
TEACHER'S NOTES 9

CAN THE RADON PROBLEM BE FIXED?

BACKGROUND

This lesson plan on fixing radon problems provides the student with very little background information and is open-ended. The primary objective is two-fold: allow students to come up with some creative and workable solutions to a radon problem and expand students' understanding of purpose, role, and audience in the writing process. This activity might best be conducted in small groups of 3 to 5 students.

The radon reduction or mitigation strategies designed by the students should take into consideration the principal entry routes of radon into a house and normal air flow patterns. Radon enters via openings in the lower portions of the home: small cracks in the slab or foundation, through the tops of hollow cinder-block walls, at the joints where walls and floors come together, and through holes that allow the passage of water or sewer lines or electrical conduits. Remember that the ultimate source of radon is the rocks and soils under the house.

Hot air rises. Heat and air escape largely through the upper portions of the house, especially on the leeward side (away from the prevailing wind). This escape of air at the top of the house causes the creation of a slight vacuum in the lower sections of the house. Air will be pulled in via the pathways of least resistance. These can be open windows, or some of the openings to the soil through which radon is pulled by the suction of the vacuum.

Mitigation strategies for elevated radon are selected on the basis of:

- how high the radon concentrations are
- house design
- appearance (aesthetics) of the remedies
- cost/benefit trade-offs
- difficulty of implementation

Some common mitigation strategies include one or more of the following:

1. Natural ventilation - opening windows and vents to facilitate the flow of outside air into the house, especially on the lower levels.
2. Forced ventilation - installation of one or more fans to blow air into (never out of) the house on the lower levels. Blowing air out of the house can make the problem worse by increasing the vacuum effect that pulls radon in. Any increase in ventilation will increase the heating and cooling costs.
3. Forced ventilation with heat recovery - Heat exchangers blow air both into and out of the house at the same time. The ducts are arranged in a fashion to allow the incoming air to be partially warmed or cooled by the outgoing air. These systems reduce the amount of added heating/cooling costs that result from ventilation.
4. Sealing radon gas entry points, especially:
 - floors in basements or crawl spaces
 - floor drains
 - perimeter drains around basements
 - uncapped top blocks in hollow-block walls
 - cracks and holes in foundation walls
 - joints between walls and basement floor

5. Soil ventilation - drawing soil gas away from the house before it enters. Fans are used to put suction on the soil around and under the house to draw the air away, or to blow outdoor air into the soil. The latter creates a "pressure bubble" underneath the house that forces soil gas away from the house.

WARM-UP

As a way of introducing or reviewing audience, purpose, and role in the writing process, have students prepare a three minute speech about any topic of interest to them. The speech, however, has to include a specific audience (e.g., students, taxpayers), purpose (e.g., persuade, inform), and role (e.g., advocate, salesperson).

TEACHING TIPS

Students may come up with some of these strategies, or variations thereof, on their own. Alternatively, some groups of students may need some assistance from the teacher to get started.

GROUPING

It is recommended that students work in groups of 3 to 5 to prepare both their speech and subsequent radon report.

MINIMUM RECOMMENDED TIME ALLOCATION

One class period, plus a homework assignment to complete the write-up.

LEARNING PROCESS SKILLS

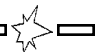
| <u>Science</u> | <u>Math</u> | <u>Social Studies</u> | <u>Social or Group</u> |
|----------------|-------------|-----------------------|------------------------|
| Communicating | Classifying | Solving problems | Collaborating |
| Inferring | Verifying | and drawing | with others |
| Applying | Analyzing | conclusions | |

STUDENT RESPONSES

There are no "correct" answers for this exercise. Student responses should be well thought-out, should reflect an understanding of radon inflows and outflows from the home, and should propose reasonable and workable solutions. Responses should be well organized and well written. Students should use their own practical knowledge of home repairs and building construction to systematically approach a problem-solving situation.

EXTENDED ACTIVITIES

1. Have students research how building contractors prepare estimates or bids for potential clients.
2. Have students prepare a formal speech about a contemporary issue from three different perspectives (e.g., persuade versus describe).





Radon Alert
Lesson Plan Evaluation Sheet
and FREE POSTER AND STORYBOOK offer

The New Jersey Department of Environmental Protection is happy to provide these lesson plans for use by teachers. In order to evaluate the use of the lesson plans, we would greatly appreciate your response to the following questions. All teachers who return these forms will receive a FREE RADON POSTER depicting information about radon in a colorful format and a STORYBOOK about a Native American child and his experience with radon in his home.

1. Which Radon Alert lesson plan(s) did you use?

2. How useful did you find it/them (check one) ?

- Not useful
 Slightly useful
 Moderately useful
 Very useful
 Extremely useful

3. Do you plan to use them again in the future? Yes No

4. In your view, what would make the lesson plans MORE useful:

Your name: _____ **Phone Number:** _____

Subject area: _____ **Grade:** _____

Mailing address:

To receive your FREE RADON POSTER and STORYBOOK, mail or fax this completed form to:

NJDEP Radon Program, P. O. Box 415, Trenton, NJ 08625

Fax: 609-984-5595.

(Questions? Call the Radon Program at 1-800-648-0394.)