Fire Science

Objectives

Student will understand the chemistry and behavior of fire.

Skills

- Student will demonstrate a knowledge of fire science and the realities of fire.
- Student will demonstrate a knowledge of the fire tetrahedron, chain reaction, and methods of extinguishment.
- Student will analyze the leading causes of home fires and demonstrate an understanding of the importance of personal responsibility in preventing them.

Introduction

Fire is a natural phenomenon and critical to human survival on earth. People have used fire as a tool for hundreds of years. Treated with respect and care, it heats and lights our homes and cooks our food.

Fire fascinates us. It may frighten and even terrify us, whatever our age. Fire has caused destruction, injury and death and will continue to do so unless people develop greater knowledge and respect for its powers. The majority of fires are caused by human carelessness and misinformation.

Students who understand fire science gain a realistic understanding of fire and its power. Students, like firefighters, study the science of fire so they know what causes it, how to extinguish it, and ultimately, how to prevent it.

Vocabulary

Chemical Chain Reaction - a series of events with one event leading to another

Combustion - an act of burning which transforms matter and releases energy in the form of light and heat

Combustible - any substance which, when exposed to heat, gives off vapors that will burn when combined with oxygen and ignited

Conduction - the transfer of heat by direct contact from one material to another (touching a hot skillet handle)

Convection - the transfer of heat by circulating gases or fluids because of differences in density and the action of gravity (hot air rises; cold air sinks)

Extinguish - to cause to cease burning

Flashover - sudden spread of flame over an area when it becomes super-heated

Fuel - a combustible solid, liquid or gas used to produce heat or power

Ignition - to cause a fuel to burn

Incendiary - involving a deliberate burning of property

Oxidation - the process of combining with oxygen

Oxygen- a colorless, odorless, tasteless gas

Radiation - transmission of heat by means of radiant energy waves (the warmth you feel when you stand before a fire is radiant heat)

Smoke - a gaseous product that arises from a burning substance

Tetrahedron - a figure with three sides and a base, like a pyramid

A UNDERSTANDING FIRE

Materials provided:
- *Backdraft* video clip
- *Actual House Fire* video clips (3 versions)
- *Fire Science Vocabulary* list

Teacher preparation:
- Review video clips prior to class
- Prepare copies of *Fire Science Vocabulary* list

More about the actual house fire scenarios:
- There are three versions of the actual house fire. In the first, *A Firefighter's Explanation*, the methods used to fight the fire are described.
- Next, two versions of the same fire (*Music Version 1* and *Music Version 2*) are shown without words but with the addition of music. Note how the style of the background music affects one's emotional reaction to the fire.

a class discussion and research activity

Teacher-led discussion

Lead a discussion on the students' personal experiences with fire. Sample questions might include:

- Does your family have cultural traditions for using fire?
- Does your family use fire in some way for celebrations?
- Did you learn about fire through some kind of family tradition?
- Does anyone know someone who had a house fire?
- What happened?
- How did it start?
- How much damage did it cause?
- Does anyone know someone who's been burned in a fire?
- What happened?
- What are the characteristics of fire?

Video review and teacher-led discussion

View *Backdraft* and three video clips of an actual house fire. Lead a discussion on the realities of fire (see *Teacher Notes*). Compare and contrast the portrayal of fire in *Backdraft* to the clips of the actual house fire. Suggested discussion questions for *Backdraft* are on page 3.

Vocabulary research activity

Distribute the vocabulary list and have students research the definitions or…

(go to page 3)

a cartoon/drawing activity

- Divide the class into small groups.
- Give each one of the vocabulary words.
- Have each group develop a cartoon or drawing that illustrates the definition of the word they have been given.
- The completed cartoons or drawings should be shared with the class as a whole.

