



INVESTIGATION 3

What is a pico?

NOTES TO TEACHER

PURPOSE: to explore the relative magnitude of numbers

MATERIALS:

- metric ruler (with millimeter readings)
- magnifying glass

BACKGROUND:

Understanding the relative magnitude of numbers, big and small, is a vital concept for students of all ages. Though most people have few problems with conceptualizing the probability of a future rain shower (e.g., 40% chance of showers) or the likelihood of heads turning up in a coin toss (1 out of 2 possibilities), many have difficulty relating to much larger or smaller numbers such as a trillion or a billionth.

There are a number of systems in use for measuring radioactivity. The basic unit of measurement most commonly used in the United States for radioactivity is the curie, abbreviated as "Ci". One curie is equal to 37 billion radioactive disintegrations per second. The radioactive energy given off by radon and its decay products is usually measured in picocuries (pCi) or trillionths of a curie.

This investigation helps students conceptualize the unit of measurement for radon, the picocurie, as a way of understanding the magnitude of the problem associated with this radioactive gas.

WARM-UP:

Ask students to sort and label different objects in the classroom according to their mass, volume, and length using the metric system. Make sure students can discriminate between the different Latin (e.g., deci, centi, milli, etc.) and Greek prefixes (deca, kilo, etc.). Use the enclosed sample numerical display to help students visualize some of the more extreme numbers beginning with nano or pico.

PROCESS SKILLS:

| Science | Mathematics | Social Studies | Social or Group |
|--|------------------------------|---|------------------------------|
| Communicating Categorizing Comparing | Classifying Investigating | Judging information related to a problem | Collaborating with others |

ACTIVITY SUMMARY:

STEP 1

Students study the chart displaying the relationship between the numerical value and the corresponding metric unit.

STEP 2

Students respond to questions based on the metric chart

STEP 3

Students use a metric ruler (with millimeters) and a magnifying glass to measure the thickness of various objects. Students then fill out the chart in its entirety.

STEP 4

Students respond to questions involving the pico as a unit of measurement.

STUDENT RESPONSES

Handout #2

1. 10
2. 10,000,000,000
3. 1,000
4. 1,000,000,000
5. 1,000,000
6. 1,000,000,000,000

Handout #3

1. Responses will vary.
2. Responses will vary.
3. Responses will vary.

MINIMUM RECOMMENDED TIME

Three or four hours.

EXTENSION ACTIVITIES

1. Have students research additional units of measurement used in the physical, earth, and life sciences.
2. Have students assemble a bulletin board display illustrating each of the units of measurement used in this activity as well as an object to represent or symbolize each unit.





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:

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