## Firefighter Accidents, Injuries, and Deaths

### Course
Firefighter I

### Unit II
Safety and Orientation

### Essential Question
An average of 100 firefighters lose their lives in the line of duty each year and an additional 100,000 are injured. Are we to accept these statistics as “part of the risk we assume”, or do we move forward, learning what causes those deaths and injuries to make our profession as safe as possible?

### Rationale
Firefighting is considered one of the most dangerous professions in the world—perhaps the most dangerous, except for the military during a time of war. Firefighters are themselves at war with an enemy that can injure, maim, or kill, oftentimes without a moment’s notice. Recognizing that every call we respond to is potentially deadly highlights the need to recognize that no call is routine. Our mission in the fire service is to “save lives and property.” Among those lives we are mandated to save are our own. Recognizing when, how, and why accidents and injuries occur is the first step to reducing line of duty deaths and injuries. Learning your department’s policies and procedures relative to firefighter safety can help make that happen.

### Objectives
The student will be able to:

1. Describe the elements of a personnel accountability system, as well as how to apply that system at an emergency scene
2. Identify potential firefighter health considerations that may have long term ramifications
3. Identify a minimum of three (3) types of accidents or injuries that commonly occur responding to and from incidents of fire apparatus or personal vehicles, at emergency scenes, during training, and at the station and other on-duty locations
4. Demonstrate techniques that may be used for emergency escape and other rescue situations where and when firefighters may become trapped or disoriented in fires or other hostile environments

### Engage
Start a general discussion about firefighting, including:

- The local jurisdiction’s Risk Management and Safety Program (documentation available from your local fire department)
- Common injuries and injury prevention
- Firefighter deaths and the causes

Ask the students their ideas for reducing the current numbers of accidents, injuries, and deaths in the fire service. Express the fact that an effective safety program can only exist if everyone, Chiefs, fire officers, and firefighters support it. Use the Discussion Rubric for assessment.

### Key Points

#### I. Firefighter Personal Accountability Systems

A. Must effectively identify and track fire service personnel in fires and other emergencies while fire service personnel are working within a hazard zone
   1. Structural fires

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a. Anywhere a Self-Contained Breathing Apparatus (SCBA) is utilized
b. Collapse zone
c. Should have a mandated Standard Operating Procedure (SOP)

2. Haz-Mat incidents within established hazard zones

3. Passport System
   a. Often referred to as a “tag” system in the fire service
   b. An officer maintains a “passport” list of all personnel assigned to him or her
      i. Before entering a hazard zone, the passport or tag is left with an accountability officer who maintains a status board of those operating in the hazard zone
      ii. Upon leaving the hazard zone, the firefighter’s officer collects the passports, and the status board reflects that accordingly

4. Self-Contained Breathing Apparatus (SCBA) Tag System
   a. Includes more specific information than a basic passport system
      i. Time of entry
      ii. Expected time of exit based on SCBA team’s supply status
      iii. All personal protective equipment (PPE) is spot-checked prior to entry
      iv. Relief crews are often sent in anticipation of the interior crews running out of air supply

II. Anticipated Firefighter Health Considerations with Long-Term Ramifications
   A. Diseases of concern
      1. Bloodborne pathogens – pathogenic microorganisms present in human blood that can cause human disease
      2. Airborne pathogens – viruses, bacteria, and other harmful organisms spread by tiny droplets sprayed when a patient breathes, coughs, or sneezes. They are inhaled or absorbed through a firefighter’s eyes, mouth, or nose.
   B. Communicable diseases of concern
      1. Hepatitis – causes inflammation of the liver and comes in four forms
         a. Hepatitis A – acquired through contact with stool (feces)
         b. Hepatitis B (HBV)
            i. Acquired through contact with blood and other bodily fluids
            ii. Known to live in dried blood for many days, posing a risk long after most other common viruses would have died
iii. Can be deadly
iv. Can cause cancer of the liver
v. Hepatitis B shots are the only type of vaccination that keeps you from a disease that can cause cancer
c. Hepatitis C
   i. A sexually transmitted disease (STD)
   ii. The main mode of transmission is through intravenous (IV) drug use. IV drug users have an 80% chance of contracting Hepatitis C in one year's time
d. Hepatitis D – can only be contracted if you have Hepatitis B; it is a sub-class of Hepatitis B

