1. The half-life of radon-222 is 4 days. Using this example, explain what ½ life is.

2. a. If you started with 100 million radioactive atoms, how many would you have left after:
   One ½ life? ______________ Two ½ lives? ______________ Three half-lives? __________

   b. What happens to the radioactive atoms once they decay?

3. The following graph shows the radioactive decay curve for Iodine-131. This radioisotope is used in medicine to help diagnose issues with the thyroid such as cancer and hyperthyroidism. Use the graph for questions.
   a. What percent of the isotope remains after 32 days? (be exact)

   b. What is the ½ life of Iodine-131?

   c. A patient administered 20 mg of iodine-131. How many mg of this radioactive isotope will remain in the body after 24 days? (show work)

4. Why do you think it’s important that radioactive isotopes used internally for diagnosis or treatment have relatively short half-lives?

5. How much of a 100.0g sample of Au-198 is left after 8 days if its half-life is 2 days? (Show work)

6. A 50.0 g sample of N-16 decays to 12.5 g in 14 seconds. What’s the half-life? (Show work)

7. There are 5.0g of I-131 left after 40 days. How many grams were in the original sample if the half-life is 8 days? (Show work)
Activity - Radioactive Dating Using $\frac{1}{2}$ Life (Data)

**Instructions:** Use class set for instructions on lab.

**Part 1: Data/ Observations:**

<table>
<thead>
<tr>
<th># radioactive “parent” atoms</th>
<th>Start (time 0)</th>
<th>Shake 1 (10 years)</th>
<th>Shake 2 (20 years)</th>
<th>Shake 3 (30 years)</th>
<th>Shake 4 (40 years)</th>
<th>Shake 5 (50 years)</th>
<th>Shake 6 (60 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # stable “daughter” atoms that decayed</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>% of radioactive atoms remaining</td>
<td>100 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Class Average (see computer generated data)

**Rate of radioactive decay for “boneyum” graph**

<table>
<thead>
<tr>
<th>% of radioactive atoms remaining</th>
<th>Time (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Graph** your results from your data table & also the class averages.
- time on x axis
- % radioactive on y axis
- draw a best fit line through your data points
- label group & class graphs

**Questions:**

1. Using class graph, what is the $\frac{1}{2}$ life for this radioactive isotope? Explain how you know this.

2. Use your class avg. graph to determine how many of the radioactive atoms would remain after:
   a) 5 years?
   b) 55 years?

**Part II: Determining Identity of a Missing Person**

1. Read “real-life application” on activity handout
2. Use your graph above and the missing persons report to answer the questions.

**Forensic report results:** Tests on the skeletal bones show 10% of their radioactive “boneyum” atoms remain.

A) Using your class avg. graph, determine how many years have gone by if 10% of the radioactive atoms remain.

B) Knowing that the body was found in 1998, around which year did this person die? (Use missing persons report)

C) Name the probable missing person. Explain how you determined this.