Program Transfer Goals

- Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.
- Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.
- Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.
- Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

PACING

First Grading Period				Second Grading Period		Third Grading Period			Fourth Grading Period		
Unit 1: Solving One Variable Equations and Inequalities	Unit 2: Attributes of Functions	Unit 3: Sequences	Unit 4: Attributes of Linear Functions and Equations	Unit 5: Writing Linear Equations and Inequalities	Unit 6: Systems of Linear Equations and Inequalities	Unit 7: Operations with Polynomial and Radical Expressions	Unit 8: Factoring Polynomials	Unit 9: Attributes of Quadratic Functions and Equations	Unit 10: Solving Quadratic Equations	Unit 11: Exponential Functions and Equations	Unit 12: Modeling Functional Behavior
				Semester Exams					Final Exams		

Assurances for a Guaranteed and Viable Curriculum

Adherence to this scope and sequence affords every member of the learning community clarity on the knowledge and skills on which each learner should demonstrate proficiency. In order to deliver a guaranteed and viable curriculum, our team commits to and ensures the following understandings:

Shared Accountability: Responding to the Needs of All Learners

- High levels of learning for all students.
- The district and course formative assessments aligned to the standards for this course support educators and learners in monitoring academic achievement and leveraging interventions.

Shared Understanding: Curriculum Design

- The district curriculum design weaves together the elements of content, skills and assessments in order to adhere to curriculum design at the macro and micro level, ensuring vertical alignment.
- The district curriculum incorporates standards, scope and sequence, enduring understandings, essential questions, performance assessments, and recommended resources.

Interdependence: Curriculum Units

Members of the learning community utilize the curriculum units, plan collaboratively, and reflect on results for continuous improvement.

UNIT 1: SOLVING ONE VARIABLE EQUATIONS AND INEQUALITIES

TIMELINE: 3 WEEKS - 1ST GRADING PERIOD

Within this unit of study, learners will build upon their understanding of solving equations from middle school, including using the distributive property, combining like terms, isolating the variable within an equation or inequality, and checking the validity of a solution.

- **Transfer Goal:**
  - o Use abstract and concrete strategies interchangeably to communicate mathematical ideas and justify the accuracy of solutions.
  - o Apply prior knowledge to create and extend patterns in new situations.

Students will know...
variables represent values that can be determined; a solution is a value that makes a statement true; statements can be manipulated while maintaining balance.

Students will be skilled at...
using the Distributive Property; combining like terms; isolating a variable within an equation or inequality; checking the validity of a solution.

UNIT 2: ATTRIBUTES OF FUNCTIONS

TIMELINE: 2 WEEKS - 1ST GRADING PERIOD

Based on their study in grade 8 of the foundational concepts of functions, learners will determine the domain and range of a function, distinguishing between the two in real-life situations, and evaluate functions given an element of the domain or range.

- **Transfer Goal:**
  - o Use abstract and concrete strategies interchangeably to communicate mathematical ideas and justify the accuracy of solutions.
  - o Apply prior knowledge to create and extend patterns in new situations.
  - o Appreciate and contribute to mathematical patterns in natural and real world situations.

Students will know...
functions are expressed using a specific notation, not all relations are functions; there is a connection between x-axis, domain, input, and independent variable; there is a connection between y-axis, range, output, and dependent variable.

Students will be skilled at...
expressing the domain and range as inequalities; evaluating functions given an element of the domain or range; determining whether a relation is a function; distinguishing domain and range based on a real-life situation.

Unit 3: Sequences

Timeline: 0.5 Weeks - 1st Grading Period

Learners will continue to study patterns based on multiple representations, classifying sequences as arithmetic or geometric and interpret sequences expressed as functions.

- ■ **Transfer Goal:**
    - o Apply prior knowledge to create and extend patterns in new situations.
    - o Appreciate and contribute to mathematical patterns in natural and real world situations.

Students will know…
arithmetic sequences have a common difference; geometric sequences have a common ratio.

Students will be skilled at…
continuing patterns based on multiple representations and multiple forms; classifying sequences as arithmetic or geometric; write a formula for any term in a given sequence; interpreting sequences when expressed as a function.

Unit 4: Attributes of Linear Functions and Equations

Timeline: 3 Weeks - 1st/2nd Grading Period

Within this unit of study, learners will connect the concepts of functions to linear relationships, finding slope, intercepts, domain, and range of given linear equations and inequalities from multiple representations.

- ■ **Transfer Goal:**
    - o Use abstract and concrete strategies interchangeably to communicate mathematical ideas and justify the accuracy of solutions.
    - o Determine and justify the most efficient tool(s) to accurately perform a variety of mathematical tasks.
    - o Apply prior knowledge to create and extend patterns in new situations.
    - o Appreciate and contribute to mathematical patterns in natural and real world situations.

