This booklet comprises the eighth grade component of a series of curriculum guides on fire and burn prevention. Designed to meet the age-specific needs of eighth grade students, its objectives include: (1) focusing on technical aspects of fire hazards and detection, and (2) exploring fire hazards outside the home. Texas essential elements of instruction that may appropriately be integrated with the fire prevention curriculum are listed. The booklet's three sections provide lesson plans, teacher materials, and student materials. The five lessons are: "Applying Fire Science"; "At the Workplace/Sprinklers"; "Smoke Alarms"; "Outdoor Fire Safety"; and "Accepting My Safety Job." Each lesson plan includes objectives; a list of materials; and suggestions for a focus activity, presentation of content, guided and independent practice, reteaching, enrichment, and closure. A pretest/posttest is provided, along with activity sheets to be photocopied. A scope and sequence chart covering kindergarten through high school is also presented. (JDD)
Fire Safety for Texans

Fire and Burn Prevention Curriculum Guide Developed by Texas Commission on Fire Protection

Eighth Grade

Fire Safety's My Job
Dear Educator:

The Texas Commission on Fire Protection is pleased to provide this curriculum guide to facilitate the teaching of fire prevention. To understand why instruction in fire prevention must be matched to the developmental needs of students, please read the introduction section beginning on Page 3. This introduction also tells how fire prevention education can be coordinated with the instructional requirements of Texas schools.

We welcome your comments and suggestions. Please telephone or write to share your successes and questions with our staff. Also, we invite you to request guides for other grade levels and additional copies of this booklet by clipping and returning the form below.

Your involvement in fire prevention education will be appreciated by your students and your entire community.

Sincerely,

Anne Easterling
Program Administrator
Fire Prevention Education

Please send the following curriculum guide(s):

<table>
<thead>
<tr>
<th>Grade Level</th>
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<tbody>
<tr>
<td>Kindergarten</td>
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<td>Third Grade</td>
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<td>High School Economics</td>
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Comments and suggestions on Grade ________________ guide(s):

__________________________________________________________________________

Are you currently using other materials produced by the Commission on Fire Protection? (Circle one) Yes No

Name __________________________________________ Position _______________________

Address ________________________________________ Telephone ______________________

City ___________________________ State ____________ ZIP _____________

Mail to: Texas Commission on Fire Protection, Fire Prevention Education, P.O. Box 2286, Austin, TX 78768

Andrew F. Mehl, Chairman, El Paso * Roy Clayman, Vice Chairman, Abilene * David Burkhardt, Secretary, Arlington
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Fire Safety for Texans

Fire and Burn Prevention Curriculum Guide Developed by Texas Commission on Fire Protection

Eighth Grade

Fire Safety’s My Job
Fire Safety for Texans
The complete series from the Texas Commission on Fire Protection

Kindergarten
Fire Safe Together

First Grade
Fire Safety: Any Time, Any Place

Second Grade
Making Me Fire Safe

Third Grade
Positively Fire Safe

Fourth Grade
Fire Safety: Stop the Heat

Fifth Grade
Charged Up For Fire Safety

Sixth Grade
Fire Safety Power

Seventh Grade
Responsible For Fire Safety

Eighth Grade
Fire Safety's My Job

Health (High School)
A Lifetime For Fire Safety

Economics (High School)
Fire Safety For Consumers
### Scope and Sequence for Fire and

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<tr>
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<tbody>
<tr>
<td><strong>General Objectives</strong></td>
<td><strong>Basic Awareness</strong></td>
<td><strong>First Grade</strong></td>
<td><strong>Second Grade</strong></td>
<td><strong>Third Grade</strong></td>
</tr>
<tr>
<td>Basic awareness of fire and burn dangers. Simple actions to reduce injury, parent involvement.</td>
<td>Basic knowledge of fire and burn hazards. Basic understanding of simple injury reduction: continuous parent involvement.</td>
<td>Basic understanding of how to prevent and put out fires, grills, self-defense in case of fire and elect, smoke or burn situations.</td>
<td>Hazards and safe storage of flammable liquids, proper actions to prevent fires and to burn or to reduce the risk of fire, especially related to metallic objects.</td>
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</tr>
<tr>
<td><strong>Science of Fire</strong></td>
<td><strong>Understanding and Analysis of Facts about Fire</strong></td>
<td><strong>Inlay Ligation</strong></td>
<td><strong>Limitation Reduction</strong></td>
<td><strong>Embers and CMOs</strong></td>
</tr>
<tr>
<td>Identifies &quot;good&quot; and &quot;bad&quot; fires and heat sources. 25x41A, 25x1C</td>
<td>Identifies three elements of fire hazards. 25x41A, 25x1C</td>
<td>Identifies those elements of fire hazards. 25x41A, 25x1C</td>
<td>Identifies three elements of fire hazards. 25x41A, 25x1C</td>
<td>Identifies three elements of fire hazards. 25x41A, 25x1C</td>
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<tr>
<td><strong>Safety Communication</strong></td>
<td><strong>Who and why</strong></td>
<td><strong>What and where</strong></td>
<td><strong>Why and where</strong></td>
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<tr>
<td>Identifies &quot;hot&quot; and &quot;cold&quot; air or smoke in hazard zones. 25x41A, 25x1C</td>
<td>Identifies &quot;hot&quot; and &quot;cold&quot; air or smoke in hazard zones. 25x41A, 25x1C</td>
<td>Identifies those elements of fire hazards. 25x41A, 25x1C</td>
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<tr>
<td><strong>Injury Reduction</strong></td>
<td><strong>Preventing and Analyzing Techniques to Reduce Fire and Burn Injuries</strong></td>
<td><strong>Preventing and Analyzing Techniques to Reduce Fire and Burn Injuries</strong></td>
<td><strong>Preventing and Analyzing Techniques to Reduce Fire and Burn Injuries</strong></td>
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<tr>
<td>Demonstrates and practices rolling on ground in cases of clothing fire. 25x41A, 25x1C</td>
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<tr>
<td><strong>Hazard Recognition</strong></td>
<td><strong>Recognizing Fire and Burn Hazards at Home, Play and Work</strong></td>
<td><strong>Recognizing Fire and Burn Hazards at Home, Play and Work</strong></td>
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<tr>
<td>Identifies hot and cold objects, including:</td>
<td>Identify hot and cold objects, including: 25x41A, 25x1C</td>
<td>Identifies those elements of fire hazards. 25x41A, 25x1C</td>
<td>Identifies those elements of fire hazards. 25x41A, 25x1C</td>
<td>Identifies those elements of fire hazards. 25x41A, 25x1C</td>
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<tr>
<td><strong>Hazard Reduction</strong></td>
<td><strong>Applying and Analyzing Techniques for Reducing or Eliminating Fire and Burn Hazards</strong></td>
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<tr>
<td>States rules to stay away from hot objects. 25x41A, 25x1C</td>
<td>States rules to stay away from hot objects. 25x41A, 25x1C</td>
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<td><strong>Evacuation and Dismissal</strong></td>
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<td>Knows and applies methods of fire and smoke warning and escape and exit techniques, values the importance of smoke detectors and escape planning. 25x41A, 25x1C</td>
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<td><strong>Emergency and Fire Safety</strong></td>
<td><strong>Recognizing Hazards of Matches, Lighters and Other Fire Hazardous Items</strong></td>
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<td>Demonstrates using matches to start fires. 25x41A, 25x1C</td>
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<td><strong>Reporting A Fire</strong></td>
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<td>Knows and applies appropriate methods of reporting suspected fire or smoke situations. 25x41A, 25x1C</td>
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<tr>
<td><strong>Care Giving</strong></td>
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<td>Understands and uses appropriate methods of care and attention to others who are ill or sick, including young children and older adults. 25x41A, 25x1C</td>
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<td>Understands and values the role of the fire service in community and in saving lives. 25x41A, 25x1C</td>
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<td><strong>Outdoor Safety</strong></td>
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<td>Knows and applies methods for reducing outdoor fires and escapes from smoke and burning smoke detectors. 25x41A, 25x1C</td>
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<td>Fifth Grade</td>
<td>Sixth Grade</td>
<td>Seventh Grade</td>
<td>Eighth Grade</td>
<td>Health</td>
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<tr>
<td><strong>Burn Prevention Education in Texas</strong></td>
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**Fifth Grade**
- Teaching equipment safety: impact of fire on outdoor environments and methods to reduce that impact; first aid for burns, personal relationship to community fire safety.

