

Teacher name: _____ Date: _____

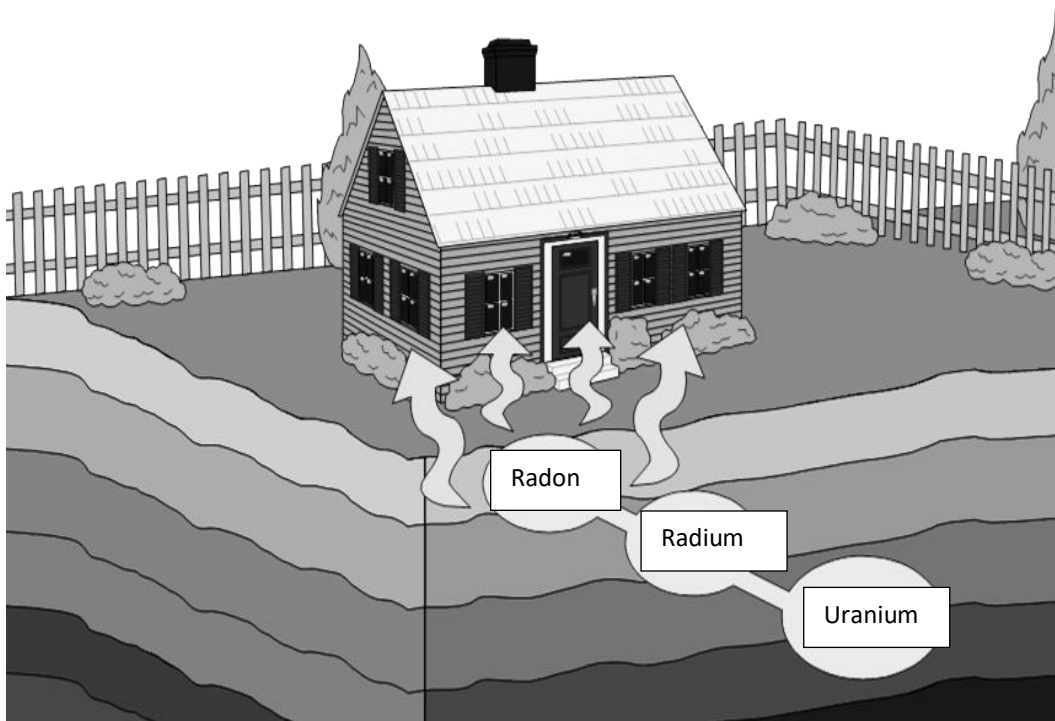
PART 1A: RADON & RADIATION

1. What are 6 properties of radon?

- | | |
|-----------------------|----------------------------------|
| i. <u>Odorless</u> | iv. <u>Radioactive</u> |
| ii. <u>Invisible</u> | v. <u>Gas</u> |
| iii. <u>Tasteless</u> | vi. <u>Emits Alpha radiation</u> |

Also decays and has a short half-life.

2. a) Label the picture below to show where radon comes from.



b) Compose a sentence(s) using the words “element(s)” and “decay(s)” to describe how radon is formed.

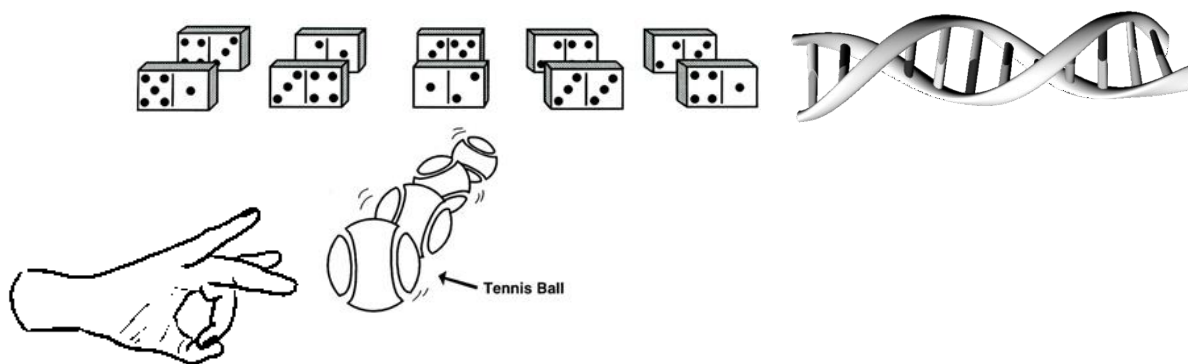
Uranium breaks down (decays) to form a different element, Radium. Radium then decays to form a different element, Radon.