Students will know…
linear equations have unique and constant slope and unique intercepts; there is a connection between solid lines and $\leq/\geq$, and a different connection between dotted lines and $</>$.

Students will be skilled at…
finding slope, intercepts, domain, and range of linear equations or inequalities from multiple representations.

UNIT 5: WRITING LINEAR EQUATIONS AND INEQUALITIES

TIMELINE: 3 WEEKS - 2ND GRADING PERIOD

Writing algebraic representations of linear equations and inequalities, learners will express given relationships using multiple representations. This unit of study includes parallel and perpendicular lines, linear regression, and direct variation.

- **Transfer Goal:**
  - o Use abstract and concrete strategies interchangeably to communicate mathematical ideas and justify the accuracy of solutions.
  - o Determine and justify the most efficient tool(s) to accurately perform a variety of mathematical tasks.
  - o Apply prior knowledge to create and extend patterns in new situations.
  - o Appreciate and contribute to mathematical patterns in natural and real world situations.

Students will know...
linear equations are represented with lines, whereas linear inequalities are represented with shaded areas; parallel lines have the same slope; perpendicular lines have opposite reciprocal slopes; the correlation coefficient is an important measure of fit between a model and a situation; direct variation involves a linear relationship with positive slope and a y-intercept of 0.

Students will be skilled at...
writing linear equations and inequalities in any of the three forms from multiple representations; converting between different forms of linear equations; writing equations for parallel and perpendicular lines; using a calculator to perform a linear regression; determining the strength of a linear regression; applying arithmetic sequences to linear equations; calculating the explicit formula for an arithmetic sequence; writing and solving equations involving direct variation.

UNIT 6: SYSTEMS OF LINEAR EQUATIONS AND INEQUALITIES

TIMELINE: 2 WEEKS - 2ND GRADING PERIOD

Learners will extend their understanding of linear equations and inequalities by writing and solving systems of linear equations and inequalities given multiple representations. Solutions to systems may be found graphically or through the algebraic methods of substitution or elimination.

- **Transfer Goal:**
  - o Use abstract and concrete strategies interchangeably to communicate mathematical ideas and justify the accuracy of solutions.
  - o Determine and justify the most efficient tool(s) to accurately perform a variety of mathematical tasks.
  - o Apply prior knowledge to create and extend patterns in new situations.
  - o Appreciate and contribute to mathematical patterns in natural and real world situations.

Students will know...
solutions exist where lines intersect; Parallel lines have no solution; coincident lines have infinitely many solutions; systems of inequalities have many solutions that are represented graphically by a shaded area.

Students will be skilled at...
writing a system of linear equations and inequalities given multiple representations; recognizing if a solution exists in a system; solving systems graphically and through possible methods of substitution and elimination; writing and solving systems in real world situations.

Unit 7: Operations with Polynomial and Radical Expressions

Timeline: 4 Weeks - 2nd/3rd Grading Period

Within this unit of study, learners will perform operations with polynomial expressions using the laws of exponents. Real world situations related to this content include area and perimeter given measurements expressed in algebraic forms.

- **Transfer Goal:**
    - o Use abstract and concrete strategies interchangeably to communicate mathematical ideas and justify the accuracy of solutions.

Students will know…
common mathematical operations can be applied to polynomials; like terms can be combined, unlike terms cannot; negative square roots do not exist as real numbers; polynomials with negative exponents can be rewritten as positive exponents; polynomials with fractional exponents can be rewritten as radicals.

Students will be skilled at…
performing all operations with polynomial expressions; using laws of exponents to simplify; simplifying radicals; combining polynomials in real world situations such as calculating the area and perimeter of shapes.

Unit 8: Factoring Polynomials

Timeline: 2 Weeks - 3rd Grading Period

Connecting from the previous unit of study, learners will factor trinomials including perfect square trinomials, difference of squares binomials, and those expressions with leading coefficients of any number, recognizing when a polynomial is non-factorable.

- **Transfer Goal:**
    - o Use abstract and concrete strategies interchangeably to communicate mathematical ideas and justify the accuracy of solutions.
    - o Determine and justify the most efficient tool(s) to accurately perform a variety of mathematical tasks.
    - o Apply prior knowledge to create and extend patterns in new situations.

Students will know…
factoring expresses a polynomial as smaller polynomials that have been multiplied together; there are different methods that should be used for factoring when a= 1 versus when a $\neq$ 1.

Students will be skilled at…
factoring trinomials with real factors including perfect square trinomials, difference of squares binomials, and leading coefficients of any number; recognizing when a polynomial is non-factorable.

