

Rolling Dice

- Roll forty 10-sided dice, and remove the dice that came up with a 0. Repeat this over and over. Record the results in the second column below:

How many dice are left

| How many rolls | Your experiment | Class average | Theory |
|----------------|-----------------|---------------|--------|
| 0 | 40 | 40 | 40 |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| 11 | | | |
| 12 | | | |
| 13 | | | |
| 14 | | | |
| 15 | | | |
| 16 | | | |
| 17 | | | |
| 18 | | | |
| 19 | | | |
| 20 | | | |

Rolling Dice (cont)

2. Fill out the “class average” column.
3. Start Fathom on your laptop.
 - a. Drag a collection into the window. Rename it “Dice” by double-clicking “Collection 1”
 - b. Click on it to select it, and go to the Collection->New Cases... menu item
 - c. Type “21” and click OK. (Not the quotation marks!)
 - d. Double-click the collection, and enter two attributes: “rolls”, and “dice_left”
 - e. For “rolls” double-click the “Formula” box and enter “caseIndex – 1”
 - f. Close “Inspect Dice”
 - g. Click on the collection to select it, and drag a table into the window.
 - h. Enter the class average data in the “dice_left” column.
 - i. Drag a graph into the window. Drag the word “rolls” from the table to the x-axis. Drag the word “dice_left” to the y-axis.
4. Fill out the “theory” column, by figuring that on average, about 10% of the dice get removed each time. Round the numbers to the nearest whole number.
5. Write an equation for the theoretical number of dice left as a function of the number of rolls. (Use “rolls” in your equation instead of “x”, because that’s how Fathom wants it.)
6. Graph the function in Fathom by selecting the graph and choosing “Plot Function” in the “Graph” menu. In the formula, do not type “y=”, or “dice_left=”. Use “rolls” instead of “x” in the formula.
7. Is the formula a good model for the data?
8. Is the function continuous or discrete?
9. Does it have a y-intercept? What is its significance?
10. Does it have an x-intercept? What is its significance?
11. Write the equation using “x” and “y” instead of rolls and dice_left. Use “a” instead of 40. Use “b” instead .9

Because x is in the exponent, this function is called an *exponential function*.