**Sixth Grade**
- Fire physical: electrical hazards and responding to those hazards; continued learning for all ages.
- Describes safety of fire hazards and detection: fire hazards outside the home.
- Describes three principles of fire equipment: detection, escape, and fire prevention.
- Describes the economic impact of fires on the community: reduction of costs.

**Seventh Grade**
- Describes safety of fire hazards and detection: fire hazards outside the home.
- Describes the economic impact of fires on the community: reduction of costs.
- Describes: first aid and burn prevention techniques and emergency actions: awareness of needs of all age groups.

**Eighth Grade**
- Describes: first aid and burn prevention techniques and emergency actions: awareness of needs of all age groups.
- Describes: first aid and burn prevention techniques and emergency actions: awareness of needs of all age groups.
- Describes: fire prevention and emergency actions: awareness of needs of all age groups.

**Health**
- Describes: first aid and burn prevention techniques and emergency actions: awareness of needs of all age groups.
- Describes: first aid and burn prevention techniques and emergency actions: awareness of needs of all age groups.
- Describes: fire prevention and emergency actions: awareness of needs of all age groups.

**Economics**
- Describes: fire prevention and emergency actions: awareness of needs of all age groups.
- Describes: fire prevention and emergency actions: awareness of needs of all age groups.
- Describes: fire prevention and emergency actions: awareness of needs of all age groups.

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<tr>
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<th>Second Grade</th>
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<th>Fourth Grade</th>
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<tbody>
<tr>
<td><strong>Essential Elements</strong></td>
<td>Current essential elements as defined by Chapter 75 of the Texas Education Code that apply. The student shall be provided opportunities to</td>
<td><strong>Science Grade</strong></td>
<td><strong>Science Grade</strong></td>
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<tr>
<td>Life Science</td>
<td></td>
<td>Earth Science</td>
<td>Physical Science</td>
<td>Life Science</td>
</tr>
<tr>
<td><strong>1. Basic needs and life processes</strong></td>
<td><strong>2. Human responsibility regarding earth science phenomena and natural resources</strong></td>
<td><strong>3. Energy - energy sources:</strong></td>
<td><strong>4. Structure and function of the human body</strong></td>
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**Science Concepts**

- Current essential elements as defined by Chapter 75 of the Texas Education Code that apply. The student shall be provided opportunities to

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<table>
<thead>
<tr>
<th>Fifth Grade</th>
<th>Sixth Grade</th>
<th>Seventh Grade</th>
<th>Eighth Grade</th>
<th>Health</th>
<th>Economics</th>
</tr>
</thead>
<tbody>
<tr>
<td>§75.25.12D observe phenomena resulting from the life, earth, and physical sciences.</td>
<td>§75.25.12D observe phenomena and apply knowledge of theories, facts, and concepts from the life, earth, and physical sciences.</td>
<td>§75.40.1.1D recognize that individuals must accept the consequences of their decisions.</td>
<td>§75.65.1.1A understand the care of body systems and their functions.</td>
<td>§75.96.1B analyze how supply and demand affect prices.</td>
<td></td>
</tr>
<tr>
<td>§75.25.6A.1A define and describe abnormal, normal, and healthy human behavior.</td>
<td>§75.45.1.1D investigate the range of effects on personal health and safety from the use of tobacco.</td>
<td>§75.44.1.11B determine the impact of technological innovations on business industry and agriculture in the U.S.</td>
<td>§75.65.1.1B relate personal behavior to wellness.</td>
<td>§75.60.1D demonstrate reasonable behavior concerning tobacco.</td>
<td></td>
</tr>
<tr>
<td>§75.25.6E.1E draw conclusions from observed data.</td>
<td>§75.44.1.11C discriminate between responsible and irresponsible choices that affect personal health.</td>
<td>§75.44.1.11C determine the impact of technological innovations on business industry and agriculture in the U.S.</td>
<td>§75.44.1.1D demonstrate reasonable behavior concerning tobacco.</td>
<td>§75.40.1.1D determine the impact of technological innovations on business industry and agriculture in the U.S.</td>
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</tr>
<tr>
<td>§75.25.7 B relate classroom objects, science principles, and activities to daily life.</td>
<td>§75.25.7 B relate classroom objects, science principles, and activities to daily life.</td>
<td>§75.44.1.1E evaluate skills in accident prevention, injury control, and emergency action.</td>
<td>§75.65.1.1G identify components of comprehensive accident prevention programs.</td>
<td>§75.65.1.1E evaluate skills in accident prevention, injury control, and emergency action.</td>
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<tr>
<td>§75.25.7 D identify benefits and limitations of advertising as it relates to selection of health-related products.</td>
<td>§75.25.7 D develop strategies for decision-making about advertising.</td>
<td>§75.44.1.1F describe social relationships in the environment.</td>
<td>§75.65.1.2A analyze messages of advertising for health resources and activities.</td>
<td>§75.65.1.2A analyze messages of advertising for health resources and activities.</td>
<td></td>
</tr>
<tr>
<td>§75.25.7 E recognize need for first aid.</td>
<td>§75.25.7 E recognize hazards in the environment, and use knowledge and skills needed to avoid injury and to prevent accidents.</td>
<td>§75.44.1.1G examine the role of consumer protection.</td>
<td>§75.65.1.2G describe the wide range of resources designed to protect and promote well-being of people.</td>
<td>§75.65.1.2E investigate current health issues.</td>
<td></td>
</tr>
<tr>
<td>§75.25.7 F.1A identify locally available voluntary health agencies.</td>
<td>§75.25.7 F.2B recognize interdependence of people and the environment, and recognize personal responsibility for protecting the environment.</td>
<td>§75.44.1.2G identify ... appear in class and on the job for providing consumer protection.</td>
<td>§75.44.1.2G identify ... appear in class and on the job for providing consumer protection.</td>
<td>§75.44.1.2G identify ... appear in class and on the job for providing consumer protection.</td>
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</tr>
<tr>
<td>§75.25.7 G.1B explain why conservation of economic resources is important.</td>
<td>§75.25.7 G.2B explain why conservation of economic resources is important.</td>
<td>§75.44.1.2G identify ... appear in class and on the job for providing consumer protection.</td>
<td>§75.44.1.2G identify ... appear in class and on the job for providing consumer protection.</td>
<td>§75.44.1.2G identify ... appear in class and on the job for providing consumer protection.</td>
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</table>

Earth Sciences
2.2 geology
- agents of weathering, erosion, and deposition.
- rock cycle

2.6 meteorology
- effects of use for change and severe weather.
- effects of weather on human activities.

Physical Sciences
2.1 energy
- laws of energy sources of energy.
- transformation of energy.
- use of energy in a variety of situations.

2.4 electricity and magnetism
- charge, current, and forces.
- properties of electromagnetism.
Introduction
Introduction

Why teach fire and burn prevention?

Each year during the past decade, about 300 Texans have died in fires. The Texas Commission on Fire Protection is committed to reducing this alarming statistic. Analysis of fire statistics shows that the vast majority of fires — and the resulting fire deaths — could have been prevented. Regrettably, most people do not know or practice even simple actions that can prevent fires and burns.

The Texas Commission on Fire Protection believes the key to reducing fires and fire deaths is education. Fire safety education has traditionally been concentrated in elementary school observances of Fire Prevention Week. While these observances can produce effective results, thoughtful analysis of the fire problem and fire safety educational programs shows that a more comprehensive, age-appropriate approach to fire safety education can multiply its benefits.

Recognizing the limits of classroom instruction time, the Texas Commission on Fire Protection has examined the Texas essential elements of instruction to determine the most appropriate topics with which to integrate fire prevention and fire safety. Teachers from across the state have provided feedback on topics appropriate for each grade level, kindergarten through high school.

The result of this extensive research is “Fire Safety For Texans,” a series of curriculum guides teaching fire and burn prevention and on the age-specific needs of eighth-grade students related to fires and burns. You will also find additional information on the format and materials found in this booklet.

This booklet has three sections:

- **Lesson Plans.** This section includes all steps in the lesson cycle.
- **Teacher Materials.** This section includes all teaching aids and tests.
- **Student Materials — Duplicating Masters.** This section includes master copies of materials to be used by students.

