



Topic C

Drawing Conclusions Using Data from a Sample

S-IC.A.1, S-IC.B.3, S-IC.B.4, S-IC.B.6

Focus Standards:	S-IC.A.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
	S-IC.B.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
	S-IC.B.4	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
	S-IC.B.6	Evaluate reports based on data.
Instructional Days:	11	
	Lesson 12:	Types of Statistical Studies (P) ¹
	Lesson 13:	Using Sample Data to Estimate a Population Characteristic (P)
	Lessons 14–15:	Sampling Variability in the Sample Proportion (E, E)
	Lessons 16–17:	Margin of Error When Estimating a Population Proportion (E, P)
	Lessons 18–19:	Sampling Variability in the Sample Mean (E, P)
	Lessons 20–21:	Margin of Error When Estimating a Population Mean (E, P)
	Lesson 22:	Evaluating Reports Based on Data from a Sample (P)

This topic introduces different types of statistical studies (e.g., observational studies, surveys, and experiments) (**S-IC.B.3**). The role of randomization (i.e., random selection in observational studies and surveys and random assignment in experiments) is addressed. A discussion of random selection (i.e., selecting a sample at random from a population of interest) shows students how selecting participants at random provides a representative sample, thereby allowing conclusions to be generalized from the sample to the population. A discussion of random assignment in experiments, which involves assigning subjects to experimental groups at random, helps students see that random assignment is designed to create comparable groups making it possible to assess the effects of an explanatory variable on a response.

¹Lesson Structure Key: **P**-Problem Set Lesson, **M**-Modeling Cycle Lesson, **E**-Exploration Lesson, **S**-Socratic Lesson

The distinction between population characteristics and sample statistics (first made in Grade 7) is revisited. Scenarios are introduced in which students are asked a statistical question that involves estimating a population mean or a population proportion. For example, students are asked to define an appropriate population, population characteristic, sample, and sample statistics that might be used in a study of the time it takes students to run a quarter mile or a study of the proportion of national parks that contain bald eagle nests.

In this topic, students use data from a random sample to estimate a population mean or a population proportion. Building on what they learned about sampling variability in Grade 7, students use simulation to create an understanding of margin of error. In Grade 7, students learned that the proportion of successes in a random sample from a population varies from sample to sample due to the random selection process. They understand that the value of the sample proportion is not exactly equal to the value of the population proportion. In Algebra II, they use margin of error to describe how different the value of the sample proportion might be from the value of the population proportion. Students begin by using a physical simulation process to carry out a simulation. Starting with a population that contains 40% successes (using a bag with 40 black beans and 60 white beans), they select random samples from the population and calculate the sample proportion. By doing this many times, they are able to get a sense of what kind of differences are likely. Their understanding should then extend to include the concept of margin of error. Students then proceed to use technology to carry out a simulation. Once students understand the concept of margin of error, they go on to learn how to calculate and interpret it in context (**S-IC.A.1**, **S-IC.B.4**). Students also evaluate reports from the media in which sample data are used to estimate a population mean or proportion (**S-IC.B.6**).