NORTHFIELD COMMUNITY SCHOOL
MATHEMATICS CURRICULUM FRAMEWORK
BOE APPROVED AUGUST 2024

ALGEBRA

PACING

PACING	SEPT	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE
TOPIC	Modeling with Linear Equations and Inequalities		Modeling with Linear Functions, Linear Systems, & Exponential Functions			Quadratic Equations, Functions & Polynomials			Modeling with Statistics	
NJSLA Domain	Seeing Structure in Expressions		Arithmetic with Polynomials and Rational Functions			Arithmetic with Polynomials and Rational Functions			Interpreting Categorical and Quantitative Data	
District Assessments	MAP – Fall, Winter, Spring Fluency Test and Constructed Response 2-3 times per year, Fall, Winter (optional), Spring Lesson quizzes - Pre-Assessment and Skill Assessment (Form A or B), teacher made quizzes, modified quizzes Unit Test Assessments- Big Ideas Math Assessments, modified tests, teacher made tests NJSLA Spring									
Mathematical Practices	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with Mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning									

NJSLS Technology	TECH.8.1.12.A.3 TECH.8.1.12.F.1	TECH.8.1.12.A.3 TECH.8.1.12.F.1	TECH.8.1.12.A.3. TECH.8.1.12.F.1	TECH.8.1.12.A.3. TECH.8.1.12.F.1	TECH.8.1.12.A.3. TECH.8.1.12.F.1	TECH.8.1.12.A.3 TECH.8.1.12.F.1	TECH.8.1.12.A.3 TECH.8.1.12.F.1	TECH.8.1.12.A.3 TECH.8.1.12.F.1	TECH.8.1.12.A.3 TECH.8.1.12.F.1	TECH.8.1.12.A.3 TECH.8.1.12.F.1
NJSLS Career Readiness Practices	CRP.K-12:CRP2, CRP4,CRP11, CRP8, CRP7	CRP.K-12:CRP2, CRP4, CRP11, CRP8, CRP7	CRP.K-12:CRP2 CRP4 CRP11, CRP8, CRP7	CRP.K-12:CRP2 CRP4 CRP11, CRP8, CRP7	CRP.K-12:CRP2 CRP4 CRP11, CRP8, CRP7	CRP.K-12:CRP2, CRP4, CRP11, CRP8, CRP7	CRP.K-12:CRP2, CRP4 CRP11, CRP8, CRP7	CRP.K-12:CRP2, CRP4 CRP11, CRP8, CRP7	RP.K-12:CRP2 ,CRP4, CRP11, CRP7, CRP8	CRP.K-12: CRP2 CRP4 CRP11 CRP8 CRP7
9.1 Personal Financial Literacy Standards	9.1.8.A 9.1.8.B 9.1.8.C 9.1.8.D 9.1.8.E 9.1.8.G	9.1.8.A 9.1.8.B 9.1.8.C 9.1.8.D 9.1.8.E 9.1.8.G	9.1.8.A 9.1.8.B 9.1.8.C 9.1.8.D 9.1.8.E 9.1.8.G	9.1.8.A 9.1.8.B 9.1.8.C 9.1.8.D 9.1.8.E 9.1.8.G	9.1.8.A 9.1.8.B 9.1.8.C 9.1.8.D 9.1.8.E 9.1.8.G	9.1.8.A 9.1.8.B 9.1.8.C 9.1.8.D 9.1.8.E 9.1.8.G	9.1.8.A 9.1.8.B 9.1.8.C 9.1.8.D 9.1.8.E 9.1.8.G	9.1.8.A 9.1.8.B 9.1.8.C 9.1.8.D 9.1.8.E 9.1.8.G	9.1.8.A 9.1.8.B 9.1.8.C 9.1.8.D 9.1.8.E 9.1.8.G	9.1.8.A 9.1.8.B 9.1.8.C 9.1.8.D 9.1.8.E 9.1.8.G

Mathematics | High School—Algebra

Expressions: An expression is a record of a computation with numbers, symbols that represent numbers, arithmetic operations, exponentiation, and, at more advanced levels, the operation of evaluating a function. Conventions about the use of parentheses and the order of operations assure that each expression is unambiguous. Creating an expression that describes a computation involving a general quantity requires the ability to express the computation in general terms, abstracting from specific instances.