★ General Objectives: To focus on technical aspects of fire hazards and detection
To explore fire hazards outside the home

Essential Elements: The student will be provided opportunities to:

- §75.44 (b) 3. classify objects or events according to similarities and differences.
- §75.44 (b) 7D. contrast human activities that affect the natural environment.
- §75.48 (c) 3D. analyze the impact of technological innovations on business, industry and agriculture (in U.S.).

Background: Age Profile

Stage of identity vs. role confusion, which means the young teen needs experiences that will help establish his own identity. Lack of successful experiences may lead to confusion about his future role as an adult.

The young teen experiences variability in emotions, physical abilities and scholastic interests. She is probably more concerned about appearance and sex roles than occupational choice, but will begin thinking about careers and the future.

While the eighth grader desires to be independent, acceptance by peers is very important. He may be easily influenced by peer pressure and have a tendency to hero worship. The young teen may take risks and exhibit a tendency to test authority. She "tries on" different attitudes and actions.

He is beginning formal operational thought, which means he is learning to solve problems without models. He wants to try mental manipulations. Thinking can be flexible, abstract and local. The junior high student can apply his new thinking skills to many situations. Successful learning can take place through
experiences, hypothetical projections, role models, demonstrations, rehearsal and teaching others.

The young teen operates under a morality of cooperation. She views rules as flexible, to be obeyed out of respect.

Fire And Burn Hazards

Cigarette smoking, especially combined with drugs and alcohol.

Cooking — contact with stoves or other appliances; hot liquids or grease while serving or cooking food, including job-related.

Flammable substances — gasoline, including use in car, storage in garage, use to start fire; explosive chemicals.

Burns from mechanical equipment — burns from exhaust, radiator, battery or welding on cars or motorcycles; gasoline; mini-bikes and lawn mowers.

Clothing ignition from careless smoking or cooking. Smoke and gas inhalation from fire.

Outdoor hazards — utility poles and high-tension wires; sunburn; fireworks.

Teacher's Notes On Materials: Illustrations and activity sheets in this booklet are intended to serve as masters. Photocopy, then use the photocopy as directed.

The eighth-grade unit uses background information and activity sheets in the form of a student "Tech Manual." The teacher may produce the booklet (insert all pages in a folder or staple pages together), or the pages may be distributed to the students during each lesson to insert in a folder. The lesson plans assume that the material has already been compiled into booklets.

Pages to include in the student "Tech Manual" are:

- "Fire Safety Technical Manual" Title Page
- "Factors In Ability To Burn"
- "How Would It Burn?"
- "Hazards In The Workplace"
- "Selected Safety Guidelines"
- "Be On Guard"
- "My Own Business"
- "Smoke Alarms On Guard"
- "Home Smoke Alarm Survey"
- "Outdoor Fires"
- "Outdoor Fire Safety"
- "Wanted: Fire Safety Helper"

Pre-Test and Post-Test: Conduct the pre-test prior to presenting the first lesson and the post-test following the fifth lesson.

Teacher's Note on Closure Activities: Some activities included in the closure phase of the lesson cycle may be effectively used in the next lesson's focus activity.

Key To Icons: The following icons can be used to easily identify activities in the lesson plans:

- Lesson objectives
- Focus and closure
- Creative group activity, including role playing
- Lecture
- Group problem-solving activity
- Answering questions
- Guest presenter
- Investigation or research
- Creative writing activity
- Cut-and-paste activity
- Group discussion
- Drawing, artwork or illustration
LESSON ONE:

Applying Fire Science

Goal: To relate characteristics of fire and flammable/combustible materials

★ Objectives: The student will:
- define and describe fire, flash point, flammability of construction and clothing types (44(b)70)

Materials: Pre-tests (p. 15); "Fire Safety Learning Laboratory" sign (p. 16); pages titled "Fire Safety Technical Manual" (p. 29), "Factors in Ability To Burn" (p. 30) and "How Would It Burn" (p. 31) from student "Tech Manual"; "Factors in Ability To Burn" overhead transparency (p. 17); answer keys (p. 23).

Focus: Administer pre-test before beginning lesson.
Display "Fire Safety Learning Laboratory" sign. Introduce unit on fire prevention by reviewing basic information (three elements of fire, rolling to put out clothes fire, crawling in smoke, cooking a burn, checking for fire hazards). Tell students that:
- This study will focus on the workplace and on technical aspects of fire safety.
- The classroom will be a mock factory called the "Fire Safety Learning Laboratory."
- The students will be "Fire Safety Technicians." Define "technician" as a person who has a specialized job that requires specific knowledge and skill.

List unit objectives:
- To focus on technical aspects of fire hazards and detection
- To explore fire hazards outside the home

Outline lesson objectives (paragraph above).

Presentation Of Content: Distribute "Fire Safety Tech Manuals." Discuss purpose of a technical manual, presented on the title page. Encourage student involvement in the mock lab situation.

Participatory lecture: Remind students that before beginning their job, they will need some background information. Have selected students read aloud the definitions and descriptions of fire, flammable flash point, and flash fire. Have students give at least one example of the use of each term. Briefly examine the flash point chart. (The chart is provided as supplementary information.)

Display "Factors in Ability To Burn" on overhead projector. Examine and discuss explanation of "Factors in Ability To Burn." Have students classify items in the room as more or less easily burned.

Guided Practice: Direct student attention to classification activity on "Factors in Ability To Burn." Read the list of items and guide students in writing the name of the items in appropriate boxes.

Independent Practice: Direct student attention to "How Would It Burn?" activity. Instruct students to read the stories and answer the questions.

Reteaching: Invite a fire fighter or fire investigator to talk to class about burn characteristics of different types of structures.

Enrichment: Have students conduct a complete inventory of a room, listing all items. Have them classify each item in a chart similar to the chart used in the guided practice activity. Ask students to share their evaluation of the relative risk of fire in that room (does it contain more objects that are easily burned?) and how the risk of fire might be reduced.

Closure: Review selected responses to the story-question activity. Review the definition of flash point and flammable. Congratulate students on their "first day on the job" as "fire safety technicians."

Introduce the next lesson by telling students that they will examine fire hazards commonly found in workplaces and an increasingly popular way of reducing fire in the workplace.
LESSON TWO:

At The Workplace / Sprinklers

Goal: To review fire hazards in the workplace and to study the concept and use of fire suppression sprinklers

Objectives: The student will:

- list at least 10 typical hazards in the workplace, including industrial, retail and office
- describe basic function of sprinklers, including residential fast response sprinklers

Materials: "Hazards In the Workplace" (p. 32-35), "Be On Guard" (p. 36) and "My Own Business" (p. 37) from student Tech Manual; "Fire Suppression Sprinkler" illustration (p. 18); answer keys (p. 23-24).

Focus: Remind students that despite awareness of fire hazards, the United States public has not shown great success in preventing fire; the exception is in the workplace, where laws and concern for profits have created much attention on the safety of property and people.

Tell students that their job at the Fire Safety Learning Laboratory today will be to examine workplace safety. Outline lesson objectives (paragraph above).

Presentation Of Content: Direct student attention to "Hazards In The Workplace" page in their Tech Manuals. Read and discuss the first section. Have students name some types of equipment found in different types of work sites and businesses.

Read section "Sprinklers." Discuss the following questions:

- What is the purpose of automatic fire suppression sprinklers? (To put out or control the fire until fire fighters can arrive.)
- Why would a business owner or a building owner install sprinklers? (To protect the building or the supplies or equipment in the building. To save money.)
- In the past, most sprinklers were installed to keep property from being lost in a fire. Now, more sprinklers are being installed to protect people from fire. How do you feel about this? (Allow students to share their opinions.)

Guided Practice: Group problem solving activity:

Divide students into six groups. Assign each group one of the remaining sections. Have the students read their respective sections and prepare lists of five items or actions that might create fire hazards in that type of business. Allow five to 10 minutes. Instruct students to write their lists on the appropriate section of "Be On Guard" pages of their Tech Manuals.

Have groups report their lists. Write on poster or overhead projector, while students complete the remaining sections of "Be On Guard."

Independent Practice: Creative analysis:

Direct student attention to "My Own Business" pages of their Tech Manuals. Have students pretend to set up their personal division of the Fire Safety Learning Laboratory based on their own interests. Working on their own, have students prepare a list of possible fire hazards and write a statement on the use or value of sprinklers.

Reteaching: Have students talk with parents, vocational teachers or other adults about safety in the workplace. Ask students to prepare a list of 10 workplace fire hazards based on the discussion.

