| **Unit 5: Descriptive Statistics** | **Strand:** Summarize, represent, and interpret data on a single count or measurement variable |
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**New Jersey Student Learning Standards::**

.Math.Content.HSS-ID.A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).

.Math.Content.HSS-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.Content.HSS-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).

.Math.Content.HSS-ID.A.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

| **Unit 5: Descriptive Statistics** | **Strand:** Summarize, represent, and interpret data on two categorical and quantitative variables |
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**New Jersey Student Learning Standards::**

.Math.Content.HSS-ID.B.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

.Math.Content.HSS-ID.B.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

- Math.Content.HSS-ID.B.6a Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
- .Math.Content.HSS-ID.B.6b Informally assess the fit of a function by plotting and analyzing residuals.
- .Math.Content.HSS-ID.B.6c Fit a linear function for a scatter plot that suggests a linear association.

| **Unit 5: Descriptive Statistics** | **Strand:** Interpret linear models |
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**New Jersey Student Learning Standards::**

.Math.Content.HSS-ID.C.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

.Math.Content.HSS-ID.C.8 Compute (using technology) and interpret the correlation coefficient of a linear fit.

.Math.Content.HSS-ID.C.9 Distinguish between correlation and causation.

| **Unit 5: Descriptive Statistics** | **Strand:** Build new functions from existing functions. |
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**New Jersey Student Learning Standards::**

Math.Content.HSF-BF.B.3 Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of $k$ (both positive and negative); find the value of $k$ given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

| **Unit 5: Descriptive Statistics** | **Strand:** Construct and compare linear, quadratic, and exponential models and solve problems. |
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**New Jersey Student Learning Standards:**

Math.Content.HSF-LE.A.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.

- Math.Content.HSF-LE.A.1a Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
- CCSS.Math.Content.HSF-LE.A.1b Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
- Math.Content.HSF-LE.A.1c Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval

relative to another.

.Math.Content.HSF-LE.A.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

.Math.Content.HSF-LE.A.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

**Big Ideas:**

How do you interpret data to derive valid conclusions?
How do graphical displays influence interpretation of data?
How does knowing the probability of an event help us to predict possible outcomes?
How are theoretical probabilities used to make predictions and decisions?

**Essential Questions:**

- **How can collection, organization, interpretation and display of data be used to answer questions?**
- **How can the representation of data influence decision?**
- **How can change be represented mathematically?**
- **How can we use mathematical models to describe change or change over time?**
- **How are functions and their graphs related?**
- **How can we model situations involving exponents?**
- **How can we model situations involving quadratics?**

**Enduring Understandings:**

- **The message displayed by the data depends on the display.**
- **The results of a statistical investigation can be used to support or refute an argument.**
- **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.**
- **Graphs and equations are alternative ways for depicting and analyzing patterns of change.**
- **Mathematical models can be used to describe physical relationships; these relationships are often non-linear.**

**Knowledge, Skills, and Instructional Objectives:**

- Create and analyze a variety of graphs that represent data: dot plots, histograms, and box plots.
- Analyze data sets and use summary statistics to compare the data sets and to answer questions regarding the data.
- Create scatter plots and lines of best fit.
- Calculate slope of a line.
- Identify, write, and graph direct variations.
- Write equations for lines in slope-intercept form from several different pieces of given information.
- Use an equation written in slope-intercept form to determine slope and y-intercept of a line.
- Evaluate and graph exponential functions.
- Solve problems involving exponential decay, including compound interest.

**Instructional Materials/Resources:**

**Glencoe : Algebra 1**
**Triumph Learning: Common Core Coach Mathematics 8**
**Glencoe: Math Common Core Edition, Course 3**
**McDougal Little: Algebra, Structure and Method Book 1**

**Suggested Vocabulary:**

**Dot plot, histogram, box plot, mean, median, mode, interquartile range, standard deviation, outlier, scatter plot, sample space, measures of variation, bivariate data, line of best fit, relative frequency,**

**Technology:**

- Calculator

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| | • ActivBoard<br>• ipads<br>• Safari Montage<br>• Document camera<br>• Study island<br>8.1.2.A.4; 8.1.P.C.1 |

**Recommended Instructional Activities:**

- **Problem of the Day/Warm Up activity**
- **Direct Instruction**
- **Guided Practice**
- **Independent Practice**
- **Cooperative group Activities**
- **Homework assignments**

