from the rocker panel. The attachment for the seat belt mechanism might be a viable alternative for the ram to rest against.
2. Discuss how prior to displacing the steering column forward, the bottom half of the steering wheel should be cut with either bolt cutters or a hacksaw. First break away the plastic covering with vice grip pliers.

NOTE: Some texts suggest that this inner ring of steel inside a steering wheel may be made of sprung steel. In the event that this situation is encountered, it is necessary to cut the spokes of the steering wheel with a hydraulic cutter. The procedure is difficult to do with a hacksaw.

3. Demonstrate how hydraulic spreaders are used with a steel bearing plate at the floorboard under the steering column to push a steering column upward.
4. See EO # 9 item 4 for the techniques that move the steering wheel and column.
5. Demonstrate displacing a steering column on a front wheel drive vehicle using a tractor jack.
 - a) Secure a chain around the steering column and attach it to the chassis on the driver side.

- b) Using a bearing plate, place the tractor jack under the chain near the firewall.
- c) Begin raising the jack just enough for the steering column to clear the patient.

Reference:

J&B Fundamentals 2nd edition, page 740

APPLICATION

Set up an exercise where the students will get an opportunity to participate in a practical activity using the techniques demonstrated. Have the students displace a steering column using the appropriate equipment.

PRESENTATION

ENABLING OBJECTIVE #11

The Firefighter II candidate, working as a member of a team, shall correctly demonstrate displacing the dashboard.

1. Demonstrate the proper techniques including safety considerations for extricating an entrapped or pinned patient of a motor vehicle accident by displacing the dashboard.
 - a) Remove the windshield. Cut all 'A' and 'B' posts and flap roof back.
 - b) Make a relief cut on driver and passenger side close to the hinge.
 - c) Place a hydraulic ram on each side of the vehicle.
 - d) Simultaneously push the dash forward until patient is no longer entrapped.
 - e) Insert cribbing into the relief cuts to prevent the dash from settling back down.

Reference:

Delmar Handbook 3rd edition, pages 557, 564-565

J&B Fundamentals 2nd edition, pages 740-741

NOTE: Various manufacturers recommend using the spreader unit pinched down on the rocker panel near the 'B' post as a butt for the ram to rest against, extreme caution should be exercised when using this procedure because of the tremendous pressures

which are allowed to build up. Various base plates constructed of I-beam steel have been made which accomplish the same thing and produce less of a risk to emergency service personnel. In the absence of such a bearing plate, other viable options include making a partial cut into the rocker panel, or using the bracket that holds the seat belt mechanism. Both provide a bearing surface for the ram to rest against.

APPLICATION

Set up an exercise where the students will get an opportunity to participate in a practical activity using the techniques demonstrated. Have the students displace a dashboard using the appropriate equipment.

NOTE: The instructor may refer to the following texts for further Information regarding vehicle extrication.

1. **Vehicle Rescue by Harvey Grant.**
2. **Emergency Rescue Technician Instructor Outline – NCFRC.**
3. **Vehicle Rescue and Extrication by Ron Moore.**
4. **Principles of Extrication ,IFSTA.**

SUMMARY

Review procedures for disentangling a patient from a wrecked vehicle using the following techniques:

- Remove laminated and tempered glass.
- Displace and remove a rooftop.
- Displace and remove a door.
- Displace a steering wheel.
- Displace a steering column.
- Displace a dashboard.

LESSON THREE

FIREFIGHTER II

Rescue

DOMAIN: COGNITIVE

LEVEL OF LEARNING: COMPREHENSION

MATERIALS

IFSTA Essentials 5th edition or Jones and Bartlett Fundamentals of Fire Fighter Skills 2nd Edition or Delmar Firefighter's Handbook 3rd Edition; NFPA 1670 Standard on Operations and Training for Technical Rescue Incidents; IFSTA Advanced Rescue Techniques video; VCR/DVD and monitor; overhead projector or laptop computer and multimedia projector; transparencies and projection screen; four water rescue throws bags.

NFPA 1001 JPR, 2008 edition

6.4.2 Assist rescue operation teams

Junior Member Statement:

Junior Member training activities should be supervised by qualified instructors to assure that the cognitive and psychomotor skills are completed in a safe and non-evasive manner. While it is critical that instructors be constantly aware of the capabilities of all students both mentally and physically to complete certain tasks safely and successfully, the instructor should take every opportunity to discuss with departmental leaders and students the maturity and job awareness each participant has for the hazards associated with fire and rescue training.

TERMINAL OBJECTIVE

The Firefighter II candidate shall correctly demonstrate safe procedures while conducting rescue operations involving structural collapse, trench, cave and tunnel rescue, water, and elevator rescue.

