

INTRODUCTION TO PROBABILITY

What Is Probability?

Probability is the possibility that a certain event will occur.

- An event that is certain to occur has a probability of 1. An event that cannot occur has a probability of 0. Therefore, the probability of an event occurring is always between 0 and 1.
- The closer a probability is to 1, the more certain that an event will occur.
- Probability is the chance of an event occurring divided by the total

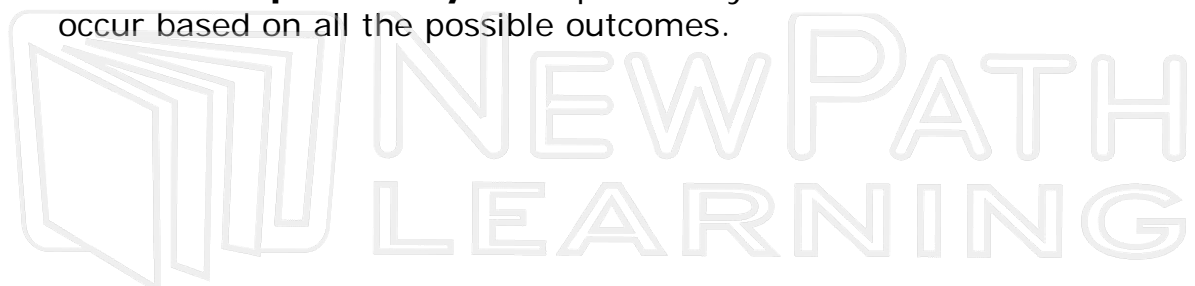


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Experimental probability is the probability that a certain outcome will occur based on an experiment being performed multiple times

Theoretical probability is the probability that a certain outcome will occur based on all the possible outcomes.



How to use probability

The **probability** of one event occurring is equal to the chance of the event occurring divided by the total outcomes.

- For example, the probability of picking a seven out of a standard deck of cards is $\frac{4}{52}$, or $\frac{1}{13}$. Since the probability of picking a seven is $\frac{1}{13}$, a prediction can be made if a card is picked 50 times.

Ex. Chance of a seven out of 50 times, $\frac{1}{13} = \frac{x}{50}$, $3x = 50$, $x = 16.7 \approx 17$

The number of times a seven is picked would be 17.

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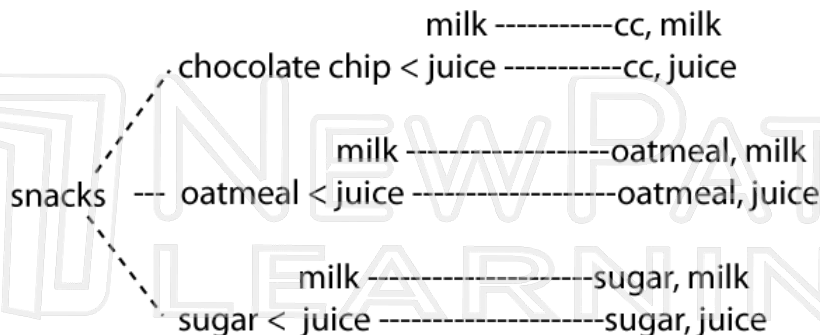
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from for a snack. How many different combinations are there? Use the **tree diagram** below:



This tree diagram shows that there are 6 different ways to have a snack.

This could also be figured out using the Counting Principle. With the **Counting Principle**, the number of different choices is multiplied to get the different combinations. For the above example, 3 cookies x 2 drinks = 6 combinations. The probability of picking sugar cookies and milk is $1/6$.

Experimental probability is the probability that a certain outcome will occur based on an experiment being performed multiple times. For example, Jeanie's class is doing an experiment about picking the numbers 1 -10. Jeanie picks the number 3. Her teacher picks a number 10 times and the numbers are 2, 1, 6, 9, 7, 6, 3, 7, 3, and 6. The probability of Jeanie's number, 3, being picked is $2/10$ or $1/5$.

Theoretical probability is the probability that a certain outcome will occur based on all the possible outcomes. For example, the probability of picking a red marble from a bag containing 10 marbles, 3 of which are red, is $3/10$.



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Try This!

1. Is the **probability** that June is a summer month closer to 0 or 1?

2. What is the **probability** of picking a red card out of a deck of 52 cards?

3. If a die is rolled 60 times, how many times will it land on a 2?

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6. Using the **Counting Principle**, how many outcomes are there for a pizza with 2 types of sauces, 3 types of cheeses and 8 types of toppings?

7. Ruth's class did an experiment where a die was rolled 8 times. Ruth picked the number 4. The results were 2, 1, 6, 1, 6, 3, 5, and 2. What was the probability of Ruth getting a 4?