Foundations of Algebra

Length of Course: Term
Elective/Required: Required
Schools: Middle Schools
Eligibility: Grade 8
Credit Value: N/A
Date Approved: August 26, 2019
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INTRODUCTION

The New Jersey Student Learning Standards (NJSLS) for Mathematics are intended to provide students with a solid foundation in number sense, in particular whole numbers, fractions, and decimals. The focus of instructional time for the course of Pre-Algebra is on formulating reason about expressions and equations; modeling bivariate data with linear equations; solving linear equations and systems of linear equations; understanding the concept of a function and using functions to describe quantitative relationships; analyzing two- and three-dimensional figures using distance, angle, similarity, and congruence, and applying the Pythagorean Theorem to solve problems.

This curriculum guide is standards based which reflects the NJSLS for Mathematics, the Mathematical Practices that are expected to be used in teaching mathematics K-12 are as follows and infused throughout the guide:

- Make sense of problems and persevere in solving them.
- Use appropriate tools strategically.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

The purpose of the revision was to further integrate the practice standards as well as incorporate technology in a meaningful way to enhance instruction and learning.

Learning mathematics with understanding is essential to enable students to problem solve. Students learn mathematics by problem solving, not just by listening and memorizing. When mathematical facts are connected, taught in a contextual setting, applied to real world applications, and infused in technology knowledge is more likely retained.

The primary resource for this course is EdGems Math Course 3.
MARKING PERIOD 1:
Unit 1 Equations
1.0 (7th grade Pre-Requisite) Create, Evaluate, and Simplify Variable Expressions
1.1 Solve One and Two-Step Equations
1.2 Solve Multi-Step Equations
1.3 Solutions to Linear Equations
1.4 Square Roots and Cube Roots
1.5 Solving Equations With Exponents
1.6 *Simplifying Roots

Unit 2 The Pythagorean Theorem
2.1 The Pythagorean Theorem
2.2 Applying the Pythagorean Theorem
2.3 Distance on the Coordinate Plane

MARKING PERIOD 2:
Unit 3 Proportional Relationships
3.1 Understanding Functions
3.2 Proportional Relationships
3.3 Calculating Slope from Graphs
3.4 The Slope Formula

Unit 4 Functions
4.1 Graphing Using Slope Intercept Form
4.2 Writing Linear Equations for Graphs
4.3 Writing Linear Equations from Key Information
4.4 Linear Equations in Other Forms
4.5 Introduction to Non-Linear Forms
4.6 Interpreting Graphs of Functions

Unit 5 Systems of Equations
5.1 Parallel, Intersecting of the Same Line
5.2 Solving Systems by Graphs
5.3 Solving Systems by Substitutions
5.4 Solving Systems Using Elimination
5.5 Applications of Systems of Equations
5.6 *Converting Repeating Decimals to Fractions

Unit 6 Angle Relationships
6.1 Alternate Exterior and Interior Angles
6.2 Corresponding and Same-Side Interior Angles
6.3 Angle Sum of a Triangle
6.4 *Congruent and Similar Triangles (only Exterior Angle Thm)

Unit 7 Transformations
7.1 Reflections
7.2 Translations
7.3 Rotations
7.4 Dilations
7.5 Composition of Transformations

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MARKING PERIOD 4:
Unit 8 Exponent Properties
8.1 Multiplications Properties of Exponents
8.2 Division Properties of Exponents
8.3 Scientific Notation
8.4 Application of Scientific Notation

Unit 9 Volume
9.1 Volume of Cylinders
9.2 Volume of Cones
9.3 Volume of Spheres

*Unit 10 Bivariate Data
10.1 Scatter Plots and Association
10.2 Lines of Best Fit
10.3 Writing Equations for Lines of Best Fit
10.4 Bivariate Data and Frequency Tables *if time permits
UNIT 1: EQUATIONS

Essential Questions

● What are the various methods that can be used to evaluate numerical and algebraic expressions?
● What is the purpose of an equation?
● How do we apply mathematical properties/operations to solve equations?
● Do other numbers exist besides rational numbers? Why are they necessary?

