

MODULE 4 OVERVIEW

TEKS Addressed:

7.6A, 7.6B, 7.6C, 7.6D, 7.6E, 7.6F, **7.6G, 7.6H, 7.6I, 7.12A, 7.12B, 7.12C**

*Bold TEKS = Readiness Standard

Analyzing Populations and Probabilities

Sessions: 43

Prior Knowledge

Why is this module named *Analyzing Populations and Probabilities*?

Analyzing Populations and Probabilities formally introduces and explores probabilities and uses numeric and graphical displays students learned in previous courses to compare populations. Students learn to analyze

the representativeness of experimental probabilities and statistics drawn from samples of populations, focusing on the validity and usefulness of appropriately generated data.

The Research Shows . . .

“Probability is an important part of any mathematical education. It is a part of mathematics that enriches the subject as a whole by its intersection with other uses of mathematics. Probability is an essential tool in applied mathematics and mathematical modeling. It is also an essential tool in statistics.”

GAISE Report | 8

What is the mathematics of *Analyzing Populations and Probabilities*?

Analyzing Populations and Probabilities contains three topics: *Introduction to Probability*, *Compound Probability*, and *Drawing Inferences*. Students learn the basics of probability and use experimental and theoretical probability to

make predictions. They construct probability models and design simulations. They generate random samples to determine statistics from populations and use them to make conclusions.

possible learning objectives

14 SESSIONS
13 LEARNING • 1 ASSESSMENT

TOPIC 1 Analyzing Populations and Probabilities

Learning Together: 9 Sessions

TEKS: 7.6B, 7.6C, 7.6D, 7.6E, 7.6H, 7.6I

Students conduct probability experiments and determine theoretical and experimental probabilities of events.

- Students use probability models to organize the probabilities of outcomes in a sample space.
- Students use proportional reasoning to predict expected frequencies of favorable outcomes in larger samples.
- Students calculate the percent error between theoretical and experimental probabilities.
- Students use various tools to simulate the results of experiments.

Learning Individually: 4 Sessions

Targeted Skills Practice for Analyzing Populations and Probabilities

- Students estimate probabilities of events.
- Students determine theoretical and experimental probabilities of events.
- Students construct uniform and non-uniform probability models.
- Students describe a simulation to model a situation and then describe one trial.
- Students conduct experiments, record results, and determine experimental probabilities.



12 SESSIONS
11 LEARNING • 1 ASSESSMENT

TOPIC 2 Compound Probability

Learning Together: 8 Sessions

TEKS: 7.6A, 7.6B, 7.6C, 7.6D, 7.6I

Students use arrays, lists, and tree diagrams to organize the possible outcomes of an experiment.

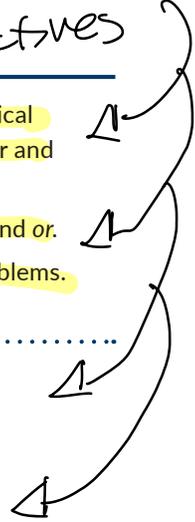
- Students create probability models, calculate experimental and theoretical probabilities, and use proportional reasoning to determine percent error and make predictions of expected numbers of outcomes.
- Students learn about compound events that use the conjunctions *and* and *or*.
- Students design and conduct simulations for compound probability problems.

Learning Individually: 3 Sessions

Targeted Skills Practice for Compound Probability

- Students use arrays to construct sample spaces.
- Students use tree diagrams to construct probability models.
- Students determine compound probabilities.
- Students use simulations to answer questions.

possible learning objectives



possible learning objectives

Learning Together: 11 Sessions

TEKS: 7.6B, 7.6F, 7.6G, 7.12A, 7.12B, 7.12C

Students use random samples to collect representative data from a specified population.

- Students use the results of the sample and proportional reasoning to estimate population parameters.
- Students use data displays and measures of center and variation to compare populations.
- Students use random samples to draw inferences about populations and to compare two populations.

Learning Individually: 5 Session

Targeted Skills Practice for Drawing Inferences

- Students determine whether data collected in a survey represent a census or a sample and whether each survey result is a parameter or a statistic.
- Students use random samples to calculate measures.
- Students compare the measures of center and spread in problem situations.
- Students analyze bar graphs, double bar graphs, stacked bar graphs, circle graphs, stem-and-leaf plots, and box plots.

How is Analyzing Populations and Probabilities connected to prior learning?

This module builds on students' experiences with proportional reasoning, including percent error. They have developed formal strategies for solving proportions and calculating percent error. Students use these skills to make predictions and compare the percent error between experimental and theoretical probabilities and between statistics and parameters.

Prior Knowledge

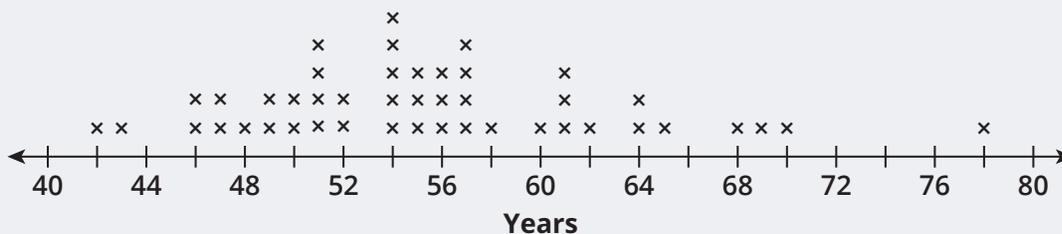
In previous courses, students calculated the mean, the median, and the interquartile range of data sets. They also displayed numeric data using dot plots, stem-and-leaf plots, histograms, and box plots.

Dot plot Repres.

Math Representation

Catalina collected data on the ages of the 46 presidents of the United States at their first inauguration. She created data displays of the presidents' ages at inauguration.

Ages at Inauguration



When will students use knowledge from *Analyzing Populations and Probabilities* in future learning?

Students will develop a more in-depth and more algorithmic approach to probability in high school, including compound and conditional probabilities.

Math Representation

Conditional probability is the probability of event B, given that event A has already occurred: $P(B|A)$. You can represent the conditional probability,

$P(B|A)$ for independent events as $\frac{\text{desired outcomes}}{\text{total outcomes}}$.

The probability of event B, given that A has already occurred is the probability of A and B divided by the probability of A.

$$P(B|A) = \frac{\text{desired outcomes}}{\text{total outcomes}}$$

$$\begin{aligned} &= \frac{A \text{ and } B}{A} \\ &= \frac{A \text{ and } B}{A} \cdot \frac{\frac{1}{\text{total}}}{\frac{1}{\text{total}}} \\ &= \frac{A \text{ and } B}{\text{total}} \cdot \frac{1}{\text{total}} \\ &= \frac{A \text{ and } B}{\text{total}} \\ &= \frac{P(A \text{ and } B)}{P(A)} \end{aligned}$$

Students will also engage in varied types of data collection and need to understand the role of randomization and simulation in making valid inferences.

4 Analyzing Populations and Probabilities

MODULE 1 Assessment Summary

Topic	Topic Title	Name	Administered	TEKS*
1	Introduction to Probability	End of Topic Assessment	After Topic 1	7.6B 7.6C 7.6D 7.6E 7.6H 7.6I
2	Compound Probability	End of Topic Assessment	After Topic 2	7.6A 7.6B 7.6C 7.6D 7.6I
3	Drawing Inferences	End of Topic Assessment	After Topic 3	7.6G 7.12A 7.12B 7.12C

*Bold TEKS = Readiness Standard