2. Tuberculosis (TB)
   a. An infection that sometimes settles in the lungs and can be fatal
   b. Highly contagious and can spread through the air
   c. If a patient has a productive cough, you are safest if you consider it TB and use your Body Substance Isolation (BSI) kit

3. Acquired Immune Deficiency Syndrome (AIDS) is the name for a set of conditions that exist when the immune system has been attacked by the Human Immunodeficiency Virus (HIV)
   a. It is a smaller risk to firefighters than TB and Hepatitis B or C because the virus does not survive well outside the human body
   b. Methods of exposure to firefighters include direct contact with blood and/or bodily fluids through an open wound, a puncture wound such as an accidental needle stick, or splashes of blood or body fluid into firefighter's eyes, nose, or mouth

III. Accidents and Injuries Common to Firefighters
A. Sprains and Strains
   1. Account for 50% of all firefighter injuries (IFSTA 2008)
   2. All firefighters should learn proper lifting techniques
      a. Keep your back as straight as possible
      b. Lift with your legs, not your back
      c. Do not attempt to lift items that are too bulky or heavy to handle yourself; instead get help
   3. Use a second person or mechanical lifting device to prevent back injuries

B. Slips, trips, and falls
   1. Often the result of poor footing caused by slippery surfaces, uneven surfaces, objects, or substances on the floor
   2. Stress good housekeeping at the station and be aware on call responses
   3. Handrails, slide poles, and slides at the station must be
C. Heart attacks, strokes, and heat exposure account for 53.9% of all firefighter fatalities (IFSTA 2008)
D. Vehicle crashes responding to and from alarms account for 21.7% of all firefighter fatalities (IFSTA 2008)
E. From most to least common, firefighter deaths are caused by
   1. Stress
   2. Responding and returning to fires
   3. Falls or coming in contact with falling objects
   4. Products of combustion
   5. Building collapse
F. From most to least common, firefighter injuries are caused by
   1. Wounds, cuts, and bruises
   2. Strains and sprains
   3. Smoke or gas inhalation
   4. Burns
   5. Eye injuries

IV. Rescue and Emergency Escape Techniques
A. Emergency Escape
   1. Involves breaking through barriers (walls, doors, windows) if necessary to escape life threatening situations
   2. Necessary because of fire behavior (flashover, backdraft, etc.) or structural collapse
   3. May be necessitated because the firefighter becomes trapped, disoriented, or is running out of air supply
B. Personal Safety Systems (PSS)
   1. New York City Fire Department system
      a. To be used only once, and then taken out of service
      b. A belt-mounted nylon storage bay with heat sensor
      c. An alloy steel hook attached to 50 feet of life safety rope with a stopper knot on the end, with a descender, and a carabiner
      d. Can be used to escape from a building as tall as six stories or more
C. Personal Alert Safety Systems (PASS) Alarm – an electronic lack of motion detector that notifies personnel when a firefighter becomes motionless for 30 seconds
   1. Understand the proper use and operation of integrated units as well as single clip-on (detachable) units
      a. Auto alarm activation
      b. Manual alarm activation
   2. Must retrain with these semiannually
D. Rapid Intervention Teams or Crews (RIT or RIC)
   1. NFPA 1500 and the Occupational Safety and Health Administration (OSHA) require firefighters to operate in teams of
two or more when operating in an Immediately Dangerous to Life or Health (IDLH) atmosphere
2. This includes building fires beyond the incipient stage
3. A RIT is comprised of two or more trained and equipped firefighters outside the building prepared to make entry to rescue the entry team. This is now commonly known as the “two in/two out rule”
4. RIT team members may have other assigned duties outside the structure, but they must be able to leave them to fulfill their primary assignment of rescuing downed firefighters

Activities
1. Have the students use the Internet and newspaper or magazine articles to identify at least three (3) types of accidents or injuries that commonly occur in the following situations: responding to and from emergency incidents, training exercises, and station and other on duty locations. Have the students present their results to the class using computer-based presentation software. Use the Presentation Rubric for assessment.

