

## Intro to Probability

**Definition:** The set of all possible outcomes in a random experiment is called the

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Each possible outcome is called an

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Describe the sample space for the following random experiments:

1. A six-sided fair die (we will assume dice are six-sided and fair unless otherwise stated).
2. Flipping a fair coin twice.
3. Choosing 2 marbles from a bag (with replacement) with 2 red marbles, 2 blue marble, and 1 green marble.
4. (Try It!) Three dice are rolled and the sum is computed.

**Definition:** The **fundamental counting principle** says that if there are  $n$  outcomes from one event and  $m$  outcomes from the another, then there are

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total possible outcomes.

**Definition:** If all outcomes are equally likely, then the **probability** of an event occurring is

$$P(E) = \frac{\quad}{\quad} .$$

3. What is the probability of rolling a 2 on a die?
  
  
  
  
  
  
  
  
  
  
4. What is the probability of getting two heads in a row when flipping a coin twice?
  
  
  
  
  
  
  
  
  
  
5. What is the probability of pulling (with replacement) two red marbles from a bag with 2 red marbles, 2 blue marbles, and 1 green marble?
  
  
  
  
  
  
  
  
  
  
6. What is the probability of rolling an even number or a one?

**Definition:** Two events are said to be **disjoint (or mutually exclusive)** if they cannot both happen. The probability of disjoint events  $A$  or  $B$  occurring is

$$P(A \text{ or } B) = \underline{\hspace{2cm}}.$$

7. What is the probability of drawing a jack or a queen from a deck of cards?

8. What is the probability of rolling a number greater than 3 or an even number?

**Definition:** The probability of two events (not necessarily disjoint)  $A$  or  $B$  occurring is

$$P(A \text{ or } B) = \underline{\hspace{2cm}}.$$

10. What is the sample space for the following event: you flip one coin and roll one die.
11. What is the sample space for the following event: two different integers between 1 and 5 are chosen and listed in increasing order.
12. Suppose that  $P(A) = .4$ ,  $P(B) = .3$ , and  $P(A \text{ and } B) = \frac{1}{4}$ . Are  $A$  and  $B$  disjoint events?
13. In problem 12., what is the probability of the first number being 2 or 3? What about the probability of the first number being 5?
14. What is the probability of getting at least one heads if you flip a coin three times?