

"I Can" Help My Student...

- Perform an experiment and collect data on a chance event, such as rolling die or picking names out of a hat.
- Explain why as probabilities approach 100% or 1, they become more likely.
- Use probability models to find probabilities of events.
- Compare theoretical and experimental probability.
- Represent probabilities of simple and compound events as a fraction, decimal, or percent.
- Create organized lists, tables, tree diagrams, and simulations to determine the probability of compound events.

Vocabulary

probability: A measure of the likelihood of an event. It is the ratio of the number of ways a certain event can occur to the number of possible outcomes.

probability model: A drawing or chart used to assign probabilities to outcomes of a chance process by examining the nature of the process. The set of all outcomes is called the sample space, and their probabilities sum to 1.

event: Any possible outcome of an experiment in probability.

experimental probability: The ratio of the number of times an outcome occurs to the total amount of trials performed.

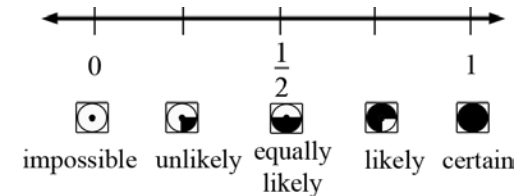
$$\text{Experimental Probability} = \frac{\text{The number of times an event occurs}}{\text{The total number of trials}}$$

theoretical probability: The mathematical calculation that an event will happen in theory.

sample space: The set of all possible outcomes from a probability experiment.

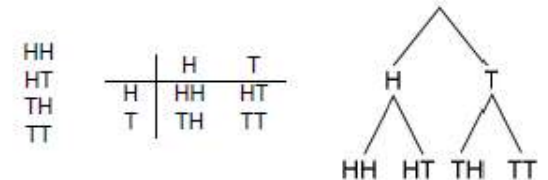
Important Understandings and Concepts

Probability can be expressed in terms such as impossible, unlikely, likely, or certain, as a number between 0 and 1, or as a percent between 0% and 100% as illustrated on the number line.

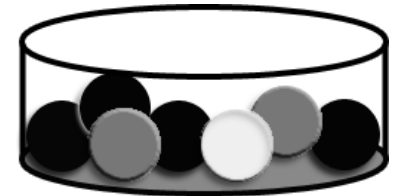


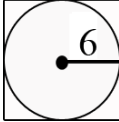
Probability models can be helpful in predicting the probability of an event. Like shown to the right, all the possible outcomes of the toss of two coins can be represented as an organized list, table or **tree diagram**. The sample space becomes a model when a probability of each simple event, such as the chance of getting exactly two heads, is specified. This model shows that the **theoretical probability** of getting two heads is 1 out of 4 tosses or 25%. This may or may not happen in an actual experiment of many coin tosses, which is **experimental probability**.

Different representations of a sample space



An **independent event** is one that does not depend on another event. For example, the probability of picking a white marble from those shown to the right is 1 out of 7, $1/7$, or about 14%. But what would be the chance of picking the white marble two times in a row? This is a **compound event**. The chance of white on the first draw is $1/7$, and the chance of picking the white marble again is $1/7$. The compound probability of picking white two times in a row is $1/7 \times 1/7$ or $1/49$ which is about a 2% probability.



Sample Problems	How Can You Help Your Student?
<p>1. There are three choices of jellybeans – grape, cherry and orange. If the probability of getting a grape is $\frac{3}{10}$ and the probability of getting a cherry is $\frac{1}{5}$, what is the probability of getting an orange?</p> <p>Solution: The probability of getting a cherry is $\frac{1}{5}$ which is the same as $\frac{2}{10}$. So the probability of getting either a grape or a cherry is $\frac{3}{10} + \frac{2}{10} = \frac{5}{10}$ or 1 out of 2. So the probability of getting an orange must be 5 out of 10 or $\frac{1}{2}$ or 50%.</p> <p>2. If you choose a point in the square, what is the probability that it is <u>not</u> in the circle?</p>  <p>Solution: The area of the square would be 12×12 or 144 units squared. The area of the circle would be 113.04 units squared. The probability that a point is not in the circle would be $\frac{30.96}{144}$ or 21.5%.</p> <p>3. How many ways could 3 students, Amy, Brenda, and Carla, come in 1st, 2nd and 3rd place in a contest?</p> <p>Solution: Making an organized list will identify that there are 6 ways for the students to win a race</p> <ul style="list-style-type: none"> A, B, C A, C, B B, C, A B, A, C C, A, B C, B, A <p>4. More problems and solutions for the content in this unit can be found at http://www.illustrativemathematics.org/7.SP.C</p>	<ul style="list-style-type: none"> • Playing games is a wonderful way to practice skills at home in a fun environment. <i>Stack-n-Pack</i> books contain several math games covering math concepts from Kindergarten through High School. <i>Stack-n-Pack</i> card games may be checked out from your school (contact your school's Parent Liaison) or purchased online: Stack-n-Pack Mathematics Card Games for K-HS. The Variables game from the <i>Stack-n-Pack 6-8</i> book is good practice for 7th graders. • Students can use simulations such as <i>MARBLE MANIA</i> on AAAS (http://sciencenetlinks.com/interactives/marble/marblemania.html and http://sciencenetlinks.com/student-teacher-sheets/marble-mania/) or the <i>RANDOM DRAWING TOOL</i> on <i>NCTM'S ILLUMINATIONS</i> (http://illuminations.nctm.org/ActivityDetail.aspx?ID=67) to generate data and examine how the experimental probability compares to the theoretical probability. • Topics 4, 5, 6, 7, and 8 on this LearnZillion page contain different online video lessons for the content in this unit. http://learnzillion.com/courses/43?collection_id=545 • This Khan Academy page, starting with the Basic Probability topic and the topics beneath that, has online video lessons for the content in this unit. https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-probability-statistics • Practice determining the probability of simple events. http://www.ixl.com/math/grade-7/probability-of-simple-events • You Tube video on the basics of probability. http://www.youtube.com/watch?v=AY3O_qsSnbE