Video Title	Scene Description
Backdraft, 1991 Starring Kurt Russell, William Baldwin	Lieutenant Stephen McCaffrey (Kurt Russell) and his rookie brother Brian McCaffrey (William Baldwin) go into an apartment building that is on fire. They proceed up the stairs in search of a child.
Pre-screen for inappropriate language.	*Discussion Notes:* • Does the experienced firefighter (Russell) demonstrate expected use of firefighting gear? *Evidence: his jacket is flapping open, he does not use a SCBA (self-contained breathing apparatus), he instructs his rookie brother to "hold your breath" when they are walking up the stairs.* • Is the rescue of the child realistic? *Evidence: Lt. McCaffrey emerges from the apartment without smoke discoloration.* • What techniques are used to capture the child's rescue? Is Lt. McCaffrey presented as a hero? *Evidence: slow motion, silhouetted figure, his "cowboy" approach results in a saved child but without any repercussions on his well-being.* • Would Lt. McCaffrey likely have been walking upright through the smoke and fire? *Evidence: The heat from the fire would have been unbearable for someone walking upright.*

B EXTINGUISHING FIRE

Materials provided:
- *Fire Concepts* video clip
- *Fire Tetrahedron* overhead
- Fire Tetrahedron model master (if you wish to make a 3D version)
- *Extinguishment Scenarios* work sheet

Teacher preparation:
- Review video clip prior to class
- Chain reaction cards - enough for entire class (one card marked "heat," one marked "oxygen," one marked "fuel," and the balance marked "chain reaction"
- Signs for the classroom - heat, oxygen, fuel

Extension activity:
- Invite the local fire department to give a fire extinguisher demonstration and lesson

Note:
Fire extinguisher information has been included in the supplemental materials section of this unit if you choose to include a lesson about extinguishers. Pages 21 and 23 when printed back-to-back and folded in three become a brochure.

a demonstration activity

Introduce the fire tetrahedron as a graphic illustration of the process of fire. Explain the process of a chain reaction (see *Teacher Notes*).

In order to understand the fire tetrahedron, students must first understand the chemical chain reaction.

Chain Reaction Demonstration
- The class and teacher form a circle.
- The teacher makes a sound such as hand clapping.
- The student to the teacher's right repeats the sound. The next student does the same and so on around the circle, until all are reproducing the sound at the same time.
- The sound stops when it returns to the teacher and a new sound, such as finger snapping, is begun and the process is repeated.

Chemical Chain Reaction of Fire Demonstration
- Using the same procedure as above, have each student draw a card: one card will be marked "fuel"; one will be marked "oxygen"; one will be marked "heat." All the rest will be marked "chain reaction." Students are to keep the contents of their cards secret.
- Repeat the chain reaction activity. When the sound reaches the student with the "heat" card, the student steps out of the circle and the sound stops.
- Explain that when any part of the chemical chain reaction is removed, the fire chain reaction stops.

(go to page 5)

- Repeat the activity until the reaction has been stopped by "fuel" and "oxygen" also.
- In each case, explain how removing any part of the chemical chain reaction extinguishes or prevents a fire.

How Did You Do That? activity

Show *Fire Concepts* video clip. The concepts the students have practiced and discussed are demonstrated.

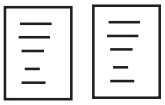
To extinguish fire:

a) heat (cool it)
b) oxygen (smother it)
c) fuel (remove it)

- Put up three signs in the classroom—for heat, oxygen and fuel.
- Various fire scenarios will be given (*Extinguishment Scenarios* work sheet provided).
- For each scenario, the students, in small groups, will decide on the best way to control the fire and move to the sign representing their decision.
- Students will present their rationale to the rest of the class.

ANALYSIS OF FIRE INCIDENTS

Materials provided:
- Incident Analysis Work Sheet
- *The Westhome Siren* (30 copies)*



Teacher preparation:
- Copies of *Incident Analysis Work Sheet*, one per group per article.
- You may want to review the *Fire Concepts* video clip from Lesson B.

**The Westhome Siren* is the local paper of the fictitious town of Westhome, Oregon. As you can see, Westhome has a real problem with residential fires! All the articles in *The Westhome Siren* have been taken from actual newspapers and all the incidents actually occurred in Oregon. Thirty copies of the *Siren* are included with the curriculum.

an analysis activity

More than 13,000 fires occur in Oregon each year. On average, forty Oregonians lose their lives in these fires. These fires also cause millions of dollars in property loss. The majority of structure fires occur in the home and are largely human-caused. Social attitudes and individual responsibility are significant factors in Oregon's fire problem.

