

## Unit 7 Probability and Statistics

### Algebra II

#### Unit Description:

In this unit, students study normal data distributions and solve problems using tables and technology. An examination of bias provides students with a reason to develop simple random samples from a population of interest. Students create simulations with and without technology to test conjectures about data. Margin of error is applied to population proportions and an informal understanding of statistical significance is developed.

#### Standards for Mathematical Practice

- MP.1 Make sense of problems and persevere in solving them.
- MP.2 Reason abstractly and quantitatively.
- MP.3 Construct viable arguments and critique the reasoning of others.
- MP.4 Model with mathematics.
- MP.5 Use appropriate tools strategically.
- MP.6 Attend to precision.
- MP.7 Look for and make use of structure.
- MP.8 Look for and express regularity in repeated reasoning.

#### Louisiana Student Standards for Mathematics (LSSM)

The Louisiana Student Standards for Mathematics (LSSM), designates the following standards as A2: Algebra 2. *Italicized standards are designated as A1: Algebra 1 and are considered prerequisite standards for Algebra 2. While these prerequisite standards are present in the curriculum for scaffolding purposes, teachers will focus instruction on Algebra 2 expectations.*

<b>S-ID: Interpreting Categorical and Quantitative Data</b>	
<b>A. Summarize, represent, and interpret data on a single count or measurement variable.</b>	
<i>S-ID.A.2</i>	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
<i>S-ID.A.3</i>	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★
S-ID.A.4	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. ★

<b>B. Summarize, represent, and interpret data on two categorical and quantitative variables.</b>	
S-ID.B.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ <b>a.</b> Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize exponential models. ★
<b>S-IC: Making Inferences and Justifying Conclusions</b>	
<b>A. Understand and evaluate random processes underlying statistical experiments.</b>	
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.A.2	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. <i>For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?</i> ★
<b>B. Make inferences and justify conclusions from sample surveys, experiments, and observational studies.</b>	
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.5	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. ★
S-IC.B.6	Evaluate reports based on data. ★

**\*As defined by LSSM, the basic modeling cycle involves:**

1. identifying variables in the situation and selecting those that represent essential features,
2. formulating a model by creating and selecting geometric, graphical, tabular, algebraic, or statistical representations that describe relationships between the variables,
3. analyzing and performing operations on these relationships to draw conclusions,
4. interpreting the results of the mathematics in terms of the original situation,
5. validating the conclusions by comparing them with the situation, and then either improving the model or, if it is acceptable,
6. reporting on the conclusions and the reasoning behind them.

*Choices, assumptions, and approximations are present throughout this cycle.*

**Enduring Understandings:**

- The way the data is collected, organized, and displayed influences interpretation.
- Statistics can be used to make and evaluate inferences and predictions about our world.

**Essential Questions:**

- Why is data collected and analyzed?
- What role does a random process play when conducting a survey?
- How do people use data to influence others?
- How can predictions be made based on data?

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|  | <ul style="list-style-type: none"><li>• How can we determine if statistics are valid and reliable?</li></ul> |
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