UNIT 9: ATTRIBUTES OF QUADRATIC FUNCTIONS AND EQUATIONS

TIMELINE: 3 WEEKS - 3RD GRADING PERIOD

Parallel to their study of linear functions and equations, learners will explore relationships expressed through quadratic functions. Attributes of quadratic functions and equations include domain and range, and key features such as x- and y-intercepts, vertex, minimum, maximum, zeros, and axis of symmetry. Further study will include determining effects of transformations on the quadratic function.

- ■ **Transfer Goal:**
  - o Use abstract and concrete strategies interchangeably to communicate mathematical ideas and justify the accuracy of solutions.
  - o Apply prior knowledge to create and extend patterns in new situations.
  - o Appreciate and contribute to mathematical patterns in natural and real world situations.

Students will know…
a quadratic function may have zero, one, or two x-intercepts; a quadratic function has its maximum or minimum at the vertex which lies of the axis of symmetry; quadratics can be written in and converted to standard form and vertex form.

Students will be skilled at…
determining domain & range of quadratics and represent using inequalities; recognizing connections between domain & range; writing equations in vertex form from multiple representations; converting an equation in vertex form into standard form; graphing a quadratic on a coordinate plane; identifying key features such as x-intercepts, y-intercepts, vertex, maximum, minimum, zeros, and axis of symmetry; determining effects of transformations; using technology to perform a quadratic regression and determining the strength of the regression.

UNIT 10: SOLVING QUADRATIC EQUATIONS

TIMELINE: 3 WEEKS - 4TH GRADING PERIOD

During this unit of study, learners will connect the factors of a quadratic equation to the roots/solutions of its graph. Learners will solve quadratic equations by factoring, finding the square root, completing the square, and using the quadratic formula.

- ■ **Transfer Goal:**
  - o Use abstract and concrete strategies interchangeably to communicate mathematical ideas and justify the accuracy of solutions.
  - o Determine and justify the most efficient tool(s) to accurately perform a variety of mathematical tasks.
  - o Apply prior knowledge to create and extend patterns in new situations.
  - o Appreciate and contribute to mathematical patterns in natural and real world situations.

Students will know…
there is a connection between the factors of a quadratic equation and the roots/solutions of its graph; quadratics can have zero, one, or two solutions.

Students will be skilled at…
finding solutions by factoring, taking square roots, completing the square, and using the quadratic formula; recognizing the connection between domain and range and using to determine validity of solutions; writing quadratic equations when given real solutions.

UNIT 11: EXPONENTIAL FUNCTIONS AND EQUATIONS

TIMELINE: 2 WEEKS - 4TH GRADING PERIOD

The third and final family of functions the learners will study include exponential functions and equations. Learners will explore attributes of exponential functions, identifying key features, and use technology to perform exponential regression on given data.

- ■ **Transfer Goal:**
    - o Use abstract and concrete strategies interchangeably to communicate mathematical ideas and justify the accuracy of solutions.
    - o Apply prior knowledge to create and extend patterns in new situations.
    - o Appreciate and contribute to mathematical patterns in natural and real world situations.

Students will know...
one side of an exponential graph approaches an asymptote, and the other does not; exponential functions can be used to model geometric sequences and other real-life situations.

Students will be skilled at...
determining domain and range & expressing it using inequalities; interpreting meaning of exponential equations in real world settings; writing and graphing exponential growth and decay functions; identifying the key features from a graph such as y-intercept & asymptote; using technology to perform an exponential regression & show the strength; applying knowledge of geometric sequences to exponential functions & writing a formula for the sequence.

UNIT 12: MODELING FUNCTIONAL BEHAVIOR

TIMELINE: 2 WEEKS - 4TH GRADING PERIOD

As a connection among the three types of functions studied throughout this course, learners will explore models, use technology to perform linear, quadratic, and exponential regression, and draw conclusions given data in real world settings.

- ■ **Transfer Goal:**
    - o Use abstract and concrete strategies interchangeably to communicate mathematical ideas and justify the accuracy of solutions.
    - o Determine and justify the most efficient tool(s) to accurately perform a variety of mathematical tasks.
    - o Apply prior knowledge to create and extend patterns in new situations.
    - o Appreciate and contribute to mathematical patterns in natural and real world situations.

Students will know...
the correlation coefficient is an important measure of fit between a model and a situation; models can be used to predict parts of the situation between and beyond given points; some situations cannot be modeled by any known function.

Students will be skilled at...
recognizing the relationship between domain and range in a function and representing it in inequality notation; determining an appropriate domain and range in real world settings; using technology to perform a linear, quadratic, and exponential regression and determining the strength of the regression; recognizing the difference in association and causation as applies in real world settings.