

## TEACHER'S NOTES 8



# HOW DOES RADON GET INTO YOUR HOME?

## BACKGROUND

Students will conduct a radon audit of their homes in this activity. It is intended to allow them to estimate and evaluate the major potential sources of radon entry into their homes and also to become aware of the many “unseen” routes of ventilation in the typical home. This activity provides an opportunity for students to work with mathematical concepts for estimation, computing area and mean, measuring, and working with fractions.

One of the units that is used in the United States to measure radioactivity is the curie (named for Marie Curie, the physicist and chemist who discovered radium), which is abbreviated by the symbol Ci. Its original definition was the number of radioactive disintegrations occurring per second in one gram of radium-226. However that is a subjective definition because it is difficult to measure exactly how many disintegrations are occurring! In 1950 the curie was redefined as equal to  $3.7 \times 10^{10}$  disintegrations per second; that is a *lot* of radioactivity. For most measurement purposes, radiation scientists use smaller units of a curie, such as the microcurie ( $\mu\text{Ci}$ , one millionth of a curie) or picocurie (pCi, one billionth of a curie) (see Table 1). Radon is often recorded in picocuries.

Table 1. Some common factors used in units of measure.

Factor	Prefix	Symbol	Explanation of Factor
$10^{-1}$	deci	d	one-tenth
$10^{-2}$	centi	c	one-hundredth
$10^{-3}$	milli	m	one-thousandth
$10^{-6}$	micro	$\mu$	one-millionth
$10^{-9}$	nano	n	one-billionth
$10^{-12}$	pico	p	one-trillionth

## WARM-UP

Bring in objects of different shapes and sizes. Have students compute the surface area for each object.

## TEACHING TIPS

Reinforce the concept that radon entry into the home and ventilation of radon out of the home are ultimately the only two processes that make any difference in terms of the exposure of the inhabitants to radon (their health risk). This exercise focuses primarily on the ventilation component, because measuring radon entry requires the purchase and processing of one or more radon detectors (if you have the financial resources, this would be a very useful addition). Please inform the students that a highly ventilated (leaky) house is not *necessarily* low in radon. Conducting the radon audit

and drawing the schematic diagram of their homes will take a fair amount of time. These would best be done as a homework assignment. If students live in apartments above the second floor, have them work together with classmates who live closer to the ground in conducting this exercise. Alternatively, they could conduct an audit of part of the school building.

See Resources, Speakers and Field Trips for additional information on radon entry and reduction. The American Association of Radon Scientists and Technologists may be very helpful in providing useful information on this topic, as well as arranging for a speaker. In New Jersey, be sure to contact the state radon program for lists of certified testing and mitigation businesses. See Resources, State Radon Programs.

**GROUPING**

It is recommended that students work in pairs to complete the warm-up activity.

**MINIMUM RECOMMENDED TIME ALLOCATION**

Allow two days for the homework portions (home audit and schematic drawing) and one class period for analysis and discussion.

**LEARNING PROCESS SKILLS**

<u>Science</u>	<u>Math</u>	<u>Social Studies</u>	<u>Social or Group</u>
Communicating	Investigating	Solving problems	Collaborating with
Categorizing	Verifying	and drawing	others
Applying	Analyzing	conclusions	

**STUDENT RESPONSES**

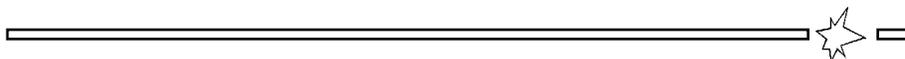
Question 7: Typical responses might include:

- increase air flows (ventilation) to rid the house of excess radon
- seal cracks in basement floor or foundation
- spend less time in the basement
- sleep in room with window open

Question 8: The information in this activity provides absolutely zero information regarding the radon concentrations in any home. It merely helps the students evaluate the factors that might exacerbate or ameliorate whatever radon problem exists. They need to know *how much* radon is leaking in from underground. The only way to get an estimate of that is to take some radon measurements in the home.

**EXTENDED ACTIVITIES**

1. If a student in the class has had radon mitigation work conducted at his/her home, have that student report to the class on what was done, why, and what the results were.
2. Have students research different ways radon can be measured in a home. Have their research report include the cost of the radon measuring device, length of test, and accuracy of results.





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## **Radon Alert**

### **Lesson Plan Evaluation Sheet**

### **and FREE POSTER AND STORYBOOK offer**

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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?**

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**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:**

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**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.)**