

## SECTION 12 FIRE BEHAVIOR (FIRE SCIENCE)

### *Live Fire Training Prerequisite*

- 12-I.01 Trainee shall define heat and fire.  
**NFPA 1001 4.3.10, 4.3.11, 4.3.12**
- 12-I.02 Trainee shall define the fire triangle and tetrahedron.  
**NFPA 1001 4.3.10, 4.3.11, 4.3.12**
- 12-I.03 Trainee shall identify two (2) chemical, mechanical, and electrical energy heat sources.  
**NFPA 1001 4.3.10, 4.3.11, 4.3.12**
- 12-I.04 Trainee shall define the following:  
**NFPA 1001 4.3.10, 4.3.11, 4.3.12**
- A. incipient
  - B. flame spread
  - C. hot smoldering
  - D. flashover
  - E. steady state
  - F. clear or free burning
  - G. back draft explosion
- 12-I.05 Trainee shall define the four (4) methods of heat transfer.  
**NFPA 1001 4.3.10, 4.3.11, 4.3.12**
- A. Conduction
  - B. Convection
  - C. Radiation
  - D. Direct Flame Impingement
- 12-I.06 Trainee shall define the three (3) physical states of matter in which fuels are commonly found.  
**NFPA 1001 4.3.10, 4.3.11, 4.3.12**
- A. solid
  - B. liquid
  - C. gaseous
- 12-I.07 Trainee shall define the hazard of finely divided fuels as they relate to the combustion process.  
**NFPA 1001 4.3.10, 4.3.11, 4.3.12**
- 12-I.08 Trainee shall define:  
**NFPA 1001 4.3.10, 4.3.11, 4.3.12**
- A. flash point
  - B. fire point
  - C. ignition temperature
  - D. upper and lower explosive limits
- 12-I.09 Trainee shall define concentrations of oxygen in air as it affects combustion.  
**NFPA 1001 4.3.10, 4.3.11, 4.3.12**
- 12-I.10 Trainee shall identify three (3) products of combustion commonly found in structural fires which create a life hazard.  
**NFPA 1001 4.3.10, 4.3.11, 4.3.12**
- 12-I.11 Trainee shall identify characteristics of water as it relates to its fire extinguishing potential.  
**NFPA 1001 4.3.10, 4.3.11, 4.3.12**

12-I.12 Trainee shall define the following units of measurements:

**NFPA 1001 4.3.10, 4.3.11, 4.3.12**

- A. British Thermal Unit (BTU)
- B. Fahrenheit (F°)
- C. Celsius (C°)
- D. Calorie (C)
- E. Joule, the SI unit for energy

12-I.13 Trainee shall define thermal balance and imbalance.

**NFPA 1001 4.3.10, 4.3.11, 4.3.12**

12-I.14 Trainee shall identify chemical by-products of combustion.

**NFPA 1001 4.3.10, 4.3.11, 4.3.12**

12-I.15 Trainee shall define the fire extinguishment theory.

**NFPA 1001 4.3.10, 4.3.11, 4.3.12**

12-I.16 Trainee shall identify pressure and velocity.

**NFPA 1001 4.3.10, 4.3.11, 4.3.12**

*Firefighter I - There are no objectives required for this certification level.*

*Firefighter II - There are no objectives required for this certification level.*