



4-H Radon Project Manual

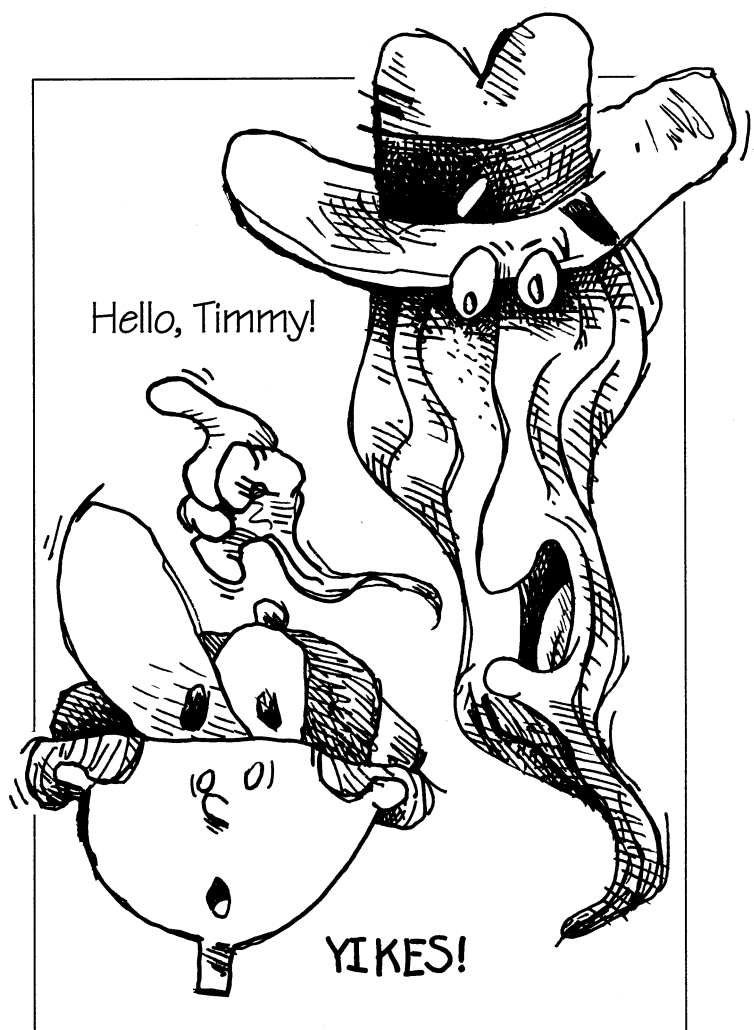
Objectives of the 4-H Radon Project

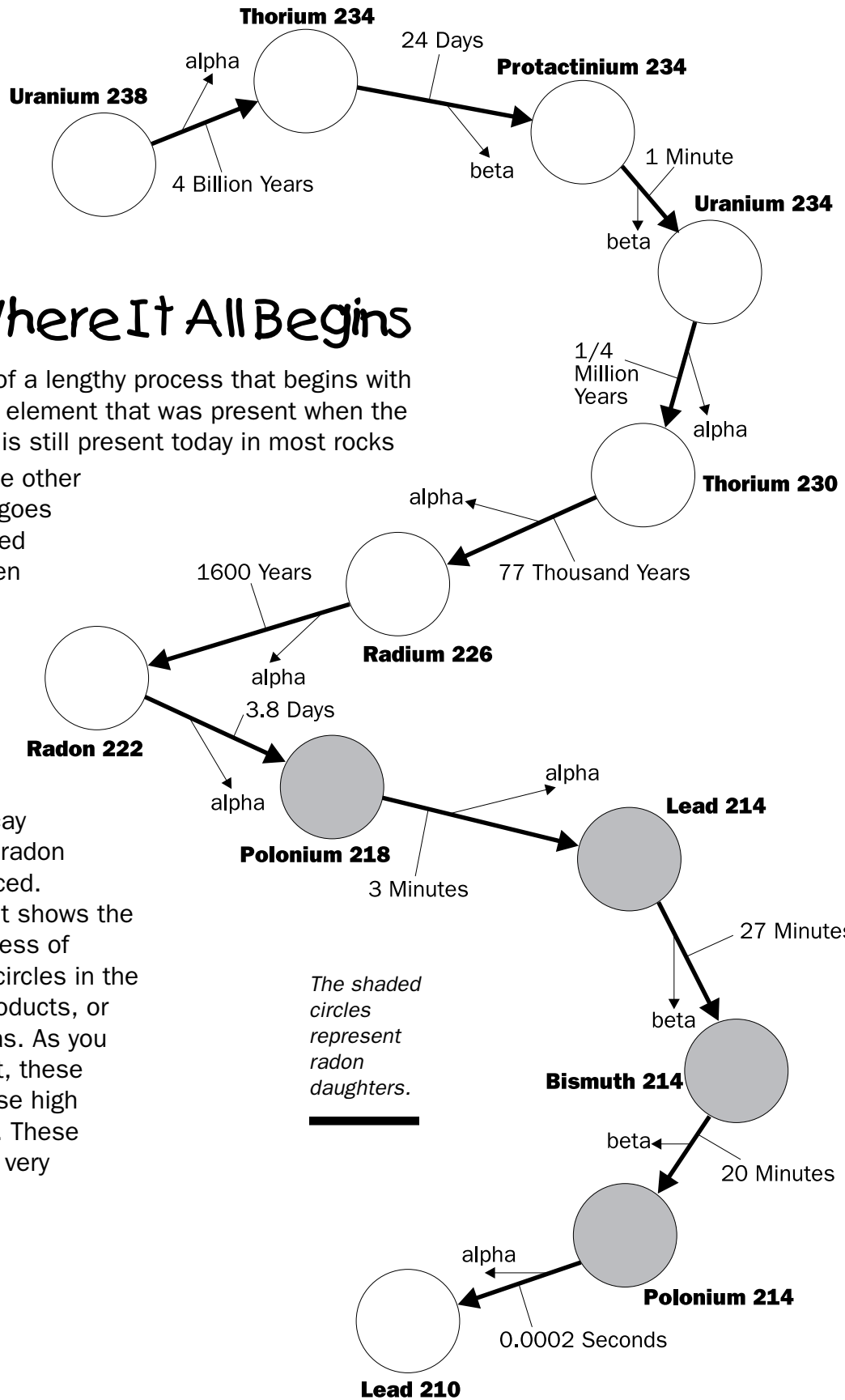
- To encourage all 4-H families to test their homes for radon
- To encourage 4-H members to talk to others in their community about testing for radon
- To encourage action to lower high radon levels

