

## Lesson 1: Probability Experiments and Sample Spaces

**Goal:** To construct the sample space for a probability experiment and determine the probability of an event.

In the first part of this course, we learned how to use functions to analyze situations and make predictions. In this part of the course, we will learn how to use **probability** to analyze situations and make predictions.

Probability is a branch of mathematics that provides a way of assigning a numeric value to describe the likelihood or possibility of something happening. Like other topics in mathematics, specialized vocabulary and symbols are used.

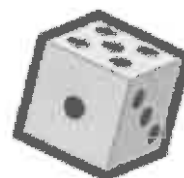
Throughout the unit, refer to the **Probability Vocabulary List** at the start of the unit as needed.

### Example 1 – Creating a sample space from a description of an experiment

Aman performs a probability experiment using a six-sided die. He tosses the die and records the result.

- a) Construct the sample space showing all the possible outcomes.

$$\{1, 2, 3, 4, 5, 6\}$$



- b) How many outcomes does the sample space show? 6

- c) Determine the probability of rolling the number 3:  $P(3) = \frac{1}{6}$

- d) Determine the probability of not rolling the number 3:  $P(3^c) = \frac{5}{6}$   
*complement*

- e) Determine the probability of rolling a number that is prime:  $P(\text{prime}) = \frac{3}{6} \Rightarrow \frac{1}{2}$   
*prime = {2, 3, 5}*

- f) Determine the probability of rolling a number  $> 4$ :  $P(>4) = \frac{2}{6} \Rightarrow \frac{1}{3}$   
*{5, 6}*

- g) Determine the probability of rolling the number 7:  $P(7) = \frac{0}{6} \Rightarrow 0$

- h) Determine the probability of rolling a number that is even or odd:  $P(\text{odd, even}) = \frac{6}{6} \Rightarrow 1$

- i) Determine the probability of rolling a number that is even and odd:  $\frac{0}{6}$   
*There is NO odd and even numbers on one side of the die*

**Note:** The probability of a totally impossible event is always 0.

The probability of a totally certain event is always 1.

Probabilities are never negative and they are never greater than 1.