
TEACHER'S NOTES 2

HOW DOES PROBABILITY RELATE TO RADON?

BACKGROUND

Many people, including students, have little understanding of the phenomenon of radioactivity. This is unfortunate, because radioactivity and radioactive substances have become increasingly important in our daily lives. **Please review the background material presented in Section III on radioactivity before beginning this lesson plan.** It is particularly important for students to recognize that the kind of radiation emitted, half-life, and energy of the radiation all have a profound influence on any possible biological effects from radiation.

The half-life of a radioactive element is extremely important in influencing the behavior and effects of the element and its radiation. It provides information on how long the radioactive element will last before decaying into something else. It also provides information on the frequency of radioactive disintegrations. An extremely long-lived radioactive element will only infrequently emit its radiation. A radioactive element with a short half-life will repeatedly emit its radiation during a short period of time. Students will have to comprehend the concept of probability in order to understand half-life. The procedures outlined in this lesson plan should help communicate this concept to the students.

WARM-UP

Prior to beginning *How Does Probability Relate to Radon?* have students take out a coin and toss it 20 to 30 times in the air. Have them record their results on a sheet of paper to arrive at the probability of tossing a “heads” versus a “tails”.

This lesson plan may be preceded by a hands-on geiger counter activity, which will help to get students excited about the concepts of radiation and radioactivity. Have students record changes in the amount of radioactivity detected by the geiger counter in response to 1) changing the distance from the radioactivity source, and 2) shielding the source with different kinds of materials (e.g., paper, thin plastic, aluminum foil, wood, etc.). See Resources, Equipment and Materials for information regarding the availability of geiger counters or other radiation counters.

TEACHING TIPS

If you write a letter on school stationery to the M&M/Mars Candy Company, you can get a coupon for a free bag of m&m’s to use in this exercise. Have the students compose the letter, and also compose a “thank you” letter afterwards. See Resources, Equipment and Materials.

GROUPING

Pairing students in groups of two is suggested to complete the probability activity and subsequent analysis.

MINIMUM RECOMMENDED TIME ALLOCATION

One class period.

LEARNING PROCESS SKILLS

<u>Science</u>	<u>Math</u>	<u>Social Studies</u>	<u>Social or Group</u>
Communicating Inferring Applying	Investigating Analyzing	Judging information related to a problem	Collaborating with others

STUDENT RESPONSES

- Question 7: The appropriate response is one roll.
- Question 8: The appropriate response is two rolls (one-half of one-half to arrive at 1/4 remaining)
- Question 12: The appropriate responses are as follows:
- a) 4.5 billion years
 - b) 2.5 grams

EXTENDED ACTIVITIES

1. Have students research current articles in periodicals relating to radiation in general, including both beneficial uses and harmful effects.
2. Have students research the half-lives and isotopes of uranium leading to radon-222.





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.)