# Unit 6: Supplemental and Supporting Topics

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 4**
Length: **4 Weeks**
Status: **Published**

## Summary of Supplemental and Supporting Topics

The final unit of study for this course will explore topics that are typically associated with a first-year algebra course yet not emphasized on the state testing. Additionally, the last few weeks of the school year provide an appropriate time for students to gain familiarity with topics that will appear in future math courses. In particular, this unit will introduce students to elementary topics in data analysis (including measures of central tendency for a data set and visual representations of data sets), operations with radicals, simplifying radical expressions, and graphs of square root and cube root functions.

**Revision Date:** July 2024

## NJ Standards for Supplemental and Supporting Topics

Analyzing various sets of real world data including multiple cultures and backgrounds incorporates the following:

This unit also reflects the goals of the Department of Education and the Amistad Commission including the infusion of the history of Africans and African-Americans into the curriculum in order to provide an accurate, complete, and inclusive history regarding the importance of of African-Americans to the growth and development of American society in a global context.

This unit includes instructional materials that highlight the history and contributions of Asian Americans and Pacific Islanders in accordance with the New Jersey Student Learning Standards in Social Studies.

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| ELA.K-12.1 | Developing Responsibility for Learning: Cultivating independence, self-reflection, and responsibility for one's own learning. |
| MATH.9-12.S.ID.A | Summarize, represent, and interpret data on a single count or measurement variable |
| MATH.9-12.N.RN.A | Extend the properties of exponents to rational exponents |
| MATH.9-12.S.ID.A.1 | Represent data with plots on the real number line (dot plots, histograms, and box plots). |
| MATH.9-12.N.RN.A.1 | Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. |
| MATH.9-12.S.ID.A.2 | 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. |
| MATH.9-12.S.ID.A.3 | Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). |

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| MATH.9-12.N.RN.A.2 | Rewrite expressions involving radicals and rational exponents using the properties of exponents. |
| MATH.9-12.N.RN.A.3 | Simplify radicals, including algebraic radicals (e.g., $\sqrt[3]{54} = 3\sqrt[3]{2}$, simplify $\sqrt{32x^2}$). |
| MATH.9-12.N.Q.A.1 | Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. |
| MATH.9-12.N.Q.A.2 | Define appropriate quantities for the purpose of descriptive modeling. |
| MATH.9-12.N.Q.A.3 | Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. |
| MATH.9-12.S.IC.B | Make inferences and justify conclusions from sample surveys, experiments, and observational studies |
| MATH.9-12.F.IF.C.7.b | Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. |
| SCI.HS-LS3-3 | Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. |
| SCI.HS-LS4-3 | Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. |
| WRK.K-12.P.5 | Utilize critical thinking to make sense of problems and persevere in solving them. |
| WRK.K-12.P.8 | Use technology to enhance productivity increase collaboration and communicate effectively. |
| WRK.K-12.P.9 | Work productively in teams while using cultural/global competence. |

## Essential Questions for Supplemental and Supporting Topics

- What are the measures of central tendency for a given data set, and why are they useful?
- What are the steps needed to create a histogram and a boxplot for a data set?
- How does one simplify radical expressions (with and without variables)?
- How does one construct graphs of square root functions and cube root functions, and what are their key characteristics?
- What does it mean to rationalize the denominator of a radical expression?

## Enduring Understandings for Supplemental and Supporting Topics

- The mean, median, and mode are measures of central tendency for a data set, and they offer insights about typical values for a data set.
- A histogram is a frequency bar graph that provides a helpful visual representation for a data set.
- A boxplot is comprised of the five-number summary for a data set and is a useful visual representation of the data.
- Radicals are considered simplified when the radicand contains no perfect squares.
- Rational expressions are not allowed to contain radicals in the denominator.

## Objectives for Supplemental and Supporting Topics

- How to identify the mean, median, and mode for a data set.
- How to construct a histogram for a data set.
- How to make a boxplot, based on the five-number summary for a data set.
- How to simplify radical expressions, using the product rule and rationalizing the denominator when necessary.
- How to graph square root functions and cube root functions.

## Objectives for Supplemental and Supporting Topics

- Performing an exploratory analysis with a univariate data set.
- Identifying key numerical descriptors for a univariate data set.
- Simplifying and combining radical expressions, with and without variables.
- Graphing square root functions and cube root functions.

## Learning Plan for Supplemental and Supporting Topics

1-2 Weeks: Introductory tools for data analysis, including how to find the mean, median, and mode of a data set, and how to construct visual representations of univariate data sets, including the histogram and boxplot.

1-2 Weeks: Class time is used to practice simplifying radical expressions using the product rule, multiplying radicals and combining like radical terms, and learning how to rationalize the denominator of a radical expression. Students will be introduced to, and given time to practice making graphing graphs of square root functions and cube root functions.

## Evidence/Performance Tasks for Supplemental and Supporting Topics

Daily classroom activities and discussions will serve as formative assessments with the teacher sharing feedback and commentary at the individual and whole group levels. Students will also have opportunities to exchange input with their peers during small group exercises which provide opportunities for them to practice working with the content. Students will complete exercises on the IXL platform which will give immediate feedback and develop a SmartScore that tracks their progress with these topics.

## Materials

Core Instructional materials: Lecture notes and classroom activities designed by instructors.

Core Book List including Algebra 1, Pearson Publishing

Supplemental instructional materials: IXL

## Suggested Strategies for Modification

Possible accommodations/modification for Algebra 1