In this project, you will learn:

- Where radon comes from
- How radon gets into houses
- The risks presented by radon decay products
- How to test for radon
- How to prevent radon from entering your house

Radon is an odorless, colorless, tasteless gas that is found in nature. It can accumulate in many homes and other buildings in our state and can be a health hazard for you and your family. To fully understand how radon gas can be a problem, we will have to travel several billion years back in time!

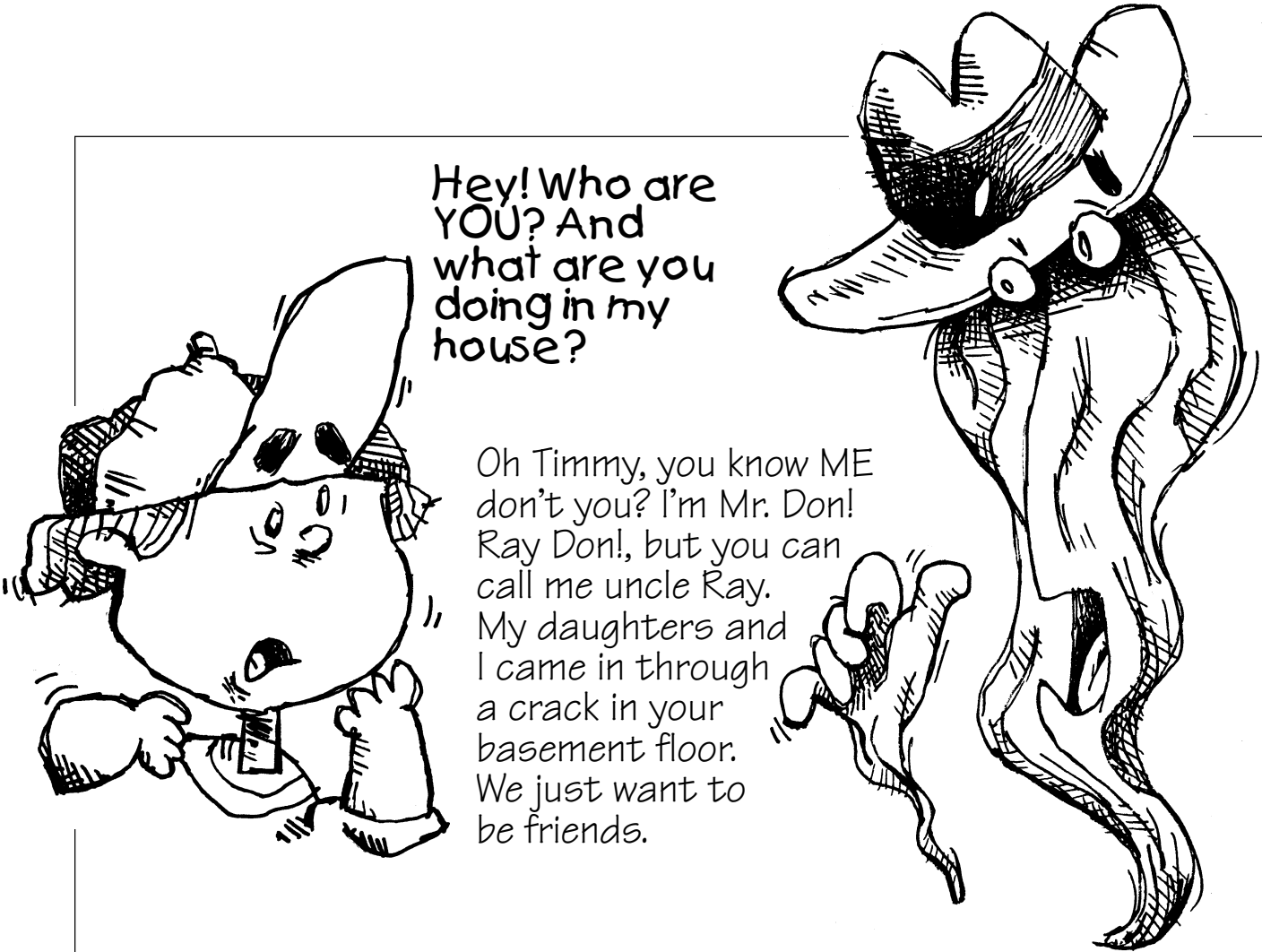




Uranium: Where It All Begins

Radon is a product of a lengthy process that begins with uranium, a radioactive element that was present when the earth was formed and is still present today in most rocks and soils. Uranium, like other radioactive elements, goes through a process called radioactive decay. When uranium decays, radium is formed. Radium also undergoes radioactive decay, producing radon gas. When radon gas decays, radon decay products—also called radon daughters—are produced.

The chart to the right shows the radioactive decay process of uranium. The shaded circles in the chart are the decay products, or daughters, of radon gas. As you can see from the chart, these radon daughters release high energy alpha particles. These alpha particles can be very harmful to people.



Hey! Who are YOU? And what are you doing in my house?

Oh Timmy, you know ME don't you? I'm Mr. Don! Ray Don!, but you can call me uncle Ray. My daughters and I came in through a crack in your basement floor. We just want to be friends.

Radon Daughters: Bad News for Our Lungs!

Radon is an inert gas—which means it doesn't do anything! We inhale and exhale most of the gas without causing harm to our lungs. However, radon daughters are particles and can attach themselves to furniture, TV sets and, more important, to dust or other particles in the air.

