LESSON ONE FIREFIGHTER I Sprinklers

DOMAIN: COGNITIVE

LEVEL OF LEARNING: KNOWLEDGE

MATERIALS

Overhead projector or laptop computer and multimedia projector; projection screen; IFSTA Essentials 5th edition or Jones and Bartlett Fundamentals of Fire Fighter Skills 2nd Edition or Delmar Firefighter's Handbook 3rd Edition.

NFPA 1001 JPR, 2008 edition

5.3.14 Conserve property

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 I candidate, when given a written exam, shall correctly describe the major benefits provided by an automatic sprinkler system.

ENABLING OBJECTIVES

1. The Firefighter I candidate shall correctly describe in writing how the presence of an automatic sprinkler system located within a building enhances life safety.

2. The Firefighter I candidate shall correctly identify in writing the reasons why the presence of an automatic sprinkler system promotes property conservation within a structure.

3. The Firefighter I candidate shall correctly identify in writing why sprinklers are not utilized in all occupancies.

LESSON ONE
FIREFIGHTER I
Sprinklers

MOTIVATION

Two major benefits of sprinkler-protected buildings are: they provide reduced risk of personal injury, and they reduce property damage that results from fire. The fact that a building is sprinkler protected is important to a firefighter and can play a major role in the success or failure of a fire fighting operation. Where an automatic sprinkler system protects a facility, the fire will usually be small, any civilian casualties will usually be confined to the area of origin, and fire fighters will be working in a far less dangerous environment. Automatic sprinkler systems are the most reliable form of fire protection for industry, institutions, commercial facilities, and residential occupancies. Firefighters should develop a good understanding of how sprinklers impact life safety and property conservation, and thus become strong advocates promoting sprinkler protection within their communities. Additionally, the firefighter should be aware of the reduced risk to their own safety when combating fires within sprinkler protected buildings.

PRESENTATION

ENABLING OBJECTIVE #1

The Firefighter I candidate shall correctly describe in writing how the presence of an automatic sprinkler system located within a building enhances life safety.

1. List and discuss the advantages of a sprinkler system in terms of life safety.
    a) The sprinkler system discharges water directly on fire.
    b) Combustion products are limited.
    c) Prewetting is accomplished.
    d) Automatic local audible alarms are used.

2. Discuss some of the rare situations where people have died in sprinkler-protected buildings and why. Be sure to point out that no multiple deaths have been reported to the NFPA involving fires in sprinkler-protected buildings.

3. Discuss the life-safety performance of sprinklers in Australia and New Zealand. Point out that in the 100 years between 1886 and 1986, only 11 fatalities were related to fires in sprinkler protected buildings.

4. Identify occupancies where sprinklers would be of obvious benefit and discuss the reasons why.
   a) High-rise occupancies.
   b) Hospitals.
   c) Convalescent / nursing homes.
   d) Schools or institutions.
   e) Concert halls / convention centers.
   f) Multiple residential occupancies.
   g) Hotels / motels.
   h) Factories.
   i) Shopping centers.

5. Briefly, discuss residential sprinkler systems from a life safety perspective and emphasize that residential fires kill more people than any other type of fire.

Reference:
Delmar Handbook 3rd edition pages 357-358
J&B Fundamentals 2nd edition, pages 949-950, 960
IFSTA Essentials 5th edition, pages 825, 842-843, 855-856

APPLICATION

Divide the class into small groups and have them identify occupancies in their communities that would represent a potential for high loss of life in case of a fire.

PRESENTATION

ENABLING OBJECTIVE #2

The Firefighter I candidate shall correctly identify in writing the reasons why the presence of an automatic sprinkler system promotes property conservation within a structure.

1. List and discuss the advantages of a sprinkler system in terms of property conservation.
   a) The sprinkler system discharges water directly on fire.
   b) Combustion products are limited.
   c) Prewetting is accomplished.
   d) Automatic local audible alarms are used.
   e) The fire department may be notified automatically.

2. Point out the fact that fire is an inherent hazard in industry. Without automatic sprinkler systems to protect industry, many cities and communities would loose a significant part of their tax base.