2. Have the students review the Operational Check of Body Substance Isolation (BSI) Kit for First Responders Checklist. Upon completion of skills review, have students complete the skills under the supervision of an instructor.

3. Have the students write a scenario describing themselves as firefighters trapped in an emergency situation. The paper should include the steps taken to escape the emergency. Have the students research local standard operating procedures (SOPs) as needed. Use the Writing Rubric for assessment.

4. As a class discuss the following questions. Use the Discussion Rubric for assessment.
   - What are some potential firefighter health issues?
   - Which ones of these health issues may have long-term ramifications?
   - What can firefighters do to avoid these issues and their ramifications?

Assessments
Firefighter Accidents, Injuries, and Deaths Quiz and Key
Operational Check of Body Substance Isolation (BSI) Kit for First Responders Checklist
Discussion Rubric
Presentation Rubric
Writing Rubric

Materials
Firefighter Accidents, Injuries, and Deaths computer-based presentation
Personal Alert Safety System (PASS) alarm
Self-Contained Breathing Apparatus (SCBA)
BSI Kit
Computer with Internet access
Newspaper and magazine articles
Computer-based presentation software

Resources
0135151112, Essentials of Firefighting (5th Edition), International Fire Service Training Association (IFSTA)
0912212233, Safety and Survival on the Fireground, Vincent Dunn

Accommodations for Learning Differences
For reinforcement, students will participate in peer teaching (mentoring) and team learning, participate in guided research and note-taking (web-based), and keep journals (keywords and definitions).

For enrichment, students will participate in situational awareness exercises and classroom discussion and training exercises.

Instruction can be differentiated by use of oral exam, skill demonstration, or written testing. When students have met the minimum standard to be considered competent in the didactic phase of instruction as well as the tactile learning phase, it should be recorded.

State Education Standards
Texas Essential Knowledge and Skills for Career and Technical Education
§130.299. Firefighter I (One to Two Credits).
(16) The student recognizes common types of accidents and injuries and their causes. The student is expected to:
(A) describe the elements of a personnel accountability system and the application of the system at an incident;
(B) identify potential long-term firefighter health considerations;
(C) identify at least three common types of accidents or injuries such as those occurring at the emergency scene, responding to and returning from calls on fire apparatus, in personal vehicles, at the fire station, at other on-duty locations, and during training; and
(D) demonstrate techniques for action when trapped or disoriented in a fire situation or in a hostile environment.

College and Career Readiness Standards
English Language Arts
III. Speaking
A. Understand the elements of communication both in informal group
discussions and formal presentations (e.g., accuracy, relevance, rhetorical features, organization of information).

1. Understand how style and content of spoken language varies in different contexts and influences the listener’s understanding.
2. Adjust presentation (delivery, vocabulary, length) to particular audiences and purposes.

B. Develop effective speaking styles for both group and one-on-one situations.

3. Plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning.
Firefighter Accidents, Injuries, and Deaths Quiz

1. _____ Passport systems are often referred to as _____ systems.
   a. Entry
   b. Card
   c. Tag
   d. All of the above

2. _____ Bloodborne pathogens are inhaled or absorbed through firefighter’s eyes, mouth, or nose.
   a. True
   b. False

3. _____ This type of Hepatitis is commonly acquired through contact with blood and other body fluids:
   a. Hepatitis B
   b. Hepatitis C
   c. Hepatitis D
   d. Hepatitis A

4. _____ The main mode of transmission for this type of Hepatitis is IV drug use:
   a. Hepatitis A
   b. Hepatitis B
   c. Hepatitis C
   d. Hepatitis D