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ACTIVITY 1: "DOMINO DNA WITH ALPHA, BETA, AND GAMMA"

Materials Per Group: 10 dominoes, 1 small Styrofoam ball, 1 small plastic ball and 1 tennis ball
Procedures:

1. Group representative should gather the activity materials and place them on the desk.
2. Set each domino on its long edge and spread them out leaving a four-centimeter space between each (about the length of one domino).
3. Arrange the dominoes in two parallel rows of five dominoes each. Space the rows about eight centimeters apart (about two domino lengths). Now, you should have two straight and parallel rows of evenly spaced and upright dominoes.

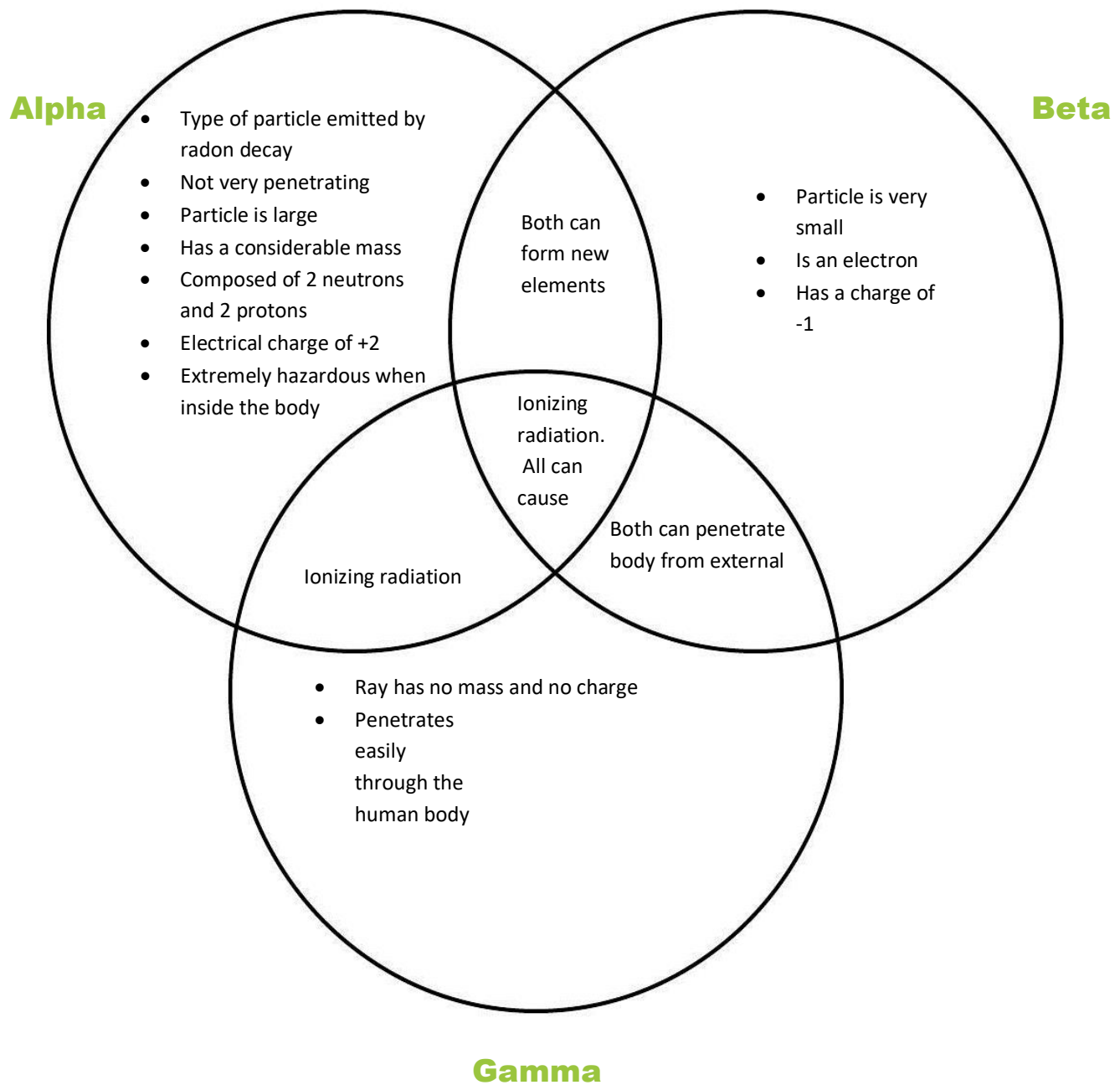


4. **FLICK (not roll)** the tennis ball toward the dominoes. Record the "damage" on your activity sheet. (How many dominoes were knocked down?)
5. Repeat steps three and four two more times to complete 3 trials.
6. Repeat steps three, four, and five using the small plastic ball, and then the Styrofoam ball.
7. Calculate the average values for each ball, and identify which type of ionizing radiation each ball represents (and record in inferences column).