3. Illustrate how commercial properties, such as shopping malls and strip malls with multiple businesses, could not coexist without suffering devastating loses if there was a fire and no automatic sprinkler protection.

Reference:
Delmar Handbook 3rd edition pages 357-358
J&B Fundamentals 2nd edition, pages 949-956
IFSTA Essentials 5th edition, page 825

PRESENTATION

ENABLING OBJECTIVE #3

The Firefighter I candidate shall correctly identify in writing why sprinklers are not utilized in all occupancies.

1. Discuss with the class the various occupancies that might not always be protected by a sprinkler system, but should be.
   a) High-rise occupancies.
   b) Hospitals.
   c) Convalescent / nursing homes.
   d) Schools or institutions.
   e) Concert halls / convention centers.
   f) Multiple residential occupancies.
   g) Hotels / motels.
   h) Factories.
   i) Shopping Centers.

2. List and discuss the common objections to sprinklers.

a) Sprinkler systems drench people and cause panic or illness.
b) All sprinklers discharge water at the same time.
c) There is a high installation cost.
d) Appearance.
e) There may be a limited water supply to feed the system.

3. Discuss incentives for installing sprinkler systems. Listed below are some examples of incentives, there are others that you may want to list.
   a) Liability reduction, life safety.
   b) Code deviations, trade-offs..
   c) Insurance savings.
   d) Limiting fire department cost.

Reference:
J&B Fundamentals 2nd edition, page 561

SUMMARY

Reiterate that automatic sprinkler systems are installed in all types of occupancies primarily for property conservation, however they are life-safety related.

Review the aspects of automatic sprinkler system protection that promote property conservation.

Review the reasons why some occupancies, may not be protected by automatic sprinkler systems.

LESSON TWO FIREFIGHTER I Sprinklers

DOMAIN: Psychomotor

LEVEL OF LEARNING: Application

MATERIALS

Overhead projector or laptop computer and multimedia projector; projection screen; access to an automatic sprinkler system or a sprinkler system simulator; IFSTA Essentials 5th edition or Jones and Bartlett Fundamentals of Fire Fighter Skills 2nd Edition or Delmar Firefighter's Handbook 3rd Edition.

NFPA 1001 JPR, 2008 edition

5.3.14 Conserve property

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

When provided with a sprinkler system or a sprinkler simulator, the Firefighter I candidate shall demonstrate the ability to correctly identify and properly use system components that are designed to provide fire department support to an automatic sprinkler system.

ENABLING OBJECTIVES

1. The Firefighter I candidate, when provided with a sprinkler system or a sprinkler simulator, shall correctly identify and properly connect a hose to the fire department connection.

2. The Firefighter I candidate, when provided with a sprinkler system or a sprinkler simulator, shall correctly identify and properly operate a sprinkler system's main control valve.

LESSON TWO
FIREFIGHTER I
Sprinklers

MOTIVATION

The successful operation of an automatic sprinkler system will often depend upon the support provided by the local fire department. This support actually starts during a pre-incident survey.
It is imperative that the Firefighter I candidate have a good understanding of automatic sprinkler system components and how they can be utilized to provide the necessary fire department support that will be required. The firefighter should also become familiar with the location of these system components in the local response area.

PRESENTATION

ENABLING OBJECTIVE #1

The Firefighter I candidate, when provided with a sprinkler system or a sprinkler simulator, shall correctly Identify and properly connect a fire hose to the fire department connection.

1. Discuss the water motor alarm.
   a) Purpose.
   b) Location.
   c) How it operates.

2. Discuss the purpose of a fire department connection (FDC).

3. Discuss the characteristics of various FDCs.
   a) The importance of clappers or swing check.
   b) Type of connection: size, type of threads.
   c) Ball drip valve.
   d) Check valve.
   e) Break-away-caps.

4. Ask if all sprinkler systems are equipped with an FDC?

5. Point out that fire department connections are sometimes omitted.
    a) Omissions are described under section 4-6.8, 2008 edition of the NFPA 13, Standard for the Installation of Sprinkler Systems.
    b) Many older systems may not be equipped with an FDC.