Enduring Understandings

● Numerical and algebraic expressions can be simplified/evaluated using order of operations and computation of rational numbers.
● Equations are used to model real-life problems.
● Inverse operations are used to solve equations.
● Rational and irrational numbers are subsets of the Real Number System and are solutions to equations.

Core Content

Objectives: Alignment to NJSLs: 8th Grade NJSLs Math

Find the value of numerical expressions using the order of operations.

Create and evaluate variable expressions.

Apply and utilize mathematical properties to simplify variable expressions.

Apply inverse operations to solve equations.

Model, create, and solve multi-step equations.

Classify the number of solutions to linear equations as none, one, or infinite solutions.

Instructional Actions

6.EE.2 (Supporting Standard) Write, read, and evaluate expressions in which letters stand for numbers.

7.NS.3 (Supporting Standard) Solve real-world and mathematical problems involving the four operations with rational numbers.

8.NS.1 (Supporting Standard) Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

8.NS.2 (Supporting Standard) Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the

Assessment Check Points:

Target Tracker (Self-Assessment) Tracker for students to use to chart progress throughout unit (1.1-1.6)

Exit Card (Formative) Small "quiz" used to determine base level of proficiency to guide planning (1.1-1.6)

Gem Challenge (Formative or Summative) Online standards based items for use after standard has been covered (1.3, 1.4, 1.6)

Performance Task (Formative or Summative) Multi-step and multi-standard strategic thinking task (1.2, 1.5)

Tiered Assessments (Summative) Unit assessment (selected and constructed)

Resources – (Technology)

EdGems Math - Course 3
Teacher Gems PD Overview
http://www.socrative.com/
www.kahoot.it
www.shodor.org
www.insidemathematics.org
www.xyzsolve.com
www.ck12.org
www.mathjong.com
Pear Deck
Socrative
Edpuzzle
- Understand and recognize that there are numbers that are not rational, and approximate them by rational numbers.

- Apply knowledge of rational and irrational numbers to solve real world application problems.

- Approximate/estimate square roots and *cube roots to problem solve.

  *if time permits

| value of expressions (e.g., \(\pi^2\)). | Digital Intervention and Enrichment resources - http://www.mathjong.com/Chrome Mathjong.php  
https://www.mathpapa.com/practice/training/  
http://www.ck12.org/algebra/ | response items) at the tiered level. (1.6) |
<table>
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<td><strong>8.EE.7 (Major Standard)</strong></td>
<td><strong>Assessments (Summative)</strong></td>
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<tr>
<td>Use square root and cube root symbols to represent solutions to equations of the form (x^2 = p) and (x^3 = p), where (p) is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that (\sqrt{2}) is irrational.</td>
<td>Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form (x = a), (a = a), or (a = b) results (where (a) and (b) are different numbers).</td>
<td>Unit assessment (selected and constructed response items) at the proficient level. (1.6)</td>
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<td><strong>8.EE.7b (Major Standard)</strong></td>
<td><strong>Comparing and ordering rational numbers</strong></td>
<td><strong>Kahoot</strong> - equations</td>
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<tr>
<td>Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms</td>
<td>Students compare/order rational and irrational numbers using a virtual tool.</td>
<td><strong>PARCC Practice Problems</strong></td>
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<td><strong>Formative Assessment digital tools (optional):</strong></td>
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|                                       | Edpuzzle  
Socrative  
DotStorming  
Peardeck  
Nearpod  
Quizizz |                                      |
### Instructional Adjustments:

**Modifications/Student difficulties/Common errors**

- Emphasize note taking strategies
- Note cards for vocabulary
- Reword problems
- Guided notes
- Graphic organizers
- Peer editing/feedback
- Use models/manipulatives
- Review common errors
- Find and Fix the error strategy
- Problem Based Learning strategies
- Question Formulation Techniques
## Foundations of Algebra Grade 8
### UNIT 2: THE PYTHAGOREAN THEOREM

### Essential Questions
- Can the Pythagorean Theorem be used on all triangles?
- Without measuring tools, how can the side lengths of a right triangle be deduced?
- How can it be determined that a triangle is a right triangle?