Enrichment: Have students interview parents or other adults on fire hazards or fire safety guidelines in their workplaces and prepare a report on the value of fire safety programs on the job.

Have students investigate the use of sprinklers in local buildings.
Lesson Three:

Smoke Alarms

Goal: To explore the functions and applications of smoke alarms.

Objectives: The student will:
- Describe basic function of two types of smoke detectors. (48(c)3D)
- Survey and maintain smoke alarms at home. (48(c)3D)

Materials: “Smoke Alarms At Work/How Smoke Alarms Work” (p. 38), “Smoke Alarms On Guard” (p. 39) and “Home Smoke Alarm Survey” (p. 40) from student Tech Manual; “Smoke Alarms At Work/How Smoke Alarms Work” illustration (p. 19); answer keys (p. 24).

Focus: Tell students today their jobs as Fire Safety Technicians will take them to their own homes.
Display “Smoke Alarms At Work” chart showing smoke alarm performance in fires. Tell students that fire safety experts say that having a working smoke alarm triples the chances of surviving a fire and that smoke alarms are technical innovations that have saved hundreds of lives and can save more. Outline lesson objectives (paragraph above).

Presentation Of Content: Direct student attention to “Smoke Alarms On Guard” pages in their Tech Manuals. Display “How Smoke Alarms Work” illustration. As students examine illustrations and explanations, lead a discussion on the similarities and differences of the two types of detection methods.
Direct student attention to “Helping Smoke Alarms Do Their Job.” Review and discuss basic guidelines for smoke alarm placement and maintenance. Have students describe important times for checking smoke alarms. (When the alarm emits a low-battery warning, when moving into a new house, when the alarm seems to go off needlessly when there is no smoke.)

Guided Practice: Direct student attention to “Alike Or Different.” Have students read the instructions and circle the appropriate answers.

Independent Practice: Direct student attention to “Home Smoke Alarm Survey” pages in their student Tech Manuals. Have students take the pages to their homes to complete the activity.

Reteaching: Direct students in writing statements on the importance of installing and properly maintaining smoke alarms.

Enrichment: Have students locate smoke detectors/alarms in school or other public building and describe the locations. Have students research local ordinances on smoke alarms in residences, hotels and/or rental property.

Closure: Have student volunteers share the results of their home surveys. Remind students that the technology of smoke alarms has improved significantly in recent years and that the trend will probably continue. Remind them of their future role as family leaders and providers in maintaining smoke alarms in their homes.
Introduce the next lesson by telling students that their next assignment for the Fire Safety Learning Laboratory will help them become involved in the environment.
LESSON FOUR:

Outdoor Fire Safety

Goal: To review and explore issues of outdoor fire safety, including fireworks

Objectives: The student will:

- list comprehensive rules for outdoor safety *44(b)7D
- investigate community laws on fireworks *44(b)7D

Materials: "Outdoor Fires" (p. 41) and "Outdoor Fire Safety" (p. 42) pages from student Tech Manual; "Outdoor Fires" graphs (p. 20); answer keys (p. 24).

Focus: Review information from Lesson One on characteristics of forests and wildlands (more combustible in dry weather, high quantity of fuel for fire). Point out that while forests and wildlands are renewable resources, regrowth is long term. Emphasize students' role in preserving outdoors.

Tell students that for this lesson, the Fire Safety Learning Laboratory will move outdoors. Outline lesson objectives (paragraph above).

Presentation Of Content: Display "Outdoor Fires" graph on overhead projector or poster. Point out graph titled "Types of Fires, 1991" and have students recognize outdoor fires as the largest numbers. Direct student attention to "Types of Outdoor Fires, 1991" on overhead or poster and have students recognize "Trees, brush and grass" as the largest number of outdoor fires and "Refuse (trash)" as the second largest.

Participatory lecture / discussion: Direct student attention to "Outdoor Fires" in student Tech Manual. Point out "Causes of Brush and Grass Fires" on the overhead transparency or poster, and direct student attention to those graphs in their books.

Lead discussion of the types of materials that are involved and the causes of outdoor fires as students answer questions on the page. Emphasize the conclusion that outdoor fires rarely occur naturally; that virtually all outdoor fires are caused by people, either on purpose or through negligence.

Guided Practice: Small-group study: Divide students into small work groups of two to four people. Direct student attention to "Outdoor Fire Safety" pages from student Tech Manual. Have students read the outline, then write rules or guidelines related to preventing outdoor fires for all items.

Note: The sections may be assigned by group, with results copied or posted for the entire class.

Independent Practice: Investigation and /or opinion paper: In preparing to write opinion papers described in the following paragraph, students may be assigned to investigate laws or rules regulating fireworks or outdoor burning in their community. If the investigation is not assigned, students may base their papers on general information provided in "Outdoor Fire Safety" (above).

Have students prepare opinion papers on the value of restrictions on fireworks and/or outdoor burning. Papers should include at least three outdoor fire safety rules that they can use or apply in their own experiences. Papers should integrate information on general hazards of outdoor fires, with recognition of fireworks and/or outdoor burning as an unnecessary source of heat.

Reteaching: Have students research the short-term and long-term effects of a wildlands fire. Their research might include loss of homes for animals, loss of crops, effect on soil erosion, cost of replacing trees or crops, or damage to nearby buildings.

Enrichment: Submit student papers to student newspaper or community newspaper for consideration for publication.

Have students research news stories on dry weather "outdoor burning bans" enacted by many county governments in recent years.

Closure: Review rules prepared by students in Guided Practice activity. Have student volunteers share their opinion papers. Restate general concern for preserving the environment by preventing outdoor fires.

Introduce next lesson by telling students that their final day acting as Fire Safety Technicians will be a look at how they might actually apply what they've learned about fire safety.

Commission on Fire Protection: Fire Safety For Texans

10

Eighth Grade: Fire Safety's My Job
LESSON FIVE:

Accepting My Safety Job

Goal: To review and reinforce personal responsibilities for fire safety

Objectives: The student will:

- describe desire to be safe and to keep others safe

Materials: "Help Wanted" illustration (p. 21); "Wanted: Fire Safety Helper" pages (p. 42) from student Tech Manuals; post-tests (p. 22); answer keys (p. 23-25).

Focus: Display "Help Wanted" illustration. Tell students that thanks to their work as "fire safety technicians" during this study, they now have many skills that would qualify them for this kind of job. Outline lesson objectives (paragraph above).

Presentation Of Content: Brainstorming discussion: Lead students in a brainstorming, review discussion on the meaning of:

- Fire — include review of fire history, components of fire, types of materials that are flammable, factors in flammability.
- Safety — include safety rules for various types of workplaces, safety rules for the outdoors, use of smoke alarms and sprinklers.
- Responsibility — include the student's ability to control and influence his/her environment, the changes in responsibilities as the student grows and matures, the role that the student can have in his family and community.

Guided Practice: Direct student attention to "Wanted: Fire Safety Helper" pages in student Tech Manuals. Instruct the students to prepare a description of a fire safety job of their choosing. Guide students in selecting a type of job (job title). Note suggestions on page. NOTE: Some student may prefer to select a general title, such as fire safety worker.

Continue guiding students in listing things that are needed to do the selected job. Help students relate what they have learned during the unit.

Independent Practice: Direct student attention to the second activity on their "Help Wanted" pages. Have the students write short letters saying why they are qualified for the jobs. Remind them to list at least five specific fire safety facts they know or skills that they have. Remind them to include one sentence expressing their personal desires to help others be fire safe.

Reteaching: Guide students in discussion of the interdependency of community and family members. Include a discussion of the consequences of a lack of safety awareness.

Enrichment: Invite a fire service professional to talk about his/her role in community safety. Have students who are members of service groups (Boy Scouts, Girl Scouts, 4H, etc.) report on safety projects with which their organization has been involved.

Closure: Review the original "Help Wanted" illustration and compare it to the job descriptions and letters prepared by the students. Discuss real opportunities for becoming involved in community safety projects.

