# Half-Life: Teacher Answer Key

Each radioactive (unstable) element has a different half-life. Hypothesize what half-life is: **The amount of time it takes for half of the radioactive atoms in a sample to decay into a more stable form.**

Half-Life Number	Number of Remaining Radon Atoms
0	400
1 (3.8 days)	*200*
2 (7.6 days)	*100*
3 (11.4 days)	*50*
4 (15.2 days)	*25*
5 (19 days)	*12.5*
6 (22.8)	*6.25*
7 (26.6 days)	*3.13*
8 (30.4 days)	*1.57*
9 (34.2 days)	*.79*
10 (38 days)	*.40*
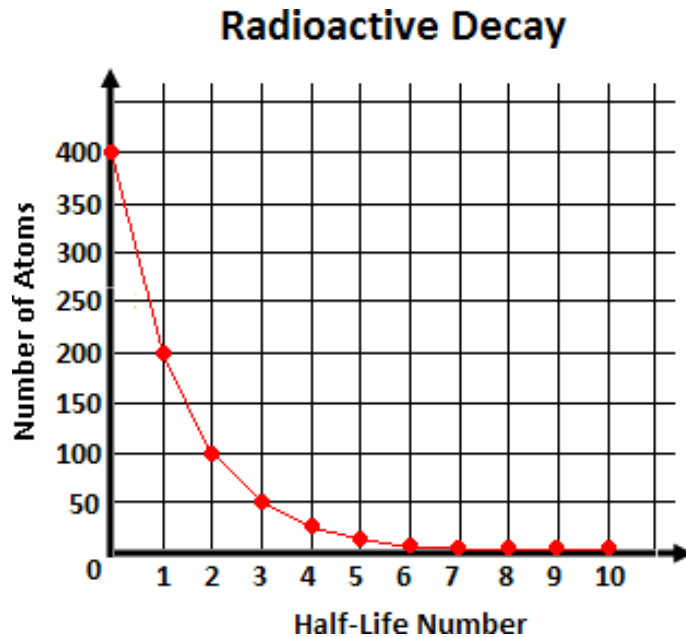
Radioactive Decay

1. Observations: Students should observe that the more time that passes, the more radioactive decaying takes place. After each half-life number, the number of radon atoms is decreased by half.

2. Conclusions: **Students should reach the conclusion that over time, radioactive atoms become more and more stable as they decay.**

3. Why is it useful to know the half-life of radioactive materials? **It helps in determining how long radioactive material must be safely stored, when radioactive material will be safe to handle, or how long a source will remain radioactive. For example, radioactive dye (called a tracer) or radioactive seeds are used in medical imagery and cancer treatment. Knowing the half-life helps doctors and patients know how long the radioactive material will be effective and when it will stop producing**

radiation. Radium is used in industrial radiography devices (a technology similar to x-ray imaging) to inspect for flaws in metal parts. Radium also has been added to the tips of lightning rods, improving their effectiveness by ionizing the air around it. We do not generally use radon for any useful purposes.

4. Radon is the second leading cause of lung cancer. How does the half-life of radon and its decay products cause damage to lung tissue that can lead to lung cancer over the course of a lifetime? **Radon gas decays into radioactive particles that can get trapped in your lungs when you breathe. As they break down further, these particles release small bursts of energy. This can damage lung tissue and lead to lung cancer over the course of your lifetime. The amount of time between exposure and the onset of the disease may be many years.**