6. Discuss what actions can be taken to supplement a sprinkler system's water supply in the absence of a fire department connection.
    a) Pump into private yard hydrant.
    b) Pump into the 2" main drain where provisions make it possible.
    c) Pump into a standpipe hose connection utilizing double female adapters.

7. Discuss procedures for connecting hose lines to an FDC.
    a) Locate the water supply's municipal hydrant.
    b) Connect the water supply hose from hydrant to the support pumper.
    c) Advance two 2 ½" discharge lines to the sprinkler siamese or one.
    d) Use large diameter hose line.
    e) Remove F.D.C. caps and connect both discharge lines to the siamese.
    f) Utilize adapters where required.

Reference:
Delmar Handbook 3rd edition pages 366-368, 374-373
J&B Fundamentals 2nd edition, pages 513, 956-958
IFSTA Essentials 5th edition, pages 850-852, 856

NOTE: While the objective of this lesson plan can probably be achieved through practical demonstration and application, it is recommended that you begin in the classroom to briefly familiarize students with automatic sprinkler system components.

APPLICATION

Make arrangement with a local proprietor and take students on a tour of a sprinklered facility to identify fire department connections and their components.

While it may not be possible to familiarize your class with all the sprinklered properties in their community, due to time constraints, it is essential that you point out the general locations where the fire department connection may be found. A training facility or a simulator should be provided to allow each student an opportunity to practice connecting hose lines to a FDC.

NOTE: It is not a good practice to allow students to connect lines to an actual fire department connection for training purposes due to liability.

PRESENTATION

ENABLING OBJECTIVE #2

The Firefighter I candidate when provided with a sprinkler system or a sprinkler simulator, shall correctly identify and properly operate a sprinkler system's main control valve.

1. Discuss the purpose of the main control valve found on a sprinkler system.

2. Briefly identify the type of main control valves commonly used on an automatic sprinkler system.
   (a) OS&Y.
   (b) PIV.
   (c) PIVA.
   (d) WPIV.

3. Describe the procedures for operating the main control valves. Be sure to stress the fact that you cannot depend 100% on the indicating device found on some indicating type valves.

4. A training facility or a simulator should be provided to allow each student an opportunity to operate various control valves.

Reference:
Delmar Handbook 3rd edition pages 367-369
J&B Fundamentals 2nd edition, pages 563, 954-956
IFSTA Essentials 5th edition, pages 847-848

APPLICATION

Make arrangements with a local proprietor and take students on a tour of a sprinklered facility to identify main control valves.

NOTE: Do not allow students to operate control valves located at sprinklered facilities.

NOTE: Additional details about sprinkler control valves are included in the Firefighter II lesson plans.

SUMMARY

Emphasize the fact that it is obvious when a sprinkler system activates and, it will need some type of support from the firefighters.

Emphasize that if the fire is still burning out of control when the fire department arrives, it is apparent that the sprinkler system will need to be quickly and appropriately supplemented.

Review the fact that sprinkler systems will often have the fire under control when the fire department arrives. Subsequently, immediate attention must be given to the appropriate control valves. Time is crucial. Firefighters should already be familiar with the location and procedures for operating the main control valves.

LESSON THREE FIREFIGHTER I Sprinklers

DOMAIN: PSYCHOMOTOR

LEVEL OF LEARNING: APPLICATION

MATERIALS

IFSTA Essentials 5th edition or Jones and Bartlett Fundamentals of Fire Fighter Skills 2nd Edition or Delmar Firefighter's Handbook 3rd Edition; slides from the Factory Mutual program, "Fighting Fire in Sprinklered Buildings;" sprinkler heads, sprinkler wedge or tongs, and access to plumbing to simulate an activated sprinkler head.

NFPA 1001 JPR, 2008 edition

5.3.14 Conserve property

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 I candidate, when given a sprinkler head, shall accurately describe it's operating components and shall be able to stop the flow of water through a sprinkler head by correctly plugging the orifice.

ENABLING OBJECTIVES

1. The Firefighter I candidate, when given a sprinkler head, shall correctly describe it's type, temperature rating, approximate flow and position of installation.