ENABLING OBJECTIVES

1. The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used during a structural collapse scene.
2. The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used during shoring of a trench collapse.
3. The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used during cave and tunnel rescue scenes.
4. The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used when neutralizing energized electrical lines at an accident scene.
5. The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used during a water or ice rescue.
6. The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used during an industrial accident scene.
7. The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used during elevator and escalator rescue.

LESSON THREE

FIREFIGHTER II

Rescue

MOTIVATION

Firefighters are confronted with special rescue problems ranging from water rescue to major structural collapse. Each of these problems creates special hazards for the fire fighter and requires specialized training and equipment to mitigate these hazards. This unit introduces the firefighter to various types of rescue problems and presents basic training information only. Fire and rescue service personnel need to constantly seek out additional specialized training in order to increase the level of competency to further reduce the risk of firefighter death and injury during rescue operations.

PRESENTATION

ENABLING OBJECTIVE #1

The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used during a structural collapse scene.

1. List and discuss the four types of structural collapse.
 - a) Pancake.
 - b) V-shaped.
 - c) Lean-to.
 - d) Cantilever.
2. List and discuss the four stages of structural collapse rescue.
3. Discuss the principles of shoring.
 - a) A method designed to stabilize weakened structures or parts of a structure.
 - b) Process of preventing sudden or unexpected movement of heavy items that cannot be moved

- quickly but pose an immediate threat to patients and rescuers.
- c) Shoring equipment may include; timber braces, air bags, cribbing, jacks, or a combination of all of the above.
4. Identify the three most common types of shoring techniques.
 5. Identify and discuss environmental hazards associated with collapses.
 - a) Damaged utilities.
 - b) Atmospheric contamination.
 - c) Hazardous materials contamination.
 - d) Darkness.
 - e) Temperature extremes.
 - f) Noise.
 - g) Fire.
 - h) Adverse weather.
 6. Identify and discuss physical hazards associated with collapses.
 - a) Unstable rubble and debris.
 - b) Confined spaces.
 - c) Heights.
 - d) Exposed wiring and rebar.
 7. Discuss the general principles of tunneling.
 8. Show the structural collapse portion of the IFSTA Advanced Rescue video.

Reference:

Delmar Handbook 3rd edition, pages 568-570

IFSTA Essentials 5th edition, pages 362-363

NOTE: NFPA 1670 Standard on Operations and Training for Technical Rescue Incidents is the standard addressing emergency response to special rescue operations. The standard divides skill capabilities into three levels, awareness, operations and technician.

PRESENTATION

ENABLING OBJECTIVE # 2

The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used during shoring a trench collapse.

1. Discuss the primary reasons why workers and sometimes rescuers are killed or seriously injured at excavation and trenching sites.
 - a) Walls of trenches are not sloped or shored in accordance with federal and state OSHA standards.
 - b) Failure to recognize that a trench is a hazardous environment.
2. Identify the three types of trench collapse.
3. Identify the conditions that may contribute to a trench collapse.
4. Identify shoring procedures as they relate to certain soil conditions.
5. Identify safety precautions firefighters should adhere to when working in and around trenches.
 - a) Only rescuers with advanced training should enter a trench.
 - b) Do not enter the trench until it is safely shored.
 - c) The rescuer should wear appropriate PPE for physical, atmospheric and environmental hazards associated with trench rescue.
 - d) The atmosphere should be constantly monitored.
 - e) Exit ladders should be placed in trenches every 25 feet with the tip extending 3 feet above the lip of the trench.
 - f) Unnecessary firefighter personnel and civilians should be kept out of trench and away from the lip of the trench.
 - g) Identify hazards such as underground utilities, water lines, explosives, toxic or flammable gases.
6. Discuss the OSHA timbers shoring chart.

Reference:

Delmar Handbook 3rd edition, pages 571-573
IFSTA Essentials 5th edition, pages 365-366

NOTE: The N.C. Dept. of Labor, Division of Occupational Safety and Health regulates trenching and excavation operations. Fire and rescue agencies responding to trenching accidents are required to comply with the safety procedures that are mandated by OSHA. Fire and rescue agencies could be held accountable for inappropriate actions taken at a trenching accident. A copy of the trenching standard (1926.650) and a guidebook are available by contacting N.C. OSHA, Bureau of Education, Training, and Technical assistance. The telephone number is (919) 733-2486.

NOTE: OSHA standard 1926 provides two sets of timber shoring charts. One Set is for the use of hardwood; the other set is used for softwood. Each set consists of three charts, one chart for each soil classification.

APPLICATION

Contact the local Water and Sewer Department or rescue service to obtain shoring devices such as hydraulic shores, air shores, screw jacks or trench box. Display and demonstrate the devices and their usage. Allow the students to practice with them.