Groups analyze news articles
- Select a group process that works for your class.
- Student groups will analyze newspaper articles of fire incidents found in *The Westhome Siren*.
- Be sure each article is covered by a group.
- Working together, students will use the work sheet to structure their analysis.
- Have each group summarize their article and analysis for the class.
- As a class, build a list of the cause of each fire examined. The finished list will represent the ten leading causes of home fires in Oregon. (See *Teacher Notes* for a listing of the top ten for 2003.)

Teacher-led discussion
- Discuss the causes of the fires and determine what percentage of the total are human-caused.
- Emphasize the importance of personal responsibility and accountability in influencing fire problems.

A&B TEACHER NOTES

WHAT IS FIRE?

Fire is a chemical reaction. It is the rapid oxidation of a fuel, producing heat and light. Fuel, such as wood, provides the energy for the fire. Oxygen, found in the air we breathe, is required for burning to occur. Heat, such as a match or lighter, provides a source of ignition and causes the continued vaporization of the fuel. The chemical chain reaction is fire. If any one of the four components—heat, fuel, oxygen, chemical chain reaction—is missing, fire cannot start. It is prevented. Removal of any one of the four components causes fire to be extinguished.

A fire triangle with heat, oxygen and fuel as the three sides was used as an aid to explain the processes of combustion and halting combustion. With the development of chemical methods of extinguishment such as potassium and sodium bicarbonate dry chemicals and vaporizing liquid agents, it was necessary to add another dimension to the fire triangle. The new figure, the fire tetrahedron, adds the chemical chain reaction in order to explain the action of chemical extinguishment methods in preventing or stopping the chemical chain reaction. A tetrahedron is a solid pyramidal form. Each component of the tetrahedron must be in place for combustion to occur.

COMPONENTS OF THE FIRE TETRAHEDRON

- **Oxygen**. A colorless, odorless, tasteless gas that is essential for life. There must be at least 16% oxygen for a fire to burn. The air we breathe is about 21% oxygen.
- **Fuel**. A combustible material. Combustibles will burn when combined with the right amount of oxygen and ignited. Examples of fuels include wood, paper, fabric, grease, wax, etc. Fuels can be solid, liquid or gas. Typically, solids and liquids must be heated to the point where they are converted into a vapor or gas before they will burn.
- **Heat**. A physical phenomenon manifested as an increase in temperature. Heat is the energy component of the fire tetrahedron. When heat comes in contact with fuel, the energy supports the combustion reaction.
- **Chemical Chain Reaction**. High molecular activity. The chemical chain reaction known as fire occurs when fuel, oxygen and heat are present in the right conditions and the right amount.

A&B TEACHER NOTES

WHAT MAKES FIRE DANGEROUS? Fire is dangerous because…

FIRE IS FAST.

In thirty seconds, a simple flame can get completely out of control. That's how quickly curtains catching fire from a space heater can turn into a major fire. In as little as five minutes your house can be engulfed in flames. A fire doubles in size every thirty seconds. Flashover can occur in as little as three minutes. Flashover happens when everything in a room—from an armchair to the TV set—becomes superheated and bursts into flames simultaneously.

FIRE IS HOT.

