Rolling Dice: Introduction to Exponential Functions



# Part 1: Collect Data

|  |  |
| --- | --- |
| **Roll Number** | **Number of Remaining dice** |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |
| 6 |  |
| 7 |  |
| 8 |  |
| 9 |  |
| 10 |  |
| 11 |  |
| 12 |  |
| 13 |  |
| 14 |  |
| 15 |  |

1. “Roll” 36 Dice
2. Remove all dice that show a “4”
3. Count how many remain. **DO NOT** return dice once they have been removed.
4. Repeat this process until no dice remain or you have “rolled” them 15 times, whichever comes first.

# Part 2: Graphing on Desmos

1. Open the Desmos app
2. Click the “+ “ sign and select table
3. Zoom in and out (+ or – on graph) so that you can see all points

# Part 3: In a Perfect World

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Side of a dice** |  |  |  |  |  |  |
| **Probability of rolling that side** |  |  |  |  |  |  |

Step away from the literal dice, allowing for fractional quantities to remain (half or a quarter of a dice). Fill in the T-Table to determine the expected number of remaining dice. HINT: Think about how many were left after each roll?

|  |  |  |  |
| --- | --- | --- | --- |
| **Roll Number** | **Expected number of remaining dice** | **Multiply** | **Expand** |
| 0 |  |  |  |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |

# Part 4: Making the Connection

|  |
| --- |
| 1. Based on the pattern you observed in Part 3, create an equation to represent the situation.
 |
| 1. Open the app Desmos app. Click the “+ “ sign and select **expression**. Enter the equation you created in part 3. How does it compare with the points you graphed from part 2?
 |
| 1. In terms of the dice activity, what is the physical meaning of the 36 in your equation?
 |
| 1. How is the 36 related to the graph of the curve?
 |
| 1. What do the other numbers in your equation represent?
 |
| 1. How will the fraction change if you took out 3’s *and* 4’s? How would the equation change? How would the graph change?
 |