

Introduction:

My investigative question is: I wonder what the probability of me getting as free ticket when rolling two dice is. The possible outcomes could be a giant popcorns worth, 50% discount on my ticket, a free ticket and not winning at all. I predict winning a giant popcorn will have the highest frequency overall.

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The promotion requires me to buy a ticket to the film and be given two dice to roll and to win the following prizes:

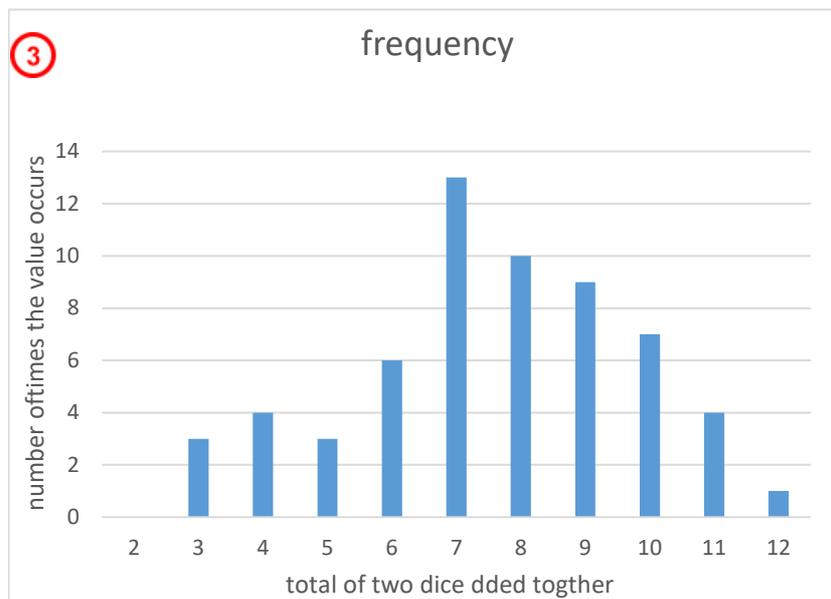
- If the total is 7 or an 11 I will win a giant popcorn.
- If the total is 3, 5 or 9 I will get a 50% discount on my ticket.
- If I throw a double, I will get a free ticket.

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The possible outcomes for this experiment are rolling a 2, 3, 4, 5, 6, 7, 8, 9,10,11 and 12

On the other hand, if I do not win any of these prizes, then I will pay the full prize on my ticket. In this investigation, the tools that I am going to use are the two coloured dice (Red & Blue) and my laptop. I will throw the two dice on the table and record the total of the two dice on the data table 60 times. If one or both dice falls onto the ground, the result will not be recorded into the data table. I will then calculate the experimental probability from the 60 trials and graph it.

Total	Tally	Frequency	Pizes
2			No Prize
3	II	2	50% discount
4	III	3	1 free ticket
5	IIII	4	50% discount
6	IIII II	7	No Prize
7	IIII IIII III	13	Giant popcorn
8	IIII IIII	10	No Prize
9	IIII IIIII	9	50% discount
10	IIII II	7	I free ticket
11	IIII	4	Giant popcorn
12	I	1	1 free ticket



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I can see from my table:

The probability of winning 50% discount on the ticket is $15/60$ is 0.25.

The probability of winning free ticket is $11/60$ is 0.1833.

The probability of winning giant popcorn is $17/60$ is 0.283.

The probability of getting no prize is $17/60$ is 0.2833.

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I can see on my graph above, the sum of 7 has the highest frequency and the lowest frequency is at 12 and comparing my frequency with the others, the most frequent number is 7. I also noticed that the chance of getting no prize and winning a giant popcorn had the same probability outcome, while winning a free ticket had the lowest probability.

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Given my experimental probably results above I wonder if the theoretical probability winning a free ticket will also end up being lowest probability.

Below I have listed the possible outcomes

This table 1 shows the possible outcomes for the total outcome of the Red and Blue dice

R,B	R,B	R,B	R,B	R,B	R,B
1,1	2,1	3,1	4,1	5,1	6,1
1,2	2,2	3,2	4,2	5,2	6,2
1,3	2,3	3,3	4,3	5,3	6,3
1,4	2,4	3,4	4,4	5,4	6,4
1,5	2,5	3,5	4,5	5,5	6,5
1,6	2,6	3,6	4,6	5,6	6,6

- Possible outcomes of giant popcorns are $8/36$.
- Possible outcomes of 50% discount on tickets are $10/36$.
- Possible outcomes of free tickets are $6/36$.

This table 2 shows the probabilities of winning a prize.

Prizes	Probability of winning a prize	Percentage of winning a prize
Win Giant Popcorn Worth \$5	0.22	22%
Win 50% discount on ticket	0.28	28%
Win Free Ticket	0.17	17%
No Prize	0.33	33%
Total	1.00	100%

Conclusion:

I found from this investigation that my prediction was correct. The investigation also showed that the overall probability of winning a free ticket had the lowest probability of happening. So the probability of me winning a free movie ticket is 0.1833. This is consistent with not only my experimental probability but also my theoretical probability result.

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