



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?

Next Generation Science Standard Connections

5-PS1-3. Make observations and measurements to identify materials based on their properties.

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.



MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

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: a. 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.

b. 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.

c. 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: a. Recognize and describe that the atoms of each element are alike but different from atoms of other elements.

b. Recognize and describe that different arrangements of atoms into groups compose all substances.

c. 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

d. 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.

e. 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:**
- a. Use appropriate tools to gather data and provide evidence that equal volumes of different substances usually have different masses.
 - b. 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.
 - c. 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:

- a. 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

b. Use evidence from observations to identify and describe factors that influence reaction rates.

- Change in temperature

- Acidity

c. Identify the reactants and products involved in a chemical reaction given a symbolic equation, a word equation, or a description of the reaction.

d. Provide data from investigations to support the fact that energy is transformed during chemical reactions.

e. Provide examples to explain the difference between a physical change and a chemical change.