

Glen Ridge Public Schools – Mathematics Curriculum

Course Title: Pre- Algebra 7

Subject: Mathematics

Grade Level: 7th Grade

Duration: One Academic Year

Prerequisite: Math 6

Elective or Required: Required Content Course

Mathematics Mission Statement

Mathematics is an integral part of our lives. Students must be actively involved in their mathematics education through the use of modeling and demonstrating the ability to persevere through problem solving. The mathematics curricula will emphasize critical thinking skills through a balance of logic and reasoning, attention to precision by utilizing patterns and structure, and bridging these ideas to cross-curricular learning. Students will be engaged and challenged in a student-centered learning environment that is developmentally appropriate and will communicate mathematical ideas, both in a verbal and written form. Through effectively applying hands-on manipulatives, basic computation skills and the use of technical writing to justify their processes, students will critique the work of themselves and others.

Course Description:

Pre-Algebra 7 students will develop fundamental mathematical ideas and methods through a student-centered based curricula. These methods provide a strong foundation in algebraic and geometric concepts. This course emphasizes problem solving strategies and applies the use of mental math and estimation to determine the validity of a solution. Concepts covered in this course include algebraic reasoning, number sense, numeric relationships, geometric properties, data analysis and statistical thinking.

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Date Submitted: Summer, 2017

Course Name: Pre-Algebra 7

Unit #1: Number Sense

Approximate # of Weeks: 5 Weeks

Essential Questions

- How are velocity and speed related?
 - Is the sum of two integers positive, negative, or zero? How can you tell?
 - How are adding and subtracting integers related?
 - Is the product/quotient of two integers positive, negative, or zero? How Can you tell?
 - How are multiplying and dividing integers related? Different?
 - How can you use a number line to order rational numbers?
 - How does adding and subtracting rational numbers compare with adding and subtracting integers?
 - How is multiplying and dividing rational numbers similar to multiplying and dividing integers?
 - How can you use inverse operations to solve an equation?

New Jersey Student Learning Standards

7.NS.1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

7.NS.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

7.NS.3: Solve real-world and mathematical problems involving the four operations with rational numbers.

7.EE.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

7.EE.2: Understand that rewriting an expression in different forms in a problem context can shed light of the problem and how the quantities in it are related.

7.EE.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as

appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

7.EE.4: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

Upon completion of this unit students will be able to:

- Use the order of operations to simplify numerical expressions (7.NS.1).
- Identify properties of rational numbers and use them to simplify numerical expressions (7.NS.1, 7.EE.2, 7.EE.3).
- Evaluate algebraic expressions (7.NS.1).
- Translate words into numbers, variables, and operations (7.EE.2, 7.EE.4).
- Simplify algebraic expressions (7.EE.1, 7.EE.4).
- Compare and order integers and determine absolute value (7.NS.1).
- Add integers (7.NS.1, 7.NS.3, 7.EE.3).
- Use additive inverses and absolute value in real-world situations (7.NS.1).
- Subtract Integers (7.NS.1).
- Multiply and divide integers (7.NS.2, 7.EE.2).
- Solve one-step equations with integers (7.NS.1, 7.EE.4).
- Write fractions as decimals and vice versa, and determine whether a decimal is terminating or repeating (7.NS.2, 7.NS.3).
- Compare and order fractions and decimals (7.NS.2, 7.NS.3).

Interdisciplinary Standards (NJCCCS.org)

Standard 9.1 - 21st-Century Life & Career Skills

Standard 8.1 - Computer and Information Literacy

Standard 8.2 - Technology Education

Activities/ Technology

- Numeric Property Group Presentation - Investigate & Share
- Finding Speed & Velocity using Real word Experiences and Applications
- Algebra Tile Operations Labs (Intro/Combining Like Terms, Addition, Subtraction, Multiplication & Division, Solving One-Step Equations)
- Human Rational Number Line
- Math Card War - One-Step Equations (Big Ideas Activity 3, page 77)
- Problem Solving/ Real-Life Applications
- Google Classroom
- Math XL

Enrichment Activities

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
Smart Board Lessons	Entry/ Exit Slips	Unit Quizzes	Think/Pair/Share
Calculator Labs	Thumbs Up/ Thumbs Down	Quarterly Assessments	Entry/ Exit Slips
Google Classroom Exit Slips	Dry Erase Boards	Unit Projects	Whiteboards
Online Quizzes	Think/Pair/Share		Classwork/ Homework
	Revisit Essential Questions (Objectives)		Real World Applications
			Manipulatives
			Open Ended Questions
			Verbal Assessment
			Rhetorical Questions
			Unit Projects
			Error Analysis
			Math Games

Resources/ Online Resources

- Teacher Webpage
- Math XL
- *Big Ideas Math Text*, Common Core Curriculum
- *On Core Mathematics*, Middle School Grade 7, Houghton Mifflin Harcourt
- Technology (See Appendix B):
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #2: Numeric Relationships

Approximate # of Weeks: 3 Weeks

Essential Questions

- How does adding and subtracting rational numbers compare with adding and subtracting integers?
- How does multiplying and dividing rational numbers compare with multiplying and dividing integers?
- How does solving one-step equations containing integers compare to solving one-step equations containing rational numbers?

New Jersey Student Learning Standards

7.NS.1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

7.NS.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

7.NS.3: Solve real-world and mathematical problems involving the four operations with rational numbers.

