MATH 125

24 April 2015

Lucky 7s

When rolling two fair six-sided dice, the sum of the numbers which face up can range from two to twelve. Theoretically, the most likely result is seven, hence the common phrase among gamblers, “Lucky seven.” The theoretical probability of rolling a seven is 1/6, but due to extenuating circumstances, such as the height, angle, and composition of the surface which the dice land on and any obstacles the dice may come across while rolling, such as changes in elevation, the empirical probability would very likely not be the same as the theoretical.

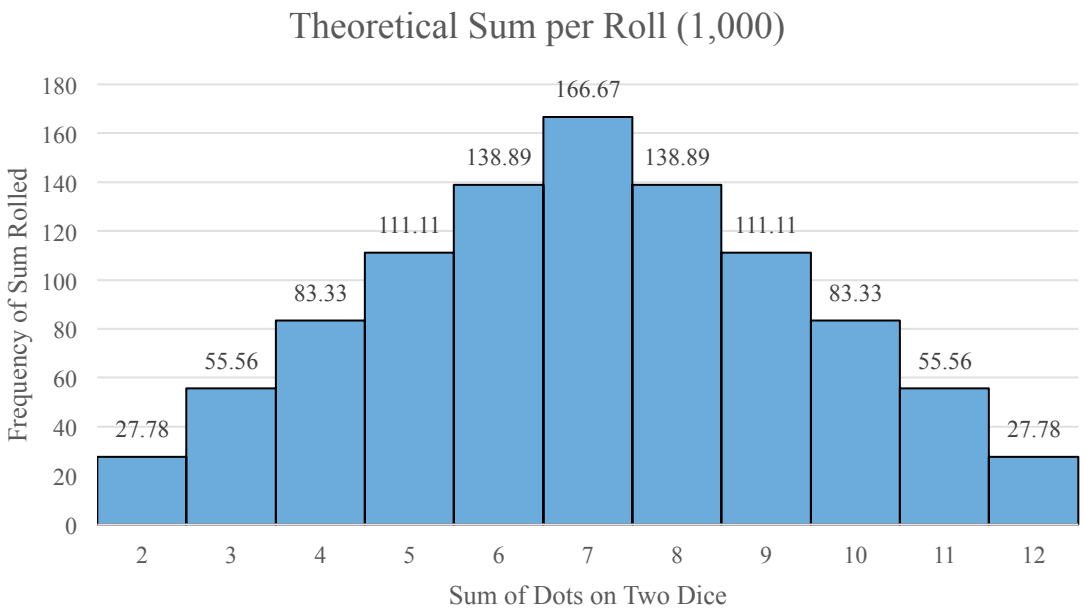
Dice Sum	Probability	Percent Probability	Dice Sum	Probability	Percent Probability	Dice Sum	Probability	Percent Probability
2	1/36	2.78%	6	5/36	13.89%	10	1/12	8.33%
3	1/18	5.56%	7	1/6	16.67%	11	1/18	5.56%
4	1/12	8.33%	8	5/36	13.89%	12	1/36	2.78%
5	1/9	11.11%	9	1/9	11.11%	Doubles	1/6	16.67%

Figure 1.1 Theoretical Probability of the Sum of Two Dice

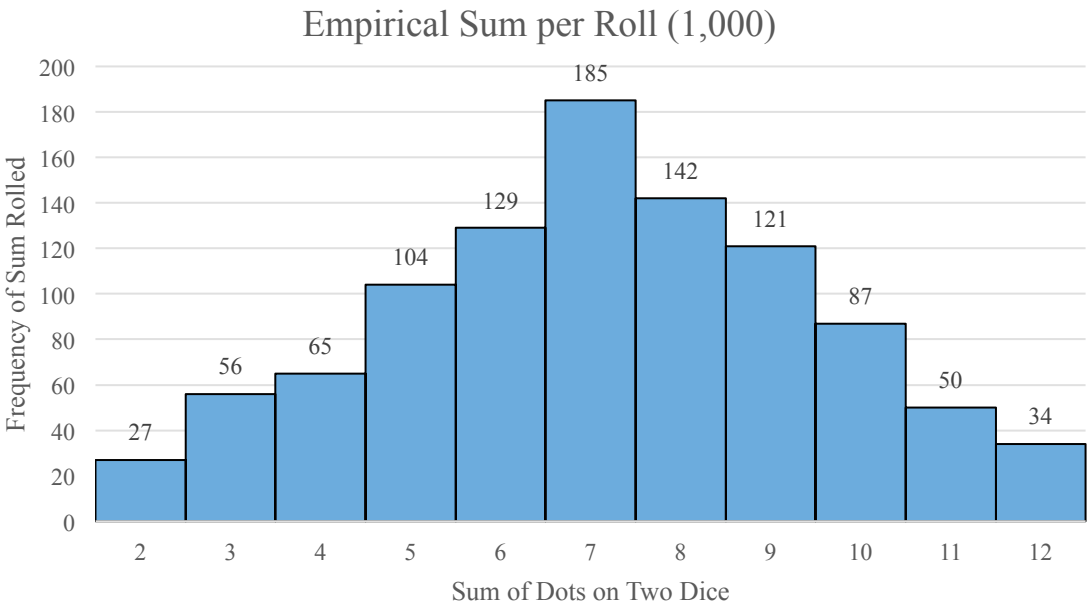
Several controls were implemented in this experiment. The two dice used were purchased at the same time and from the same company. Before each roll, both dice were reset to the same position: one pip (the black dots on the dice) facing up on each die and the same number of pips facing out on each die on one side. The dice were also shaken three times immediately before they were thrown onto a flat, solid surface from a low level to avoid the dice rolling too far.

One die was colored blue, the other black. The dice were colored different colors to tell the difference between the two since the results of two rolled dice are a combination, not a permutation, because the dice can land on the same number. There are two ways to get a sum of three because the blue die could land on one or two pips, as could the black die, yielding a chance for a 1-2 or a 2-1, which are different. After each roll, number of pips showing up on each die was written onto a chart in the corresponding column. The four columns on the chart

included the number of the roll (1-1,000), the number of pips on the blue die (1-6), the number of pips on the black die (1-6), and the sum of the pips on the blue and black dice (2-12). Due to the long list of data, the chart spanned three columns on eight pages. Seven of these pages each contained one hundred thirty data points, nine hundred ten data points across the seven pages. The eighth and last page contained the final ninety data points. On the back of each page, the sums of each roll were tallied to keep track of the frequency of each sum that had been rolled.



Doubles: 166.67


Empirical Sum per Roll (1,000)
Frequency of Sum Rolled
200
180
160
140
120
100
80
60
40
20
0
27
56
65
104
129
185
142
121
87
50
34
2
3
4
5
6
7
8
9
10
11
12
Sum of Dots on Two Dice

Doubles: 160