

Name: _____

Date: _____

Chemistry

Half-Life of a Penny Activity

One characteristic of radioactive material is that radioactive isotopes spontaneously give off particles. This process, called radioactive decay, changes the nucleus of the material. The length of time it takes for half of a sample of radioactive material to decay is called the half-life. Each radioactive isotope has a characteristic half-life, ranging from less than a second to millions of years. In this activity, you will use pennies that can land “heads up” (nuclei that have undergone radioactive decay) or “tails up” (nuclei that haven’t yet decayed) as a simplified model of half-life.



Prediction

Do you think half of the pennies will show “heads up” for each shake of the box? Why do you think so?

Materials

pennies, 100

Equipment

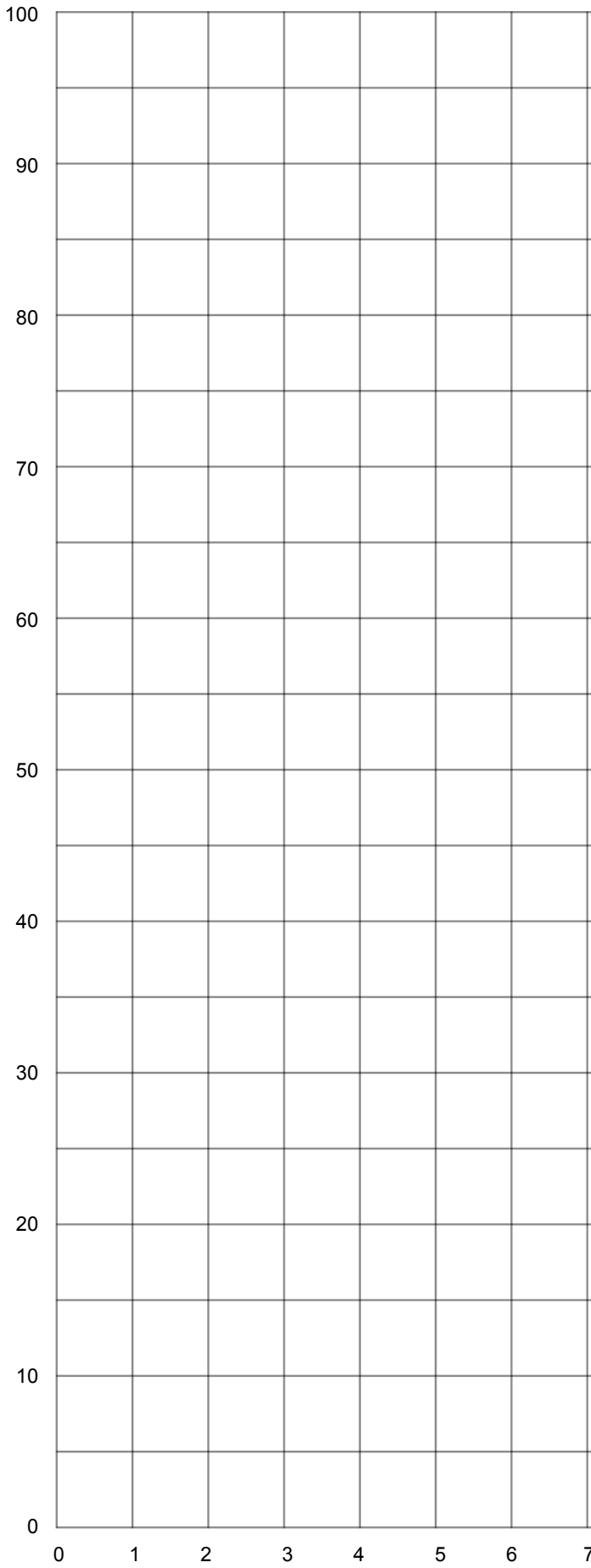
shoe box or other cardboard box

Procedure

1. Count out 100 pennies and place all of them ‘tails up’ into the box. Close the box.
2. While securely holding the lid closed, shake the box for several seconds.
3. Open the box and remove all of the pennies that are ‘heads up’.
4. Count the number of pennies remaining in the box and record. **DO NOT PUT ANY PENNIES BACK IN THE BOX!**
5. Close the box and repeat Steps #2-4 until only one penny remains or the box is empty.
6. Perform two additional trials by repeating Steps #1-5.
7. Using the data you collected in this lab, construct a line graph of the number of pennies vs. shakes for all three trials. Label your axes and title your graph(s) appropriately.

Questions

1. In this lab, what did the pennies represent? What did one trial represent?
2. In your graph, which variable went on the x-axis? Which variable went on the y-axis? Explain why for both.
3. Theoretically, 50% of the pennies should ‘decay’ with each shake. Select one of your three trials and determine the average percentage of pennies that were removed with each shake. Did you actually remove half of the pennies with each shake? Explain why or why not.



DATA TABLE			
Shakes	Trial 1	Trial 2	Trial 3
0	<i>100</i>	<i>100</i>	<i>100</i>
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

