



WEATHERIZATION

TOPIC OF STUDY

Building Sciences



90 MINUTES

KEY TERMS

infiltration
exfiltration
ventilation
conditioned system

LESSON

Air Leakage

BIG IDEA(S)

Unwanted air leakage is the primary cause of energy inefficiency.

OBJECTIVES

Students will:

- Make observations and compare rates of air leakage in balloon model
- After exploring air leakage in a balloon model, apply the concept of air leakage to homes
- Identify potential points of air leakage
- Relate the issue of air leakage to financial loss
- Summarize basic principles of air leakage

TASK LIST SUBCATEGORY

- 804 Identify infiltration and exfiltration points
810 Use energy efficiency industry vocabulary

OVERVIEW

All homes breathe, but most homes breathe too much. Unwanted air leakage, is the primary cause of energy inefficiency. Addressing air leakage problems is the second most important priority after health and safety. The unintentional introduction of air into a building is known as air infiltration.

STANDARDS

PA/SDP

- 3.2.12.A9.** Formulate and revise explanations and models using logic and evidence.
3.2.12.B2. Explain how energy flowing through an open **system** can be lost.
3.4.10.A2. Interpret how **systems** thinking applies logic and creativity with appropriate comprises in complex real-life problems.

INSTRUCTIONAL

TEXT/REFERENCES

Energy Conservation Handbook. pp. 96 - 101

MATERIALS NEEDED

Content: Air Leakage Assessment Worksheet

MATERIALS

- Timer
- 3 balloons per pair of students with pinholes prepared in advance

Technology: Access to YouTube





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IMPLEMENTATION (LESSON PLAN)

ENGAGE

- Quick leakage general introduction: Family Feud style game/whole class questioning – Name top 5 things you would not want to leak. (roof, toilet, baby’s diaper, change/money in your pocket, soda, food, air from a car/bike tire, data/information). Ask students why they would not want these things to leak? (damage = money loss).

EXPLORE

1. Give each team of students three balloons: one with no pinholes, one with a single pinhole, and one with 5 pinholes.
2. Ask students to blow up and tie off one of the balloons. Using a timer on their phone or a provided timer, students should immediately begin to make observations of the balloon for a 1 minute period. At the end of the 1 minute period students should record the approximate amount of deflation (0%, 25%, 50%, 100%) in a data table. Repeat the trials three times.
3. Ask students to repeat the above steps with the remaining two balloons.
4. Ask students to record what they think happened.

EXPLAIN

1. Student teams report back results to whole group, explaining results.
2. Ask students to create a definition of the terms “infiltration” and “exfiltration.”

EXTEND

1. Ask students to apply the balloon air leakage results to a house. If the house is leaking warm air in the winter, how does this impact the owner’s energy bill?
2. Show first 6 min 30 seconds of YouTube video: <https://youtu.be/dgl4UTpdMtE>

EVALUATE

- Use the Air Leakage Assessment Worksheet.

RESOURCES/LINKS

Ohio State University Extension Green Home Technology Center

<https://greenhome.osu.edu/reduced-air-infiltration>

Finding Air Leakages by Qualibuild

<https://youtu.be/dgl4UTpdMtE>

