Board Approved August 2017

DEPARTMENT: Mathematics COURSE: Algebra I

Week	Marking Period 1	Week	Marking Period 3
1	Number Sense	19	Exponents & Exponential Functions
2	Number Sense	20	Exponents & Exponential Functions
3	Solving Equations & Inequalities	21	Exponents & Exponential Functions
4	Solving Equations & Inequalities	22	Polynomial Expressions & Factoring
5	Solving Equations & Inequalities	23	Polynomial Expressions & Factoring
6	Solving Equations & Inequalities	24	Polynomial Expressions & Factoring
7	Solving Equations & Inequalities	25	Quadratic Equations & Functions
8	Relations & Functions	26	Quadratic Equations & Functions
9	Linear Equations & Inequalities	27	Quadratic Equations & Functions
Week	**Marking Period 2**	**Week**	**Marking Period 4**
10	Linear Equations & Inequalities	28	Radical Expressions & Equations
11	Linear Equations & Inequalities	29	Radical Expressions & Equations
12	Linear Equations & Inequalities	30	Radical Expressions & Equations
13	Linear Equations & Inequalities	31	Probability, Data, & Statistics
14	Systems of Equations	32	Probability, Data, & Statistics
15	Systems of Equations	33	Probability, Data, & Statistics
16	Systems of Equations	34	Rational Functions
17	Systems of Equations	35	Rational Functions
18	Systems of Equations	36	Rational Functions

Algebra I

Time Frame	Standard- 2 weeks	Block- 5 days

Topic

1-NUMBER SENSE

Essential Questions

How do you evaluate algebraic expressions and powers?
How do you model relationships with variables and equations?
How do you simplify expressions and formulas?
How do you classify and compare real numbers?
How do you represent functions as tables, graphs, and rules?
How do you combine matrices with addition and subtraction?
How do you combine numbers using order of operations?
How do you use the distributive property to combine like terms?
How do you use the properties to solve equations?

Enduring Understandings

How large amounts of data are presented in a concise format, such as a graph or table.
What happens to positive and negative values when they are combined.

Alignment to NJSLS

N.Q.1, A.SSE.1, A.CED.2, F.IF.4

Key Concepts and Skills

- Students should be able to replace variables with numbers to solve an equation
- Simplifying expressions using Exponents and Order of Operations
- Determine patterns of both numerical and geometric sequences
- Utilize data presented in a scatter Plot
- Operations with Rational Numbers
- Solve expressions using the Distributive Property

Learning Activities

- Video Tutor-phschool.com
- Modeling Activity
- Real-World Application-reading graphs in current newspapers
- Play Order of Operations Game
- Algebra Tile Activity
- Human Number Line
- Group Practice

Assessments

Entrance and Exit Cards
Homework
Quiz
Chapter Test

21st Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
	Life & Career Skills		Information Literacy		Media Literacy		

Interdisciplinary Connections

Algebra I

Historical data in tables and graphs
Technology Integration
8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Graphing calculator

Algebra I

Time Frame	Standard- 5 weeks	Block- 10 days

Topic

2-EQUATIONS AND INEQUALITIES

Essential Questions

How do you solve multi-step equations and inequalities?
How can you determine the solution of an equation or inequality (no solution, infinite solutions, one solution)?
How do you transform a literal equation?
How do you solve a proportion?
How do you model an equation for a real-life application?
How do you find percent of change?
How do you graph an inequality on a number line?
How do you solve an absolute value equation?
*How do you solve a problem using a problem solving plan?
*How do you solve a mixture problem (such as weighted averages)?
*How do you solve a uniform motion problem (such as opposite direction, same direction, and back and forth)?
*How is solving an absolute value inequality different from an equation?

Enduring Understandings

When solving an equation, 3 things may result: x will equal a number, the x will eliminate leaving either a true or false statement- if true, there are infinite solutions, if false, there are no solutions to the equation.
The purpose of transforming a literal equation is to solve for a different value, such as Area= length times width, what if you had the area and the width, how would you find the length?
To solve a proportion, cross-multiplication is most effective.
An inequality results in an infinite amount of answers with an ending or beginning value.
Absolute value equations result in and infinite amount of points between two values or outside of two values.
*Absolute value inequalities result in an infinite amount of points between two values or outside of two values.
3x=0 means that x=0

Alignment to NJSLS

A.CED.1, A.SSE.1, A.REI.3, A.CED.1, A.CED.4

Key Concepts and Skills

- Students should be able to solve an equation in one variable with single or multi steps.
- When solving an inequality, you are finding the endpoint and then shading in a specific direction.
- When solving an absolute value, you are getting 2 answers most of the time.