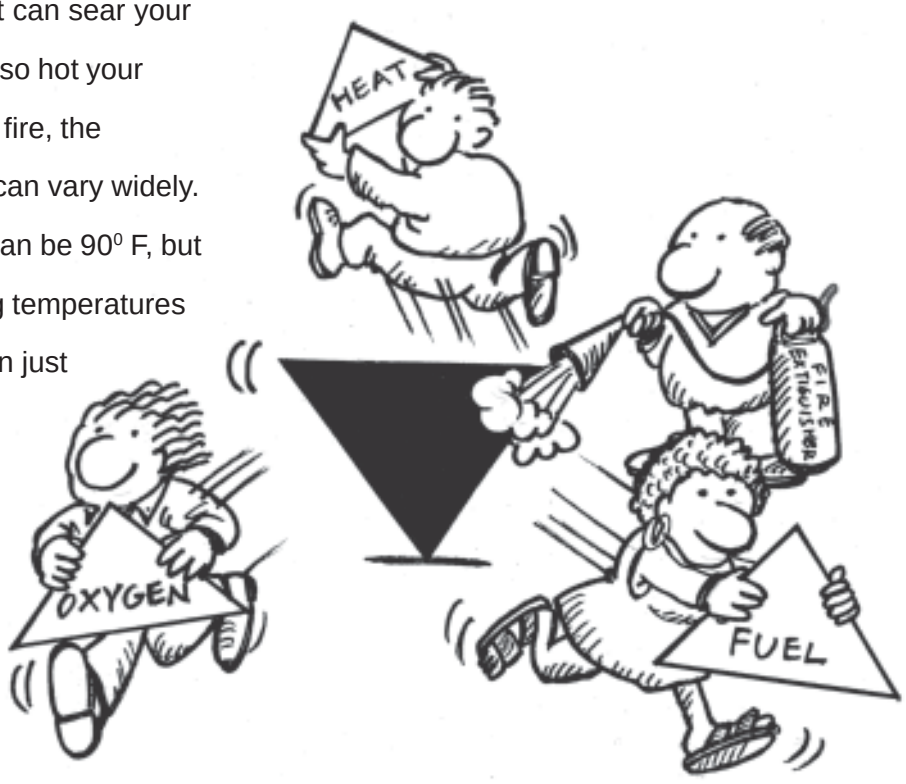
Fire's heat can be even more threatening than its flames. The air gets so hot it can sear your lungs, not letting you breathe…so hot your clothing fuses to your skin. In a fire, the temperatures in a single room can vary widely. Air temperature near the floor can be 90^0 F, but over 600^0 F at eye level. Ceiling temperatures can reach a blistering 1000^0 F in just five minutes.

FIRE IS DARK.

You may think fire is bright, but it actually becomes pitch black as smoke rolls down from the ceiling. Imagine yourself unable to see and terrified, trying to find your way out.

FIRE IS DEADLY.

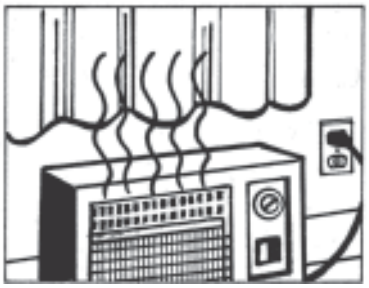
Fire uses the oxygen you need to breathe and produces poisonous gases. In fact, smoke and toxic gases kill more people than flames do. Breathing even small amounts of these gases can make you disoriented and drowsy. You could pass out and die in minutes.

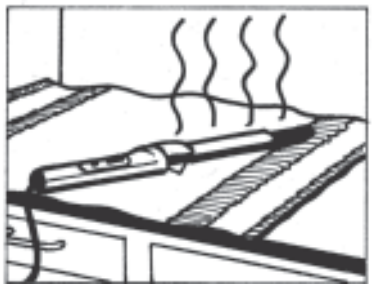


A&B TEACHER NOTES

HOW DOES FIRE SPREAD?

There are three ways in which fire, if left unchecked, can spread—radiation, convection and conduction. These are processes for transferring heat from one combustible object to another.





Radiation. Combustibles near a fire are subject to radiant heat. The closer they are to the fire the sooner they will be heated to the point of ignition. Once radiant heat has ignited a nearby object, the heat from this new fire radiates to other objects increasing the intensity of the fire and its rapid spread. Flashover is the extreme culmination of this process.

Convection. A fire heats the air around it and releases hot toxic gases. As the gases heat, they becomes less dense and start to rise. A ceiling in a house can stop the gases but the they will spread out and the temperature in the room will get hotter and hotter. That's why you are taught to crawl low in a fire where the air is cooler and there is more oxygen. It is also the reason firefighters will try to vent the roof in a house fire and cool down the heated air.

Conduction. Conduction occurs when a hot solid, liquid or gas contacts an object that is highly combustible. When a curling iron is left on and placed on top of a towel, the curling iron will produce enough heat to ignite the towel.

ALSO…spontaneous ignition. When materials slowly oxidize they produce heat. Without ventilation to carry the heat away, the temperature builds up until an ignition point is reached. Oily rags thrown into a pail behind a work bench is a good example of spontaneous ignition.