### Enduring Understandings
- The Pythagorean Theorem is used to find missing side lengths of a right triangle.
- The converse of the Pythagorean Theorem is used to determine if a triangle is right.

### Core Content

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<td>8.G.6 (Major Standard) Explain a proof of the Pythagorean Theorem and its converse.</td>
<td><strong>Recommend Activities/Strategies:</strong></td>
<td><strong>Target Tracker</strong> (Self-Assessment) Tracker for students to use to chart progress throughout unit.(2.1-2.3)</td>
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<td><strong>8.G.7 (Major Standard)</strong> Apply the Pythagorean Theorem to real world problems.</td>
<td>8.G.7 (Major Standard) Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.</td>
<td><strong>Assessment Check Points:</strong></td>
<td><strong>Exit Card</strong> (Formative) Small “quiz” used to determine base level of proficiency to guide planning. (2.1-2.3)</td>
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<td><strong>8.G.8 (Major Standard)</strong> Use the Pythagorean Theorem to find the distance between two points on a coordinate plane.</td>
<td>8.G.8 (Major Standard) Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.</td>
<td><strong>Rich Tasks Unit 2</strong></td>
<td><strong>Gem Challenge</strong> (Formative or Summative) Online standards based items for use after standard has been covered.(2.2,2.3)</td>
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<td><strong>Tiered Assessments</strong></td>
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<td><strong>Online virtual tools to explore and game play - Digital Investigation of Pythagorean Theorem</strong></td>
<td><strong>EdGems Math - Course 3</strong></td>
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<td><strong>Explore 2.3 Explore</strong></td>
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<td><strong>Shodor: A National Resource for Computational Science Education</strong></td>
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**Modifications/Student difficulties/Common errors**

- Emphasize note taking strategies
- Note cards for vocabulary
- Reword problems
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## Essential Questions

- What is a function? How are functions used?
- How is a linear function recognized?
- How are proportional relationships recognized?
- How are proportional relationships and linear equations related?
- Do all linear equations model proportional relationships?

## Enduring Understandings

- To be a function, every input has exactly one output. Functions can help represent real-life situations.
- A linear function is recognized by a steady rate of change.
- All proportional relationships are linear equations.
- Not all linear equations are proportional relationships.

## Core Content

### Objectives:

- Learn how to determine if a relationship is a function.
- Understand the connections between proportional relationships, lines, and linear equations.
- Interpret the constant of proportionality as the slope of the graph.
- Calculate the slope of a line from a graph, table or two ordered pairs.

### Alignment to NJSLS:

**8th Grade NJSLS Math**

#### 8.EE.5 (Major Standard)
Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

#### 8.EE.6 (Major Standard)
Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation \( y = mx \) for a line through the origin and the equation \( y = mx + b \) for a line intercepting the vertical axis at \( b \).

#### 8.F.1 (Major Standard)
Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs.

### Instructional Actions

#### Recommend Activities/Strategies:

- Lesson Guide 3.1
- Lesson Guide 3.2
- Lesson Guide 3.3
- Lesson Guide 3.4
- Explore 3.3 Explore 3.4 Explore
- Teacher Gems Activities 3.1 Relay 3.2 Climb the Ladder 3.3 Partner Math 3.4
- Rich Tasks Unit 3
- Tic-Tac-Toe Unit 3
- Performance Tasks Unit 3 use after 3.2 and 3.4

#### Assessment Check Points:

- Target Tracker (Self-Assessment) Tracker for students to use to chart progress throughout unit. (3.1-3.4)
- Exit Card (Formative) Small "quiz" used to determine base level of proficiency to guide planning. (3.1-3.4)
- Gem Challenge (Formative or Summative) Online standards based items for use after standard has been covered. (3.1-3.4)
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### Resources – (Technology)