Reading an expression with comprehension involves analysis of its underlying structure. This may suggest a different but equivalent way of writing the expression that exhibits some different aspect of its meaning. For example, $p + 0.05p$ can be interpreted as the addition of a 5% tax to a price p. Rewriting $p + 0.05p$ as $1.05p$ shows that adding a tax is the same as multiplying the price by a constant factor.

Algebraic manipulations are governed by the properties of operations and exponents, and the conventions of algebraic notation. At times, an expression is the result of applying operations to simpler expressions. For example, $p + 0.05p$ is

the sum of the simpler expressions p and 0.05p. Viewing an expression as the result of operation on simpler expressions can sometimes clarify its underlying structure.
A spreadsheet or a computer algebra system (CAS) can be used to experiment with algebraic expressions, perform complicated algebraic manipulations, and understand how algebraic manipulations behave.

Equations and inequalities: An equation is a statement of equality between two expressions, often viewed as a question asking for which values of the variables the expressions on either side are in fact equal. These values are the solutions to the equation. An identity, in contrast, is true for all values of the variables; identities are often developed by rewriting an expression in an equivalent form.
The solutions of an equation in one variable form a set of numbers; the solutions of an equation in two variables form a set of ordered pairs of numbers, which can be plotted in the coordinate plane. Two or more equations and/or inequalities form a system. A solution for such a system must satisfy every equation and inequality in the system.
An equation can often be solved by successively deducing from it one or more simpler equations. For example, one can add the same constant to both sides without changing the solutions, but squaring both sides might lead to extraneous solutions. Strategic competence in solving includes looking ahead for productive manipulations and anticipating the nature and number of solutions.
Some equations have no solutions in a given number system, but have a solution in a larger system. For example, the solution of $x + 1 = 0$ is an integer, not a whole number; the solution of $2x + 1 = 0$ is a rational number, not an integer; the solutions of $x2 – 2 = 0$ are real numbers, not rational numbers; and the solutions of $x2 + 2 = 0$ are complex numbers, not real numbers.
The same solution techniques used to solve equations can be used to rearrange formulas. For example, the formula for the area of a trapezoid, $A = ((b1+b2)/2)h$, can be solved for h using the same deductive process.
Inequalities can be solved by reasoning about the properties of inequality. Many, but not all, of the properties of equality continue to hold for inequalities and can be useful in solving them.

Connections to Functions and Modeling: Expressions can define functions, and equivalent expressions define the same function. Asking when two functions have the same value for the same input leads to an equation; graphing the two functions allows for finding approximate solutions of the equation. Converting a verbal description to an equation, inequality, or system of these is an essential skill in modeling.

Algebra Overview:

Seeing Structure in Expressions

- Interpret the structure of expressions
- Write expressions in equivalent forms to solve problems

Arithmetic with Polynomials and Rational Functions

- Perform arithmetic operations on polynomials
- Understand the relationship between zeros and factors of polynomials
- Use polynomial identities to solve problems
- Rewrite rational expressions

Creating Equations

- Create equations that describe numbers or relationships

Reasoning with Equations and Inequalities

- Understand solving equations as a process of reasoning and explain the reasoning
- Solve equations and inequalities in one variable
- Solve systems of equations
- Represent and solve equations and inequalities graphically

Social Emotional Learning (SEL) in MATHEMATICS:

Provide students with opportunities to express themselves through discussions that connect to each topic and allow them to explore their feelings about math. Thinking deeply about each topic will help students apply problem solving and critical thinking strategies that will help them reflect on their work and overall performance as well as confidence in mathematics.

- What parts of math make you feel successful?
- What can we learn from our mistakes?
- What self-talk can you use to help you persevere?
- What are positive ways to respond when math starts to feel challenging?
- What can friends say to help us feel better and more successful in math?
- What can we learn from our mistakes in math?

