**Unit 5: Arson**

**Keywords**

* Fire: Produced when a substance undergoes rapid oxidation involving heat and light
* Arson: The deliberate or purposeful act of starting or accelerating a fire

**Facts**

* In 2010, 384,000 fires occurred in homes in the United States
* Most victims die from smoke or toxic gases and not from burns
* Smoking is the leading cause of fire related deaths
* Cooking is the major cause of house fires

**Fuel + Oxygen + Heat = Fire**

* The Fire Triangle represents the three elements needed for fire to occur: heat, fuel, and oxygen.
* Fuel: can be any combustible (substance that easily catches fire) material in any state of matter - solid, liquid, or gas.  Most solids and liquids become a vapor or gas before they will burn.  Examples: Clothing, furniture, curtains, flammable liquids
* Oxygen: The air we breathe is ~21% oxygen.  Fire requires at least 16% oxygen.
* Heat: is the energy necessary to increase the temperature of the fuel to a point where sufficient vapors are given off for ignition (spark that starts the fire) to occur.  Examples: Stoves, heating appliances, fireplaces, damaged wiring

**The Role of Fire Investigator**

* Is the scene safe?
* Evacuate the scene
* Wear protective clothing
* Turn off gas and electricity
* Interview witnesses
* Look for suspicious activity
* Check the color of fire or smoke
* Take notes, video, and photographs
* Work from the least damaged areas to the most heavily damaged areas.
* Examine doors, windows to see whether or not they were locked during the fire
* Collect evidence (accelerant samples, fire items, and other crime scene evidence.
* Determine the point of origin. Establish point of origin – the area where the fire started will tend to burn for a longer period of time and have the worst damage
* Determine the heat source(s)
* Hypothesize the reasons for the fire

**The Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)** is a Federal Agency responsible for:

* administering and enforcing the criminal and regulatory Federal laws pertaining to destructive devices (bombs), explosives, and arson.
* studies science and technology related to detecting explosives, effects of explosives, behavior of explosives and explosive devices

**Fire Investigation Protocol Terms**

* Point of Origin- Burn patterns and other damage can help determine the point of origin, or the location where the fire started.
* Char Patterns- Created by very hot fires that burn very quickly and move fast along its path, so that there can be sharp lines between what is burned and what isn't.
	+ A char pattern on a door would help determine which side of the door the fire was on.
	+ A char pattern on the floor would help determine the use of an accelerant and its path.
* V-Patterns - Fire burns up, in a V-shaped pattern, so a fire that starts at an outlet against a wall leaves a char pattern that points to the origin.
	+ A very narrow V-shape might indicate a fire that was hotter than normal (used accelerant).
	+ A wide V-shape might indicate a fire that was slow burning.
	+ A U-shape could indicate that there was a "pool of origin" rather than a point of origin, such as might be caused by, say, a puddle of gasoline.
* Heat Shadows - Occur when furniture shields part of a wall; can help determine the origin point.
* Glass - Glass fragments, windows, and light bulbs can provide clues to a fire.
	+ Light bulbs tend to melt toward the heat source, so the "direction of melt" can indicate the direction of the fire.
	+ The shattered/cracked glass of windows can provide indications as to how a fire burned.
	+ A dark soot layer on the glass could indicate a slow, smoldering fire.
	+ Clear glass with an abnormal pattern of cracking could imply a very hot fire (due to an accelerant?)
* Chimney Effect – Since fire burns upwards, there can be a "chimney effect" where the fire ignites at a point, the superheated gases rise upward and form a fireball, which continues straight up to burn a hole in the ceiling. If the roof is not entirely burnt, and the fire investigator finds such a hole, the origin of the fire could be directly underneath.
* Color of smoke – Determine what type material was burning
* Color of flames – Indicates at what temperature and chemicals were burning during the fire. Example: red/orange/yellow flame – carbon was present, inorganic substances vary in color.
* Accidental Nature of Fires include
	+ Heating System
	+ Electrical appliances
	+ Lightning
	+ Children playing with matches
	+ Smoking
* Non-Accidental fired include evidence of:
	+ Odors – Gas, kerosene, or other accelerants
	+ Furnishing – Removal of personal objects and valuables
	+ Clothing – Check debris for buttons, zippers, etc.
	+ Locked windows, blocked doors
	+ Two or more points of origin
	+ Look for inverted v-patterns (can be a sign that an accelerant was used)
	+ Floors charred –Can indicate use of an accelerant
	+ Trailers that lead the fire from one place to another
* Motives For Arson
	+ *Crime concealment*: To conceal another crime such as murder, burglary, or vehicle.
	+ Revenge or spite: To get back at someone for a perceived injustice.
	+ *Monetary Gain*: Arson-for-Profit fires are set to burn a building, vehicle, or some other object in order to gain profit from the fire. The profit may come in several forms; from insurance coverage on the property, or from putting a competitor out of business
	+ *Malicious Vandalism*: Fire set to someone’s property, just to destroy it. Malicious vandalism fires account for the largest percentage of arson fires. These fires are frequently set by juveniles.
	+ *Mentally Disturbed*: Some persons have been found to have an irresistible impulse to set fires. – Pyromaniac