- EdGems Math - Course 3
- Teacher Gems PD Overview
- PARCC | Home - Pearson
- Illuminations
- Desmos | Beautiful, Free Math
- inside mathematics - a professional resource for educators /
- Khan Academy
- Edpuzzle
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- Tiered Assessments
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<tr>
<td>pairs consisting of an input and the corresponding output.</td>
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<table>
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<th>vocabulary related to the graphs of linear functions.</th>
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<td>Desmos - focus of activity is on the slope of a line.</td>
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## Essential Questions
- How is a linear function recognized?
- How do you write a linear equation based on graphs and key information?
- How do you interpret non-linear real-world graphs?

## Enduring Understandings
- A linear function is recognized by a steady rate of change.
- Use the equation $y=mx+b$ to write the equation of the line.
- Identify where non-linear graphs increase and/or decrease.

## Core Content

### Objectives:
- Graph linear functions from an equation
- Write equations for linear functions based on graphs or key information
- Convert other forms into slope-intercept form
- Interpret and compare functions
- Describe qualitative features of a graph (increasing, decreasing, linear and nonlinear)

### Alignment to NJSLS: 8th Grade NJSLS Math

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<tr>
<th>8.F.2 (Major Standard)</th>
<th>8.F.3 (Major Standard)</th>
<th>8.F.4 (Major Standard)</th>
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<tbody>
<tr>
<td>Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions)</td>
<td>Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.</td>
<td>Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two $(x, y)$ values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.</td>
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### Instructional Actions

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### Assessment Check Points:

- Target Tracker (Self-Assessment) Tracker for students to use to chart progress throughout unit.(4.1-4.6)
- Exit Card (Formative) Small “quiz” used to determine base level of proficiency to guide planning. (4.1-4.6)
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- Tiered Assessments (Summative) Unit

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<tr>
<td>Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.</td>
<td>Use similar triangles to explain why the slope $m$ is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at $b$.</td>
<td>(Summative) Unit assessment (selected and constructed response items) at the tiered level. (4.6)</td>
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<td>PARCC Practice Problems</td>
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<td>Kahoot - Functions</td>
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<td>Formative Assessment</td>
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<td>Tools:</td>
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<td>- Nearpod</td>
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<td>- Socrative</td>
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<td>- Pear Deck</td>
</tr>
</tbody>
</table>

**Instructional Adjustments:**

**Modifications/Student difficulties/Common errors**
- Emphasize note taking strategies
- Note cards for vocabulary
- Reword problems
- Guided notes
- Graphic organizers
- Peer editing/feedback
- Use models/manipulatives
- Review common errors
- Find and Fix the error strategy
- Problem Based Learning strategies
- Question Formulation Techniques
### Essential Questions

- What methods can be used to solve pairs of simultaneous linear equations in two variables?
- What is the solution to a system of equations when graphed on a coordinate plane?

### Enduring Understandings

- Simultaneous linear equations in two variables can be solved using graphing and substitution methods.
- The solution to a graphed system of equations is the point of intersection, no solution if the lines are parallel, and infinite solutions if the lines are the same.