**Extension Strategies/Activities:**

Career Exploration: Statistician

**Cross-curricular Connections/Standards:**
RI.8.2; NJSLSA.W2; W.8.2; NJSLSA.SL2; SL.8.1

21st Century Skills
CRP1; CRP3; CRP6; CRP11; CRP12

**Suggested Assessments:**

- Problem of the Day
- Homework
- Developmental Assessments
- Summative Assessments
- Notebooks
- Final Exam
- Benchmarks
- Projects

**Modifications for SpEd/ELL/Students at Risk/Gifted**
**Supports, Accommodations, and Modifications must be provided as stated in IEP, 504 Plan or I-Team Intervention Plan, and may include (but not limited to) the following:**
**Presentation accommodations:**

- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Use alternate texts at lower readability level
- Work with fewer items per page or line and /or materials in a larger print size
- Use magnification device, screen reader, or Braille/Nemeth Code
- Use audio amplification device (e.g., hearing aide(s), auditory trainer, sound-field system( which may require teacher use of microphone)

- Be given a written lists of instructions
- Record a lesson, instead of taking notes
- Have another student share class notes with him
- Be given an outline of lesson
- Be given a copy of teacher's lecture notes
- Be given a study guide to assist in preparing for assessments
- Use visual presentations of verbal material, such as word webs and visual organizers
- Use manipulatives to teach or demonstrate concepts
- Have curriculum materials translated into native language

**Response accommodations:**

- Use sign language, a communication device, Braille, other technology, or native language other than English
- Dictate answers to a scribe
- Capture responses to an audio recorder
- Use a spelling dictionary or electronic spell-checker
- Use a word processor to type notes or give responses in class
- Use a calculator or table or "math facts"
- Respond directly in the test booklet rather than on an answer sheet.

**Setting accommodations:**

- Work or take a test in a different setting, such as quiet room with few distractions
- Sit where he learns best (for example, near the teacher, away from distractions)
- Use special lighting or acoustics
- Take a test in small group setting
- Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
- Use noise buffers such as headphones, earphones, or earplugs

**Timing accommodations:**

- Take more time to complete a task or a test
- Have extra time to process oral information and directions
- Take frequent breaks, such as after completing a task

**Scheduling accommodations:**

- Take more time to complete a project
- Take a test in several timed sessions or over several days
- Take sections of a test in a different order
- Take a test at a specific time of day

**Organization skills accommodations:**

- Use an alarm to help with time management
- Mark texts with a highlighter
- Have help coordinating assignments in a book or planner
- Receive study skills instruction

**Assignment modifications:**

- Complete fewer or different homework problems than peers
- Write shorter paper
- Answer fewer or different test questions
- Create alternate projects or assignments

**Curriculum modifications:**

- Learn different material (such as continuing to work on multiplication while classmates move on to fractions, or moving ahead to an extension concept/skill while classmates continue to work on a core skill)
- Get graded or assessed using a different standard than the one for classmates

| **Unit 4: Quadratic Functions and Modeling** | **Strand:** Understand the relationship between zeros and factors of polynomials. |
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**New Jersey Student Learning Standards:**

Math.Content.HSA-APR.B.3 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

| **Unit 4: Quadratic Functions and Modeling** | **Strand:** Extend the properties of exponents to rational exponents. |
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**New Jersey Student Learning Standards:**

Math.Content.HSN-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. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.*

Math.Content.HSN-RN.A.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

| **Unit 4: Quadratic Functions and Modeling** | **Strand:** Use properties of rational and irrational numbers. |
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**New Jersey Student Learning Standards:**

.Math.Content.HSN-RN.B.3 Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

| **Unit 4: Quadratic Functions and Modeling** | **Strand:** Interpret functions that arise in applications in terms of the context. |
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**New Jersey Student Learning Standards:**

Math.Content.HSF-IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.**

Math.Content.HSF-IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.**

Math.Content.HSF-IF.B.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

| **Unit 4: Quadratic Functions and Modeling** | **Strand:** Analyze functions using different representations. |
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**New Jersey Student Learning Standards:**

Math.Content.HSF-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

- Math.Content.HSF-IF.C.7a Graph linear and quadratic functions and show intercepts, maxima, and minima.
- Math.Content.HSF-IF.C.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

Math.Content.HSF-IF.C.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

- Math.Content.HSF-IF.C.8a Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

Math.Content.HSF-IF.C.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum*.**

| **Unit 4: Quadratic Functions and Modeling** | **Strand:** Build a function that models a relationship between two quantities. |
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**New Jersey Student Learning Standards:**