Observations					Inferences
Ball Type	Trial #1	Trial #2	Trial #3	Avg.	Radiation Type
Tennis					Alpha
Sm. plastic					Beta
Styro-foam					Gamma

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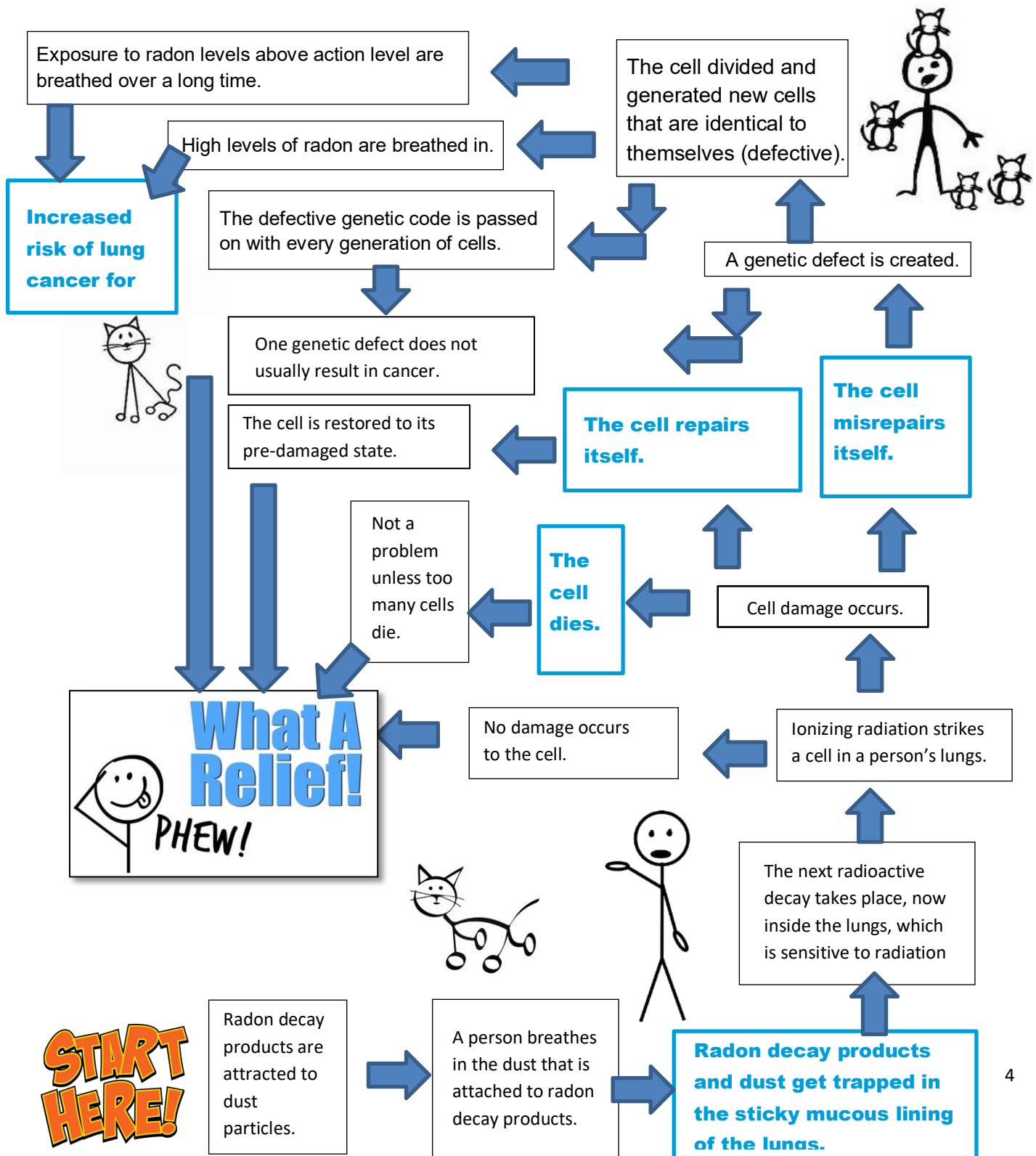
4. Use this Venn diagram to identify the similarities and differences between different types of ionizing radiation, including their ability to damage DNA.



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PART 1B: RADON & DNA DAMAGE

5. Complete the flow chart



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ACTIVITY 2: "LIFE GOES ON!"