Learning Activities

- My mom is twice my age. Five years ago, she was 5 more than twice my age. How old am I? The result will be the same on both sides, meaning that I could be any age for this problem.
- Using algebra tiles and a scale to show that what you do to one side of an equation, you

must do to the other side.

- Use communicators

Assessments

Homework
Quizzes
Test

21st Century Skills

	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
X	Life & Career Skills		Information Literacy		Media Literacy		

Interdisciplinary Connections

Data from all subjects use percent of change

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Graphing calculator

Algebra I

Time Frame	**Standard- 1 week**	**Block-3days**

Topic

3-RELATIONS AND FUNCTIONS

Essential Questions

How do you interpret a graph given a situation?
What is a function/ relation?
What are the different ways to represent a function?
Can you write a rule from a table?
How do you determine if a relation in a table or graph is a function?

Enduring Understandings

Function patterns can be represented in two variables.
Functional relationship relates the value of one variable, such as y or f(x), to another variable, such as x.
Functional relationships can be related visually by graphs, as well as by sets, rules, tables, and mappings.

Alignment to NJSLS

A.CED.2, A.CED.3, F.IF.1, N.Q.1, F.IF.4, F.IF.5, F.IF.7a, F.LE.2

Key Concepts and Skills

- To interpret, sketch and analyze graphs from various situations (ie time vs distance from home)
- To identify relations and functions
- To evaluate functions
- To determine range and domain
- To utilize function notation, f(x), evaluate and construct tables
- To use the vertical line test to determine if a relation is a function
- To write function rules based on real world situations

Learning Activities

- Video tutor – phschool.com
- Worksheets on f(x), real life situations, writing function rules from words
- Discussions on graphs from 5.1, worksheets
- TI 83 – table, table set up
- Power point slides on teacher drive
- GPS – guided problem solving p 276

Assessments

Partners or groups on 5.1 graphs
Tests, quizzes
Homework

21st Century Skills

	Creativity	x	Critical Thinking	x	Communication	x	Collaboration
x	Life & Career Skills	x	Information Literacy	x	Media Literacy		

Algebra I

Interdisciplinary Connections
Science and history: graphs and functions
Technology Integration
8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Graphing calculator

Algebra I

Time Frame	Standard- 5 weeks	Block- 7 days

Topic

4-LINEAR EQUATIONS AND INEQUALITIES

Essential Questions

How do you find the slope of a line and interpret slope as a rate of change?
How do you find the rate of change from tables and graphs?
How do you write equations in slope-intercept form and how do you graph it?
How do you write an equation of a line given two points?
How do you write equations in standard form and how do you graph it?
How do you write equations in point-slope form and how do you graph it?
How do you write equations of parallel and perpendicular lines?
How do you graph an absolute value equation in two variables?
How do you graph a linear inequality in two variables?
*How do you graph an absolute value equation in two variables?
*How does a transformation of absolute value equations take place?

Enduring Understandings

Slope is a ratio of rise over run
Determine the sign of the slope by looking at the line from left to right
There are many ways to solve problems but some are more efficient than others.
Graphs and equations are alternative ways for depicting and analyzing patterns of change.
Functional relationships can be expressed in real contexts, graphs, algebraic equations, tables and words. Each representation of a given function is simply a different way of expressing the same idea.
*In an absolute value equation, the "a" widens or narrows the function, the "h" shifts it horizontally, and the "k" shifts it vertically.