Math.Content.HSF-BF.A.1 Write a function that describes a relationship between two quantities.***

- .Math.Content.HSF-BF.A.1a Determine an explicit expression, a recursive process, or steps for calculation from a context.

| **Unit 4: Quadratic Functions and Modeling** | **Strand:** Build new functions from existing functions. |
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**New Jersey Student Learning Standards:**

Math.Content.HSF-BF.B.3 Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of $k$ (both positive and negative); find the value of $k$ given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

| **Unit 4: Quadratic Functions and Modeling** | **Strand:** Construct and compare linear, quadratic, and exponential models and solve problems. |
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**New Jersey Student Learning Standards:**

Math.Content.HSF-LE.A.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

| **Unit 4: Quadratic Functions and Modeling** | **Strand:** Interpret expressions for functions in terms of the situation they model. |
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**New Jersey Student Learning Standards:**

Math.Content.HSF-LE.B.5 Interpret the parameters in a linear or exponential function in terms of a context.

**Big Ideas:**

What patterns exist in the relationships between quantities?
Why change from one form of a relation to another?
What changes result from altering specific parameters in a situation?

| **Essential Questions:** | **Enduring Understandings:** |
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| • **How are patterns of change related to the behavior of functions?**<br>• **How can we use mathematical models to describe change or change over time?**<br>• **How are functions and their graphs related?**<br>• **How can we use algebraic representation to analyze patterns?**<br>• **How can we model situations involving exponents?**<br>• **How can we model situations involving quadratics?**<br>• **How can numeric operations be extended to algebraic objects?**<br>• **How are arithmetic operations related to functions?**<br>• **How can we use mathematical language to describe** | • **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.**<br>• **Graphs and equations are alternative ways for depicting and analyzing patterns of change.**<br>• **The value of a particular representation depends on its purpose.**<br>• **Relationships can be described and generalizations made for mathematical situations that have numbers or objects that repeat in predictable ways.**<br>• **The same pattern can be found in many different ways.**<br>• **Mathematical models can be used to describe physical relationships; these relationships are often non-linear.** |

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| **non-linear change?**<br>• **How can we model situations using quadratics?** | • **Algebraic and numeric procedures are interconnected and build on one another to produce a coherent whole.**<br>• **Rules of arithmetic and algebra can be used together with equivalence to transform equations and inequalities so solutions can be found to solve problems.** |

**Knowledge, Skills, and Instructional Objectives:**

- Understand slope as a rate of change.
- Write equations for lines in slope-intercept form from several different pieces of given information.
- Use an equation written in slope-intercept form to determine slope and y-intercept of a line.
- Use x and y intercepts to graph a line.
- What happens to the graph of a function if I change the values of m and b?
- Find the inverse of a linear function.
- Evaluate expressions containing zero and integer exponents.
- Use multiplication and division properties of exponents to evaluate and simplify expressions.
- Evaluate and graph exponential functions.
- Solve problems involving exponential decay, including compound interest.
- Perform mathematical operations on numerical or algebraic expressions with square roots.
- Multiply polynomials.
- Find special products of binomials.
- Identify quadratic functions and determine the maximum and minimum.
- Find the zeros of a quadratic function from its graph.
- Graph quadratic functions.
- Find the vertex of a quadratic function by completing the square.

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| **Instructional Materials/Resources:**<br><br>**Glencoe : Algebra 1**<br>**Triumph Learning: Common Core Coach Mathematics 8**<br>**Glencoe: Math Common Core Edition, Course 3**<br>**McDougal Little: Algebra, Structure and Method Book 1** | **Suggested Vocabulary:**<br><br>Radical expression, rationalizing the denominator, conjugate, radical equations, extraneous solutions, hypotenuse, legs, converse, Pythagorean Triple, distance formula, midpoint, rational function, excluded value, rational expression, least common multiple, least common denominator, mixed expression, complex fraction, rational equation, extraneous solution, work and rate problems |
| | **Technology:**<br><br>• Calculator<br>• ActivBoard<br>• ipads<br>• Safari Montage<br>• Document camera<br>• Study island<br>8.1.2.A.4; 8.1.P.C.1 |

**Recommended Instructional Activities:**

- **Problem of the Day/Warm Up activity**
- **Direct Instruction**
- **Guided Practice**
- **Independent Practice**