Note about the process of oxidation: Oxidation of a substance occurs continuously as long as it is exposed to an oxidizing agent such as air. This process is usually so slow that people don't notice it—rusting iron and yellowing paper are examples.

B TEACHER NOTES

HOW CAN FIRES BE EXTINGUISHED?

If one of the components of the tetrahedron is eliminated after a fire ignites, the fire is extinguished.

Heat removal. Dousing with water. Water is effective in removing heat from most fires except electrical, flammable liquid or grease fires. Water can conduct electricity and make an electrical fire worse. Water can cause burning liquids, such as grease, to splatter and spread the fire.

- Turn off the heat source, such as the stove or oven.

Oxygen removal. Cutting off the oxygen supply. Placing a lid on a grease fire in a pan, snuffing out a candle, smothering by throwing dirt on a campfire, applying fire extinguishing foam or retardant on a wildfire and doing "Stop, drop and roll" if clothing has caught on fire.

Fuel removal. Shutting off the fuel source. Turning off the gas (propane) on a barbecue. Removing nearby combustibles. Digging a fire line around a wildfire removes grasses, trees and shrubs and keeps the fire from spreading.

Breaking the chain reaction. Interfering with the chemical reaction. Dry chemical fire extinguishers stop the chain reaction.

HOW CAN FIRES BE PREVENTED?

Responsible behavior and an understanding of fire science are the keys to preventing fires. Any time just one of the four components of fire is removed, the possibility of fire is eliminated. When a fire hazard is identified and corrected, one side of the tetrahedron has been removed. Examples include recycling a pile of papers instead of stacking them next to a heater (eliminating fuel), or using an ashtray instead of throwing a burning cigarette into dry grass (eliminating heat).

B TEACHER NOTES

FIRE EXTINGUISHERS

WHAT LABELS TELL US

Labels on fire extinguishers give information about the type of fire on which they may be used. Look for letters, numbers, geometric shapes or pictograms. The higher the rating number on A and B fire extinguishers, the larger the fire they can put out. Be aware that the models with higher numbers are also heavier.

Fires involving wood or cloth behave differently than fires involving liquids or metals. Using the wrong type of extinguisher could make matters worse.

Combination extinguishers

Combination fire extinguishers are designed to extinguish more than one type of fire. For example, an extinguisher labeled "ABC" works on class A, B and C fires. An extinguisher labeled BC works on class B and C fires.

Helpful hints

A fire extinguisher should be “listed" and “labeled” by an independent testing laboratory such as Factory Mutual (FM) or Underwriters Laboratory (UL).

You may need more than one extinguisher in your home. They should be installed where they are easily seen and near an escape route.

An extinguisher that has been used must be recharged.

BE WISE. BE PREPARED.

Fight a fire with a fire extinguisher ONLY when the following conditions are met:

- The fire department has been called
- People have left / are leaving the building
- The fire is small and confined
- The extinguisher is the correct type for the fire and is in working order
- A safe escape route is behind you as you fight the fire
- You are trained to use the extinguisher and confident that you can do so

TEACHER NOTES

Ten leading causes
of One- and Two-Family Dwelling Fires (2003)

Top Examples	**Number of fires**
Failure to clean [1]	434
Heat source too close to combustibles [2]	158
Source of heat unattended [3]	153
Abandoned, discarded material [4]	142
Short circuit, ground fault [5]	131
Other electrical failure [6]	119
Failure to use ordinary care [7]	69
Juvenile involved [8]	66
Unlawful incendiary [9]	64
Lack of maintenance, worn out [10]	60

Definitions or examples:

1 chimneys, lint traps, grease hoods
2 a candle near a Christmas tree
3 pot left on the stove and no one in the room
4 usually applies to a tossed cigarette
5 car wires, wires touching tree branches
6 power surge/overheat (such as power strip)
7 human carelessness
8 juvenile-set fire, intentional or not
9 incendiary - fire set intentionally
10 just plain old

Fire Science Vocabulary

Name _____ Date _____

Directions: Write a definition for each of the following words. Use the information discussed in class, or look up words in a dictionary.