Commission on Fire Protection: Fire Safety For Texans

Eighth Grade: Fire Safety's My Job
Teacher Supplemental Materials
In the blank before each number, write the letter of the phrase that correctly describes the term:

1. Fire _______ A. Gives off vapors that will burn at low temperatures
   _______ B. A chemical process involving heat, fuel, oxygen and uninhibited chemical reactions
2. Flammable liquid _______ C. Capable of burning
   _______ D. Temperature at which vapors from flammable liquids will catch fire.
3. Flash point _______ E. A chemical process involving heat, fuel, oxygen and uninhibited chemical reactions
4. Flammable _______ F. A chemical process involving heat, fuel, oxygen and uninhibited chemical reactions

Circle the item in each pair that will burn more easily:

5. loosely-worn nylon shirt
   tightly-woven cotton shirt
6. wooden house, edged with brick
   concrete factory
7. oily rags stored in a closed metal can
   oily rags stored on a shelf

Circle the letter of the best answer:

8. A fire suppression sprinkler is turned on by:
   a. the person who sees the fire.
   b. an alarm system that detects the fire.
   c. high heat directly below it.
9. Having a working smoke alarm _______ your chances of surviving a fire.
   a. doubles
   b. triples
   c. does not change
10. Which type of fire occurs more often?
    a. Building fires
    b. outdoor fires
    c. car and truck fires
11. Which type of smoke alarm uses a small light to help detect smoke?
    a. photoelectric
    b. ionization
12. Every person should be responsible for fire safety. _______ True _______ False
13. Fire suppression sprinklers cover the entire room with water in order to be sure to put the fire out. _______ True _______ False
14. Because fewer fires occur on the job, workers do not need to be concerned about fire safety. _______ True _______ False

Answer the following questions:

15. How often should a smoke alarm be tested?

16. What burns most often in an outdoor fire?

Our Motto:
"Fire safety's MY job!"

Teacher: Use with all lessons. Transfer to poster or flyer, and display in classroom.
Factors in Ability To Burn
Background Information / Classification Activity

Many factors affect whether something will burn easily or whether it will be more difficult to burn. Two major factors are:

1. What item is made of
2. Whether oxygen is available

Examples of resources that burn easily:
- plants, trees and grasses
- wood and other plant products, such as cotton, paper, many fabrics, vegetable cooking oil, alcohol
- petroleum-based products, such as gasoline, oil, many other flammable liquids, nylon and polyester

Examples of resources that do not burn easily:
- metals and rocks
- concrete, bricks and similar products
- fabrics or wood that has been treated with a flame retardant chemical

The availability of oxygen is affected by how the item is made.
- Example: A tightly-worn cotton shirt allows less oxygen than a loosely-woven cotton shirt. Close-fitting clothes allow less oxygen than loose-fitting clothes.

The availability of oxygen can be controlled by where the item is located.
- Example: Oily rags, which might self-ignite, should be stored in a closed metal container. If a fire should start, the fire will quickly use up the oxygen and die.

Classification Activity
Look at the following list of items. Classify each according to whether it would burn more easily or less easily. Then write each in the appropriate section of the table below.

<table>
<thead>
<tr>
<th>Natural Resource</th>
<th>Burns more easily</th>
<th>Burns less easily</th>
</tr>
</thead>
<tbody>
<tr>
<td>forests, grasslands, petroleum, rocks and barren soil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buildings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wood-frame house, building built of steel and concrete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>loose, flowing lace gown, close-fitting, tightly-woven cotton shirt, flame-retardant pajamas</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bonus
On a separate sheet of paper, make a complete list of all items in this room or a room at home. Then make a copy of the table above and classify each item on your list.

After you complete your classification table, write a statement telling whether you think a fire might be likely to start in the room.
Fire Suppression Sprinkler
Background Information / Illustration

Water pipes

Heat-sensitive link (which closes the flow of water to the spray head)

Sprinkler head

Ceiling

Spray head

When the heat-sensitive link is broken, water can flow through the spray head to the source of heat directly below.

Teacher: Use with Lesson Two, Page 8. Transfer to poster or overhead transparency.
Both types of smoke alarms need electricity to operate. They may use batteries or may be directly connected to the building’s electrical wiring (called “hard-wired”).
Outdoor Fires

Graph Illustrations

**Types of Fires 1992**

- Vehicle Fires: 21,507
- Building Fires: 25,412
- Outdoor & Other: 42,697
- Refuse, trash: 17,966
- Other: 3,623
- Tree, brush, grass: 21,108

Total Fires Reported — 53,758

In fires where causes were known

- Fireworks: 500
- Rekindle: 419
- Arson & suspected arson: 5,085
- Natural conditions: 532
- Careless smoking: 1,109
- Children playing: 1,304
- Inadequate control of open fire: 1,768
- Other misuse of heat: 566

Source: Texas Fire Incident Reporting System

Teacher: Use with Lesson Four. Page 10, transfer to poster or overhead transparency.
Help Wanted

Take-charge person who knows about fire safety and prevention.
Job involves preventing fires and burns.
Eighth Grade: Fire Safety’s My Job

POST-TEST

In the blank before each number, write the letter of the phrase that correctly describes the term:

1. Fire  
A. Gives off vapors that will burn at low temperatures
2. Flammable liquid  
B. A chemical process involving heat, fuel, oxygen and uninhibited chemical reactions
3. Flash point  
C. Capable of burning
4. Flammable  
D. Temperature at which vapors from flammable liquids will catch fire.

Circle the item in each pair that will burn more easily:

5. loosely-worn nylon shirt  6. wooden house, edged with brick, concrete factory
   tightly-woven cotton shirt

Circle the letter of the best answer:

8. A fire suppression sprinkler is turned on by:
   a. the person who sees the fire.
   b. an alarm system that detects the fire.
   c. high heat directly below it.

9. Having a working smoke alarm ______ your chances of surviving a fire.
   a. doubles
   b. triples
   c. does not change

10. Which type of fire occurs more often?
    a. building fires
    b. outdoor fires
    c. car and truck fires

11. Which type of smoke alarm uses a small light to help detect smoke?
    a. photoelectric
    b. ionization

12. Every person should be responsible for fire safety.  
    True  False

13. Fire suppression sprinklers cover the entire room with water in order to be sure to put the fire out.  
    True  False

14. Because fewer fires occur on the job, workers do not need to be concerned about fire safety.  
    True  False

Answer the following questions:

15. How often should a smoke alarm be tested? ___________

16. What burns most often in an outdoor fire? ___________

17. Name three types of fire problems found in the workplace:  

18. List three rules for outdoor fire safety:  

### My Own Business

#### Create a Business Plan

You have been given a special task — create your own business! Create a business plan that includes:

- **Mission Statement**: A clear statement of what your business will do.
- **Marketing Plan**: Strategies for attracting customers.
- **Financial Projections**: Predictions of income and expenses.
- **Organizational Structure**: How tasks will be divided among team members.

#### Describe Your Business

- **Product or Service**: What your business will offer.
- **Target Market**: Who your business will serve.
- **Competition**: Who else is offering similar products or services.
- **Unique Selling Proposition**: What sets your business apart from competitors.

#### Appendix

- **Business Model Canvas**: A tool for visualizing your business model.
- **SWOT Analysis**: A framework for identifying strengths, weaknesses, opportunities, and threats.

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### Smoke Alarms On Guard

#### Helping Smoke Alarms Do Their Job

- **Installation Guide**: Smoke alarms should be installed in each bedroom and hallway of your home.
- **Testing Recommendations**: Test your smoke alarms monthly to ensure they are working properly.
- **Battery Replacement**: Replace the batteries in your smoke alarms twice a year.

#### Smoke Alarm Safety

- **Alarms in Every Room**: Smoke alarms should be installed in every room of your home.
- **Test Before and After**: Test your smoke alarms before and after you replace the batteries.
- **Maintenance**: Keep your smoke alarms clean and free of dust and debris.

---

### Outdoor Fires

#### Anatomy of a Wildfire

- **Wildfire Drivers**: What causes wildfires to occur.
- **Wildfire Behavior**: How wildfires spread and what factors influence their spread.
- **Wildfire Mitigation Strategies**: Strategies for reducing the risk of wildfires.

#### Wildfire Safety Tips

- **Know the Signs**: Be aware of the signs of a wildfire and what to do if one starts.
- **Evacuation Planning**: Plan routes to safety in case of a wildfire.
- **Wildfire Awareness**: Keep informed about wildfire conditions in your area.

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### Answer Key

#### Question 1: Accept reasonable answers

- **Check that hazards match characteristics of business**.
- **Listed, have**.
- **Answer might include protecting lives or property to save money.**
### Outdoor Fire Safety

**Name:**

**Outdoor Fire Safety**

Find each outdoor fire hazard, and write a rule of outdoor fire safety that would prevent it from occurring.