5. _____ This type of Hepatitis is also considered an STD:
   a. Hepatitis A
   b. Hepatitis D
   c. Hepatitis B
   d. Hepatitis C

6. _____ IV drug users have a ____ percent chance of contracting the Hepatitis asked about in question 4.
   a. 40
   b. 80
   c. 50
   d. 90
7. _____ Of the total number of firefighters killed each year, what percentage are killed responding and returning to alarms?
   a. 10.6%
   b. 15%
   c. 21.7
   d. 53.9%

8. _____ Heart attacks, strokes, and heat exposure account for what percent of firefighter fatalities?
   a. 10.6%
   b. 15%
   c. 21.7
   d. 53.9%

9. _____ The New York City Fire Department’s Personal Safety System can be used to escape from building as tall as _____ stories or more.
   a. 2
   b. 3
   c. 5
   d. 6

10. _____ PASS Alarms are an electronic lack of motion detector that notifies personnel when a firefighter becomes motionless for ____ seconds.
    a. 30
    b. 60
    c. 90
    d. 120
Firefighter Accidents, Injuries, and Deaths Quiz Key

1. C
2. B
3. A
4. C
5. D
6. B
7. C
8. D
9. D
10. A
## Operational Check of Body Substance Isolation (BSI) Kit for First Responders Checklist

**Directions** – Demonstrate the operational check of a BSI Kit. Verbalize the mandatory items within the kit and the steps to successfully complete this skill. Begin on my instruction to start. Stop when all identified steps have been accomplished and put your hands in the air to signal that you are finished with this skill. Do you understand these instructions?

<table>
<thead>
<tr>
<th>Performance Objectives</th>
<th>2 pts. each</th>
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<tbody>
<tr>
<td>Have students describe and demonstrate the following tasks:</td>
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<td>Identify and verbalize that all of the components of the BSI Kit are present:</td>
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<td>• Protective gloves</td>
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<td>• Eye protection</td>
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<td>• Mask</td>
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<td>• Alcohol-based hand cleaner, approved by the Center for Disease Control (CDC)</td>
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<td>Check to confirm that the gloves are vinyl or non-latex</td>
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<td>Check the eye protection to confirm that it provides protection from the front and the sides (American National Standards Institute (ANSI) Standard Z87.1)</td>
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<td>Check for a surgical type mask, N-95 or (HEPA) respirator mask approved by the National Institute for Occupational Safety and Health (NIOSH)</td>
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<td>Check for the alcohol-based hand cleaner approved by the Center for Disease Control (CDC)</td>
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<td>Participates in group discussion</td>
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<td>Encourages others to join the conversation</td>
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<td>Keeps the discussion progressing to achieve goals</td>
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<td>Shares thoughts actively while offering helpful recommendations to others</td>
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<td>Gives credit to others for their ideas</td>
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<td>Respects the opinions of others</td>
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<td>Involves others by asking questions or requesting input</td>
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<td>Expresses thoughts and ideas clearly and effectively</td>
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**Total Points (32 pts.)**

**Comments:**
### Presentation Rubric

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<td>• Includes properly cited sources (if used)</td>
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<td><strong>Creativity/Neatness</strong></td>
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<td>• Integrates a variety of multimedia effects to create a professional presentation (transition and graphics) or appropriate visual aid used</td>
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<td>• Title slide, table of contents, bibliography are included, using acceptable format</td>
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<td>• Image and font size are legible to the entire audience</td>
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<td>• Communicates with enthusiasm and eye contact</td>
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<td>• Voice delivery and projection are dynamic and audible</td>
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<td><strong>Audience Interaction</strong></td>
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<td>• Presentation holds audience’s attention and relates a clear message</td>
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<td>• Clearly and effectively communicates the content throughout the presentation</td>
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**Total Points (20 pts.)**

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## Writing Rubric

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<td>The writing has all required parts from introduction to conclusion in smooth transition.</td>
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<td>The writing is interesting, supportive, and complete.</td>
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**Total Points (28 pts.)**

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