See Lesson Plan for Answer Key

Materials: envelope containing puzzle pieces, blank puzzle grid, writing tool

PROCEDURES:

Follow the directions given by your teacher. Use the blank grid below to assist you.
When you have completed the puzzle, complete the corresponding table on page 9.

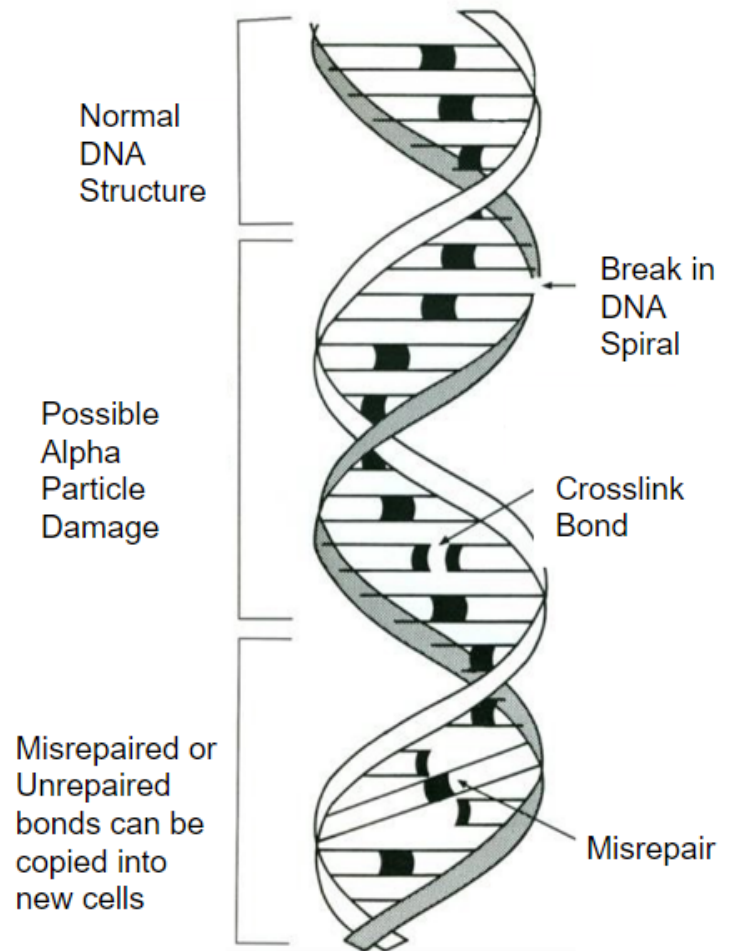
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“Life Goes On!”

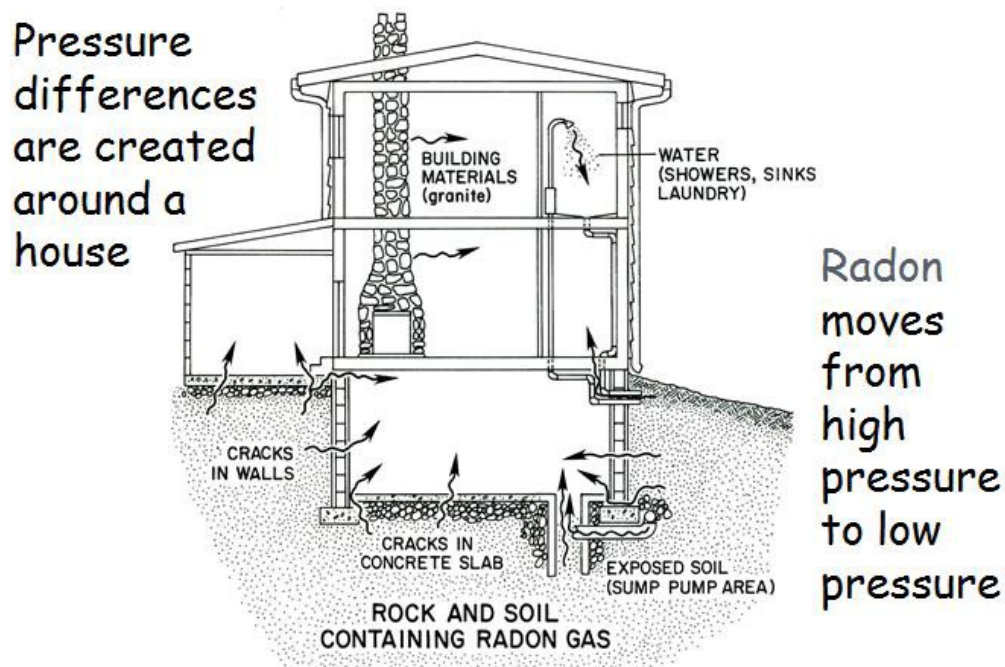
POTENTIAL OUTCOMES	SIMILARITIES TO WHAT MAY HAPPEN TO A CELL
a. Puzzle was not put together in the allotted time	If a cell is unable to repair itself after exposure to ionizing radiation, it will die
b. Puzzle was identical to the answer key and the hand-drawn piece resembles the matching puzzle piece	A cell is successfully repaired to its pre-damaged state. No genetic defects occurred due to the exposure to radiation.
c. Puzzle is identical to the puzzle answer key except for the hand-drawn piece	A cell has repaired itself. The cell created a genetic defect, which will be passed onto the next generation of cells when the cell reproduces itself. Even if a cell misrepairs itself and contains a genetic defect, it will not necessarily become cancerous.
d. Multiple puzzle pieces are misplaced and the hand-drawn piece does not resemble the missing puzzle piece	Increased risk for cancer. It takes multiple genetic injuries over many cell generations for cancer to occur.

