7.SP Rolling Dice

Alignments to Content Standards: 7.SP.C.7 7.SP.C.6

Task

Roll two dice 10 times. After each roll, note whether any sixes were observed and record your results in the table below.

Roll	Any Sixes? (Y/N)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

a. What fraction of the 10 rolls resulted in at least one six?

b. Combine your results with those of your classmates. What fraction of all the rolls in the class resulted in at least one six?

c. Make a list of all the different possible outcomes that might be observed when two dice are rolled. (Hint: There are 36 different possible outcomes.)

d. What fraction of the 36 possible outcomes result in at least one six?

e. Suppose you and your classmates were able to roll the two dice many thousands of times. What fraction of the time would you expect to roll at least one six?

IM Commentary

This task is intended as a classroom activity. Students pool the results of many repetitions of the random phenomenon (rolling dice) and compare their results to the theoretical expectation they develop by considering all possible outcomes of rolling two dice. This gives them a concrete example of what we mean by long term relative frequency.

A possible stumbling block for students is the idea that there are two ways to roll a six and a five: six on the first die and five on the second, or *vice versa*. It often helps to use dice of different colors (e.g., one red and one green). This makes the distinction between the two outcomes easier to envision.

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Solution

a. Answers will vary, but should be centered around $\frac{11}{36}$ (roughly 0.306)

b. Combing results from the entire class should produce a result closer to the theoretical value in part (d).

c. The table below gives all possible outcomes of rolling two dice. Rolls resulting in at least one six are bold.

(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	**(1,6)**
(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	**(2,6)**
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	**(3,6)**
(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	**(4,6)**
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	**(5,6)**
(6,1)	**(6,2)**	**(6,3)**	**(6,4)**	**(6,5)**	**(6,6)**

d. $\frac{11}{36}$, or approximately 0.306.

e. Same as (d).