- How can you be a good group member?
- How will you help yourself get “unstuck?”
- Where or when can you use today’s math lesson when you are not in school?
- How do we respond if we don’t agree with someone’s answer or if we know the answer is incorrect?
- How do we feel about solving problems in a different way when asked?
- Did everyone get a fair chance to talk and/or use the manipulatives?

UNIT 1		
Unit Summary	**NJSLS Standards**	**Essential Questions**
Modeling with Linear Equations and Inequalities	A.REI.B.3,A.REI.A.1,A.CED.A.4, A.CED.A.1,A.CED.A.2, A.REI.D.10, A.REI.D.11, S.ID.C.7, S.ID.C.8, S.ID.C.9	How do you solve linear inequalities and equations in one variable? What are the different parts of an expression? What is a scatter plot and what can it be used to determine? How do you solve systems of equations?
Learning Goals: Perform arithmetic operations on polynomials Understand the relationship between zeros and factors Interpret the structure of expressions Solve equations and inequalities in one variable Create equations that describe numbers or relationships Interpret functions that arise in applications in terms of the context Represent and solve equations and inequalities graphically Build a function that models a relationship between two quantities Construct & compare linear, quadratic, & exponential models Build new functions from existing functions Analyze functions using different representation Use properties of rational and irrational numbers		
Fluency Expectations:		

Solve linear equations and inequalities in one variable (including literal equations);justify each step in the process.
Interpret terms, factors, coefficients, and other parts of expressions in terms of a context .
Equations and inequalities describe relationships.
Equations can represent real-world and mathematical problems.
Equations represent quantitative relationships
Scatter plots represent the relationship between two variables.
Scatter plots can be used to determine the nature of the association between the variables.
Linear models may be developed by fitting a linear function to approximately linear data.
The correlation coefficient represents the strength of a linear association. y = f(x), y=g(x) represent a system of equations
Systems of equations can be solved graphically

Modifications and Accommodations (ELL, SE, BSI, G&T, 504):

ELL:
- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher models reading aloud daily
- Provide peer tutoring
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments
- Provide students with English Learner leveled readers.

SE:
- Allow extra time to complete assignments or tests
- Guided notes and/or scaffold outline for written assignments
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications

BSI:
- Guided notes and/or scaffold outline for written assignments
- Introduce key vocabulary before lesson
- Work in a small group
- Lesson taught again using a differentiated approach
- Allow answers to be given orally or dictated
- Use visuals / Anchor Charts
- Leveled texts according to ability

G&T:
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Expose students to beyond level texts.

504:
- Follow all the 504 plan modifications
- Text to speech/audio recorded selections
- Amplification system as needed
- Leveled texts according to ability
- Fine motor skill stations embedded in rotation as needed
- Modified or constrained spelling word lists
- Provide anchor charts with high frequency words and phonemic patterns

Vocabulary:
inverse operations, equivalent equations, identity, absolute value, extraneous solution, literal equation, solution set, equivalent inequalities, compound inequality, absolute value inequality, absolute deviation

Resources:
Math textbook, online sites, classroom library, etc

UNIT 2		
Unit Summary	**NJSLS Standards**	**Essential Questions**
Modeling with Linear Functions, Linear Systems, & Exponential Functions	A.CED.A.3,A.REI.D.12, F.IF.A.1, F.IF.A.2, F.IF.A.3,F.IF.A., F.IF.A.4,F.IF.A.5, F.IF.A.6, A.SSE.A.1	How do you solve a systems of equations algebraically What is domain and range?

		Are sequences functions? What is the rate of change of a non-linear function?