- **Cooperative group Activities**
- **Homework assignments**

**Extension Strategies/Activities:**

Application: Linear Regression
Application: Floor Plans

**Cross-curricular Connections/Standards:**
RI.8.2; NJSLSA.W2; W.8.2; NJSLSA.SL2; SL.8.1

21st Century Skills
CRP1; CRP3; CRP6; CRP11; CRP12

**Suggested Assessments:**

- Problem of the Day
- Homework
- Developmental Assessments
- Summative Assessments
- Notebooks
- Final Exam
- Benchmarks
- Projects

**Modifications for SpEd/ELL/Students at Risk/Gifted**
**Supports, Accommodations, and Modifications must be provided as stated in IEP, 504 Plan or I-Team Intervention Plan, and may include (but not limited to) the following:**
**Presentation accommodations:**

- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Use alternate texts at lower readability level
- Work with fewer items per page or line and /or materials in a larger print size
- Use magnification device, screen reader, or Braille/Nemeth Code
- Use audio amplification device (e.g., hearing aide(s), auditory trainer, sound-field system( which may require teacher use of microphone)
- Be given a written lists of instructions
- Record a lesson, instead of taking notes
- Have another student share class notes with him
- Be given an outline of lesson
- Be given a copy of teacher's lecture notes
- Be given a study guide to assist in preparing for assessments
- Use visual presentations of verbal material, such as word webs and visual organizers
- Use manipulatives to teach or demonstrate concepts
- Have curriculum materials translated into native language

**Response accommodations:**

- Use sign language, a communication device, Braille, other technology, or native language other than English
- Dictate answers to a scribe
- Capture responses to an audio recorder
- Use a spelling dictionary or electronic spell-checker

- Use a word processor to type notes or give responses in class
- Use a calculator or table or "math facts"
- Respond directly in the test booklet rather than on an answer sheet.

**Setting accommodations:**

- Work or take a test in a different setting, such as quiet room with few distractions
- Sit where he learns best (for example, near the teacher, away from distractions)
- Use special lighting or acoustics
- Take a test in small group setting
- Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
- Use noise buffers such as headphones, earphones, or earplugs

**Timing accommodations:**

- Take more time to complete a task or a test
- Have extra time to process oral information and directions
- Take frequent breaks, such as after completing a task

**Scheduling accommodations:**

- Take more time to complete a project
- Take a test in several timed sessions or over several days
- Take sections of a test in a different order
- Take a test at a specific time of day

**Organization skills accommodations:**

- Use an alarm to help with time management
- Mark texts with a highlighter
- Have help coordinating assignments in a book or planner
- Receive study skills instruction

**Assignment modifications:**

- Complete fewer or different homework problems than peers
- Write shorter paper
- Answer fewer or different test questions
- Create alternate projects or assignments

**Curriculum modifications:**

- Learn different material (such as continuing to work on multiplication while classmates move on to fractions, or moving ahead to an extension concept/skill while classmates continue to work on a core skill)
- Get graded or assessed using a different standard than the one for classmates

* F.IF.4 and F.IF.5: Limit to linear and quadratic functions.
** F.IF.9: Limit to linear or quadratic functions.
*** F.BF.1: Limit to linear or quadratic functions

| **Unit 3: Expressions and Equations** | **Strand:** Interpret the structure of expressions. |
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**New Jersey Student Learning Standards**

Math.Content.HSA-SSE.A.1 Interpret expressions that represent a quantity in terms of its context.*

- Math.Content.HSA-SSE.A.1a Interpret parts of an expression, such as terms, factors, and coefficients.
- Math.Content.HSA-SSE.A.1b Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.*

Math.Content.HSA-SSE.A.2 Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.***

| **Unit 3: Expressions and Equations** | **Strand:** Write expressions in equivalent forms to solve problems. |
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**New Jersey Student Learning Standards:**

Math.Content.HSA-SSE.B.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. ***

- Math.Content.HSA-SSE.B.3a Factor a quadratic expression to reveal the zeros of the function it defines.
- Math.Content.HSA-SSE.B.3b Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
- Math.Content.HSA-SSE.B.3c Use the properties of exponents to transform expressions for exponential functions. *For example the expression $1.15^t$ can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*

| **Unit 3: Expressions and Equations** | **Strand:** Perform arithmetic operations on polynomials. |
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**New Jersey Student Learning Standards:**

Math.Content.HSA-APR.A.1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

| **Unit 3: Expressions and Equations** | **Strand:** Create equations that describe numbers or relationships. |
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**New Jersey Student Learning Standards**

Math.Content.HSA-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*.