When we breathe, radon daughters, whether they are attached to dust or by themselves, may become trapped in our lungs. As the radon daughters continue to decay, they release alpha particles which emit small bursts of energy. These small bursts of energy can damage lung tissue and possibly lead to lung cancer.

Although scientists still cannot predict health risks, many agree that it is best to reduce our exposure to radon daughters. Our risk of developing lung cancer from exposure to radon daughters depends on two factors:

1. The radon daughter concentration in the air we breathe and
2. The length of time we spend breathing air containing radon daughters.

In general, the risk becomes greater as the concentration of radon daughters and the amount of time we are exposed to them increase.

Does Kentucky Have a Radon Problem?

Our state has regions of black shale rock deposits and other soil geology containing uranium and radium where radon may be found. So far, state and federal agencies have determined that 17 to 25% of Kentucky houses have radon levels above the acceptable limit. Not all houses or buildings, even those in the same area, have the same radon level. In fact, one house may have a low level that is considered acceptable while the house next door may have an unacceptably high level. The only way to find out what the radon level is in your house is to test for it. We will be learning more about testing for radon later in this booklet.

**RADON! We
learned about
you in school!
You're BAD!**



Timmy needs your help!

- Design a bulletin board at your school, local grocery, or hardware store. Make sure that it gets people's attention with a message that makes them want to test their homes for radon.
- Make a radon poster to display in a place that many people will notice. Use the poster to tell people about the health problems related to radon levels in their homes.

Community Pride Activity

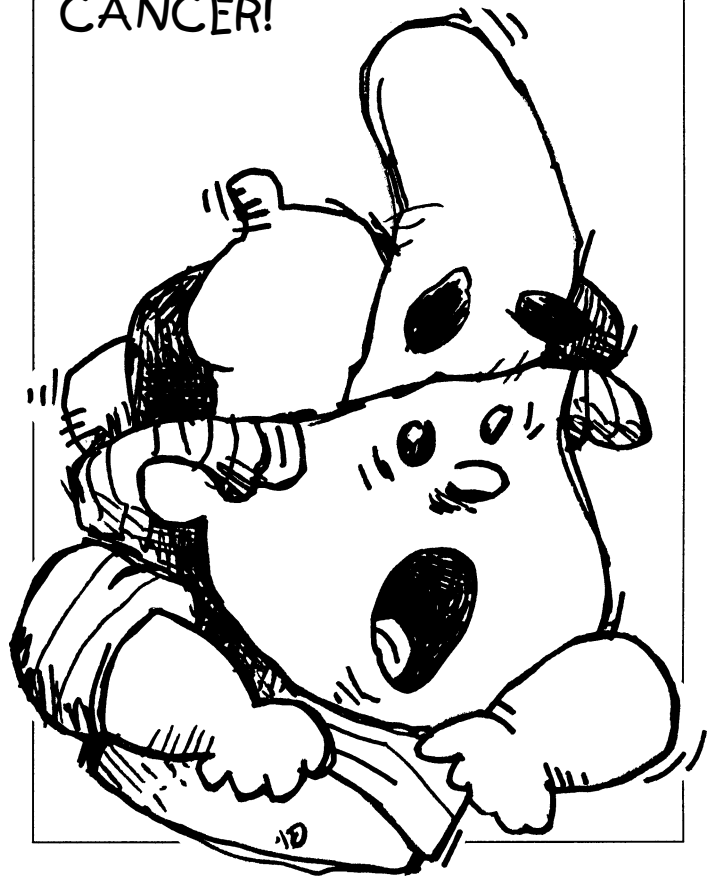
How Could Radon Get into My House?