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cigarette butts:</strong></td>
<td>Don't leave smoking materials out of doors.</td>
</tr>
<tr>
<td><strong>Extinguishing coals:</strong></td>
<td>Don't烬ish coals on grass or other flammable objects.</td>
</tr>
<tr>
<td><strong>Matchsticks:</strong></td>
<td>Keep matches out of reach of children.</td>
</tr>
<tr>
<td><strong>Paper towels:</strong></td>
<td>Never throw paper towels or other materials near flames.</td>
</tr>
<tr>
<td><strong>Propane tanks:</strong></td>
<td>Keep propane tanks away from fire hazards.</td>
</tr>
<tr>
<td><strong>Small fires:</strong></td>
<td>Keep small fires under control.</td>
</tr>
<tr>
<td><strong>Burnt wood:</strong></td>
<td>Do not burn burnt wood.</td>
</tr>
<tr>
<td><strong>Towels:</strong></td>
<td>Never hang towels near fires.</td>
</tr>
<tr>
<td><strong>Candles:</strong></td>
<td>Never leave candles unattended.</td>
</tr>
<tr>
<td><strong>Fire hydrants:</strong></td>
<td>Keep fire hydrants accessible.</td>
</tr>
</tbody>
</table>

**Outdoor Rule:**

- **Basic Fire Safety:**
  - Check local laws before starting fires.
  - Follow safety instructions.
  - Keep fires under control.
  - Keep a water source nearby.
  - Follow directions.

**Wanted:**

Fire Safety Helper

**Job Title:**

**Accept reasonable answers.**

**Qualifications:**

- Know what a fire safety helper must know and be able to do.
- Know the basics of fire safety.
- Know how to use a fire extinguisher.
- Know the importance of fire safety in the community.

**Job Description:**

- Accept reasonable answers. Encourage students to focus on skills presented in lesson.

**Date:**

**Your Name:**

**Students Name:**
Student Materials — Duplicating Masters
Purpose: The purpose of a technical manual in business is to give workers special information they need to do their jobs. Many workers call their books "tech manuals."

This "Tech Manual" will teach you about fire safety in places outside your home. These places include the workplace and outdoors. This "Tech Manual" also includes information on the use of technical innovations to detect and put out fires.

During your study of fire safety, your class will pretend to be workers for the Fire Safety Learning Laboratory. Use this study as a chance to learn more about the kind of business in which you might work.

Background Information

Definitions: These words will be helpful in understanding fire safety.

Fire: a chemical process that converts a fuel into other byproducts. This process requires heat, fuel and oxygen, plus the continuation of uninhibited chemical reactions. Also called combustion.

Flammable: something that will burn. Generally has the same meaning as combustible.

Flammable liquid: a special classification of liquids that are highly flammable or explosive. These liquids typically give off vapors that are explosive at relatively low temperatures.

Flash point: the temperature at which vapors from a flammable liquid can catch fire or explode.

The chart at the right illustrates the flash point for several flammable liquids frequently stored in homes.

Extended diagram of flash point temperatures for various flammable substances.

Teacher: Use with Lesson One, Page 7. Duplicate for student use.
Factors in Ability To Burn
Background Information / Classification Activity

Many factors affect whether something will burn easily or whether it will be more difficult to burn. Two major factors are:

1. What item is made of

Examples of resources that burn easily:
- plants, trees and grasses
- wood and other plant products, such as cotton, paper, many fabrics, vegetable cooking oil, alcohol
- petroleum-based products, such as gasoline, oil, many other flammable liquids, nylon and polyester

Examples of resources that do not burn easily:
- metals and rocks
- concrete, bricks and similar products
- fabrics or wood that has been treated with a flame retardant chemical

Note: Leather and wool generally do not burn as easily as fabrics.

2. Whether oxygen is available

The availability of oxygen is affected by how the item is made.

Example: A tightly-worn cotton shirt allows less oxygen that a loosely-woven cotton shirt. Close-fitting clothes allow less oxygen than loose-fitting clothes.

The availability of oxygen can be controlled by where the item is located. Example: Oily rags, which might self-ignite, should be stored in a closed metal container. If a fire should start, the fire will quickly use up the oxygen and die.

Classification Activity

Look at the following list of items. Classify according to whether it would burn more easily or less easily. Then write each in the appropriate section of the table below.

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<td></td>
<td></td>
</tr>
<tr>
<td>grasslands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>petroleum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rocks and barren soil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buildings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wood-frame house</td>
<td></td>
<td></td>
</tr>
<tr>
<td>building built of steel and concrete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>loose, flowing lace gown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>close-fitting, tightly-woven cotton shirt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>flame-retardant pajamas</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On a separate sheet of paper, make a complete list of all items in this room or a room at home. Then make a copy of the table above and classify each item on your list.

After you complete your classification table, write a statement telling whether you think a fire might be likely to start in the room.

Bonus

Teacher: Use with Lesson One, Page 7. Transfer to overhead transparency.
How Would It Burn?
Story Analysis Activity

Read each story, then answer the questions about fire safety in each situation.

The wildlands area includes forests and grasslands that are home to many birds and animals. Although the weather has been dry, many small animals and insects flourish. The summer days are long, and many people from the nearby town enjoy picnics in a small park on the edge of the forest.

The local fire department is concerned about fire in the wildlands. They are encouraging strict safety guidelines for a petroleum-based chemical storage building that is being built nearby.

List three flammable items from the story:

What conditions or characteristics of the wildlands in this story make it easier to burn?

The neighborhood has a blend of old and new buildings. Mrs. Harris lives in a 100-year-old frame house that is furnished with wooden antiques and needlework-upholstered furniture. Just down the block, the Garcia family recently built a brick home. They have enjoyed buying modern furniture — leather, brass and glass.

Everyone in the neighborhood was glad when a service station was built a few blocks away. The new building is built entirely of concrete blocks. It also has a small store and car wash.

Which one of the two houses would burn more easily?

Why?

What characteristic of the new service station might keep a fire from starting?

What characteristic of the service station might make a fire more likely?

Name a flammable liquid that might be found at the service station:

What is the flash point of the flammable liquid you named?

The drama department's production of "The Night Before Christmas" requires many different types of costumes. Mark, who plays the father, will be wearing close-fitting, wool longjohns and a stocking cap. Mari plays the mother and wears a long, flowing gown and a long housecoat with billowing sleeves.

To be properly dressed as Santa Claus, Terence is renting a red suit with boots, hat and beard from a costume company. The company said all their costumes are treated with a flame-retardant chemical.

Of course, the students playing the children will wear regular children's pajamas, which are also flame retardant. A federal law says that all children's pajamas must be flame retardant.

Which costumes are less likely to catch fire?

Why?

Which costumes are more flammable?

Why?

How could the costumes be changed to make them safer?
Hazards In the Workplace

Background Information

The Occupational Health and Safety Act and other federal and state laws provide many safeguards that protect workers on the job. However, workers still face many fire hazards:

- Arson is the No. 1 cause of fires in many types of businesses.
- As in homes, carelessness and ignorance about fire hazards are also problems in the workplace. The fire hazards themselves may be different than fire hazards in the home.
- Industrial equipment, such as manufacturing equipment and commercial kitchen equipment, present unique fire and burn hazards.
- Many businesses and industries rely on a high use of electrical and electronic equipment. This increases the risk of electrical shock and the possibility of electrical or appliance fires and burns.
- The large amount of combustible materials, especially in stores and offices, increases the fire hazard for workers.

**Sprinklers**

**How they work:** Fire suppression sprinklers are individual spray heads tied into a system of water pipes. When the heat of a fire raises the temperature of a sprinkler head to a certain point (usually 165°F), that sprinkler will open and release water directly over the source of the heat. Different brands of sprinklers use different methods for opening the sprinkler. Some have a metal link that melts; others have small glass bulbs filled with liquid.

**History of sprinklers:** Sprinklers were invented in 1874 by an American named Henry S. Parmelee to protect his piano factory. During the first half of the 1900s, sprinklers were installed almost exclusively to protect buildings, especially warehouses and factories. Because sprinklers reduced the chance of fire destroying the building, insurance companies charged less to insure buildings with sprinklers. The lower cost of insurance helped companies pay for the cost of installing sprinklers.