### Core Content

<table>
<thead>
<tr>
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<th>Alignment to NJSLS: 8th Grade NJSL Math</th>
<th>Instructional Actions</th>
<th>Resources – (Technology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Determine if a system of two linear equations are parallel, intersecting or the same line.</td>
<td>8.EE.8a (Major Standard) Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because the points of intersection satisfy both equations simultaneously.</td>
<td>Lesson Guide 5.1 Lesson Guide 5.2 Lesson Guide 5.3 Lesson Guide 5.4 Lesson Guide 5.5 *Lesson Guide 5.6</td>
<td>EdGems Math - Course 3 Teacher Gems PD Overview <a href="http://www.socrative.com/">http://www.socrative.com/</a> <a href="http://www.kahoot.it">www.kahoot.it</a> <a href="http://www.shodor.org">www.shodor.org</a> <a href="http://www.Insidemathematics.org">www.Insidemathematics.org</a> <a href="http://www.xyzsolve.com">www.xyzsolve.com</a> <a href="http://www.ck12.org">www.ck12.org</a> <a href="http://www.mathjong.com">www.mathjong.com</a> Pear Deck Socrative Edpuzzle Quizizz</td>
</tr>
<tr>
<td>● Solve a system by graphing, substitution and elimination.</td>
<td>8.EE.8b (Major Standard) Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.</td>
<td>Explore 5.1 Explore 5.2 Explore 5.4 Explore 5.6 Explore</td>
<td></td>
</tr>
<tr>
<td>● Write and solve systems for real-world situations.</td>
<td>8.EE.8c (Major Standard) Solve real-world and mathematical problems leading to two linear equations in two variables.</td>
<td>Teacher Gems Always, Sometimes, Never 5.1 Partner Math 5.2 Ticket Time 5.3 Activities 5.4 Activities 5.5 Math 5.6 Rich Tasks Unit 5 Tic-Tac-Toe Unit 5</td>
<td></td>
</tr>
<tr>
<td>● *Apply systems of equations to determine the fraction that represents a repeating decimal.</td>
<td>8.NS.1 (Major Standard) Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers,</td>
<td>Performance Tasks Unit 5 - use after 5.3 and 5.5</td>
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<tr>
<td>*if time permits</td>
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</tbody>
</table>

### Instructional Actions

- **Recommend Activities/Strategies:**
  - Lesson Guide 5.1
  - Lesson Guide 5.2
  - Lesson Guide 5.3
  - Lesson Guide 5.4
  - Lesson Guide 5.5
  - Lesson Guide 5.6

- **Assessment Check Points:**
  - Target Tracker (Self-Assessment) Tracker for students to use to chart progress throughout unit. (5.1-5.6)
  - Exit Card (Formatative) Small “quiz” used to determine base level of proficiency to guide planning. (5.1-5.6)

### Resources – (Technology)

- **EdGems Math - Course 3**
- **Teacher Gems PD Overview**
  - [www.kahoot.it](http://www.kahoot.it)
  - [www.shodor.org](http://www.shodor.org)
  - [www.Insidemathematics.org](http://www.Insidemathematics.org)
  - [www.xyzsolve.com](http://www.xyzsolve.com)
  - [www.ck12.org](http://www.ck12.org)
  - [www.mathjong.com](http://www.mathjong.com)
  - [Pear Deck](https://www.peardeck.com)
  - [Socrative](https://www.socrative.com)
  - [Edpuzzle](https://www.edpuzzle.com)
  - [Quizizz](https://www.quizizz.com)
show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

<table>
<thead>
<tr>
<th>3-Act Math Task - Problem based Activity: Playing Catch Up - applying knowledge of linear systems to problem solve in a real world setting.</th>
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<tbody>
<tr>
<td>level. (5.6)</td>
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<tr>
<td>Assessments (Summative)</td>
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<tr>
<td>Unit assessment (selected and constructed response items) at the proficient level. (5.6)</td>
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<td>PARCC Practice Problems</td>
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<tr>
<td>Formative Assessment digital tools (optional):</td>
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<tr>
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<tr>
<td>DotStorming</td>
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<tr>
<td>Peardeck</td>
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<td>Nearpod</td>
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<tr>
<td>Quizizz</td>
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</table>

**Instructional Adjustments:**

*Modifications/Student difficulties/Common errors*

- Emphasize note taking strategies
- Note cards for vocabulary
- Reword problems
- Guided notes
- Graphic organizers
- Peer editing/feedback
- Use models/manipulatives
- Review common errors
- Find and Fix the error strategy
- Problem Based Learning strategies
- Question Formulation Techniques
## UNIT 6: ANGLE RELATIONSHIPS

### Essential Questions
- How do geometric properties and logical reasoning prove and make conclusions about relationships in geometry?

### Enduring Understandings
- Properties of parallel lines and triangles justify mathematically the relationships in geometry.

