The Half-life of Pennies Lab

Can you use pennies to demonstrate "decay?

Imagine existing more than 5,000 years and still having more than 5,000 to go! That is exactly what the unstable element carbon-14 does. Carbon-14 is a special unstable element used in the absolute dating of material that was once alive, such as fossil bones. Every 5,730 years, half of the carbon-14 in a fossil specimen decays or breaks down into a more stable element. In the following lab you will see how pennies can show the same kind of "decay."

Materials
- 100 pennies
- large container with a cover

Procedure
a. Place 100 pennies in a large, covered container. Shake the container several times and remove the cover. Carefully empty the container on a flat surface, making sure the pennies don't roll away.
b. Remove all the coins that have the "head" side of the coin turned upward. Record the number of pennies removed and the number of pennies remaining in the data table below.

Data Table (5 points)

Shake number	Number of coins remaining	Number of coins removed
1		
2		
3		
4		
5		
6		
7		
8		
9		

c. Repeat the process until no pennies are left in the container. Remember to remove only the coins showing "heads."
d. Draw a graph to plot your data. Label the *x*-axis "Number of shakes," and label the *y*-axis "Pennies remaining." Using data from your data table, plot the number of coins remaining at each shake.

e. Write a title for your graph.

_____

y label: _____

x label: _____
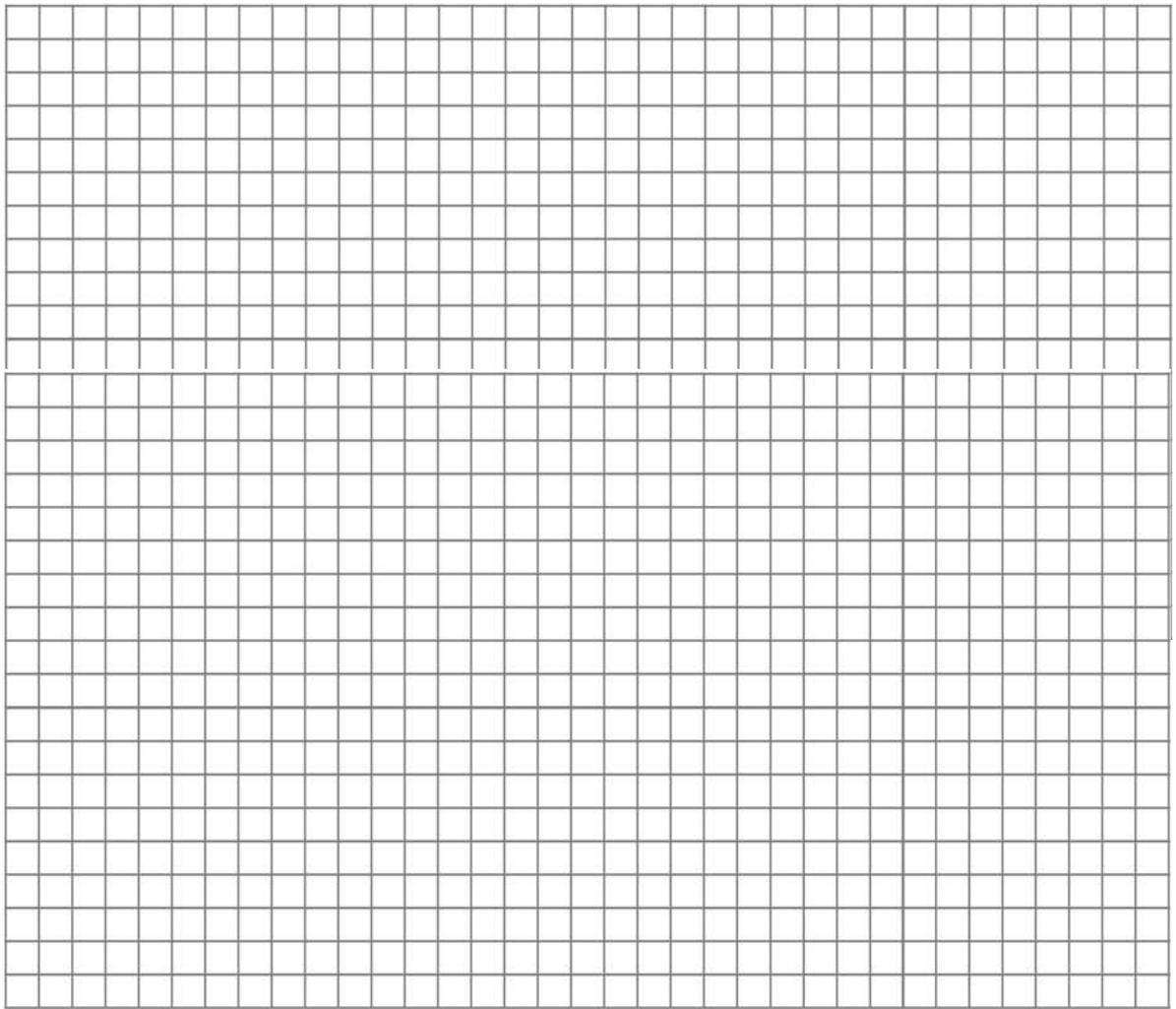
Half-life of Carbon-14

Analysis

1. Examine the "Half-life of Carbon-14" graph. Compare the graph you have made for pennies with the one for carbon-14. Explain any similarities that you see. **(5 points)**

_____
_____
_____
_____

Grams of carbon-14

100

50

25
12.5
6.25

0   1   2   3   4   5
Number of half-lives (5,730)

2. Recall that the probability of landing "heads" in a coin toss is 1/2. Use this information to explain why the remaining number of pennies is reduced by about half each time they are shaken and tossed. **(5 points)**

_____
_____
_____
_____
_____