

Name _____ Period _____ Date _____

Exponential Decay Bead Activity

1. Gather the data.

- a. Start with a cup full of 100 beads. Shake the cup and pour the beads onto a piece of paper.
- b. Remove all the beads that have the hole face up. Count the number of beads remaining and record that number in the table for Trial #1. Return the remaining beads to the cup. Shake the cup and pour the beads onto the paper.
- c. Repeat step b until the table is filled in or until you run out of beads.

Trial Number	Number of beads remaining	Decay Factor
0	100	
1		>
2		>
3		>
4		>
5		>
6		>
7		>
8		>
9		>
10		>
11		>
12		>
13		>
14		>
15		>

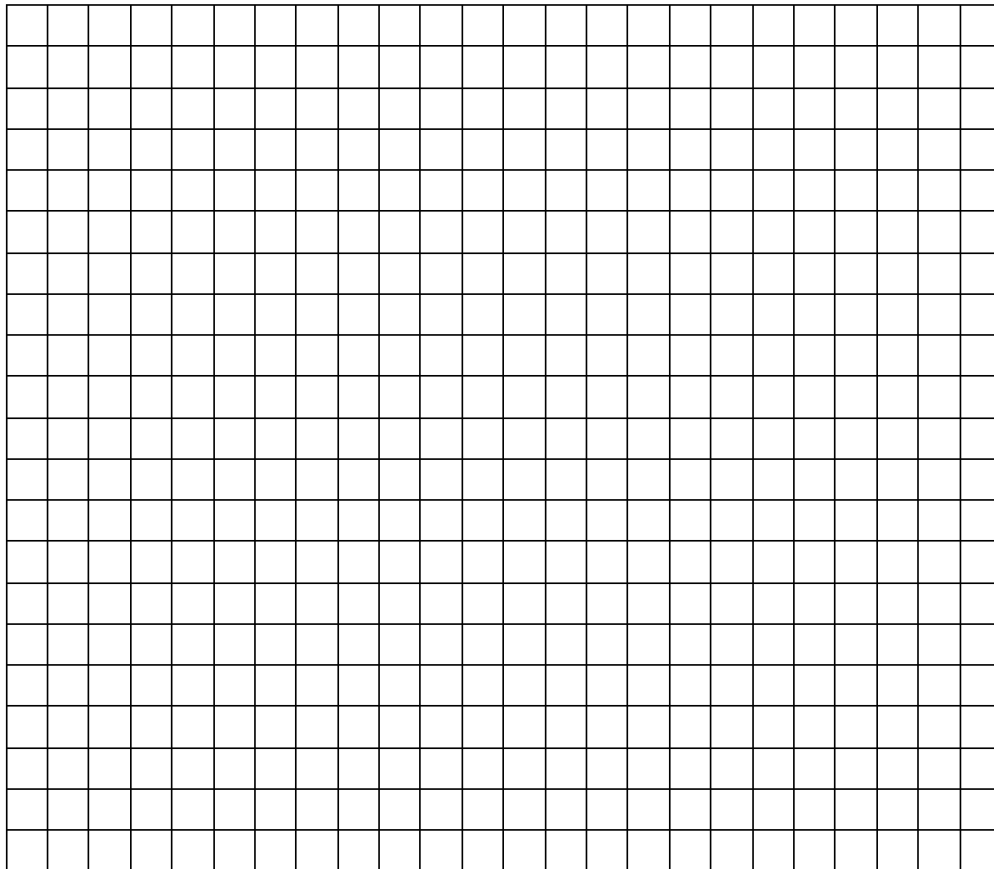
Calculate decay factors for each of your trials and add them into the table above.

2. Using your data, what is the calculated decay factor? **Note:** As the experimenter, you can decide which data points you want to include in your calculations.

3. What is the decay rate?

4. Write an equation you can use to calculate the number of beads remaining after “x” number of trials for this situation.

5. Graph your data: Create a graph of Total Beads Remaining (y) vs Trial # (x).



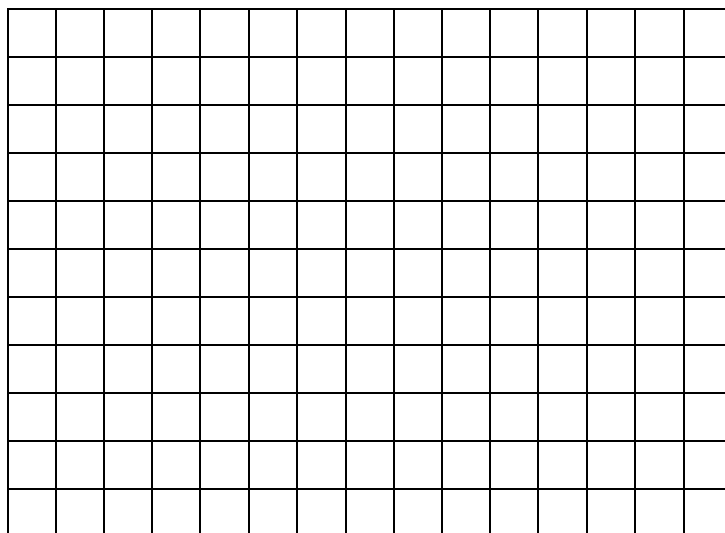
6. Thinking about what you know about probability you could have predicted this decay factor. What should it be?

7. Compare the number of remaining beads we would expect based on probability to the number of beads you actually had in your experiment.
- Fill in the table below with the number of beads you would expect to remain after each trial based on your predicted decay factor from #6.
 - In the right-hand column fill in your actual data.

Trial Number	Expected Number of Beads Remaining based on decay factor from #6	Actual Number of Remaining Beads (from your experiment)
0	100	
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

8. How does the actual number of beads remaining calculated above compare to your expected amount? Why might there be a difference?

9. Assuming the expected decay factor, if there are 43 beads remaining after 10 trials, how many did you start with?
10. If we had used Skittles instead of beads and had removed the Skittles with the "S" side up at each trial, what would the **decay rate** have been?
11. What would the equation be if we started with 100 Skittles?
12. Sketch below (on the same plot) the expected graphs for the exponential decay relationship if we started with 100 beads, compared to that with 100 Skittles. (Don't forget a key!)



13. Explain how the graphs are the same? How are they different?