Math.Content.HSA-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

.Math.Content.HSA-CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*

| **Unit 3: Expressions and Equations** | **Strand:** Solve equations and inequalities in one variable. |
|---|---|

**New Jersey Student Learning Standards:**

.Math.Content.HSA-REI.B.4 Solve quadratic equations in one variable.

- .Math.Content.HSA-REI.B.4a Use the method of completing the square to transform any quadratic equation in *x* into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

- Math.Content.HSA-REI.B.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers $a$ and $b$.

**Big Ideas:**

What is the difference between a linear function and an exponential function?
What does it mean to solve an exponential function or system?
What effect does altering an exponential function by adding k have on its graph or on a situation?

| **Essential Questions:** | **Enduring Understandings:** |
|---|---|
| • **Why is it useful to represent real-life situations algebraically?**<br>• **How can we use mathematical language to describe non-linear change?**<br>• **What are some ways to represent, describe, and analyze patterns (that occur in the world?)**<br>• **How are arithmetic operations related to functions?**<br>• **How can numeric operations be extended to algebraic objects?**<br>• **What makes an algebraic algorithm both effective and efficient?**<br>• **How can we model situations using exponents.** | • **Variables are symbols that take the place of numbers: they have different meanings depending on how they are being used.**<br>• **Real world situations, involving quadratic or exponential relationship can be solved using multiple representations.**<br>• **Variables are symbols that take the place of numbers: they have different meanings depending on how they are being used.**<br>• **Algebraic and numeric procedures are interconnected and build on one another to produce a coherent whole.**<br>• **Rules of arithmetic and algebra can be used together with equivalence to transform equations and inequalities so solutions can be found to solve problems.**<br>• **Graphs and equations are alternative ways for depicting and analyzing patterns of change.**<br>• **Real world situations, involving quadratic or exponential relationship can be solved using multiple representations.** |

**Knowledge, Skills, and Instructional Objectives:**

- Identify constant and variable terms in algebraic expressions and equations, discriminating between unlike variables.
- Solve problems involving compound interest.
- Classify polynomials.
- Add, subtract and multiply polynomials.
- Find special products of binomials.
- Factor polynomials using the GCF.
- Factor trinomials.
- Factor special products.
- Choose an appropriate method for factoring polynomials.
- Solve equations by factoring, using the quadratic formula, using square roots, and completing the square.

| **Instructional Materials/Resources:** | **Suggested Vocabulary:** |
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**Eastampton Township School District**
Curriculum Guide
Grade: 8th Grade Content Area: Honors Algebra

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| Glencoe : Algebra 1<br>Triumph Learning: Common Core Coach Mathematics 8<br>Glencoe: Math Common Core Edition, Course 3<br>McDougal Little: Algebra, Structure and Method Book 1 | Monomial, constant, zero exponent, negative exponent, order of magnitude, rational exponent, cube root, exponential equation, scientific notation, exponential function, exponential growth function, exponential decay function, compound interest, geometric sequence, common ratio, polynomial, binomial, trinomial, degree of a monomial, degree of a polynomial, leading coefficient, FOIL method, quadratic expression, factoring, factoring by grouping, zero product property, quadratic equation, prime polynomial, difference of two squares, perfect square trinomial, quadratic function, standard form, parabola, axis of symmetry, vertex, minimum, maximum, transformation, translation, dilation, reflection, vertex form, quadratic formula, absolute value function |
| | **Technology:**<br>• Calculator<br>• ActivBoard<br>• ipads<br>• Safari Montage<br>• Document camera<br>• Study island<br><br>8.1.2.A.4; 8.1.P.C.1 |
| **Recommended Instructional Activities:**<br><br>• **Problem of the Day/Warm Up activity**<br>• **Direct Instruction**<br>• **Guided Practice**<br>• **Independent Practice**<br>• **Cooperative group Activities**<br>• **Homework assignments** | |
| **Extension Strategies/Activities:**<br><br>Career Exploration: Draftsperson | **Modification Strategies/Activities:**<br><br>• Provide focusing/redirecting<br>• Use graphic organizers when needed<br>• Provide copy of notes when needed<br>• Provide extended time when needed<br>• Modify tests when needed |
| **Cross-curricular Connections/Standards:**<br>RI.8.2; NJSLSA.W2; W.8.2; NJSLSA.SL2; SL.8.1<br><br>21st Century Skills<br>CRP1; CRP3; CRP6; CRP11; CRP12 | |
| **Suggested Assessments:**<br><br>• Problem of the Day<br>• Homework<br>• Developmental Assessments<br>• Summative Assessments | |