### Core Content

<table>
<thead>
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<tr>
<td>● Discover the sum of three interior angles in a triangle.</td>
<td>8.EE.6 (Major Standard) Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation ( y = mx ) for a line through the origin and the equation ( y = mx + b ) for a line intercepting the vertical axis at b.</td>
<td>Explore 6.4 Explore 6.5 Explore</td>
<td></td>
</tr>
<tr>
<td>● Determine the relationship between interior and exterior angles of a triangle.</td>
<td></td>
<td>Teacher Gems Ticket Time 6.1 &lt;br&gt;MATHIO 6.2 Activities 6.3 &lt;br&gt;Partner Math 6.4 Activities 6.5</td>
<td></td>
</tr>
<tr>
<td>● Determine if two triangles are similar using slope and finding missing side lengths.</td>
<td></td>
<td>Rich Tasks Unit 6 &lt;br&gt;Tic-Tac-Toe Unit 6</td>
<td></td>
</tr>
</tbody>
</table>

### Assessment Check Points:
- **Target Tracker** (Self-Assessment) Tracker for students to use to chart progress throughout unit (6.1-6.5)
- **Exit Card** (Formative) Small "quiz" used to determine base level of proficiency to guide planning. (6.1-6.5)
- **Gem Challenge** (Formative or Summative) Online standards based items for use after standard has been covered (6.5)
- **Performance Task** (Formative or Summative) Multi-step and multi-standard strategic thinking task (6.3,6.5)
- **Tiered Assessments** (Summative) Unit assessment
<table>
<thead>
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<th><strong>Foundations of Algebra Grade 8</strong></th>
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<td>Unit assessment (selected and constructed response items) at the proficient level. (6.5)</td>
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</table>

**PARCC Practice Problems**

**Formative Assessment digital tools (optional):**
- Edpuzzle
- Socrative
- DotStorming
- Peardeck
- Nearpod
- Quizizz

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<td>- Problem Based Learning strategies</td>
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<td>- Question Formulation Techniques</td>
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</table>

**Quizizz**

**Nearpod**
## UNIT 7: TRANSFORMATIONS

### Essential Questions
- Do performing transformations on figures change the shape or size of the original figure?
- How does performing transformations to a figure on a coordinate plane affect the coordinates?

### Enduring Understandings
- Translations, Reflections, and Rotations do not change the shape or size of a figure. Dilating a figure does affect the size but not the shape of a figure.
- A rule can be written when a figure is transformed on a coordinate plane which is written as an ordered pair.

### Core Content

<table>
<thead>
<tr>
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<th>Resources – (Technology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform transformations on points and polygons.</td>
<td>8.G.1 (Major Standard) Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.</td>
<td>Recommend Activities/Strategies: Lesson Guide 7.1 Lesson Guide 7.2 Lesson Guide 7.3 Lesson Guide 7.4 Lesson Guide 7.5 Explore 7.2 Explore 7.4 Explore Teacher Gems Ticket Time 7.1 MATHO 7.2 Always, Sometimes, Never 7.3 Activities 7.4 Activities 7.5 Rich Tasks Unit 7 Tic-Tac-Toe Unit 7 Performance Tasks Unit 7 - use after 7.4 and 7.5</td>
<td>Target Tracker (Self-Assessment) Tracker for students to use to chart progress throughout unit.(7.1-7.5) Exit Card (Formative) Small &quot;quiz&quot; used to determine base level of proficiency to guide planning. (7.1-7.5) Gem Challenge (Formative or Summative) Online standards based items for use after standard has been covered.(7.4,7.5) Performance Task (Formative or Summative) Multi-step and multi-standard strategic thinking task. (7.4,7.5) Tiered Assessments (Summative) Unit assessment</td>
</tr>
</tbody>
</table>
two dimensional figures using coordinates.