Normal and Damaged DNA Molecule



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PART 2: RADON IN THE HOME



6. Radon travels in small spaces in soil and rocks under our homes.
7. Radon gets drawn into a home through cracks and pores in walls and floors.
8. Name 3 weather factors that will force more radon into a home:
 - i. High winds
 - ii. Heavy rain or snow
 - iii. Warmer temperatures inside than outside
9. Name 3 examples of building designs or activities within a building that will force more radon into a home:
 - i. Airflow through chimneys and/or vents
 - ii. Forced air systems and exhaust fans
 - iii. Combustion appliance (stoves, dryer, etc.)

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PART 3A: RADON TESTING

AT-HOME ACTIVITY: "THE ONLY WAY TO KNOW"

"Performing Your Test" Procedures: Starting on a Monday evening

- a. Record the serial number of the test kit on the table below. (page 10)
- b. Review the test instructions on preparing to test.
- c. Place the Radon Sampler in a central room on the lowest level of the building suitable for occupancy, whether finished or unfinished.
- d. Place the Sampler paper side up on a flat surface.
- e. Place the Sampler 2-7 feet above the floor.
- f. Place the Sampler at least 3 feet from exterior doors and windows and at least 1 foot away from walls.
- g. Make sure the Sampler has at least 6 inches of space between it and any objects above or to the side of it.
- h. The test begins immediately once opened, record your test start time.
- i. Record your prediction for test result outcome and your reasoning.
- j. Record observations of the location such as indoor/outdoor temperature, draft, movement of people, proximity to weather factors (warmer indoor temperature), building design factors (vents, chimneys) and activities within buildings (ovens, exhaust fans) relative to heating or cooling vents, types.
- k. Ensure test kit is undisturbed until test end date (Thursday evening)
- l. Keep instructions from test kit for end test directions.

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Home Test

Test Kit Serial #	Prediction (Test results will be above, at or below 4pCi/L action level , <i>and why</i>)	Environmental Observations (external & internal variables over duration of test)	Actual Test Results (pCi/L)	Inferences (Variables that may impact reliability of test)

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PART 3B: RADON TESTING CONTINUED (4 DAYS LATER)

“Stopping the Test” Procedures: Ending Thursday evening

- a. Refer to original test kit instructions and carefully review the Successful Radon Test Checklist.
- b. Update observations in table (see page 10) during test duration such as indoor/outdoor temperature, draft, movement of people, proximity to weather factors (warmer indoor temperature), building design factors (vents, chimneys) and activities within buildings (ovens, exhaust fans) relative to heating or cooling vents, types.
- c. Return completely labelled and sealed test kit to your teacher on Friday's class or a designated drop-off location on Friday.

PART 3C: RADON TESTING CONTINUED (UPON RECEIPT OF TEST RESULTS)

Procedures: (See page 10 for table)

- a. Record test results.
- b. Compare results to your prediction.
- c. Review observations and record your inferences in the table whether there may be any variables that would impact the reliability of the test results.

PART 4: RADON POSTER CONTEST

Identify the focus of your topic:

- ☐ What is radon?
- ☐ Where does radon come from?
- ☐ How does radon get into our homes?
- ☐ Radon can cause lung cancer
- ☐ Test your home for radon
- ☐ Identify the medium will you use:
- ☐ Pencil, Crayon or markers
- ☐ Paint (watercolor, tempera, or acrylic
- ☐ Collage
- ☐ Photographs
- ☐ Computer Graphic

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Brainstorm: What messaging and visual representation will be effective in making people **stop**, view/read and REMEMBER something important about radon?