Alignment to NJSLS

F.IF.4, F.IF.6, S.ID.7, A.CED.2, A.CED.3, F.IF.5, F.IF.7a, F.BF.1a, F.LE.2, F.LE.5, G.GPE.5, F.BF.3, A.REI.12

Key Concepts and Skills

- Students should be able to graph a linear equation on a coordinate plane from any form (standard, slope-intercept, point-slope)
- Students will find the slope and y-intercept of a line graphically and algebraically
- Determine if two lines are parallel or perpendicular graphically and algebraically
- How to turn a line into an inequality by shading one of the sides
- How to graph an absolute value function

Learning Activities

- Graphing a line on a coordinate plane constructed on the floor of the classroom
- Use a graphing calculator or website, such as, http://enlvm.usu.edu/ma/nav/activity.jsp?sid=__shared&cid=emready@eqns_lines&lid=4 to discover how changing the coefficient of x or the constant changes the slope and y-intercept

in the graph

- Use the graphing calculator with the Smart board to engage class discussions
- Green Globs software
- *Graphing calculator "Transform" to discover transformations of absolute value graphs

Assessments

Answering questions on a website
Sketching a line with intended results
Self check quizzes online
Quizzes
Homework
Test

21st Century Skills

	Creativity		Critical Thinking	X	Communication	X	Collaboration
X	Life & Career Skills		Information Literacy		Media Literacy		

Interdisciplinary Connections

Rates of change in science, history, and financial literacy

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Graphing Calculators
Green Globs software
SmartBoard
Internet websites

Algebra I

Time Frame	Standard-5 weeks	Block- 12 days

Topic

5-SYSTEMS OF EQUATIONS

Essential Questions

How do you solve a system by graphing?
How do you solve a system by substitution?
How do you solve a system by eliminating a variable?
What kind of application problem can be solved using a system? How do you determine the number of solutions of a system?

Enduring Understandings

The point of intersection of two linear equations can be determined by several methods (graphing, substitution, elimination).
Systems of equations can have no solutions, 1 solution or infinite solutions depending on the equations in the system.
In some cases one method may be difficult and another method may be a better choice. In some cases the lines may be parallel or the same line.
Solving a system of equations is a useful way to find solutions to real world problems (ie break even point and other applications)

Alignment to NJSLS

A.CED.2, A.CED.3, A.REI.6, A.REI.5

Key Concepts and Skills

- The student will be able to solve a system of linear equations by graphing, and the algebraic methods of substitution and elimination (including multiplying a row), and recognize when one method is superior to another.
- Some systems have no solution, some infinite solutions.
- To be able to solve a real world problem by writing the system in algebraic form, then finding the solution by various methods.

Learning Activities

- Video tutor – phschool.com
- TI 83 – tables, graphs p380
- Worksheets
- Partner lab activity – pilot rescue mission
- Modeling real world problems
- Active math – interactive textbook
- Derive computer lab
- Communicators

Assessments

Lab activities
Experiment (partners)
Tests, quizzes

Algebra I

Homework
Derive computer lab on systems

21st Century Skills

	Creativity	x	Critical Thinking	x	Communication	x	Collaboration
x	Life & Career Skills	x	Information Literacy		Media Literacy		

Interdisciplinary Connections

Financial literacy: when is one cell phone plan cheaper than another?

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
Graphing calculator
Derive 5
Internet websites

Algebra I

Time Frame	Standard- 3 weeks	Block- 8 days

Topic

6-EXPONENTS AND EXPONENTIAL FUNCTIONS

Essential Questions

How do you use exponent properties involving products and quotients?
How do you simplify expressions using zero and negative exponents?
How do you transform into scientific notation?
How do you simplify exponential expressions with multiple variables?
How do you simplify a power to a power?
What does an exponential function look like?
How do you write and graph an exponential growth/decay function?

Enduring Understandings

To simplify algebraic expressions with exponents.
Recognize and graph exponential functions with a table of values
Real world situations involving exponential relationships can be solved using multiple representations

Alignment to NJSLS

A.SSE.3c, N.RN.1, A.CED.2, F.IF.7e, F.BF.3, F.LE.1, F.LE.2, F.LE.5

Key Concepts and Skills

- To simplify expressions with zero and negative exponents
- To write numbers in scientific notation
- To add powers of like bases when multiplying monomials, and apply this to various geometric areas
- To raise a power to a power.
- To divide monomials with exponents.
- To apply various combinations of these rules for exponents.
- To graph an exponential function with a table of values.

Learning Activities

- Video tutor – phschool.com
- TI 83 – explore exponential graphs
- Experiment – exponential growth or decay model (ie m&m activity)
- Worksheets
- Power point slides on teacher drive – "monomials rules review" • Activity lab p 483, p. 474 modeling data
- Jeopardy – computer lab or projector.

