

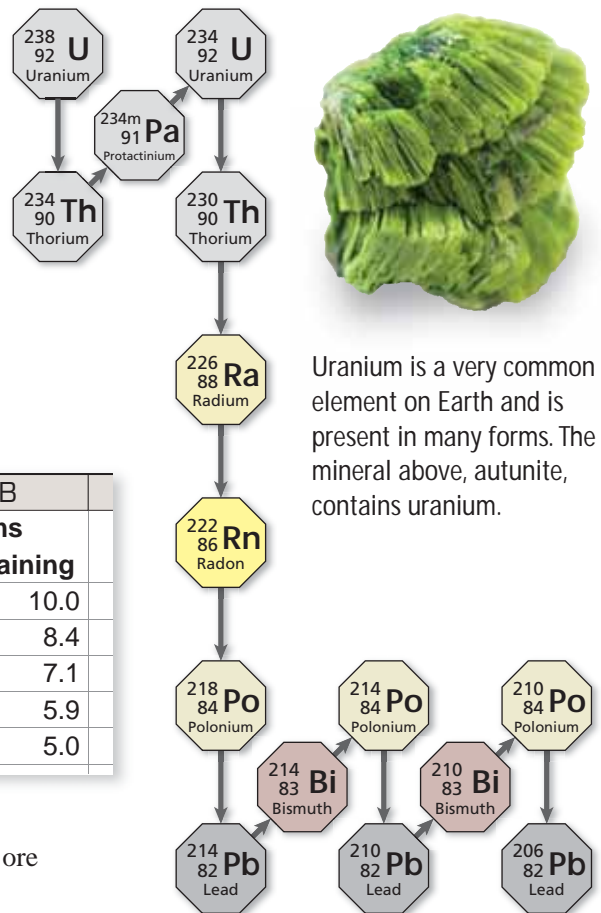


13. **Prostate Cancer** A hospital experienced a large increase in the number of prostate cancer cases in the late 1980s after the implementation of the PSA blood test. Starting in 1992, when there were 200 new cases, the number of new cases began to decay exponentially. In 1993, there were 176 new cases. Estimate the year when there were about 136 new cases. (See Example 5.)
14. **Lung Cancer** The number of lung cancer deaths at a hospital decreased from 50 in 2005 to 45 in 2006. Assuming the number of yearly deaths decays exponentially, estimate the year when there were about 30 deaths. (See Example 5.)



Uranium Decay In Exercises 15–17, use the information below. (See Example 6.)

Uranium-238 decays into thorium-234, which decays into protactinium-234m. This chain of decaying continues as shown in the diagram, which also includes radium-226 and radon-222.



Uranium is a very common element on Earth and is present in many forms. The mineral above, autunite, contains uranium.

15. A sample of uranium ore originally contained about 100 grams of uranium-238. Use the spreadsheet to determine how long it will take the sample to decay to about 61 grams.

Exercise 15

	A	B
1	Years	Grams Remaining
2	0	100.0
3	400,000,000	94.0
4	800,000,000	88.4
5	1,200,000,000	83.1
6	1,600,000,000	78.1

Exercise 16

	A	B
1	Years	Grams Remaining
2	0	10.0
3	400	8.4
4	800	7.1
5	1200	5.9
6	1600	5.0

16. A scientist separates 10 grams of radium-226 from uranium ore and places it in a storage container. Use the spreadsheet to determine how long it will take the 10 grams of radium-226 to decay to about 3 grams.
17. Consider all the radon gas produced by the decaying of radium in the storage container after 1200 years.
 - a. Would all this radon gas still be in the storage container? Explain.
 - b. Suppose a jar contains 50 grams of radon-222. About 34.7 grams of radon-222 remain after 2 days. Approximate the half-life of radon-222. Explain your reasoning.
18. **Radon Testing** Radon itself is inert, so it is typically unreactive. However, the U.S. Environmental Protection Agency recommends that all homes be tested for radon. Why do you think elevated levels of radon gas in your home are a health hazard?