During the last 20 years, building owners have installed sprinklers in more types of buildings, especially high-rise office buildings, hotels and apartments. Some cities and states adopted laws requiring sprinklers in certain types of buildings. During 1990, the U.S. Congress passed a law that requires hotels taller than three stories to have sprinklers.

**Why sprinklers are effective**

Fire sprinklers are designed to contain the fire — to put it out or keep it from getting dangerously large until fire fighters arrive to spray additional water. Sprinkler systems are also connected to alarms to warn of the fire.

Each sprinkler protects its own area. The sprinkler sprays water only when the temperature in the immediate area is hot enough. Most fires in sprinklered buildings are handled by one or two sprinklers.

Sprinklers work automatically. They do not have to rely on people to notice the fire or hear an alarm and then remember how to turn on the system.

**The Basic Parts And Operation Of A Sprinkler**

[Diagram of sprinkler system]

**Water pipes**

**Sprinkler head**

**Spray head**

When the heat-sensitive link is broken, water can flow through the spray head to the source of heat directly below.

Teacher: Use with Lesson Two, Page 8. Duplicate for student use.
Autos and Trucks

Many people use their cars while working or drive cars or trucks for a living. Follow this checklist to keep your auto fire safe.

Remember that gasoline is an explosive!

That’s what makes it a good motor fuel when used safely. Gasoline produces a flammable vapor at low temperatures, and the vapors can burst into flame very easily. Treat gasoline with respect:

☐ Never use a match or carry a lit cigarette near gasoline, especially at a service station.
☐ Carry gasoline only in approved metal containers with a pressure-relief, self-sealing cap. Never put gasoline in plastic or glass containers.
☐ Never carry gasoline or an empty gasoline can in your car.
☐ Immediately clean or remove any item on which gasoline spills.

Keep the car or truck in good repair. Follow the manufacturer’s recommended schedule for maintenance, such as oil changes, radiator fluid changes or tune ups.

Keep a fire extinguisher in the car or truck, and know how to use it. Keep a fire extinguisher near the driver’s seat.

Remember that oil and other auto fluids are also combustible. Discard used products safely at an approved disposal site or recycler. Never pour these liquids on the ground or in the trash can. Not only does that create a fire hazard, it also harms the environment.

Be aware that any mechanical part of an auto or truck can burn you. Any part of the engine, accessories or exhaust system can cause second-degree or worse burns even from slight contact.

High-Rise Buildings

Many office employees work in high-rise buildings. Many people live in multi-story apartment buildings, and many of us have stayed in large hotels. All these people face special fire hazards. There are many more people; it takes longer to escape; and there are more combustible materials, such as carpet, furniture and supplies.

Here are some other guides for people who live and work in high-rise buildings:

Know where fire-exit stairways are located.

Memorize at least two ways to each stairway. NEVER use the elevator in a fire emergency.

Know what the fire alarm sounds like, and respond as if there were a real fire every time you hear it. Never think it’s just a false alarm.

Have fire emergency exit drills.

Tell the building owners to:

☐ check the alarm system regularly,
☐ keep fire exit stairways clear,
☐ have the building inspected,
☐ keep all electrical equipment and wiring working properly,
☐ have fire exit drills,
☐ maintain the fire suppression sprinkler system and
☐ mark all exits and dangerous areas, such as electrical rooms and chemical storage.

Be a safe worker by:

☐ disposing of all cigarettes and matches properly (always check ash trays and waste cans for smoldering materials),
☐ not plugging too many appliance into electrical outlets and

If you have a disability, make arrangements with co-workers and the building owner for help in emergencies. You should have a partner who can help you in an emergency.

Employees and customers encounter fire hazards in stores and offices. How can they be more fire safe?

Avoid actions that might cause fires in electrical wires or trash.

- Don't overload electrical circuits.
- Keep electrical equipment in good repair.
- Use precautions to prevent trash fires.

Be aware that automobile-related businesses usually contain fire hazards, especially gasoline or other flammable liquids. These businesses include body paint shops, repair shops, auto dealerships, service stations, car washes and accessory shops. NO SMOKING, and observe other safety measures.

Recognize that supermarkets, department stores, variety stores -- in fact, any store -- have large quantities of combustible material. Don't smoke in stores, and be cautious with flammable materials.

Arson

Arson is the most frequent cause of commercial fires. Because fire damage affects the entire business, all employees should be concerned with preventing arson. These tips could help your business:

Reduce opportunities for deliberately set fires. Be sure that:

- All exterior areas are well lit and all entrances are secure.
- Smoke or fire detectors and sprinklers are installed to quickly detect and control fires that might occur.
- Flammable and hazardous materials are stored properly, in locked cabinets if necessary.
- Many fires are set to cover up other crimes, such as burglary. Reducing the opportunity for those crimes reduces your risk of arson too.

Identify possible fire setters. Be aware of unhappy employees or competitors.

Don't use fire insurance to solve financial problems. Some business owners set their businesses on fire to collect insurance money.

Many people are employed in garages and workshops. Here are some guidelines for their safety:

Store flammable liquids in approved metal containers. Look for the label of a testing laboratory, such as UL.

Know what products in the garage are flammable. USE ONLY FOR THEIR INTENDED PURPOSE. Read and follow all labels! Never use gasoline as a cleaning fluid or fire starter.

Never use or store flammable liquids inside the garage or in any closed-in area.

When priming a carburetor with gasoline, do not spill gasoline on hot engine parts.

Dispose of used flammable liquids properly. Don't save used oil, cleaner fluids, etc., and never pour on the ground. Discard only in approved disposal locations.

Use caution with any materials that are soiled by flammable liquids. Keep oily rags and clothes away from any heat source, especially cigarettes and hot engine parts. Because oily rags can catch fire without any other heat, store them in metal containers with tight-fitting lids. Better yet, clean or discard all oily rags.

Wear long sleeves and pants when near a hot engine or exhaust parts. This will reduce possible exposure. The slightest touch can result in a serious burn.

Use all power tools properly. Keep away from water to avoid electrical shock.

Operate gas-powered lawn mowers and other tools properly. Never refuel a hot engine! Wait until the engine cools before adding gasoline.

Keep the garage clean and organized. This reduces the opportunity for combustible items, such as paper, rags and trash, from contacting heat sources. And keep a fire extinguisher, preferably Class ABC or ABCD, readily available.
The equipment and materials in many businesses present many hazards. Here are some guidelines for industrial and commercial workers:

**Watch electrical equipment, power lines and wiring carefully.** Problems with electrical wiring or equipment are a leading cause of commercial fires. Watch for damaged wiring. Don't overload circuits.

**Maintain all equipment properly.** Follow manufacturers' guidelines to operate, maintain and repair equipment. This will reduce the risk of fire from break-downs.

**Be VERY careful with heat sources, such as welding and cutting torches, hot equipment and discarded cigarettes and matches.** Always be aware of nearby combustible materials, and clear the area before you handle a potential heat source. Follow employer guidelines.

**Be careful with all flammable liquids, especially gasoline, paint and solvents.** Store them in the proper containers. Use airtight metal cabinets, and lock the cabinets if necessary. Be sure all fueling equipment, such as gasoline pumps, is in good condition.
Be On Guard
Analysis Of Fire Hazards In The Workplace

One of the following sections will be assigned to your group. Read the Safety Guidelines section of "Hazards In The Workplace" assigned to your group. Based on that information and other information in this lesson, list five fire hazards that are found in the workplace. During reports from other groups, complete the remaining sections.

1. Arson
2. Garages And Workshops
3. Autos And Trucks
4. High-Rise Buildings
5. Stores And Offices
6. Industrial Plants

DISCUSSION: After completing your list, discuss how fire suppression sprinklers can be an important part of fire safety in businesses and homes.

Teacher: Use with Lesson Two, Page 8. Duplicate for student use.
My Own Business
Creative Analysis Activity

You have been given a special job — create your own division of the class’s Fire Safety Learning Laboratory. Your division can be any kind of business you would like, so use your imagination. Ideas: specialty store, hair stylist, auto repair shop, computer service, television producer, traveling sales representative.

Decide which one of the categories described in “Hazards In The Workplace” that your business matches best. You may use that information to complete this activity.

The NAME of my business is ____________________________________________

The PURPOSE of my business is to _______________________________________
(tell what your business does, who might use your business, etc.)

Where my business might be LOCATED _______________________________________
(mall, own building, operated from a truck, etc.)