* * * * * * * * *

CHEMICAL CHAIN REACTION -

COMBUSTION -

COMBUSTIBLE -

CONVECTION -

EXTINGUISH -

FLASHOVER -

IGNITION -

OXIDATION -

OXYGEN -

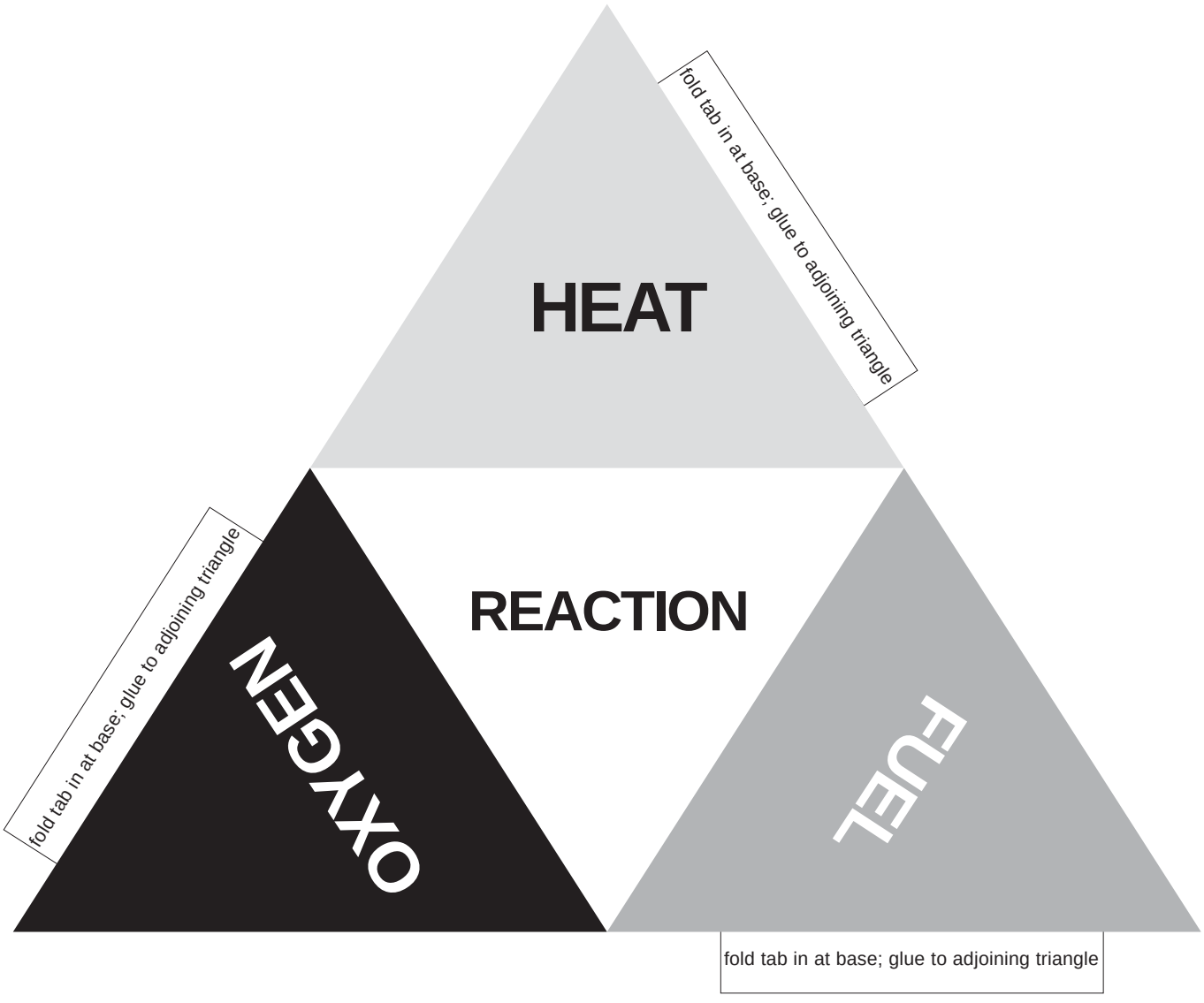
RADIATION -

SMOKE -

TETRAHEDRON -

B The Fire Tetrahedron

Instructions:
Fold in on all 3 sides of reaction triangle.
Glue tabs to inside of tetrahedron.