Because radon is a gas, it moves through small spaces in the soil and rock on which our houses are built. Radon can seep into a house through dirt floors, crawl spaces, cracks in concrete floors and walls, floor drains, sumps, joints, and tiny cracks or pores in hollow-block walls.

Radon can also be pulled into a house when fans and dryers pull air out of the house, creating a negative air pressure inside. When a negative air pressure is created, air and radon gas from outside are drawn into the house. Weather conditions may also influence radon entry. When the temperature is colder outside than inside your house, the warmer indoor air is lighter and tends to float upward. This air movement creates a negative air pressure in the lower part of the house, drawing air and radon gas inside.

Radon usually mixes with air as it moves up in a building and thus becomes less concentrated. Radon measurements made in basements are usually higher than those made on the first floor. Radon measurements on the second floor and above may be even less than those on the first floor, depending on the heating and cooling system in the building, air movement, and other factors.

You get in people's lungs and cause **CANCER!**



Timmy needs your help!

- Prepare a 4-H demonstration for your class, 4-H club, or community event such as Earth Day, health or science fairs, or Environmental Camp. In your demonstration, show others how easy it is to test for radon and tell them how to prevent radon from entering their homes.
- Prepare a 4-H speech for your class, 4-H club, or other community event. Tell people what you have learned about radon and encourage them to test their homes.

Community Pride Activity

How is Radon Concentration Measured?

While radon daughters pose the actual health threat, it is easier and less expensive to measure the radon gas concentration in a home.

Radon gas is commonly measured in picocuries per liter of air (pCi/l). This measurement tells us the number of radioactive disintegrations per second in one liter of air (a liter is about a quart). The United States Environmental Protection Agency (EPA) has established a guideline of 4 pCi/l of annual average radon exposure as an acceptable health risk.

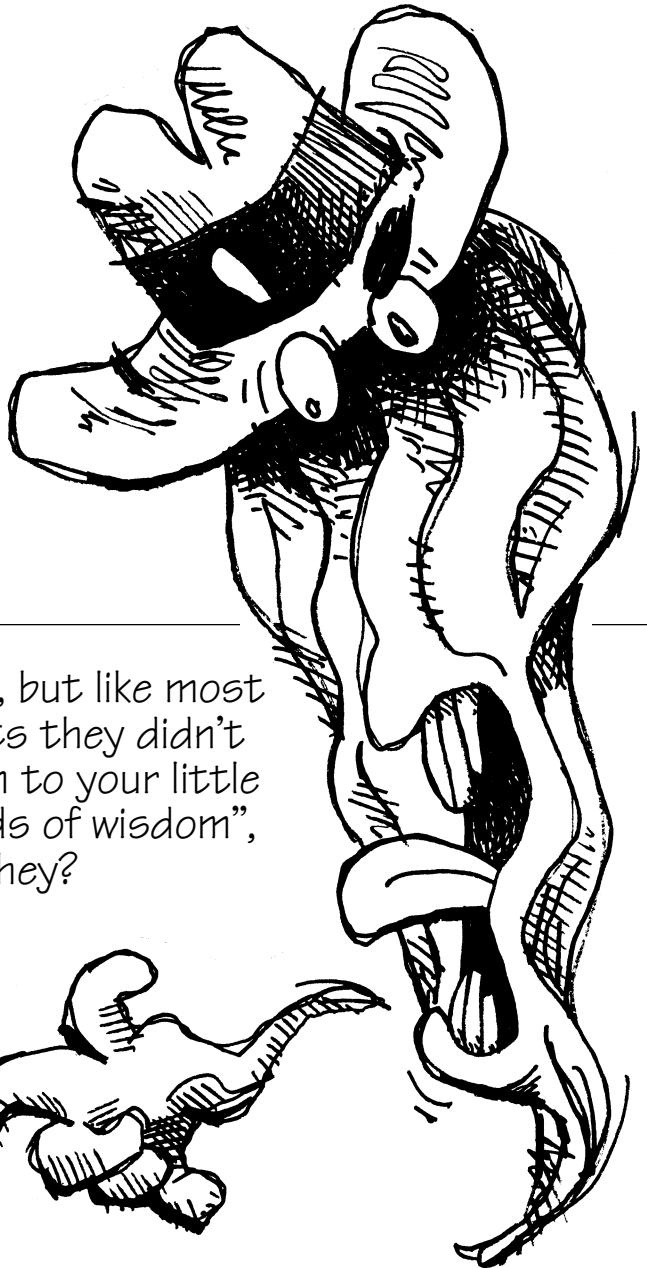
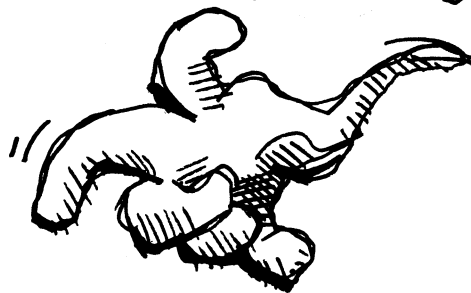
What's a "Curie"?