Learning Goals:

How to solve multistep contextual problems by identifying variables, writing equations, and solving systems of linear equations in two variables algebraically and graphically.
How to graph linear inequalities and systems of linear inequalities in two variables and explain that the solution to the system
How to Explain the definition of a function, including the relationship between the domain and range. Use function notation, evaluate functions and interpret statements in context
How to Write linear and exponential functions given a graph, table of values, or written description; construct arithmetic and geometric sequences.
How to write explicit expressions, recursive processes and steps for calculation from a context that describes a linear or exponential relationship between two quantities.
How to sketch graphs of linear and exponential functions expressed symbolically or from a verbal description. Show key features and interpret parameters in context.
Properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
Calculate and interpret the average rate of change of a function presented symbolically or as a table; estimate the rate of change from a graph

Fluency Expectations:

Systems of equations can be solved exactly (algebraically) and approximately (graphically).
F(x) is an element in the range and x is an element in the domain
Sequences are functions, sometimes defined and represented recursively.
Sequences are functions whose domain is a subset of integers.
Rate of change of non-linear functions varies.

Modifications and Accommodations (ELL, SE, BSI, G&T, 504):

ELL:
- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher models reading aloud daily
- Provide peer tutoring
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments
- Provide students with English Learner leveled readers.

SE:
- Allow extra time to complete assignments or tests
- Guided notes and/or scaffold outline for written assignments
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications

BSI:
- Guided notes and/or scaffold outline for written assignments
- Introduce key vocabulary before lesson
- Work in a small group
- Lesson taught again using a differentiated approach
- Allow answers to be given orally or dictated
- Use visuals / Anchor Charts
- Leveled texts according to ability

G&T:
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Expose students to beyond level texts.

504:
- Follow all the 504 plan modifications
- Text to speech/audio recorded selections
- Amplification system as needed
- Leveled texts according to ability
- Fine motor skill stations embedded in rotation as needed
- Modified or constrained spelling word lists
- Provide anchor charts with high frequency words and phonemic patterns

Vocabulary:

relation, function, domain, range, independent and dependent variable, linear equation in two variables, linear function, nonlinear function, solution of a linear-equation in two variables, discrete domain, continuous domain, function notation, standard form, x-intercept, y-intercept, slope, rise, run, slope-intercept form, constant function, family of functions, parent functions, transformation, translation, reflection, horizontal shrink and stretch, vertical, shrink and stretch, absolute value function, vertex, vertex form, linear model, point-slope form, parallel lines, perpendicular lines, scatter plot, correlation, line of fit, residual, linear regression, line of best fit, correlation coefficient, interpolation, extrapolation, causation, term, piecewise function, step function, System of linear equations, solution of a system of linear equations, linear inequality in two variables, solution of a linear inequality, graph of a linear inequality, half-planes, system of linear inequalities, solution of a system of linear inequalities, graph of a system of linear inequalities, nth root of a, radical, index of a radical, exponential function, exponential growth, exponential growth functions, exponential decay, exponential decay function, compound interest, exponential equation

Resources:
Math textbook, online sites, classroom library, etc

UNIT 3		
Unit Summary	**NJSLS Standards**	**Essential Questions**
Quadratic Equations, Functions & Polynomials	A.APR.A.1,A.SSE.A.2, A..REI.B.4, A.CED.A.1, F.IF.B.4, F.IF.B.5, F.IF.B.6, A.REI.D.11	What are polynomials? How do you solve a quadratic equation? How do you add, subtract, and multiply polynomials? What are the steps for transforming a quadratic equation into vertex form?

Learning Goals:
Add, subtract, and multiply polynomials, relating these to arithmetic operations with integers. Factor to produce equivalent forms of quadratic expressions in one variable.
Derive the quadratic formula by completing the square and recognize when there are no real solutions.
Solve quadratic equations in one variable using a variety of methods (including inspection, taking square roots, factoring, completing the square, and the quadratic formula) and write complex solutions in a ± bi form
Create quadratic equations in one variable and use them to solve problems.
Interpret key features of quadratic functions from graphs and tables.
Given a verbal description of the relationship, sketch the graph of a quadratic function, showing key features and relating the domain of the

function to its graph.
Find approximate solutions of f(x) =g(x), where f(x) is a linear function and g(x) is a quadratic function by making a table of values, using technology to graph and finding successive approximations.