MY JOB in my business is ________________________________________________

The NUMBER OF PEOPLE who might be working in my business ________________

The TYPE OF WORK my workers would be doing ______________________________

What would I tell my workers about FIRE SAFETY at my business ________________

List five FIRE HAZARDS with which you might be concerned:

1. ________________________________________________________________
2. ________________________________________________________________
3. ________________________________________________________________
4. ________________________________________________________________
5. ________________________________________________________________

Write a sentence describing how fire suppression sprinklers would be needed at your place of business:

______________________________________________________________________

Smoke Alarms At Work / How Smoke Alarms Work

Background Information

Both types of smoke alarms need electricity to operate. They may use batteries or may be directly connected to the building's electrical wiring (called "hard-wired").

Photoelectric Smoke Alarm

- Responds faster to larger smoke particles produced by smoldering fires.

Ionization Smoke Alarm

- Responds faster to small smoke particles from a flaming fire.

Smoke Alarms In Fatal Fires

Known performance in fires in which one or more persons died

Operated: 6
Did not operate: 10

None present: 83

Source: Texas Fire Incident Reporting System
Smoke Alarms On Guard

**Helping Smoke Alarms Do Their Job**

- Place at least one smoke alarm **on each level** (story) of the building.
- Place a smoke alarm **outside each sleeping area**.
- If your family sleeps with bedroom doors closed, place a smoke alarm **in each bedroom**.
- **Test each smoke alarm once a month**. (Match to an important date, such as pay day or the day the electric bill arrives.)
- **Change the batteries once a year**. Suggested dates: daylight savings time clock change, birthday, anniversary of alarm installation or moving.
- For the best warning system, have alarm smoke alarms interconnected so that if one sounds, they all sound. Have the alarms wired to house wiring, with backup batteries.

Smoke alarms come in a variety of options. Match the description to the type.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Good early warning for smoke and fires</strong></td>
<td>A. battery-operated</td>
<td>B. hard-wired</td>
</tr>
<tr>
<td><strong>2. Should be tested once a month</strong></td>
<td>A. battery-operated</td>
<td>B. hard-wired</td>
</tr>
<tr>
<td><strong>3. More effective at detecting smoke from flaming fire</strong></td>
<td>A. photoelectric</td>
<td>B. ionization</td>
</tr>
<tr>
<td><strong>4. More effective at detecting smoldering fires</strong></td>
<td>A. photoelectric</td>
<td>B. ionization</td>
</tr>
<tr>
<td><strong>5. Should be placed outside sleeping areas</strong></td>
<td>A. photoelectric</td>
<td>B. ionization</td>
</tr>
<tr>
<td><strong>6. Uses a small light sensor</strong></td>
<td>A. photoelectric</td>
<td>B. ionization</td>
</tr>
<tr>
<td><strong>7. Uses a small radioactive cell</strong></td>
<td>A. photoelectric</td>
<td>B. ionization</td>
</tr>
</tbody>
</table>

Fire experts say that having a **working smoke alarm triples your chances of surviving a fire**.
Name

Home Smoke Alarm Survey
Investigation And Research Activity

Draw a map of your home. Draw a blackened circle to show the location of each smoke alarm. If needed, draw an open circle where other smoke alarms should be located.

Check each smoke alarm using the steps in the table below.

<table>
<thead>
<tr>
<th>Location</th>
<th>Test by pressing test button</th>
<th>Did the alarm sound?</th>
<th>If the alarm did not work, were the batteries changed?</th>
<th>Test again. If the alarm still does not sound, the smoke alarm should be replaced.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check when done</td>
<td>Circle one:</td>
<td>Circle one:</td>
<td>Circle one:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>Alarm sounded</td>
<td>Alarm sounded after changing batteries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>Batteries were changed</td>
<td>Should be replaced because alarm did not sound</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Batteries were not changed</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check when done</td>
<td>Circle one:</td>
<td>Circle one:</td>
<td>Circle one:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>Alarm sounded</td>
<td>Alarm sounded after changing batteries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>Batteries were changed</td>
<td>Should be replaced because alarm did not sound</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Batteries were not changed</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check when done</td>
<td>Circle one:</td>
<td>Circle one:</td>
<td>Circle one:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>Alarm sounded</td>
<td>Alarm sounded after changing batteries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>Batteries were changed</td>
<td>Should be replaced because alarm did not sound</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Batteries were not changed</td>
<td></td>
</tr>
</tbody>
</table>
Look at the graphs above, and answer the following questions:

1. What type of fire occurred most often during 1992? ____________________________________________

2. What were the two most common types of outdoor fires? ____________________________________________

3. What caused the largest number of brush and grass fires? How many fires? ________________________

4. List the next three most common causes of brush and grass fires: ________________________________

5. How many brush and grass fires were caused by careless smoking? ________________________________

   ... by fireworks? ________________________________________ ... by natural conditions? ________________

6. How many brush and grass fires were caused by human actions? _________________________________

Teacher: Use with Lesson Four, Page 10. Duplicate for student use.
### Outdoor Fire Safety

**Analysis of Fire Hazards / Related Rules**

Read each outdoor fire hazard, then write a rule for outdoor fire safety that would prevent a fire or burn.

<table>
<thead>
<tr>
<th><strong>HAZARD</strong></th>
<th><strong>RULE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cigarettes</strong></td>
<td></td>
</tr>
<tr>
<td>Cigarettes thrown out of car windows start many grass fires.</td>
<td></td>
</tr>
<tr>
<td>Ashes dropped on the ground while standing outdoors can start a grass fire.</td>
<td></td>
</tr>
<tr>
<td>Matches that are thrown out of car windows after lighting a cigarette can also start a grass fire.</td>
<td></td>
</tr>
<tr>
<td><strong>Fireworks</strong></td>
<td></td>
</tr>
<tr>
<td>Fireworks create a lot of heat when they are set off.</td>
<td></td>
</tr>
<tr>
<td>Used fireworks stay very hot for hours after they are set off.</td>
<td></td>
</tr>
<tr>
<td>You can't predict where some kinds of fireworks (like rockets) will go when they are set off.</td>
<td></td>
</tr>
<tr>
<td>July is a popular time to set off fireworks, but July is usually very hot and dry, creating dry grass and brush.</td>
<td></td>
</tr>
<tr>
<td>Fireworks are usually allowed only outside of cities, farther away from fire stations.</td>
<td></td>
</tr>
<tr>
<td>Many cities do not allow fireworks.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>HAZARD</strong></th>
<th><strong>RULE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outdoor Burning</strong></td>
<td></td>
</tr>
<tr>
<td>Burning trash or leaves is against the law in some cities.</td>
<td></td>
</tr>
<tr>
<td>In other cities, you must have a special permit.</td>
<td></td>
</tr>
<tr>
<td>When you are burning trash or leaves, wind can cause the fire to spread out of control.</td>
<td></td>
</tr>
<tr>
<td>If a fire that you start gets out of control and damages someone else's property, you could be charged with arson.</td>
<td></td>
</tr>
<tr>
<td>All fires create air pollution.</td>
<td></td>
</tr>
<tr>
<td>Using a barrel to burn trash near trees or a building could catch the building or trees on fire.</td>
<td></td>
</tr>
<tr>
<td><strong>Outdoor Cooking</strong></td>
<td></td>
</tr>
<tr>
<td>Some cities do not allow outdoor cooking, such as barbecues or grills, especially in apartment buildings.</td>
<td></td>
</tr>
<tr>
<td>Barbecues and grills use fuel that can be very dangerous. They must be used correctly.</td>
<td></td>
</tr>
<tr>
<td>Charcoals can stay very hot for a long time unless they are completely put out.</td>
<td></td>
</tr>
<tr>
<td>Lighter fluids and fire starters are very dangerous. They must be used correctly.</td>
<td></td>
</tr>
</tbody>
</table>
Wanted: Fire Safety Helper
Summary Exercise / Creative Writing Activity

On the line below, write the name of the job you might like to have.


Job title: ________________________________

Qualifications: Write what a fire safety helper must know and be able to do. Make a list of at least five qualifications, such as what he/she should know about fires, what tools or equipment he/she should be able to operate (smoke alarm, for example), or what other jobs he/she has had.

You can be a fire safety helper.

Write a short letter telling why you are qualified to be a fire safety helper. Include five things that you have learned during this study on fire safety. Conclude with a sentence telling why you want to help other people be fire safe.