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**Radioactive Decay: A Sweet Simulation of Half-Life**

**Background information:**

This lab will simulate radioactive decay to understand what we mean by half-life. Radioactive decay, also known as radioactivity, is the spontaneous emission of radiation from the unstable nucleus of an atom. Radioactive decay causes isotopes of a particular element to change into another element.

In this simulation, you will use small pieces of candy marked on one side. They will be your “nuclei.” You also need a paper towel on which to place your “nuclei.”

1. What do we mean by “half-life?” \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Procedure:**

1. Count your nuclei (candy). Write that number in the data table under the heading “Number of Radioactive Nuclei.”
2. In the column marked “Prediction for Next Toss” write the number of radioactive nuclei you think you will have with your next toss (Radioactive nuclei will be those candies with the marked side DOWN).
3. Place your “nuclei” in a paper cup, cover and shake the cup. Pour the “nuclei” onto your paper towel.
4. Separate the “nuclei” into two piles, one with the marked side up and the other with the marked side down.
5. Count the number of “nuclei” in each pile. On your data table, record the number of “radioactive nuclei” candies with the marked side DOWN.
6. Predict how many radioactive “nuclei” you will have after the next toss. Record this in your data table.
7. Return only the radioactive “nuclei” to your paper cup (ONES WITH THE MARKED SIDE DOWN). Leave the “decayed nuclei,” or those with the marked side UP, off to the side in a separate pile.
8. Continue this process until there are no radioactive “nuclei” left.
9. Add more rows to your data table if needed!

**Data Table:**

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| **Toss** | **Number of radioactive nuclei (those with the marked side DOWN)** | **Prediction for next toss** |
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**Graph:**

* Using your data, prepare a graph by plotting the number of radioactive “nuclei” on the y-axis
* Plot the number of tosses (which we will call half-lives) on the x-axis.

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**Conclusion:**

1. Based on your data and graph, how good is our assumption that half of our radioactive “nuclei” decay in each half-life? Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. If you started with a sample of 600 radioactive nuclei, how many would remain undecayed after three half-lives? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_