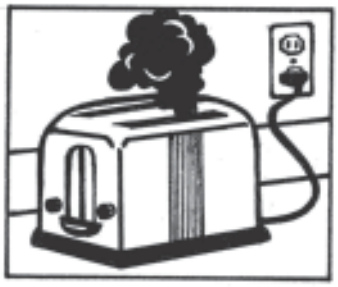
B EXTINGUISHMENT SCENARIOS

Pan fire

Zack is cooking bacon for breakfast. The burner is turned up to "high." He turns his back on the frying pan on the stove. When he next looks, the bacon grease has ignited and flames are leaping from the pan.

Campfire

The Smith family is camping. They have finished breakfast and are ready to go hiking so they need to extinguish their campfire.



Electrical fire

Tamara is making toast for a bacon, lettuce and tomato sandwich. She sets the toaster too high and the bread starts smoking.

Trash can fire

Joel walks into the boys' bathroom during recess and discovers a fire burning in the trash can.

Christmas tree fire

The Baldwins have left their Christmas tree up for several weeks after Christmas. The tree is now dry and brittle. It explodes into flames.

B EXTINGUISHMENT SCENARIOS (KEY)

Pan fire

Zack is cooking bacon for breakfast. The burner is turned up to "high." He turns his back on the frying pan on the stove. When he next looks, the bacon grease has ignited and flames are leaping from the pan.

Pan fire

- sliding a lid on the pan removes oxygen
- turning the heat off removes fuel

Campfire

The Smith family is camping. They have finished breakfast and are ready to go hiking so they need to extinguish their campfire.

Campfire

- putting water on it removes heat
- stirring ashes and displacing them removes fuel

Electrical fire

Tamara is making toast for a bacon, lettuce and tomato sandwich. She sets the toaster too high and the bread starts smoking.

Electrical fire

- unplug the toaster, shutting off electricity removes heat

Trash can fire

Joel walks into the boys' bathroom during recess and discovers a fire burning in the trash can.

Trash can fire

- dousing with water removes heat

Christmas tree fire

The Baldwins have left their Christmas tree up for several weeks after Christmas. The tree is now dry and brittle. It explodes into flames.

Christmas tree fire

- the smart move is to exit promptly and not try to extinguish

When is it the best decision to escape and call 911 rather than trying to extinguish it yourself?

TYPES OF FIRE EXTINGUISHERS

Type A* for Class A fires
Paper, trash, wood, cloth, plastics
Ordinary combustible fuels that are not liquids or metals
**Memory key: ASH is usually left after burning*

Type B* for Class B fires
Flammable liquids such as grease, oil, gasoline, acetone
Any non-metal in a liquid state, including flammable gases or vapors
**Memory key: Materials BOIL, BUBBLE* or come in *BARRELS*

Type C* for Class C fires
Electrical fires such as wiring, fuse boxes, energized electrical equipment and other electrical sources
**Memory key: Electrical CURRENT*

Type D* for Class D fires
Metals such as titanium, sodium, aluminum, magnesium
These materials are typically found in laboratory or industry settings
Special extinguishing agents are required to fight a Class D fire
Class D fires are very dangerous and should be left to the experts
**Memory key: DON'T get involved.*

Type K* for Class K fires
Cooking fires such as cooking oil, fat and grease
This is a new classification
Memory key: cooK**ing fires*

See the following pages for a brochure about fire extinguishers that can be copied and distributed.

Recommendations for your home:
- kitchen: Type 2-A:10-B:C
- living room: Type A
- bedrooms: Type A
- basement and garage: Type ABC

If a fire should occur…

- CLOSE the doors to stop the spread of the fire
- SOUND the alarm, alert others to the danger
- GET OUT of the building
- NOTIFY the fire department

DO NOT go back into the building or try to save your stuff.

Clothes, books and papers can be replaced.

YOU CAN'T!