**8.G.4 (Major Standard)**
Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

**Assessments (Summative)**
Unit assessment (selected and constructed response items) at the proficient level. (7.5)

**PARCC Practice Problems**

**Formative Assessment digital tools (optional):**
- Edpuzzle
- Socrative
- DotStorming
- Peardeck
- Nearpod
- Quizizz

**Instructional Adjustments:**
*Modifications/Student difficulties/Common errors*
- Emphasize note taking strategies
- Note cards for vocabulary
- Reword problems
- Guided notes
- Graphic organizers
- Peer editing/feedback
- Use models/manipulatives
- Review common errors
- Find and Fix the error strategy
- Problem Based Learning strategies
- Question Formulation Techniques
## UNIT 8: EXPONENT PROPERTIES

### Essential Questions
- What properties can be used to simplify expressions containing exponents?
- How do you compute expressions involving numbers written in scientific notation?

### Enduring Understandings
- The properties of exponents can be used to simplify expressions with exponents.
- Use the properties of exponents along with basic numerical operations to compute the answer.

### Core Content

#### Objectives:
- Learn properties of exponents and create equivalent expressions.
- Convert standard numbers to scientific notation and vice versa.
- Understand and apply scientific notation to simplify problems and problem solve.

#### Alignment to NJSLS: 8th Grade NJSLS Math
- **8.EE.1 (Major Standard)**
  - Know and apply the properties of integer exponents to generate equivalent numerical expressions.
- **8.EE.3 (Major Standard)**
  - Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.
- **8.EE.4 (Major Standard)**
  - Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

#### Instructional Actions

- **Recommend Activities/Strategies:**
  - Lesson Guide 8.1
  - Lesson Guide 8.2
  - Lesson Guide 8.3
  - Lesson Guide 8.4
  - Explore
    - 8.1 Explore
    - 8.2 Explore
    - 8.4 Explore
  - Teacher Gems
    - Ticket Time 8.1
    - Activities 8.2
    - Always, Sometimes, Never 8.3
    - Activities 8.4
  - Rich Tasks Unit 8
  - Tic-Tac-Toe Unit 8
  - Performance Tasks Unit 8 - use after 8.2 and 8.4

- **Assessment Check Points:**
  - Target Tracker
    - (Self-Assessment) Tracker for students to use to chart progress throughout unit.(8.1-8.4)
  - Exit Card
    - (Formatative) Small “quiz” used to determine base level of proficiency to guide planning.(8.1-8.4)
  - Gem Challenge
    - (Formative or Summative) Online standards based items for use after standard has been covered.(8.2,8.4)
  - Performance Task
    - (Formative or Summative) Multi-step and multi-standard strategic thinking task.(8.2,8.4)
  - Tiered Assessments
    - (Summative) Unit assessment (selected and constructed response items) at the tiered level. (8.4)

#### Resources – (Technology)
- EdGems Math - Course 3
- Teacher Gems PD Overview
- http://www.socrative.com/
- www.kahoot.it
- www.shodor.org
- www.Insidemathematics.org
- www.xyzsolve.com
- www.ck12.org
- www.mathjong.com
- Pear Deck
- Socrative
- Edpuzzle
- Quizizz
### Assessments (Summative)
Unit assessment (selected and constructed response items) at the proficient level. (8.4)

### PARCC Practice Problems

### Formative Assessment digital tools (optional):
- Edpuzzle
- Socrative
- DotStorming
- Peardeck
- Nearpod
- Quizizz

### Instructional Adjustments:

#### Modifications/Student difficulties/Common errors
- Emphasize note taking strategies
- Note cards for vocabulary
- Reword problems
- Guided notes
- Graphic organizers
- Peer editing/feedback
- Use models/manipulatives
- Review common errors
- Find and Fix the error strategy
- Problem Based Learning strategies
- Question Formulation Techniques
## Essential Questions

- How do you find the volume of cones, cylinders, or spheres?
- How do you find missing dimensions given the volume for cones, cylinders, or spheres?

## Enduring Understandings

- Use the appropriate volume formula, substitute in the given values, and solve for the volume.
- Use the appropriate volume formula, substitute in the given values, and solve for the missing dimension.