PRESENTATION

ENABLING OBJECTIVE # 3

The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used during cave and tunnel rescue scenes.

1. Discuss the reasons for using debris tunneling.
 - a) It is used when the patient's location is known and the chance of patient survival is high.
 - b) It is generally used only when other methods of access have failed or are not feasible.

2. Discuss the special hazards associated with tunneling.
 - a) Loose debris.
 - b) Contaminated atmospheres.
 - c) Need for testing atmosphere.
 - d) Ruptured or unstable gas, water, and electrical lines.

3. Discuss tunneling techniques.
 - a) Tunnel from lowest level.
 - b) Form a tunnel shaft along a wall or between a wall and concrete floor.
 - c) Without sharp turns.
4. List and discuss the common dangers and problems associated with cave rescue.
 - a) Darkness.
 - b) Water.
 - c) Cool temperatures.
 - d) Cave passage irregularities.
5. Discuss the problems associated with route finding in caves.
6. List and discuss equipment needs for cave rescue teams.
 - a) Clothing needs.
 - b) Technical rescue equipment.

Reference:

PRESENTATION

ENABLING OBJECTIVE # 4

The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used when neutralizing energized electrical lines at an accident scene.

1. Stress to the student that all downed electrical lines should be considered energized and dangerous.
2. Stress to students that all vehicles and PATIENTS in contact with down lines should be considered energized and direct contact by firefighters should not be made.
3. Suggest to the class that the power company should be dispatched simultaneously with the fire and rescue services to scenes involving energized lines.

Reference:

Delmar Handbook 3rd edition, pages 573-574

J&B Fundamentals 2nd edition, pages 756
IFSTA Essentials 5th edition, pages 369

APPLICATION

Contact the safety foreman at the local power company and make arrangements for a representative to present a safety lecture regarding electrical emergencies.

PRESENTATION

ENABLING OBJECTIVE # 5

The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used during a water or ice rescue.

1. List and discuss the situations, which may require the firefighter to respond to a water rescue operation:
 - a) Swimming pools.
 - b) Lakes.
 - c) Ponds.
 - d) Low-head dams- a.k.a. "drowning machine".
 - e) Streams.
 - f) Fast moving flood stage areas.
2. Discuss the difference between a rescue and a body recovery.
3. List and discuss the four general methods of water rescue.
 - a) Reach.
 - b) Throw.
 - c) Row.
 - d) Go.
4. List and discuss personal safety equipment needs.
5. Show the water rescue segment of the video IFSTA 'Advanced Rescue'.

Reference: :

Delmar Handbook 3rd edition, pages 566-568
J&B Fundamentals 2nd edition, pages 765-766
IFSTA Essentials 5th edition, page 370

APPLICATION

Working outside, divide the class into equal groups and provide each group with a water rescue throw bag or a small diameter throw line (50'-75') attached to a partially filled milk jug. Demonstrate to students how to throw the device effectively. Set up a target approximately forty feet away from the designated throwing point and have each group practice throwing a line to a simulated patient.

PRESENTATION

ENABLING OBJECTIVE # 6

The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used when operating on an industrial accident scene.

1. Explain to the students that when operating at an industrial accident scene, they should first perform a preliminary survey of the accident scene. Identify the key elements of the initial survey of an industrial accident.
 - a) Medical condition.
 - b) Degree of entrapment.
 - c) Number of rescuers needed.
 - d) Type and amount of equipment needed.
 - e) Need for specialized equipment and personnel.
 - f) Level of hazardous material risk.
2. Discuss using in-plant experts for assistance.

Reference:

Delmar Handbook 3rd edition, pages 574-576

IFSTA Essentials 5th edition, pages 372

PRESENTATION

ENABLING OBJECTIVE # 7

The Firefighter II candidate shall correctly describe in writing the techniques and safety procedures used during elevator and escalator rescue.

1. Discuss the basic operation of elevators.

2. Discuss the six steps for evacuating an elevator car.
 - a) Determining elevator car location.
 - b) Establish communications.
 - c) Contact elevator mechanic.
 - d) Secure elevator car.
 - e) Opening hoist-way doors.
 - f) Passenger removal.
3. Discuss the operational characteristic of escalators.
4. Advise the students that the best advice for rescue is to call in the escalator technician.

Reference:

Delmar Handbook 3rd edition, pages 576-580

J&B Fundamentals 2nd edition, page 768

IFSTA Essentials 5th edition, pages 374-375

SUMMARY

This lesson plan covered a wide range of special rescue problems. The intent was to give the firefighter a basic understanding of the rescue and safety principles of each problem. It must be stressed that each problem requires special training and equipment and this unit by no means fully prepares the firefighter to handle all of the special problems.