Fluency Expectations:

Polynomials form a system analogous to the integers.
Polynomials are closed under the operations of addition, subtraction, and multiplication.
Multiple methods for solving quadratic equations
Transforming a quadratic equation into the form (x - p)2 = q yields an equation having the same solutions

Modifications and Accommodations (ELL, SE, BSI, G&T, 504):

ELL:
- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher models reading aloud daily
- Provide peer tutoring
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments
- Provide students with English Learner leveled readers.

SE:
- Allow extra time to complete assignments or tests
- Guided notes and/or scaffold outline for written assignments
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications

BSI:
- Guided notes and/or scaffold outline for written assignments
- Introduce key vocabulary before lesson
- Work in a small group
- Lesson taught again using a differentiated approach
- Allow answers to be given orally or dictated
- Use visuals / Anchor Charts
- Leveled texts according to ability

G&T:
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Expose students to beyond level texts.

504:
- Follow all the 504 plan modifications
- Text to speech/audio recorded selections
- Amplification system as needed
- Leveled texts according to ability
- Fine motor skill stations embedded in rotation as needed
- Modified or constrained spelling word lists
- Provide anchor charts with high frequency words and phonemic patterns

Vocabulary:
monomial, degree of a monomial, polynomial, binomial, trinomial, degree of a polynomial, standard form, leading coefficient, closed, FOIL method, factored form, Zero-Product Property, roots, repeated roots, factoring by grouping, factored completely, Quadratic function, parabola, vertex, axis of symmetry, zero of a function, maximum value, minimum value, even function, odd function, vertex form (of a quadratic function), intercept form, average rate of change, Counterexample, radical expression, simplest form, rationalizing the denominator, conjugates, like radicals, radicand, quadratic equation, completing the square, Quadratic Formula, discriminant, system of nonlinear equations, Square root function, radical function, cube root function, radical equation, inverse relation, inverse function

Resources:
Math textbook, online sites, classroom library, etc

UNIT 4		
Unit Summary	**NJSLS Standards**	**Essential Questions**

Modeling with Statistics	F.IF.B.4, F.IF.B.5, S.ID.B.5, S.ID.B.6	How do you interpret the data distribution? What is the definition of a standard deviation? What are the categorical variables?

Learning Goals:

Interpret key features of functions from graphs and tables. Given a verbal description of the relationship, sketch the graph of a function, showing key features and relating the domain of the function to its graph. Summarize and interpret categorical data for two categories in two-way frequency tables; explain possible associations and trends in the data.

Fluency Expectations:

Appropriate use of a statistic depends on the shape of the data distribution.
Standard deviation
Categorical variables represent types of data which may be divided into groups

Modifications and Accommodations (ELL, SE, BSI, G&T, 504):

ELL:
- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher models reading aloud daily
- Provide peer tutoring
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments
- Provide students with English Learner leveled readers.

SE:
- Allow extra time to complete assignments or tests
- Guided notes and/or scaffold outline for written assignments
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications

BSI:
- Guided notes and/or scaffold outline for written assignments
- Introduce key vocabulary before lesson

● Work in a small group
● Lesson taught again using a differentiated approach
● Allow answers to be given orally or dictated
● Use visuals / Anchor Charts
● Leveled texts according to ability

G&T:
● Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
● Provide options, alternatives and choices to differentiate and broaden the curriculum
● Organize and offer flexible small group learning activities
● Provide whole group enrichment explorations
● Teach cognitive and methodological skills
● Use center, stations, or contracts
● Organize integrated problem-solving simulations
● Propose interest-based extension activities
● Expose students to beyond level texts.

504:
● Follow all the 504 plan modifications
● Text to speech/audio recorded selections
● Amplification system as needed
● Leveled texts according to ability
● Fine motor skill stations embedded in rotation as needed
● Modified or constrained spelling word lists
● Provide anchor charts with high frequency words and phonemic patterns

Vocabulary:
Data distribution, standard deviation, categorical variables, functions from graphs and tables, relationships, graph of a function, domain of the function, categorical data, two-way frequency tables, associations and trends in the data.

Resources:
Math textbook, online sites, classroom library, etc