Introduction to Probability
Extend Your Learning

Many board games use two dice, and the sum of the numbers on the dice determines how far a player moves. Consider a game that uses two dice but the difference between the two numbers on the dice determines how far a player moves.

1. The possible differences between the numbers on two ordinary dice are 0, 1, 2, 3, 4, and 5. (Ordinary dice have six faces with dots representing 1 through 6.) Explain why these are the only possible differences.

2. Predict which difference is most likely and which is least likely. Determine your prediction without listing all the ways to roll each difference. Explain your reasoning.

3. Roll two dice 36 times. After each roll, determine the difference between the numbers and record a tally mark below the difference. After 36 rolls, count the tally marks and write the total number of times each difference occurred.

Difference	0	1	2	3	4	5
Tally Marks						
Total						

4. Based on your experiment, what is the probability of rolling each difference?

P (0) = P (3) =

P (1) = P (4) =

P (2) = P (5) =

5. In order to determine the theoretical probability of rolling each difference, use the table shown below to list all the ways you could roll each difference. As you complete the table, think about rolling one red die and one white die. For example, you could roll a 1 on the red die and a 3 on the white die, or you could roll a 3 on the red die and a 1 on the white die.

0	1	2	3	4	5
		1 and 3			
		3 and 1			

6. Describe any patterns you see in your table. Do the patterns hold for all differences? Why or why not?

7. What is the theoretical probability of rolling each difference?

   P (0) = P (3) =

   P (1) = P (4) =

   P (2) = P (5) =

8. Are your experimental probabilities from problem 4 the same as the theoretical probabilities? Why or why not?

9. How do you think your experimental probabilities would change if you rolled the dice 1000 times rather than 36 times?