Assessments

Tests, quizzes
Homework
Derive computer lab on exponents

Algebra I

21 Century Skills							
	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
	Life & Career Skills	X	Information Literacy		Media Literacy		

Interdisciplinary Connections

Chemistry: use of scientific notation
History: trends in growth and decay
Biology: bacterial growth and decay

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
Graphing calculator exponential regression
Jeopardy Computer Game
PowerPoints

Algebra I

Time Frame	Standard- 3 weeks	Block- 8 days

Topic

7-POLYNOMIAL EXPRESSIONS AND FACTORING

Essential Questions

How do you factor using the greatest common factor?
How do you add, subtract, and multiply polynomials?
How do you use special product patterns to multiply binomials?
How do you factor a difference of squares?
How do you factor a perfect square trinomial?
How do you factor a trinomial with a leading coefficient?
How do you factor completely?

Enduring Understandings

Understanding the properties of real numbers can be used to multiply a monomial by a polynomial or simplify the product of binomials.
Factoring is the opposite of the distributive property.
What does it mean to find a factor of a number?
Explain why a factored expression is useful-what can we do with it?

Alignment to NJSLS

A.APR.1, F.IF.7c, A.SSE.2, A.APR.4, A.SSE.3a, A.CED.1, A.REI.4b, F.IF.8a, A.APR.3, A.SSE.3

Key Concepts and Skills

- Students should be able to identify types of expressions and determine what type of factoring needs to occur.
- Students will categorize polynomials by their degree and number of terms and learn to add, subtract, multiply and divide them.
- Factoring is the inverse process for multiplying polynomials.

Learning Activities

- Factoring Relay Game
- Spreadsheet Activity- Prentice Hall Algebra 1 textbook p. 494
- www.hippocampus.org
- Algebra Tiles Activity p. 504
- Using Models to Factor
- Small group practice
- Derive 5
- Communicators

Assessments

Partner Quiz
Exit Card
Homework
Quiz
Chapter Test

21st Century Skills

	Creativity	x	Critical Thinking	x	Communication	x	Collaboration
x	Life & Career Skills		Information Literacy		Media Literacy		

Algebra I

Interdisciplinary Connections
Genetics- Punnett squares (multiplying binomials) Construction- building a porch around two sides of a house
Technology Integration
8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Graphing calculator Internet websites- www.hippocampus.org Derive 5 software SmartBoard

Algebra I

Time Frame	Standard- 3 weeks	Block- 8 days

Topic

8-QUADRATIC EQUATIONS AND FUNCTIONS

Essential Questions

How do you graph a quadratic function?
How do you solve a quadratic using factoring?
How do you solve a quadratic using graphing?
How do you solve a quadratic using square roots?
How do you solve a quadratic using the quadratic formula?
*What does the discriminant tell you about the solutions of a quadratic function?

Enduring Understandings

Students will be able to distinguish second degree equations (quadratic) from first degree (linear).
Students will be able to a compare and identify applications of linear, quadratic or exponential functions as models of real world situations.
The quadratic formula is most appropriately used when factoring a quadratic equation is not possible.

Alignment to NJSLS

A.APR.3, A.CED.1, A.REI.4b, F.IF.8a, A.CED.2, A.CED.3, F.IF.4, F.IF.5, F.IF.7a, F.IF.7c, F.BF.3, A.REI.11

Key Concepts and Skills

- To plot standard form of quadratic functions from a table.
- Compare basic transformations of parent function.
- Identify the vertex.
- Explore real world problem solving involving quadratic functions. (ie projectile motion max height, crash point)
- Determine zeros of a quadratic function by factoring, graphing and quadratic formula.

Learning Activities

- Video tutor – phschool.com
- TI 83 – compare transformations of parent function, compare linear, quadratic, exponential
- Green globs
- Activity lab p 564
- Internet project on power point to determine applications of parabolas.
- Excel /TI 83 activity to find linear, quadratic, exponential regression trend line.
- Worksheets
- Communicators

Assessments

Lab activities
Experiment (partners)
Tests, quizzes

Algebra I

Homework							
21st Century Skills							
	Creativity	x	Critical Thinking	x	Communication	x	Collaboration
x	Life & Career Skills		Information Literacy		Media Literacy		
Interdisciplinary Connections							
Physics: Many formulas in physics are quadratic equations, such as projectile motion							
Technology Integration							
8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Graphing calculator Green Globs software Internet project Excel activity							

Algebra I

Time Frame	Standard- 3 weeks	Block- 7 days

Topic

9-RADICAL EXPRESSIONS AND EQUATIONS

Essential Questions

How do you simplify a radical?
How do you estimate a radical?
How do you simplify radicals involving products and quotients?
How do you simplify sums and differences?