<table>
<thead>
<tr>
<th>Core Content</th>
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<th>Resources – (Technology)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives:</strong> Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.</td>
<td><strong>Alignment to NJSLS:</strong> 8th Grade NJSLS Math</td>
<td><strong>Recommend Activities/Strategies:</strong></td>
</tr>
</tbody>
</table>
| 8.G.9 (Additional Standard) Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. | Lesson Guide 9.1  
Lesson Guide 9.2  
Lesson Guide 9.3  
Explore 9.2 Explore  
Teacher Gems  
Partner Math 9.1  
Climb the Ladder 9.2  
Masterpiece 9.3  
Rich Tasks Unit 9  
Tic-Tac-Toe Unit 9  
Performance Tasks Unit 9 - use after 9.2 and 9.3 | **Assessment Check Points:**  
Target Tracker (Self-Assessment) Tracker for students to use to chart progress throughout unit. (9.1-9.3)  
Exit Card (Formative) Small “quiz” used to determine base level of proficiency to guide planning. (9.1-9.3)  
Gem Challenge (Formative or Summative) Online standards based items for use after standard has been covered. (9.3)  
Performance Task (Formative or Summative) Multi-step and multi-standard strategic thinking task. (9.2,9.3)  
Tiered Assessments (Summative) Unit | **Resources – (Technology):**  
EdGems Math - Course 3  
Teacher Gems PD Overview  
PARCC | Home - Pearson  
Illuminations  
Desmos | Beautiful, Free Math  
inside mathematics - a professional resource for educators /  
Khan Academy  
Edpuzzle  
Quizizz |
### Assessments

- (Summative) Unit assessment (selected and constructed response items) at the proficient level. (9.3)

### PARCC Practice Problems

### Formative Assessment Tools:
- Nearpod
- Socrative
- Pear Deck

### Instructional Adjustments:

**Modifications/Student difficulties/Common errors**
- Emphasize note taking strategies
- Note cards for vocabulary
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- Peer editing/feedback
- Use models/manipulatives
- Review common errors
- Find and Fix the error strategy
- Problem Based Learning strategies
- Question Formulation Techniques
## Essential Questions

- How is bivariate useful when solving real world problems?
- What methods can be used to interpret bivariate data?

## Enduring Understandings

- Bivariate data allows one to investigate patterns between two quantities and determine the relationship, if any, using graphs and tables.
- Bivariate data can be interpreted by using scatter plots, linear models, and two-way tables.

## Core Content

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>8.SP.1 (Supporting Standard) Create scatter plots to show bivariate data. Investigate patterns of association in bivariate data. Find the equations for lines of best fit. Use equations of linear models to solve problems in real-world context. Find relative and conditional frequencies in two-way tables.</td>
<td>Lesson Guide 10.1 Explore 10.1 Explore 10.2 Explore 10.3 Explore 10.4 Explore</td>
<td>Target Tracker (Self-Assessment) Tracker for students to use to chart progress throughout unit.(10.1-10.4) Exit Card (Formative) Small &quot;quiz&quot; used to determine base level of proficiency to guide planning. (10.1-10.4) Gem Challenge (Formative or Summative) Online standards based items for use after standard has been covered.(10.2-10.4) Performance Task (Formative or Summative) Multi-step and multi-standard strategic thinking task. (10.3,10.4) Tiered Assessments (Summative) Unit</td>
<td>EdGems Math - Course 3 Teacher Gems PD Overview PARCC</td>
</tr>
</tbody>
</table>
**8.SP.4 (Supporting Standard)**
Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.

**Assessments**
(10.4) Assessments (Summative) Unit assessment (selected and constructed response items) at the tiered level. (10.4)
PARCC Practice Problems
Kahoot - bivariate data

**Formative Assessment Tools:**
- Nearpod
- Socrative
- Pear Deck

**Instructional Adjustments:**
*Modifications/Student difficulties/Common errors*
- Emphasize note taking strategies
- Note cards for vocabulary
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