- Notebooks
- Final Exam
- Benchmarks
- Projects

**Modifications for SpEd/ELL/Students at Risk/Gifted**
**Supports, Accommodations, and Modifications must be provided as stated in IEP, 504 Plan or I-Team Intervention Plan, and may include (but not limited to) the following:**
**Presentation accommodations:**

- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Use alternate texts at lower readability level
- Work with fewer items per page or line and /or materials in a larger print size
- Use magnification device, screen reader, or Braille/Nemeth Code
- Use audio amplification device (e.g., hearing aide(s), auditory trainer, sound-field system( which may require teacher use of microphone)
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**Response accommodations:**

- Use sign language, a communication device, Braille, other technology, or native language other than English
- Dictate answers to a scribe
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- Use a calculator or table or "math facts"
- Respond directly in the test booklet rather than on an answer sheet.

**Setting accommodations:**

- Work or take a test in a different setting, such as quiet room with few distractions
- Sit where he learns best (for example, near the teacher, away from distractions)
- Use special lighting or acoustics
- Take a test in small group setting
- Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
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**Timing accommodations:**

- Take more time to complete a task or a test
- Have extra time to process oral information and directions
- Take frequent breaks, such as after completing a task

**Scheduling accommodations:**

- Take more time to complete a project
- Take a test in several timed sessions or over several days
- Take sections of a test in a different order

- Take a test at a specific time of day

**Organization skills accommodations:**

- Use an alarm to help with time management
- Mark texts with a highlighter
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**Assignment modifications:**

- Complete fewer or different homework problems than peers
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**Curriculum modifications:**

- Learn different material (such as continuing to work on multiplication while classmates move on to fractions, or moving ahead to an extension concept/skill while classmates continue to work on a core skill)
- Get graded or assessed using a different standard than the one for classmates

* A.SSE.1: Focus on linear, quadratic, and an introduction to exponential expressions.
** A.SSE.2: Focus on polynomial expressions.
*** A.SSE.3: Limit to real numbers.

| **Unit 2: Linear and Exponential Relationships** | **Strand:** Solve systems of equations. |
|---|---|

**New Jersey Student Learning Standards**

Math.Content.HSA-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

.Math.Content.HSA-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

| **Unit 2: Linear and Exponential Relationships** | **Strand:** Represent and solve equations and inequalities graphically. |
|---|---|

**New Jersey Student Learning Standards:**

S.Math.Content.HSA-REI.D.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

.Math.Content.HSA-REI.D.11 Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

.Math.Content.HSA-REI.D.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

| **Unit 2: Linear and Exponential Relationships** | **Strand:** Understand the concept of a function and use function notation. |
|---|---|

**New Jersey Student Learning Standards:**

Math.Content.HSF-IF.A.1 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then $f(x)$ denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation $y = f(x)$.

.Math.Content.HSF-IF.A.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

.Math.Content.HSF-IF.A.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.*

| **Unit 2: Linear and Exponential Relationships** | **Strand:** Build a function that models a relationship between two quantities. |
|---|---|

**New Jersey Student Learning Standards:**

.Math.Content.HSF-BF.A.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

| **Unit 2: Linear and Exponential Relationships** | **Strand:** Interpret functions that arise in applications in terms of the context. |
|---|---|

**New Jersey Student Learning Standards:**

.Math.Content.HSF-IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would*

*be an appropriate domain for the function.*

| **Unit 2: Linear and Exponential Relationships** | **Strand:** Analyze functions using different representations. |
|---|---|

**New Jersey Student Learning Standards:**

Math.Content.HSF-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

- CCSS.Math.Content.HSF-IF.C.7a Graph linear and quadratic functions and show intercepts, maxima, and minima.

Math.Content.HSF-IF.C.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum*.

