Quantifying Uncertainty :

A Dice-based Exploration into Probability and Randomness

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Abstract: This experiment delves into the realm of probability by reporting and analyzing the outcomes of rolling a pair of dice. Through an online simulation I would roll a pair of dice 100 times, add the sums and record it. This would help focus on analyzing the likelihood of specific combinations and their probabilities. As a result I came to a conclusion of rolling a 7 twenty times, proving my hypothesis is true.

Introduction

If there's one thing no one can ever figure out, it's uncertainty. While one may be able to understand it, for example, when rolling a pair of dice. In today’s world, individuals may find themselves at a casino or among a group of people engaged in gambling. In many of these games they often use a pair of dice, where most of it relies on luck, but the rest is based on probability. For this experiment, I will roll a pair of dice 100 times, summing the outcomes and recording the results. In conducting this experiment, I will see that when rolling a pair of dice 100 times, the

likelihood of getting a seven is higher due to the greater number of outcomes that result in a seven, compared to limited ways of getting a two or twelve.

Materials

- An online simulator that rolls dice
- A table listing the possible outcomes when rolling a pair of dice
- A bar graph to compare the results

Methods

1. Find an online simulator that's able to roll a pair of dice.
2. Change any settings, so that it fits your experiment such as, making sure it is a six sided dice and that you're rolling it 100 times.
3. Create a table, listing the possible outcomes ranging from two to twelve.
4. After doing that you're able to start the generator and let it produce its outcome.
5. Record your results after it is completed on the table.
6. Once your results are recorded you're able to create a bar graph to compare your results and analyze.

Results

After rolling the dice for 100 times, I put together a table and a bar graph to show the variations in outcomes.

Table of Results

Number of outcomes	2	3	4	5	6	7	8	9	10	11	12

How many times I got it	3	2	8	15	11	20	15	8	9	5	4

Figure 1 - This demonstrates a specific number of times I reached the sum of two to twelve.

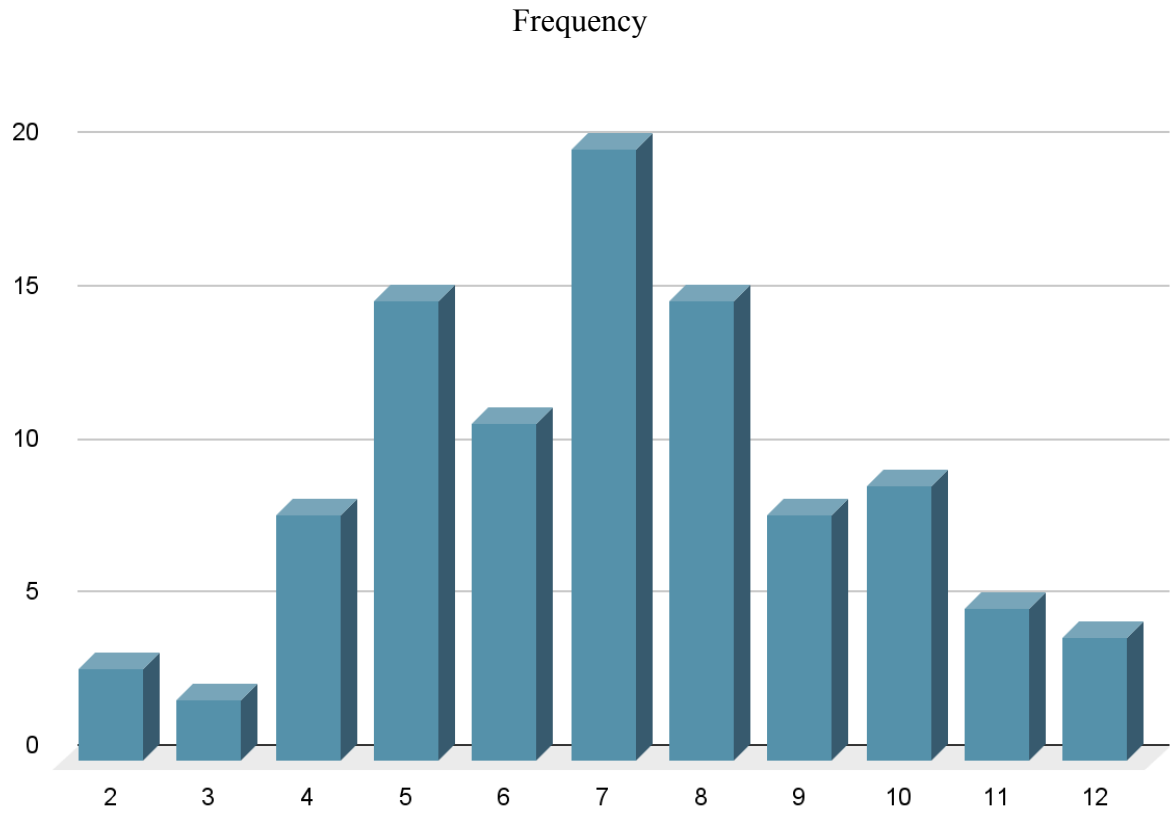

Figure 2 - The bar graph above gives you a visual difference between each outcome when rolling the pair of dice.

Analysis

Through my findings I saw that it proved my hypothesis was true. When rolling a pair of dice it is shown that twenty times I got an outcome of seven. While one of the least outcomes I got was: two, three , and twelve. It is because when rolling a pair of dice it's harder to get a two or twelve because there are less combinations. The only way you can get a two is if you roll a one on each die. While you have a bit more combinations for twelve but it's not as much as

compared to the other outcomes. Though because it is a simulation that generates the rolls for you it may not be the same results as doing it physically. One may notice that when doing it on a generator they follow a specific coding that gives you these results. Therefore it is likely that it can have different results or similar.

There was another experiment with a similar purpose. In this study they used the dice to calculate the house advantage of various gambling games. Ashok K. Singh used a formula to calculate the probability of rolling the sum of a pair of dice. As a result they found that the chances of rolling a seven was 0.167%. Ashok K. Singh , Rohan J. Dalpatadu, and Anthony F. Lucas created this formula instead of rolling the dice or using an online generator. Using this equation, they applied it to the dice game Craps and discovered a method to roll a seven multiple times.

Conclusion

In conclusion, after conducting this experiment I found that it is likely you roll a seven as a sum of two dice because of having more combinations. As for rolling a two, three, or twelve it is less likely to roll that because of having less possible combinations. In the real world you're able to apply this when gambling in order to figure out what possibilities you'll get more specifically in dice games. As for future experiments it is important to realize that generators often rely on a specific code, yet doing it 100 times does sound tiring and the outcomes would be more realistic.

Citation

Roll a die. (n.d.). Roll a Die. https://rolladie.net/roll-2-dice#!numbers=2&high=6&length=100&sets=&addfilters=&last_roll_only=false&totals_only=true

Singh, A. K., Dalpatadu, R. J., & Lucas, A. F. (2011). The Probability Distribution of the Sum of Several Dice: Slot Applications. *UNLV Gaming Research & Review Journal*, *15*(2), 109–118.

Appendix