Radioactivity is expressed in units called curies, after Marie and Pierre Curie, who were pioneers in the field. A curie is a measure of the number of atoms disintegrating per second in radioactive material. One curie is equal to 37 billion disintegrations per second. If the amount of radioactivity is small, scientists use a picocurie which is one-trillionth of a curie, or .037 disintegrations per second.

I TOLD MY PARENTS ABOUT YOU!!



YES!, but like most adults they didn't listen to your little "words of wisdom", did they?



How Can I Measure the Radon Concentration in My House?

You will need a special kit designed to measure radon levels. These inexpensive and easy-to-use kits can be found in most hardware stores and drugstores. You will probably want to ask an adult to help you select and use one of them. The most popular commercially available radon test kits are the charcoal canister or bag and the alpha track detector.

Charcoal test kits are often used for making short-term measurements of four to seven days. Because radon levels change from day to day depending on weather conditions or other factors, long-term tests more accurately measure the amount of radon your family is being exposed to. Long-term measurements are usually made with alpha track detectors, which can be used for three to twelve months. Both kits report measurements in picocuries per liter (pCi/l) of radon gas. Most radon test kits will provide

information with your results to help you understand the test measurement.

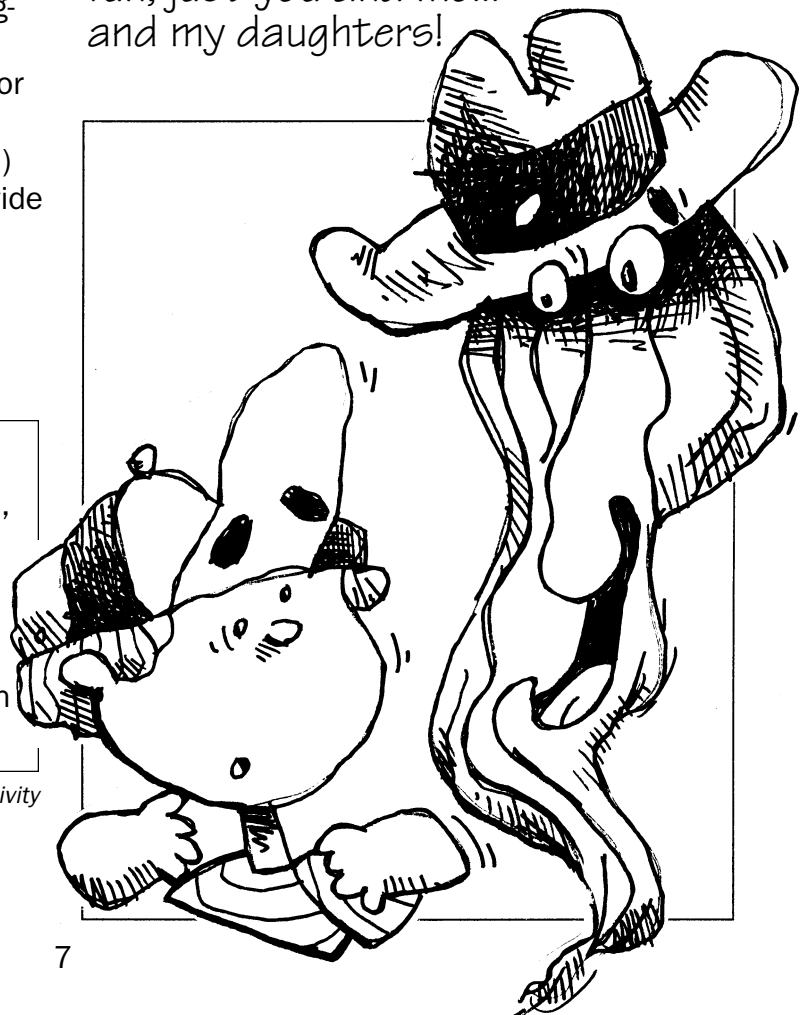
Winter is the best time to test for radon because levels may be at their highest when the house is closed up tightly. To get the most accurate measure of your family's exposure to radon, you should place the testing device in the lowest part of your house where your family spends the most time, such as a family room or bedrooms.

Face facts, Tim. They just don't believe in me. Oh we'll have fun, just you and me... and my daughters!

Timmy needs your help!

- Help staff a radon exhibit at a local mall, health conference or fair, county fair, or other event. Be informed about radon and share your information with others. Have radon test kits available for people to purchase, or let them know where they can obtain a kit in your community.

Community Pride Activity



What If My House Has a High Radon Level?

There are several ways to lower the radon level in your house. One method is to seal with caulk all cracks or holes in the walls and floors of the lowest levels of the house to keep the radon from entering. If, after sealing all cracks and holes, the radon level is still high, your family may need to hire a person who is trained to lower radon levels in houses and buildings. This person is called a “radon mitigator.”