**Big Ideas:**

Why is it important to formulate algebraic equations and inequalities in order to solve problems?
How does fluency in writing, interpreting, and translating between various forms of linear equations and inequalities enhance problem solving skills?

| **Essential Questions:** | **Enduring Understandings:** |
|---|---|
| • **How can change be best represented mathematically?**<br>• **How can we use mathematical language to describe change?**<br>• **How can we use mathematical models to describe change or change over time?**<br>• **How can we use mathematical language to describe non-linear change?**<br>• **How are functions and their graphs related?**<br>• **How can change be best represented graphically?**<br>• **How can patterns, relations, and functions be used as tools to best describe and help explain real-life situations?**<br>• **How are patterns of change related to the behavior of functions?**<br>• **How can we model situations using quadratics?** | • **Graphs and equations are alternative ways for depicting and analyzing patterns of change.**<br>• **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.**<br>• **Mathematical models can be used to describe physical relationships; these relationships are often non-linear.**<br>• **A variety of families of functions can be used to model and solve real world situations.** |

**Knowledge, Skills, and Instructional Objectives:**

- Solve systems of equations by graphing.
- Solve systems of equations by substitution.
- Solve systems of equations by elimination.
- Graph and compare a variety of functions from tables, given domains, or equations; include linear, quadratic, and absolute value functions.
- Graph and solve linear inequalities with two variables..
- Solve special systems.
- Solve systems of linear inequalities.
- Graph the relationship between two sets of data.

- Find the domain and range of functions and determine if a relation is a function.
- Solve quadratic equations by graphing.
- Use correct terminology and notation for functions.
- Recognize and extend an arithmetic sequence as a function, then find an nth term of an arithmetic sequence.
- Understand slope as a rate of change.

**Instructional Materials/Resources:**

Glencoe : Algebra 1
Triumph Learning: Common Core Coach Mathematics 8
Glencoe: Math Common Core Edition, Course 3
McDougal Little: Algebra, Structure and Method Book 1

**Suggested Vocabulary:**

**Linear function, constant function, standard form, constant, x-intercept, y-intercept, root, zeros, rate of change, slope, direct variation, sequence, terms, arithmetic sequence, common difference, inductive reasoning, deductive reasoning, slope-intercept form, constant function, linear extrapolation, point-slope form, parallel lines, perpendicular lines, bivariate data, scatter plot, line of fit, best-fit line, median-fit line, inverse relation, inverse function, set-builder notation, compound inequality, intersection, union, boundary, half-plane, closed(open) half-plane, system of equations, substitution, elimination**

**Technology:**

- Calculator
- ActivBoard
- ipads
- Safari Montage
- Document camera
- Study island

8.1.2.A.4; 8.1.P.C.1

**Recommended Instructional Activities:**

- **Problem of the Day/Warm Up activity**
- **Direct Instruction**
- **Guided Practice**
- **Independent Practice**
- **Cooperative group Activities**
- **Homework assignments**

**Extension Strategies/Activities:**

Career Exploration: Pharmacist

**Modification Strategies/Activities:**

- Provide focusing/redirecting
- Use graphic organizers when needed
- Provide copy of notes when needed
- Provide extended time when needed
- Modify tests when needed

**Cross-curricular Connections/Standards:**
**Cross-curricular Connections/Standards:**
RI.8.2; NJSLSA.W2; W.8.2; NJSLSA.SL2; SL.8.1

21st Century Skills
CRP1; CRP3; CRP6; CRP11; CRP12

**Suggested Assessments:**

- Problem of the Day
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- Developmental Assessments
- Summative Assessments
- Notebooks
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- Benchmarks
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**Timing accommodations:**

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**Scheduling accommodations:**

- Take more time to complete a project
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- Take sections of a test in a different order
- Take a test at a specific time of day

**Organization skills accommodations:**

- Use an alarm to help with time management
- Mark texts with a highlighter
- Have help coordinating assignments in a book or planner
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**Assignment modifications:**

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**Curriculum modifications:**

- Learn different material (such as continuing to work on multiplication while classmates move on to fractions, or moving ahead to an extension concept/skill while classmates continue to work on a core skill)
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| **Unit 1: Relationships Between Quantities and Reasoning with Equations** | **Strand:** Reason quantitatively and use units to solve problems. |
|---|---|

**New Jersey Student Learning Standards:**

.Math.Content.HSN-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.Content.HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.

Math.Content.HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

| **Unit 1: Relationships Between Quantities and Reasoning with Equations** | **Strand:** Interpret the structure of expressions. |
|---|---|

**New Jersey Student Learning Standards:**

Math.Content.HSA-SSE.A.1 Interpret expressions that represent a quantity in terms of its context.★

- Math.Content.HSA-SSE.A.1a Interpret parts of an expression, such as terms, factors, and coefficients.
- Math.Content.HSA-SSE.A.1b Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P*.

| **Unit 1: Relationships Between Quantities and Reasoning with Equations** | **Strand:** Create equations that describe numbers or relationships. |
|---|---|

**New Jersey Student Learning Standards:**

Math.Content.HSA-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*.**

Math.Content.HSA-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Math.Content.HSA-CED.A.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*.

