

ULRI Xplorlabs: Fire Forensics

Implemented at Gunnison High School. Freshmen Physical Science. Krystal Brown and Jeanene Nelson 2024

Fall Semester



Students will use the Xplorlabs: The Science of Fire Forensics <u>website</u> to complete the tasks below. Day 3 includes a lab and a project can be assigned at the end to encourage students to elaborate on their learning. Use the hyperlinked worksheets and the project to evaluate student learning.

Day 1, 50 minutes: Engage & Explore-<u>Fire Forensics Day 1</u> Day 2, 50 minutes: Explore-<u>Fire Forensics Day 2</u> Day 3, 90 minutes: Explore & Explain-<u>Fire Forensics Day 3</u> with lab Day 4, 50 minutes: Explain-<u>Fire Forensics Day 4</u>

Project: Elaborate- Fire Safety Poster Design Challenge



Day 1, 50 minutes: Engage & Explore- Fire Forensics Day 1

Xplorlabs: The Science of Fire Forensics website

Overview:

Students are introduced to a house fire. They document their observations in a notice and wonderings chart and record their initial thinking before developing an initial model. They then learn about the physical and chemical parts of a fire and phases of matter, defining the term pyrolysis.

Standards:

NGSS HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects). [

Anticipated Outcomes:

Students are invited into solving the case of how a fire started. They gain the required baseline knowledge to understand the basic anatomy of fire development.



Day 2, 50 minutes: Explore- <u>Fire Forensics Day 2</u>

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Overview:

Students use a simple mathematical model to explore the necessary ratios for combustion to occur by exploring the pyrolysis of a common household item, a couch. They define the fire triangle and learn about the different stages of a fire as used by firefighters and fire investigators. They predict how the three types of energy transfer can be observed in a simple lab.

Standards:

NGSS MP.4 Model with mathematics. (HS-PS2-1),(HS-PS2-2),(HS-PS2-4)

NGSS HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

Anticipated Outcomes:

Students will be able to identify the necessary components for a combustion reaction to occur and be able to explain the combustion reaction stages as it relates to real world firefighting and fire investigation.





Day 3, 90 minutes: Explore & Explain- <u>Fire Forensics Day 3</u> with lab

Xplorlabs: The Science of Fire Forensics <u>website</u>

Overview:

Students begin by exploring the combustion of a bed. They define and evaluate how temperature, pressure, volume, and airflow influence fire behavior. They explore the combustion of synthetic vs natural fibers. A lab allows students to explore the material they have learned so far and explain the phenomena in real life with their peers.

Standards:

NGSS HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

NGSS WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HSPS1-6)

Anticipated Outcomes: Students have acquired enough physical and chemical knowledge regarding the combustion process and fire behavior to be able to predict the origin of a fire in a home.





Students review the initial fire and make a claim to solve the case of origin of the fire and submit their work to their instructor for evaluation. They use the knowledge they learned to invite their school community to think about fire safety.

Standards:

NGSS RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-PS2-1)

Anticipated Outcomes:

Students successfully identify the origin of the kitchen fire and elaborate on their knowledge by creating an educational poster about fire in the home to be shared with the school.