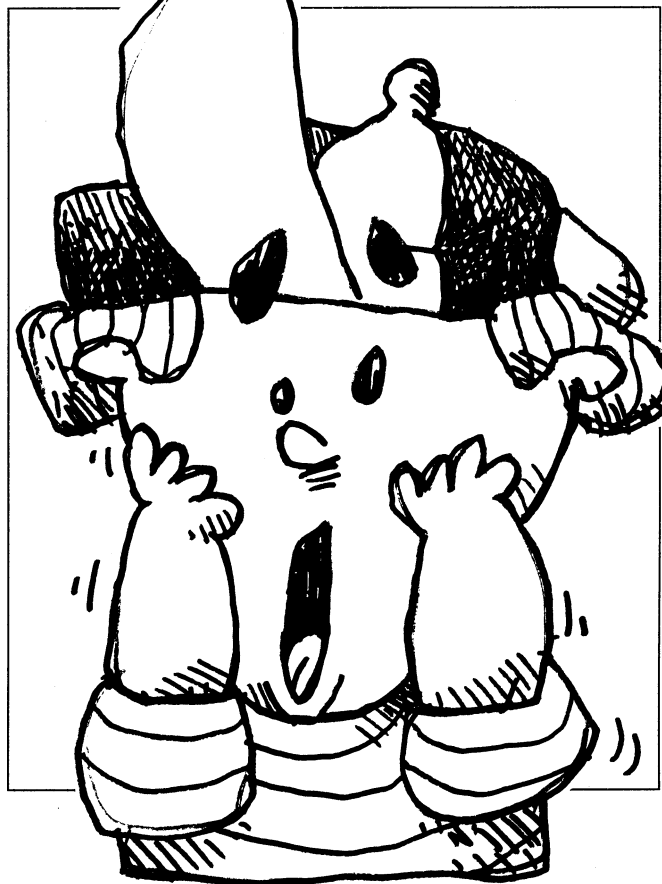
The mitigator’s job is to seal off radon entry points, or remove the radon gas after it has already entered. Because of special methods and skills involved, it is recommended that your family use only EPA-approved mitigators to fix your home!

To remove radon from your house, the mitigator may install a plastic pipe that extends upward through the roof so that radon can go up the pipe and exit into the outside air where it is quickly diluted. The pipe is usually hidden in a wall or in a place where it cannot be easily seen. Often, a small fan is placed in the pipe to help move the radon outside.

Remember, radon levels can be reduced in your home, making it a safer place to work and play.

Your...
daughters?...
you mean...

GIRLS?!!



Timmy needs your help!

- Scout your local hardware stores, groceries, and department stores to check on the availability of radon test kits. Let people in your community know where these kits are available. You might also check with your local county Extension office, health department, or other public agencies who may have the kits at a reduced cost.

Community Pride Activity

Words to Think About

Below are some the words scientists use when they talk about radon gas. Can you pronounce all the words? If not, maybe your teacher or an adult in your family can help you.

Alpha Particle: A small particle emitted when radioactive elements go through a process called radioactive decay.

Charcoal Test Kit: A flat metal can or foil bag that contains special charcoal which can measure radon concentration.

Curie: Radioactivity is expressed in units called curies, after Marie and Pierre Curie, who were pioneers in the field. A curie is a measure of the number of atoms disintegrating per second in radioactive material.

Daughters: Radioactive decay products (see chart on page 2)

Detector: This is a name for the tool used to measure the amount of radon gas in a room. The charcoal canister and alpha track tests are “detectors.”

Liter: This is a unit of measurement used to describe an amount of gas or liquid. One liter is about equal to one quart. For example, an empty one-quart milk container holds about one liter of air.

Lung Cancer: This is a disease which may be caused if you breathe elevated levels of radon for a long time.

Mitigation: Mitigation is the process of getting the radon gas out of a house or a room. A person who works to get radon out of a house or schoolroom is called a mitigator.

Picocurie: This is a very small unit of radiation measurement. It is written pCi/l. The number of radon particles in one liter of air in a room is measured this way. The U.S. Environmental Protection Agency has suggested that there should be no more than four picocuries of radon gas per liter of air in a room. This number is obtained by using a detector.

Radon: A colorless, odorless, tasteless gas which occurs in nature. It is produced by the radioactive decay of uranium and radium in the earth’s crust. (See radon decay chart on page 2.)

Test (measurement): When a detector is placed in a room to measure the amount of radon in the room, it is called a test.

In Review

Radon is a gas which you cannot see, feel, smell or taste and that is produced by nature. If someone told you that they saw a radon cloud, would you believe them?

Answer: _____

Radon can get into your house through cracks in the floor or basement walls. It can also get in through drains in the floor or through the openings around pipes. How do you stop the radon from entering through these areas?

Answer: _____

Houses can be tested for radon. What are three commonly used types of detectors which are used to show if there is radon in your house?

Answer: _____

There are several ways that can be used to get radon out of your house. What is one of the simplest ways to get radon out of a house?

Answer: _____

Radon can make you sick. What part of the body can get sick?

Answer: _____

What is the name of the disease?

Answer: _____

Acknowledgements

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Radon Word Scramble

Unscramble the words, write them in the spaces to the right, and figure out who to call when you have a radon problem. If you have trouble figuring out what the words are, look at the "Words to Think About" on page 9 or the words at the bottom of page 12.

RNIAUUM _____ _____ _____ _____ _____ _____

STANICRE _____ _____ _____ _____ _____ _____ _____

MTAO _____ _____ _____

GATNIIMOTI _____ _____ _____ _____ _____ _____ _____ _____

GNUL ARCCEN _____ _____ _____ _____ _____ _____ _____

ORADN _____ _____ _____ _____

ECETTORD _____ _____ _____ _____ _____ _____

IOCCPUIER _____ _____ _____ _____ _____ _____ _____

TRIPCELA _____ _____ _____ _____ _____ _____

Who do you call when you have a radon problem? Take the letters from the boxes on each line and write them in the boxes below.