2. The Firefighter, I candidate, when provided with a sprinkler flowing water at a minimum of 15 psi residual pressure and when given a water stopping device, shall correctly demonstrate the ability to stop the water flow from the sprinkler head.

LESSON THREE
FIREFIGHTER I
Sprinklers

MOTIVATION

Sprinkler heads have changed little in their basic design since their inception over 100 years ago. However, one modification occurred in the mid 1950's. In 1955 the NFPA designated the new spray sprinkler as the standard sprinkler and has since been required in all new sprinkler system installations. The previous standard sprinkler was simply designated the old-style sprinkler. The modification made to the sprinkler resulted in a newly designed deflector that caused the water to be discharged toward the floor. The old-style sprinkler discharges approximately 60% of the water upward. Although the basic design of sprinklers has not changed significantly, they are continuously being modified and improved. Sprinkler technology has advanced to the point they can be designed to protect almost any occupancy hazard. Since sprinkler heads come in various styles, shapes, and sizes it is imperative that the fire fighter recognize the differences in heads so that they can plug and when necessary, change heads at an incident. In most cases this is the only way to maintain automatic sprinkler protection to the rest of the facility.

PRESENTATION

ENABLING OBJECTIVE #1

The Firefighter I candidate, when given a sprinkler head, shall correctly describe it's type, temperature rating, approximate flow, and position of installation.

1. Briefly discuss with the class the definition of the term sprinklers.

2. Discuss the types / designs of sprinkler heads.
   a) Pendant.
   b) Upright.
   c) Sidewall.

3. Discuss the types of thermo-responsive assemblies and their activation.
   a) Fusible link.
   b) Glass bulb.
   c) Chemical pellet.

4. Discuss the temperature ratings and the color codes used to identify the rating of a sprinkler head.

5. Discuss the "quick-response' sprinkler head. Be sure to point out the quick-response sprinkler was primarily developed for life safety. However, the concept is being used in sprinklers designed to protect property.

6. Discuss the early-suppression-fast response sprinkler (ESFR).

Reference:
Delmar Handbook 3rd edition pages 358-361
J&B Fundamentals 2nd edition, pages 950-954
IFSTA Essentials 5th edition, pages 845-847

NOTE: Additional information on quick response and ESFR sprinklers can be obtained from John Bryan's book, Automatic Sprinkler and Standpipe Systems.

APPLICATION

If sufficient numbers of sprinklers are available, provide each student with one and allow them to describe the type, temperature rating, and principles of operation. If there are an insufficient numbers of sprinklers available for everyone, you may want to do the above as a group activity rather than an individual activity.

PRESENTATION

ENABLING OBJECTIVE #2

The Firefighter I candidate, when provided with a sprinkler flowing water at a minimum of 15 psi residual pressure and when given a water stopping device, shall correctly demonstrate their ability to stop the water flow from the sprinkler head.

1. Discuss why it may be necessary to stop the flow of water from a sprinkler using a wedge as opposed to shutting off a water control valve.

2. Illustrate the fact that due to the many design configurations of sprinkler head frames, it is difficult to design a single wedge or device that will be suitable for stopping the water flow from all sprinklers.

3. Discuss the technique for inserting a sprinkler wedge or other device into a sprinkler frame. Point out precautions that should be taken to prevent breaking the sprinkler frame.

Reference:
Delmar Handbook 3rd edition pages 367-372
J&B Fundamentals 2nd edition, pages 561-563
IFSTA Essentials 5th edition, page 856

APPLICATION

Allow each student an opportunity to stop the water flow from a sprinkler by using a wedge or other device.

SUMMARY

Review the fact that the water flow from a sprinkler can and should be controlled in some instances by using a water control valve.

Review the fact that the water supply should not be shut off in areas where the fire has not yet been controlled.

Emphasize the importance of plugging the sprinklers in the area where the fire has been controlled and leaving the water control valve on, it will leave the sprinkler system operable, thus, maintaining protection in other areas of the building.

Reiterate that plugging sprinklers requires a good understanding of sprinkler head design.