Math.Content.HSA-CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R*.***

| **Unit 1: Relationships Between Quantities and Reasoning with Equations** | **Strand:** Understand solving equations as a process of reasoning and explain the reasoning. |
|---|---|

**New Jersey Student Learning Standards:**

Math.Content.HSA-REI.A.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

| **Unit 1: Relationships Between Quantities and Reasoning with Equations** | **Strand:** Solve equations and inequalities in one variable. |
|---|---|

**New Jersey Student Learning Standards:**

.Math.Content.HSA-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

**Big Ideas:**

Why is it important to understand quantities and the relationships between them?
Why is it important to be able to interpret real world problems into algebra and back again?

**Essential Questions:**

- **How can we model situations using quadratics?**
- **Why is it useful to represent real-life situations algebraically?**
- **What are some ways to represent, describe, and analyze patterns (that occur in the world?)**
- **How are arithmetic operations related to functions?**
- **How can patterns, relations, and functions be used as tools to best describe and help explain real-life situations?**
- **How can we use algebraic representation to analyze patterns?**
- **How are patterns of change related to the behavior of functions?**
- **How can change be represented mathematically?**
- **How can we use mathematical language to describe non-linear change?**
- **How are functions and their graphs related?**
- **How can we use mathematical models to describe change or change over time?**
- **How can we model situations using quadratics?**

**Enduring Understandings:**

- **Real world situations, involving quadratic or exponential relationship can be solved using multiple representations.**
- **Variables are symbols that take the place of numbers: they have different meanings depending on how they are being used.**
- **Algebraic and numeric procedures are interconnected and build on one another to produce a coherent whole.**
- **Proportionality involves a relationship in which the ratio of two quantities remains constant as the corresponding values of quantities change.**
- **The value of a particular representation depends on its purpose.**
- **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.**
- **Mathematical models can be used to describe physical relationships; these relationships are often non-linear.**
- **Graphs and equations are alternative ways for depicting and analyzing patterns of change.**

**Knowledge, Skills, and Instructional Objectives:**

- Use and interpret appropriate units of measurement, estimation and the appropriate level of precision for applications.
- Identify constant and variable terms in algebraic expressions and equations, discriminating between unlike variables.
- Classify polynomials.
- Add and subtract polynomials.
- Find special products of binomials.
- Solve an equation in two or more variables for one of the variables.
- Write and solve problems using proportions.
- Determine the viability of solutions to a linear equation or inequality in a real world context.
- Solve equations in one variable.
- Solve equations in one variable that contain variable terms on both sides.
- Write and solve problems involving proportions.
- Solve one step inequalities and with variable terms on both sides.
- Identify solutions of inequalities in one variable. Write and graph inequalities in one variable.
- Solve systems involving linear and quadratic equations, both algebraically and graphically.
- Write equations for lines in slope-intercept form from several different pieces of given information.

**Instructional Materials/Resources:**

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**Suggested Vocabulary:**

**Algebraic expressions, variable, term, factor, product, power, exponent, base, evaluate, order of operations, equivalent expressions, additive identity, multiplicative identity, multiplicative inverse, reciprocal, like terms, simplest form, coefficient, open sentence, equation, solution, replacement set, set, element, solution set, identity, coordinate system, coordinate plane, x-and y-axes, origin, ordered pair, x- and y-coordinates, relation, mapping, domain, range, independent variable, dependent variable, function, linear and quadratic function, vertical line test, function notation, nonlinear function, intercepts, x- and y-intercept, axis of symmetry, relative maximum, relative minimum, formula, equivalent equations, multi-step equation, consecutive integers, number theory, identity, ratio, proportion, means, extremes, rate, unit rate, scale, scale model, percent of change, percent of increase, percent of decrease, dimensional analysis, unit analysis, weighted average, mixture problem, uniform motion problem, rate problem, parabola, vertex**

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8.1.2.A.4; 8.1.P.C.1

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- **Homework assignments**

**Extension Strategies/Activities:**

- Compare and compute interest and compound interest and develop an amortization table.
- Analyze processes and vehicles for buying and selling investments

**Cross-curricular Connections/Standards:**
RI.8.2; NJSLSA.W2; W.8.2; NJSLSA.SL2; SL.8.1

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**Suggested Assessments:**

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