LIVING WITH FIRE
A PROGRAM FOR CAMPUS AND STUDENT FIRE SAFETY

Living With Fire is a project to develop campus-oriented fire safety material. It will be made available, nationwide, through the US Fire Administration in November 2001.

Funding for this project was provided by the following organizations committed to reducing the tragic losses caused by fires involving students:
• American Cancer Society
• National Electrical Manufacturers Association
• National Fire Sprinkler Association
• NFPA International
• SimplexGrinnell
• United States Fire Administration
• University of Texas System

Living With Fire was developed by
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INFO BULLETIN ON…

Fire Extinguishers

LIVING WITH FIRE
A PROGRAM FOR CAMPUS AND STUDENT FIRE SAFETY

SCHOOL LOGO HERE

Fire Extinguisher Information Bulletin

How do fire extinguishers work?

Fight or flight…The most important decision to make is whether to fight the fire or escape. This is a critically important decision, and may literally mean the difference between life and death.

First, before fighting any fire, you should know how to use the fire extinguisher BEFORE you facing the fire. This is not a time for "on the job" training.

You should also size up the fire and determine if it is small enough to be put out with a fire extinguisher. This is something that you can only learn through experience…and that experience comes with fire extinguisher training.

What type of fire is it?…It is important that you be able to determine what is on fire so that you can use the proper type of fire extinguisher to put it out. There are three classes of fuel

- Class A
- Class B
- Class C

Pressurized water fire extinguishers are for Class A fuels only, such as wastebaskets, small pieces of furniture, etc.

A dry chemical fire extinguisher can be used on all three types if it is rated as an ABC fire extinguisher.

Carbon dioxide fire extinguishers are commonly used on flammable liquids and electrical fires.

Before fighting the fire…

There are a series of specific steps that you should always follow.

- First, make sure that everyone is out of danger.
- Either you, or someone else, must notify the fire department.
- Size up the fire…is it small enough to be handled by a fire extinguisher?
- You can back away from the fire if it gets out of control…make sure the fire is not between you and your escape route!
- Is your extinguisher the right extinguisher for the job? Is it matched to the type of fire?
- Is the fire extinguisher fully charged? You can tell by looking at the pressure gauge.
- Do you know how to use the extinguisher?

Fighting the fire…

It is important that you know how to operate the fire extinguisher before you attempt to fight the fire. If you decide to try, remember the word PASS, which stands for:

P – Pull the pin that unlocks the operating handle

A – aim the extinguisher low at the base of the fire.

S – Squeeze the lever on the extinguisher to discharge the agent.

S – Sweep the nozzle or extinguisher hose from side to side. Move slowly and carefully toward the fire, continuing to sweep the extinguisher back and forth at the base of the flames.

Once it is out…

Just because you have extinguished the fire, don't turn your back on it! Back away from the fire, watching it to make sure that it does not reignite. If the fire was in a pan of grease, for example, the grease may be hot enough to reignite.

Fire extinguishers should never be misused or abused. If an extinguisher is not ready to fight the fire because it has been discharged, then it has simply become a wall ornament-not a life saving tool!

Maintaining Extinguishers…

One of the most important things about a fire extinguisher is to make sure there is enough pressure in it to operate. This is often indicated by a small gauge near the handle. Usually, an arrow will either point to a green area (enough pressure) or a red area (not enough pressure in the extinguisher).

Everyone is responsible for making sure the extinguishers are in working order. Each time you pass one by you can glance at the pressure gauge to make sure that it is ready to fight a fire.

You should check with your local ordinances as to how often fire extinguishers must be checked by a certified technician. At a minimum, they should be checked once a year.

Updated 10/22/01

LIVING WITH FIRE

A PROGRAM FOR CAMPUS AND STUDENT FIRE SAFETY

Incident Analysis Work Sheet

Using the information in the news articles,
answer the following questions to help construct a fire scenario.

1. Summarize the cause of the fire.

2. Identify the fuel and heat sources for the fire.

   Fuel

   Heat

3. Consequences of the fire.

   Injuries

   Amount of property loss

4. Briefly describe how this fire was extinguished. Could it have been prevented?

5. Briefly describe a responsible behavior that would have prevented this fire.