

**Course Name: Algebra**

**Grade: 8**

**Course Description:** Through the implementation of Connected Math, students develop mathematical knowledge, conceptual understanding, and procedural skills, along with an awareness of the rich connections between math topics—across grades and across New Jersey Student Learning Standards. In addition to traditional computational skills, students focus on collaboration, pattern recognition, real world applications, and perseverance in problem solving.

Analyzing functions is a critical area of focus for eighth grade students taking Algebra. They will interpret and build functions to model a relationship between two quantities and represent and solve equations and inequalities graphically. Students will understand the concept of a function, function notation, and construction of functions. They will construct and compare linear, quadratics and exponential models and will analyze these functions using different representations. Students will create and solve equations, inequalities, and systems of equations involving linear and quadratic expressions.

Algebra students will use descriptive statistics to summarize, represent, and interpret data. Students develop a more formal means of assessing how a model fits data and will use regression techniques to describe approximately linear relationships among quantities. Students will gain experience working with rational exponents, including fractional exponents, and use the properties of exponents to solve problems efficiently and accurately.

Students will build on previous work with expressions and equations in order to represent, analyze, and solve a variety of problems and models. Students will build on the concept of proportionality to deepen and formally describe the steepness of a line as slope. Students will also use linear equations to describe associations between two quantities and two different variables. Analysis includes using mathematical models to summarize data and regression models to address variability. Student work with solving linear equations will extend to systems of linear and nonlinear equations which include systems with no solution and simultaneous equations.

This course introduces students to functions and a great deal of instructional time is spent defining, evaluating, analyzing, and comparing functions. Students will develop and use functions as a representation of a relationship that includes linear and nonlinear functions, which include inverse variation, exponential, and quadratic functions. Eighth grade Algebra units include: Linear and Inverse Variation; Exponential Functions; Quadratic Functions, Making Sense of Symbols; Systems of Linear Equations; Function Families

**Course Proficiencies:** The following is a list of the proficiencies that describe what the students are expected to know and be able to do as a result of successfully completing this course. The proficiencies are the basis of assessment of student achievement. The learner will demonstrate the ability to:

1. Interpret the structure of expressions (NJSLS A-SSE; A-SSE.A.2).
2. Write expressions in equivalent forms to solve problems (NJSLS A-SSE.B.3).
3. Perform arithmetic operations on polynomials (NJSLS A-APR.A.1).
4. Understand the relationship between zeros and factors of polynomials (NJSLS A-APR.B.3).
5. Create equations that describe numbers or relationships (NJSLS A-CED.A.1; A-CED.A.2; A-CED.A.3; A-CED.A.4).
6. Understand solving equations as a process of reasoning and explain the reasoning (NJSLS A-REI.A.1)
7. Solve equations and inequalities in one variable (NJSLS A-REI.B.3; A-REI.B.4;
8. Solve systems of equations (NJSLS A-REI.C.5; A-REI.C.6)
9. Represent and solve equations and inequalities graphically (NJSLS A-REI.A.10; A-REI.A.11; A-REI.A.12).
10. Understand the concept of a function and use function notation (NJSLS F-IF.A.1; F-IF.A.2; F-IF.A.3)
11. Interpret functions that arise in applications in terms of the context (NJSLS F-IF.B.4; F-IF.B.5; F-IF.B.6)
12. Analyze functions using different representations (NJSLS F-IF.C.7; F-IF.C.8; F-IF.C.9)
13. Build a function that models a relationship between two quantities (NJSLS F-BF.A.1)
14. Build new functions from existing functions (NJSLS F-BF.B.3)
15. Construct and compare linear, quadratic, and exponential models and solve problems (NJSLS F-LE.A.1; F-LE.A.2; F-LE.A.3).
16. Interpret expressions for functions in terms of the situation they model (NJSLS F-LE.B.5)
17. Reason quantitatively and use units to solve problems (NJSLS N-Q.A.1; N-Q.A.2; N-Q.A.3)
18. Use properties of rational and irrational numbers (NJSLS N-RN.A.3)
19. Summarize, represent, and interpret data on a single count or measurement variable (NJSLS S-ID.A.1; S-ID.A.2; S-ID.A.3)
20. Summarize, represent, and interpret data on two categorical and quantitative variables (NJSLS S-ID.B.5; S-ID.B.6)
21. Interpret linear models (NJSLS S-ID.C.7; S-ID.C.8; S-ID.C.9)
22. Develop the habits and processes necessary to efficiently communicate and solve problems related to mathematics (MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8).
23. Learn and apply key literacies surrounding technology and information media literacy, including innovation, creativity, critical thinking and problem solving while gaining a global/cultural awareness (NJSLS 9.4).

24. Develop and apply computational and design thinking to address real-world problems and design creative solutions (NJSLS 8.1 and 8.2)

**Assessments:**

1. Unit tests
2. Individual and partner quizzes
3. Performance-based assessments
4. Individual and group projects
5. Peer-to-peer and group work activity
1. Warm Ups/Exit Slips
6. Weekly Worksheets
7. Homework
8. Classroom discussion and observations
9. Participation

**BOE Adopted Materials:**

Textbook:

Connected Math Project 3, Pearson School, 2014