

TOPIC 7

Probability

In this topic, students explore probability. They determine the likelihood of an event and calculate both theoretical and experimental probability. They learn that as an experiment is repeated, its experimental probability approaches its theoretical probability.

CONNECT THE MATH

People make decisions every day based on how likely an event is to happen. You might take an umbrella when rain is likely. You might allow more travel time to get to an appointment during rush hour.

Probability is a numerical measure of likelihood. If it's more likely to be sunny than cloudy, being sunny has a higher probability than being cloudy has.

Estimate the probabilities of events with your student: How likely are the outcomes in the next turn of a game with a spinner or dice? Will the bus be on time tomorrow? Will you complete a puzzle in less than three hours? What will the next pitch thrown in a game be? How likely is it that all the traffic lights will be green on the way to the supermarket?





LESSON 7-1

Understand Likelihood and Probability

Probability (of an event) is a number between 0 and 1 that measures the likelihood that an event will occur. The closer the probability is to 1, the more likely the event will occur. Probability is often expressed as a fraction but can also be expressed as a decimal or a percent.

LESSON OBJECTIVES

- Use probability to describe the likelihood that an event will occur.
- Relate probability to mathematical fairness.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What Is Probability?](#)

- [What Is an Outcome?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [outcome](#)

You can use these search terms and phrases to help your student find additional help online:

- describing the likelihood of an event
- relating likelihood and probability
- relating probability and fairness

LESSON 7-2

Understand Theoretical Probability

Theoretical probability of an event is the number of favorable outcomes divided by the number of possible outcomes, when all outcomes are equally likely.

LESSON OBJECTIVES

- Understand theoretical probability and how it can be used.
- Use theoretical probability to predict an outcome.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [How Do You Find the Probability of a Simple Event?](#)

- [What Is Probability?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [event](#)
- [theoretical probability](#)

You can use these search terms and phrases to help your student find additional help online:

- determining theoretical probability
- using theoretical probability
- using theoretical probability to make predictions



LESSON 7-3

Understand Experimental Probability

Theoretical probability is calculated based on the ratio of desired outcomes to possible outcomes. Experimental probability consists of the results of an actual experiment. These probabilities are often very close, but are usually not identical.

LESSON OBJECTIVES

- Compare theoretical and experimental probability.
- Use experimental probability to make predictions.
- Explain differences between theoretical and experimental probability.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What Is Experimental Probability?](#)
- [How Do You Find Experimental Probability?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [experimental probability](#)
- [relative frequency](#)

You can use these search terms and phrases to help your student find additional help online:

- determining relative frequency
- determining experimental probability
- making predictions from experimental probability
- comparing theoretical and experimental probability

LESSON 7-4

Use Probability Models

A probability model can be used to evaluate a chance process and its outcomes for either theoretical or experimental probability. The model has a sample space, a list of events, and the probability of each event.

LESSON OBJECTIVES

- Develop a probability model.
- Use a probability model to evaluate a situation.
- Use a probability model to make an estimate.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [How Do You Find the Probability of a Simple Event?](#)
- [How Do You Use Experimental Probability to Predict an Outcome?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [sample space](#)
- [Probability model](#)

You can use these search terms and phrases to help your student find additional help online:

- developing a probability model
- using a probability model
- using experimental probabilities to estimate

LESSON 7-5

Determine Outcomes of Compound Events

The possible outcomes of a compound event (a combination of two or more events) can be represented using a tree diagram, a table, or an organized list.

LESSON OBJECTIVES

- Use a tree diagram, a table, or an organized list to represent the sample space for a compound event.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What is a Sample Space?](#)
- [What are Compound Events?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [compound event](#)

You can use these search terms and phrases to help your student find additional help online:

- representing sample spaces of compound events
- using a tree diagram to represent the sample space
- using a table to represent the sample space
- using an organized list to represent the sample space

LESSON 7-6

Find Probabilities of Compound Events

A model, such as a table, organized list, or tree diagram, can represent the sample space of a compound event. The sample space can then be used to determine the probability of a favorable outcome.

LESSON OBJECTIVES

- Organize information about a compound event on a table, a tree diagram, or an organized list.
- Find the probability of a compound event.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [How Do You Solve a Problem by Making an Organized List?](#)
- [How Do You Use a Tree Diagram to Count the Number of Outcomes in a Sample Space?](#)

You can use these search terms and phrases to help your student find additional help online:

- finding the probability of a compound event
- using the sample space of a compound event to calculate probability

LESSON 7-7

Simulate Compound Events

Probability models can be developed by simulating events that are difficult to perform. A tool such as a spinner, coin, number cube, or random number generator can be used in the simulation. It is important that the tool selected for a simulation has the same number of possible outcomes as the actual event.

LESSON OBJECTIVES

- Use different tools to simulate a compound event.
- Model a real-world situation involving a compound event and predict its outcome using a simulation.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [How Do You Use a Simulation to Solve a Problem?](#)
- [What Is a Simulation?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [simulation](#)

You can use these search terms and phrases to help your student find additional help online:

- using simulations to estimate probability
- probability simulations