



WEATHERIZATION

TOPIC OF STUDY

Building Sciences



90 MINUTES

KEY TERMS

equilibrium
feedback loop
system
systems thinking

LESSON

Health and Safety in the House

BIG IDEA(S)

Air flow and moisture in the home can impact the health and safety of the occupants.

TASK LIST SUBCATEGORY

- 801 Identify the principles of building science
- 802 Describe the interconnection of systems
- 106 Describe the impact of energy systems (social, economic, health, and environmental)

OVERVIEW

A house is a single system of connected parts. Simple systems can work in predictable ways; dynamic systems exhibit more complex and unpredictable behaviors. Building science is based on the use of scientific principles to understand how the house as a system impacts energy efficiency, air flow, and the overall health, safety, and comfort of the occupants. Negative health and safety issues are avoided when approaching the house as a system of interactive parts. However, older buildings may have preexisting conditions and present hazards that workers must recognize and sometimes avoid.

STANDARDS

PA/SDP

- 3.1.12.A8.** Change and Constancy: Describe and interpret dynamic changes in stable systems
- 3.2.12.A5.** Change and Constancy: Predict the shift in equilibrium when a system is subjected to a stress
- 3.4.10.A2.** Interpret how **systems** thinking applies logic and creativity with appropriate comprises in complex real-life problems.
- 3.4.12.B1.** Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of **technologies**.
- 3.4.12.C3.** Apply the concept that many technological problems require a multi-disciplinary approach.
- 3.4.12.E3.** Compare and contrast energy and power **systems** as they relate to pollution, renewable and non-renewable resources, and conservation.

OBJECTIVES

Students will:

- Apply concepts of House as a System to a variety of scenarios
- Explain the interrelatedness of health and safety of the house to the “house as a system” approach





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INSTRUCTIONAL

TEXT/REFERENCES

Energy Conservation Handbook. pp. 89 – 92

MATERIALS NEEDED

Content: Website linked below

Technology: Internet access

IMPLEMENTATION (LESSON PLAN)

ENGAGE

1. Place something in the classroom that has a strong (possibly offensive, but still safe) odor such as a strong-smelling body spray, or perhaps a food item that has a lot of garlic in it; something that will permeate the room.
2. Ask students how they can get rid of the odor. Ask students to identify some of the odors that you might smell in someone's home. Ask how odors in homes are dealt with (bathroom usage, cooking, pets, etc.).

EXPLORE

- Have students discuss in small groups three scenarios and come up with solutions to remove the odor/pollutant from the home.

Scenario #1 – Aida's grandmother loves to cook fried plantains. She makes them at least three times per week. She fries them in a large skillet filled with cooking oil. You don't like to visit her because the house always smells like fried food. What can you do to help Aida's grandmother's house smell a little more pleasant without telling her she needs to stop cooking plantains?

Scenario #2 – The Smith family lives on a very busy street. There are many trucks that use this street. The youngest child in the family was just diagnosed with asthma. What can the family do to their house to improve the air quality inside of the home?

Scenario #3 – The Ayala family just moved into a new house with brand new carpeting in the bedrooms on the second floor. The carpets have a strong odor due to a phenomenon called "off-gassing." Small chemical particles used in making the carpets are being released into the air of the home. What can the family do to improve the ventilation in their home?

EXPLAIN

- Student groups report on the solutions to the scenarios.

EXTEND

1. Ask students to identify and discuss how they have handled odors in their own home.
2. Have students read the following web site (<https://fyi.extension.wisc.edu/house/about-the-house/home-health-hazards/>) and have students take turns summarizing in their own words each of the hazards addressed on the web site.





IMPLEMENTATION (LESSON PLAN) - CONTINUED

EVALUATE

- Ask students to read the passage below and write a short essay addressing 1) how the health and safety of homes contributes to overall health of the occupants, and 2) how society can do a better job at ensuring lower-income families have access to healthy and safe housing.
- The World Health Organization (WHO) has recognized housing as a fundamental social determinant of health (SDH)¹. And WHO's Commission on Social Determinants of Health has stated that access to quality housing is a necessary element in securing social justice and health equity: *"The daily conditions in which people live have a strong influence on health equity. Access to quality housing and shelter and clean water and sanitation are human rights and basic needs for healthy living."*



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RESOURCES/LINKS

Basic Building Science webinar by The Energy Center of Wisconsin

<https://www.youtube.com/watch?v=vCSAjgVUplA>

Building Science Concepts

<https://www.wbdg.org/resources/building-science-concepts>

Building Science Concepts: Northern Arizona University

<https://mediaspace.nau.edu/media/>

[Building+Science+Concepts/0_9gnqhk0n/69035282](https://mediaspace.nau.edu/media/Building+Science+Concepts/0_9gnqhk0n/69035282)

Home Health Hazards

<https://fyi.extension.wisc.edu/house/about-the-house/home-health-hazards/>

Introduction to Building Science powerpoint slides

https://www.tboake.com/2013/172-building_science_13.pdf

National Energy Education Development (NEED) Project: Building Science booklet

<https://www.need.org/Files/curriculum/guides/BuildingScience.pdf>

