

1. Definition of fire:
  - Fire is defined as a Rapid Self-Sustaining Oxidation Process Accompanied By Heat & Light of Varying Intensities
2. Fire Triangle: Three things are needed for fire to take place:
  1. FUEL
  2. HEAT
  3. OXYGEN
3. Fire Tetrahedron:
  - In addition to the fire triangle there is a newer version of the concept to incorporate deluxe materials:
    1. HEAT
    2. FUEL
    3. OXYGEN
    4. CHEMICAL CHAIN REACTION
4. Fuel Sources:
  - VAPOR burns...only vapor!
  - For items to burn they have to be converted into vapor in 1 of the following ways:
    - PYROLYSIS = Solid Matter
    - VAPORIZATION = Liquids
    - GASEOUS = Gas
5. Heat Energy:
  - Heat is generated in 4 different methods. Without one or more of these methods heat will not be generated and therefore fire will not take place:
    1. CHEMICAL = Spontaneous Heating
    2. ELECTRICAL = Resistance Heating / Current Leakage / Overload / Static Electricity
    3. MECHANICAL = Compression / Friction
    4. NUCLEAR = Chernobyl
6. Heat Transfer:
  - Heat moves throughout a space in 3 distinct ways. Without these three methods, fire cannot spread from one point to another. It is important to understand these methods of heat transfer, because it is the fundamental essence of fire suppression.
    1. CONDUCTION = Point to Point Contact
    2. CONVECTION = Heat Currents
    3. RADIATION = Infrared Heat Waves
7. Removing Heat:
  - Heat can be removed by firefighting water provided by fire hoses.
  - Firehoses water applied in the form of water fog provides excellent cooling in a space where fire is present.

8. Firefighting Foam agent:

- Foam agent from buckets or storage tanks is entrained in (mixed with) firefighting water in a specially rigged fire hose. The resulting product is foam agent squirting out of the fire hose that can be directed to fight the fire.
- Foam agent is applied to create a floating layer on pooled oil or other flammable liquids to interrupt the fire triangle by creating a barrier between the air in the space and the flammable liquid.
- Firefighting Foam is often applied by using a straight stream hose nozzle pattern; the stream is directed at objects NEAR the fire so that it bounces off into a spray pattern that does not disturb the foam layer – disturbing the foam layer may cause the fire to reflash (start again).

9. Stages of Fire:

- Fire will go through 5 distinct stages during its “life”. Each stage has its own influence on fuel sources as the fire grows and dies. Knowing what each stage is and how it moves from one stage to another will determine both the successful fire suppression and survival of the firefighter.
  - IGNITION (Incipient) = Small in size, easily extinguished
  - GROWTH = Uses 3 methods of heat transfer to increase size of fire
  - FLASHOVER = All fuel sources giving off vapor – cannot survive
  - FULLY DEVELOPED (Free Burning) = Entire room on fire
  - DECAY = Losing fuel sources – Still have 3 other parts of tetrahedron
  - BACKDRAFT = Occurs when have 3 parts of tetrahedron (or two of triangle) – a door or other opening permits uncontrolled volume of air to enter and the fire expands rapidly into full development.
  - SPONTANEOUS COMBUSTION = Heat is generated by a chemical reaction within a substance which continues to the point of ignition. Frequently seen in poor housekeeping situations such as dirty rags soaked with incompatible chemicals that react with each other and start a fire.

10. Fire Prevention:

- Good housekeeping – keeping spaces clean and orderly – is very important.
- There are 3 basic needs for fire prevention. It is up to the individual to be responsible for all 3 parts of fire prevention.
  - ENGINEERING
  - EDUCATION
  - ENFORCEMENT

11. The basic steps to do when there is a fire:

1. SOUND THE ALARM – always the first step no matter what.
2. Report the fire or smoke condition and its location.
3. Attempt to extinguish and contain the fire ONLY if equipment is available and it is completely safe to do so (there is no smoke in the space).

## 12. SCBA

- We wear SCBA's (Self Contained Breathing Apparatus) so we can penetrate deeper into an IDLH environment to perform whatever task is necessary safely.
- SCBA's have do not have an unlimited amount of air or unlimited amount of time they can be used. You are limited by the volume of air in each cylinder.

## 13. IDLH environment:

- IDLH = Immediately Dangerous to Life & Health
- A condition "that poses a threat of exposure to containments when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment"
- Fire often creates an IDLH environment because of the products of combustion, such as Carbon Monoxide gas which causes asphyxiation

## 14. SCBA Limitations:

- Physical Conditioning
- Physical Features
- Psychological Restrictions

## 15. Classes of Fire:

- Fires are classified to their Prominent Fuel Source.
  1. CLASS A – Ordinary Combustibles
  2. CLASS B – Hydrocarbon Fuels
  3. CLASS C – Energized Electrical
  4. CLASS D – Burning Metals
  5. CLASS K – Kitchen Oils and Greases (also referred as Class B)

## 16. Fire Extinguishers:

- Each class of fire can be BEST extinguished with their respective fire extinguisher.
  1. CLASS A – Pressurized Water Extinguisher
  2. CLASS B – Dry Chemical
  3. CLASS C – CO2 / Halon or other non-conducting agent
  4. CLASS D – Dry Powder
  5. CLASS K – Specialized emulsification agents

## 17. Extinguisher Use:

- Check pressure in extinguisher – always test your agent.
  1. P – Pull the Pin
  2. A – Aim at base of fire
  3. S – Squeeze handle to discharge product
  4. Never turn back to fire when backing away.
  5. S – Sweep aggressively across base of fire until fire extinguished or extinguisher empty