Enduring Understandings

Operations can be performed with radical expressions.
Radical expressions can be simplified by using factoring of the number into primes.
Square roots are the reverse of perfect squares.
Why can simplifying a radical first help when combining radical expressions?
Why would we want to write 5 instead of $\sqrt{25}$?

Alignment to NJSLS

A.REI.2

Key Concepts and Skills

- Students should be able to determine whether a radical is in simplified form.
- Students will simplify radicals by finding the greatest perfect square.
- How to add, subtract, multiply and divide two or more radicals.

Learning Activities

- Create a table of and compare different radicals
- Small group practice
- Jeopardy
- Student presentation
- Communicators

Assessments

Team teaching activity
Partner Quiz
Entrance and Exit Cards
Homework
Quiz
Chapter Test

21st Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
	Life & Career Skills		Information Literacy		Media Literacy		

Interdisciplinary Connections

Geometry: distance formula, Pythagorean theorem

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
Graphing calculator
Jeopardy computer game

Algebra I

Time Frame	Standard- 4 weeks	Block- 10 days

Topic

10-PROBABILITY, DATA, AND STATISTICS

Essential Questions

How do you find the mean, median, mode and range?
How do you make and analyze data using a scatter plot, and a stem and leaf plot?
How do find theoretical and experimental probability?
How do you determine and find the probability of independent and dependent events?
How you find the line of best fit?
How do you use the line of best fit to predict an event?

Enduring Understandings

Organizing data and predicting and finding central tendencies
Finding the line of best fit using the graphing calculator and by choosing 2 points, connecting them and finding the equation of that line.
Remember the difference between the independent and dependent variable- the independent comes "first" and dependent comes second, it depends on what happens with the other.

Alignment to NJSLS

A.CED.2, F.IF.4, S.ID.6a, S.ID.6c, S.ID.7, S.ID.2, S.ID.3, S.ID.1, S.ID.5, S.CP.1, S.CP.2, S.CP.3, S.CP.4, S.CP.5, S.CP.6, CP.8(+)

Key Concepts and Skills

- Make a scatter plot on the graphing calculator by plugging in the data.
- Find the line of regression by using the STAT CALC utility on the calculator.
- Predict values using the line of regression.
- Calculate the probability of simple and compound events.
- Finding the probability of the second card if the first card is red.

Learning Activities

- Graphing calculator activity (such as height vs. shoe size)
- Statistics packet
- Graphing calculator overhead
- www.mathtopia.com

Assessments

Calculator quizzes
Pencil and paper quizzes
Homework
Test

21st Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
X	Life & Career Skills		Information Literacy	X	Media Literacy		

Interdisciplinary Connections

Financial Literacy: the stock market

Technology Integration

Algebra I

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Graphing calculator Probability simulation Internet websites- mathtopia SmartBoard

Algebra I

Time Frame	Standard- 3 weeks Block- 7 days

Topic

11-*Rational Functions (if time allows)

Essential Questions

How do you simplify rational expressions?
How do you multiply rational expressions?
How do you divide rational expressions?
How do you divide polynomials?
How do you add and subtract rational expressions with common denominators?
How do you add and subtract rational expressions with unlike denominators? How do you solve rational equations?

Enduring Understandings

A rational function can be written as the ratio of two polynomials.
The domain of a rational function is defined as the set of all numbers except those that make the denominator equal to zero.
Factoring the numerator and denominator and canceling out the factors is how to simplify.

Alignment to NJSLS

A.APR.7

Key Concepts and Skills

Factoring polynomials
Finding common denominators by using each of the factors once
Graphing a rational function using an asymptote

Learning Activities

Graph a rational function on a graphing calculator (activity lab p. 671)

Assessments

Calculator quizzes
Pencil and paper quizzes
Homework
Test

21st Century Skills

X	Creativity	X	Critical Thinking		Communication	X	Collaboration
X	Life & Career Skills		Information Literacy		Media Literacy		

Interdisciplinary Connections

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
Graphing calculator to show transformations

*Advanced and Honors only