



## Virtual Science of Fire Safety

### Lesson Plan

**Duration:**

Approximately 60 Minutes

**Overall Program Description:**

During the Science of Safety Virtual Field Trip, students are presented with the science behind fire itself, fire safety & prevention, and general firefighting. Students will see how fire itself is a chemical reaction and how science is used to both prevent and stop fires. They will observe how science plays a role in the starting and spreading of fires, and alternatively how science plays a role in fire prevention and firefighting through live scientific demonstrations being conducted safely at the museum. This program is supplemented by at-home, interactive hands-on activities that provide students with experiences that produce an understanding of scientific principles.

**Part I – How Fires start and spread:**

Approximately 15 minutes

**Inquiry Questions:**

How do fires get started?

How do fires spread and grow?

**Desired Results:**

After this part of the program students will understand the following:

- Fires (combustion) are the result of a chemical reaction between heat, oxygen and fuel.
- The process of removing one of those components from that reaction results in fire suppression.
- By adding more of one of those components, the fire may spread or grow.

**Activities:**

During this part of the program, students will:

- Observe how a billow adds oxygen to a fire to purposefully make it larger.
- Mimic the creation of heat through friction by rubbing their hands together.

**Assessment:**

During this part of the tour, students will be able to respond successfully to:

- What are the three parts of the fire triangle?
- What are the effects of adding or decreasing oxygen, heat and fuel to a fire

**Part II – Science behind Firefighting, Fire suppression and Fire Safety**

Approximately 30 minutes

**Inquiry Questions:**

What is the science behind firefighting and fire suppression?

What are other ways to suppress or extinguish a fire besides using water?

**Desired Results:**

After this part of the program students will understand the following:

- Fire suppression, Firefighting and fire safety all revolve around removing one or more parts of the fire triangle
- There are more than one type of fire, some fires cannot be put out by putting water on them

**Activities:**

During this part of the program, students will:

- Showcase their home made and decorated fire extinguishers
- View live experiments being conducted at the museum demonstrating different techniques of firefighting, fire suppression and fire safety

**Assessment:**

During this part of the tour, students will be able to respond successfully to:

- What are some of the different types of fire?
- How are specialized fires extinguished or suppressed?

**Part III – General Fire Safety**

Approximately 15 minutes

**Inquiry Questions:**

What are some ways to reduce the risk of fire?

How to protect ourselves during a fire?

How do you exit a burning building?

**Desired Results:**

After this part of the program students will understand the following:

- Smoke can be just as dangerous as fire while inside a burning building
- To dial 9-1-1 in case of an emergency.
- How individuals and families can practice fire safety.

**Activities:**

During this part of the program, students will:

- Learn about fire safety and home preparedness.
- Practice “stay low and go” and “stop, drop, and roll.”

**Assessment:**

During this part of the tour, students will be able to respond successfully to:

- What should you do if you are in a smoke-filled room?
- What should you do if your clothes or part of your body is on fire?



### Maryland State Curriculum Standards – Social Studies Connections

**Subject:** Political Science

**Grades:** Pre K-3

**Topic:** A. The Foundations and Function of Government

**Indicator:** 1. Explain the role of individuals and groups in creating rules and laws to maintain order, protect citizens, and provide services

**Objectives:**

- a. Identify local government leaders, such as the mayor, county council members or commissioners, and county executive, and explain their role in protecting citizens and maintaining order.
- b. Explain the consequences of violating rules and laws.
- c. Describe the selection process and duties of local officials who make, apply, and enforce laws through the government.

**Subject:** Political Science

**Grade:** 3

**Topic:** B. Individual and Group Participation in the Political System

**Indicator:** 2. Analyze the role of individual and group participation in creating a supportive community.

**Objectives:**

- a. Explain the decision making process used to accomplish a community goal or solve a community problem.
- b. Explain the roles and responsibilities of effective citizens in a political process.
- c. Describe the actions of people who have made a positive difference in their community, such as community and civic leaders, and organizations.

**Subject:** History

**Grades:** K-3

**Topic:** A. Individuals and societies change over time

**Indicator:** 2. Investigate how people lived in the past using a variety of primary and secondary sources

**Objectives:**

- a. Collect and examine information about people, places, or events of the past using pictures, photographs, maps, audio or visual tapes, and or documents.
- b. Compare family life in the local community by considering jobs, communication, and transportation.

### **Next Generation Science Standard Connections**

**5-PS1-4.** Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

**MS-PS1-2.** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.



**Maryland State Curriculum - Science Connections:**

**Subject:** Chemistry

**Grade:** 5

**Topic:** D. Physical and Chemical Changes

**Indicator:** 1. Provide evidence to illustrate that when a new material is made by combining two or more materials, its properties are different from the original materials.

- Objectives:**
- Investigate and describe what happens to the properties of materials when several materials are combined to make a mixture, such as table salt and pepper; various kinds of nuts, chocolate pieces, and coconut; sugar dissolved in milk.
  - Based on observations from investigations and video technology, describe what happens to the observable properties of materials when several materials are combined to make a new material, such as baking soda combined with vinegar.
  - Share data gathered and construct a reasonable explanation of the results.

**Subject:** Chemistry

**Grade:** 7

**Topic:** A. Structure of Matter

**Indicator:** 1. Cite evidence to support the fact that all matter is made up of atoms, which are far too small to see directly through a microscope.

- Objectives:**
- Recognize and describe that the atoms of each element are alike but different from atoms of other elements.
  - Recognize and describe that different arrangements of atoms into groups compose all substances.
  - Provide evidence from the periodic table, investigations and research to demonstrate that elements in the following groups have similar properties.
    - Highly reactive metals, such as magnesium and sodium
    - Less-reactive metals, such as gold and silver
    - Highly reactive non-metals, such as chlorine, fluorine, and oxygen
    - Almost non-reactive gases, such as helium and neon
  - Provide examples to illustrate that elements are substances that do not breakdown into smaller parts during normal investigations involving heating, exposure to electric current or reactions with acids.
  - Cite evidence to explain all living and non-living things can be broken down into elements.



**Subject:** Chemistry

**Grade:** 8

**Topic:** B. Conservation of Matter

**Indicator:** 1. Provide evidence to support the fact that the idea of atoms explains conservation of matter.

- Objectives:**
- Use appropriate tools to gather data and provide evidence that equal volumes of different substances usually have different masses.
  - Cite evidence from investigations that the total mass of a system remains the same throughout a chemical reaction because the number of atoms of each element remains the same.
  - Give reasons to justify the statement, "If the number of atoms stays the same no matter how the same atoms are rearranged, then their total mass stays the same."

**Subject:** Chemistry

**Grade:** 8

**Topic:** D. Physical and Chemical Changes

**Indicator:** 3. Provide evidence to support the fact that common substances have the ability to change into new substances.

- Objectives:**
- Investigate and describe the occurrence of chemical reactions using the following evidence:
    - Color change
    - Formation of a precipitate or gas
    - Release of heat or light
  - Use evidence from observations to identify and describe factors that influence reaction rates.
    - Change in temperature
    - Acidity
  - Identify the reactants and products involved in a chemical reaction given a symbolic equation, a word equation, or a description of the reaction.
  - Provide data from investigations to support the fact that energy is transformed during chemical reactions.
  - Provide examples to explain the difference between a physical change and a chemical change.