You call a **!**

The Radon Word Search

Find the hidden words in the RADON WORD SEARCH below!

P A R X B I G B R P W K M D C
A J A L P H A L G X A F Q H E
R B Q F R A O F A K V S A B V
T N M H A E I C S B Q R G F X
I T K X D A V Q A L C M G L Z
C H R J O H M V C O P K U H C
L Y J E N O I T A I D E M E R
E T R N C G O L J V F N H H O
B D Y Z U N N D E T E C T O R
C M I T I G A T I O N D I U O
C O P A M Z M C T W I J J S T
K S D R T Y L T G K Z E R E I
S E E L S Y O W D N I C E R N
A P M Y E U F I P C U W S H O
E S R E T S I N A C E L D U M

Find these radon words

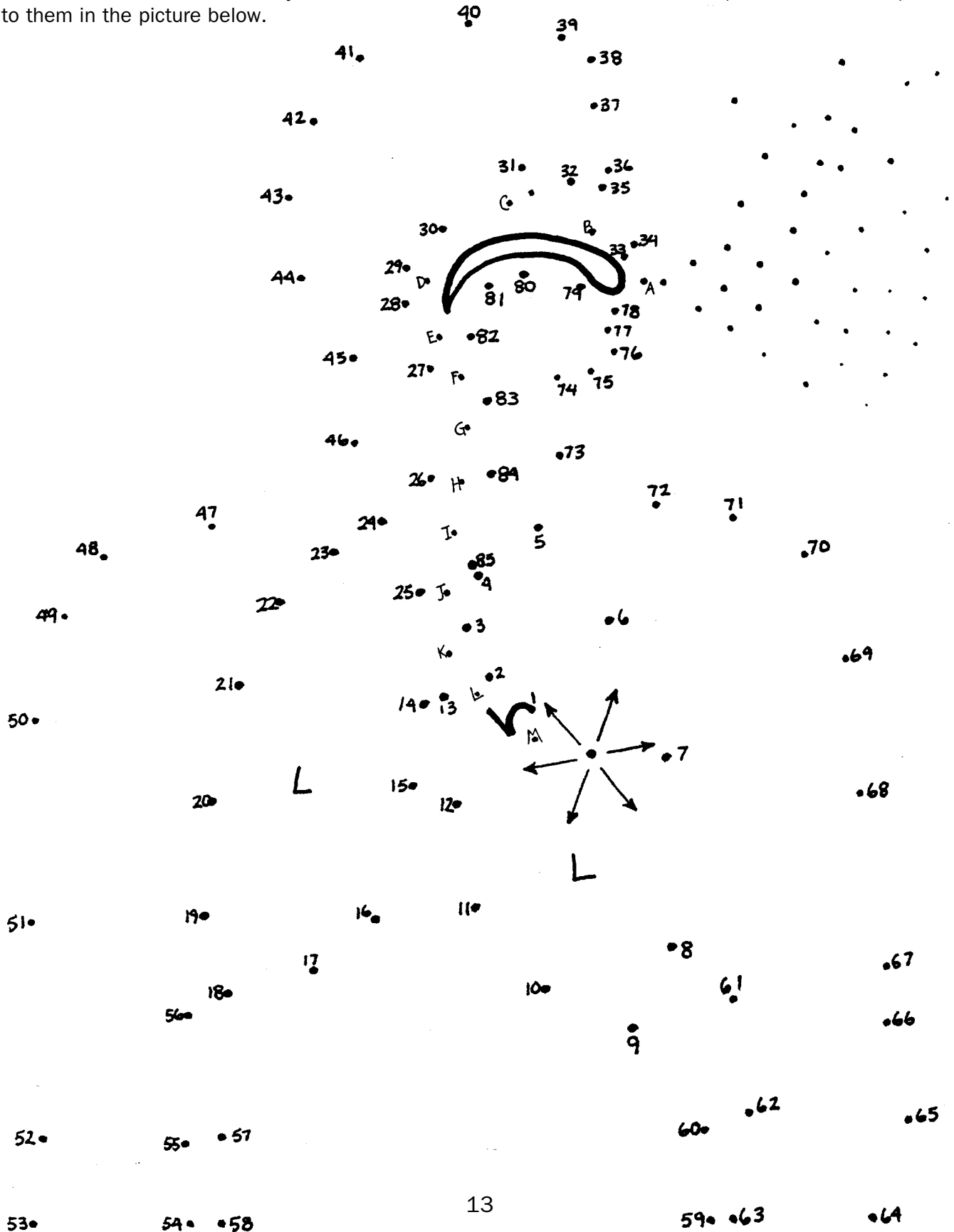
ALPHA
CANISTER
DETECTOR
GAS

HOUSE
LUNG CANCER
MITIGATION
MONITOR

PARTICLE
RADON
TEST

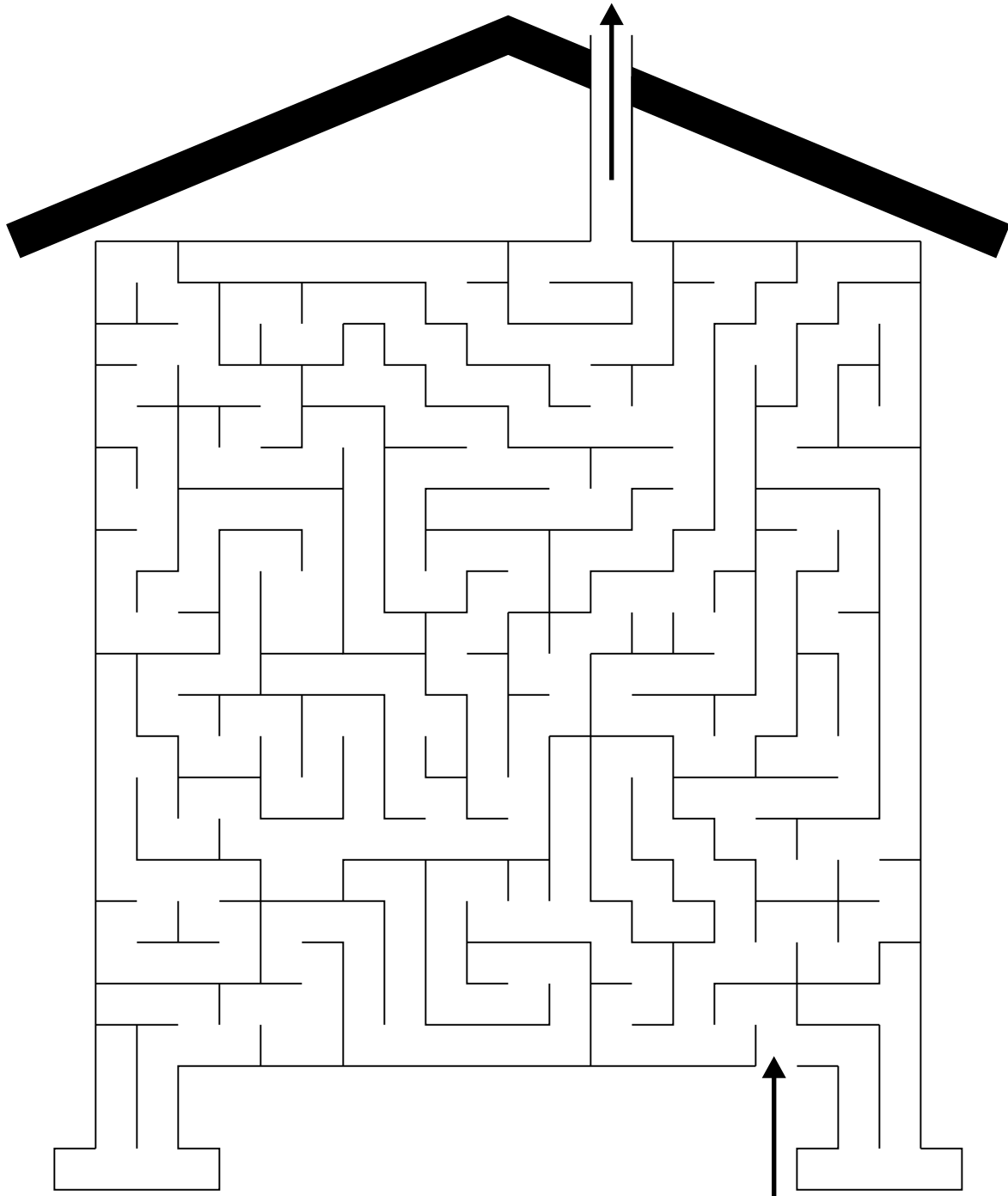
How Can Radon Make Me Sick?

To see where radon can make you sick, connect the dots that have a number (1, 2, 3, and so on) next to them in the picture below.



The Great Escape

The Great Escape



RADON GAS PARTICLES are trapped under the house.
Can you be the MITIGATOR and help them safely escape into
the atmosphere so they will not get trapped in the house?

4-H Radon Record

Complete this record and turn it in when you have completed this project.

Name _____ Birth Date _____

Address _____ County _____

Number of Years in 4-H _____ Name of Club (Class) _____

Name(s) of my Leader(s)/Teacher _____

Did You...

Y N

- Talk to your parents or guardians about testing your home for radon?
- Test your own home for radon?
- Encourage action if high levels of radon were found?
- Talk to others in your neighborhood about testing for radon?

Answer the following questions about radon:

1. What is radon?

2. Why is it dangerous to breath air with high levels of radon?

3. What percentage of homes in Kentucky have been found with high radon levels?

4. How can radon enter a home?

5. What should you do if your home has high levels of radon?

6. How can you make your neighborhood and community more aware of the health risk associated with breathing elevated levels of radon?

Keep a Record of How You Shared Your Information

What You Showed How to Do	Where Shared	How Many Did You Show It To?

Project Story. Use this space to write about your 4-H radon project. What are some of the actions you took as a result of learning more about radon? What are some of the things you learned?

County Agent's Signature

4-H Leader's Signature

Parent's Signature

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