7.EE.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Upon completion of this unit students will be able to:

- Add and subtract decimals (7.NS.1, 7.NS.3).
- Multiply decimals (7.NS.1, 7.NS.2, 7.NS.3).
- Divide decimals by integers and integers by decimals (7.NS.2).
- Solve one-step equations that contain decimals (7.NS.2, 7.EE.4).
- Add and subtract fractions 7.NS.1, 7.NS.3).
- Multiply fractions and mixed numbers (7.NS.1, 7.NS.2, 7.NS.3).
- Divide fractions and mixed numbers (7.NS.2, 7.NS.3).
- Solve one-step equations that contain fractions (7.EE.4).

Interdisciplinary Standards (NJCCCS.org)

Standard 9.3 - Career Awareness, Exploration, and Preparation

Standard 8.2 - Technology Education

Standard 6.1 - U.S. History: America in the World

Activities/ Technology

- Math Card War - Rational Numbers
- Google Classroom
- I have who has- Rational Numbers
- Human Rational Number Line
- What is Your Answer? Puzzle
- Problem Solving/ Real-Life Applications
- Math XL

Enrichment Activities

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
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			Manipulatives
			Open Ended Questions
			Verbal Assessment
			Rhetorical Questions
			Unit Projects
			Error Analysis
			Math Games
			Notebook/ Binder Quiz

Resources/ Online Resources

- Teacher Webpage

- Math XL
- Big Ideas Math Text, Common Core Curriculum
- *On Core Mathematics, Middle School Grade 7, Houghton Mifflin Harcourt*
- Technology (See Appendix B):
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #3: Proportional Relationships

Approximate # of Weeks: 7 Weeks

Essential Questions

- How do you find and compare unit rates?
- How do rates help you describe real-life problems?
- How do you compare two rates graphically?
- How can proportions help you decide when things are fair?
- How can you use tables and equations to identify and describe proportional relationships?
- How can you write a proportion that solves a problem in real life?
- How can you use ratio tables and cross products to solve proportions in science?
- How can you use models to estimate percent questions?
- How do you use percents to solve problems?

New Jersey Student Learning Standards

7.RP.1: Compute unit rates associated with ratios of fraction, including ratios of lengths, areas and other quantities measured in like or different units.

7.RP.2: Recognize and represent proportional relationships between quantities.

7.RP.3: Use proportional relationships to solve multistep ratio and percent problems.

7.EE.2: Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

7.EE.4: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

7.G.1: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from scale drawing and reproducing a scale drawing at a different scale.

Upon completion of this unit students will be able to:

- Find and compare unit rates and unit price (7.RP.1, 7.RP.2).
- Find equivalent ratios and identify proportions (7.RP.2, 7.NS.3).
- Solve proportions using cross products (7. RP.1, 7.RP.2).
- Use ratios to determine if two figures are similar (7.RP.2, 7.NS.3).
- Use similar figures to find unknown measures (7.RP.2, 7.G.1).
- Understand ratios and proportions in scale drawings and use ratios and proportions with scale (7.NS.3, 7.G.1).
- Write decimals and fractions as percents (7.EE.3).
- Estimate percents (7.EE.3).
- Use properties of rational numbers to write expressions and equations (7.NS.1, 7.NS.2, 7.EE.2, 7.EE.3).
- Solve problems involving percent of change (7.RP.3, 7.EE.2, 7.EE.3).
- Find commission, sales tax, and percent of earnings (7.RP.3).
- Compute simple interest (7.RP.3)

Interdisciplinary Standards (NJCCCS.org)

Standard 9.3 - Career Awareness, Exploration, and Preparation

Standard 8.2 – Technology Education

Standard 9.1 21st-Century Life & Career Skills

Activities/ Technology

- Google Classroom
- Ratio Concentration
- Ratios TI-84 Lab
- Unit Rates TI-84 Lab
- Percent of Change TI-84 Lab
- Make Scale Drawings & Models Lab
- Use Scale Drawings Lab
- Comparing Unit Rates
- Determining Fairness
- Problem Solving Connections: Car or Motorcycle?
- Solving a Proportion in Science
- The Game of Criss Cross
- Communicator Percent Activity
- Percent Dominos Game

- Fraction Dominos
- The National Debt
- Percents of Increase or Decrease Review Gam
- Problem Solving/ Real-Life Applications
- Math XL

Enrichment Activities

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation

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Google Classroom Exit Slips	Dry Erase Boards	Unit Projects	Whiteboards
Online Quizzes	Think/Pair/Share		Classwork/ Homework
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			Manipulatives
			Open Ended Questions
			Verbal Assessment

Rhetorical
Questions

Unit Projects

Error Analysis

Math Games

Notebook/ Binder
Quiz

Resources/ Online Resources

- Teacher Webpage
- Math XL
- Big Ideas Math Text, Common Core Curriculum
- *On Core Mathematics, Middle School Grade 7, Houghton Mifflin Harcourt*
- Technology (See Appendix B):
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #4: Statistics & Probability

Approximate # of Weeks: 4 Weeks

Essential Questions

- How can you use graphs to represent and analyze proportional relationships?
- How do you use a survey to make conclusions about the general population?
- How can you predict the results of spinning a spinner?
- How can you find a theoretical probability? Experimental probability?
- What are the differences/similarities between theoretical and experimental probabilities?
- What is the difference between independent and dependent events?
- How do you find the probability of a compound event?

New Jersey Student Learning Standards

7.SP.1: Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are

valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

7.SP.2: Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

7.SP.3: Informally assess the degree of visual overlap of the two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.

7.SP.4: Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

7.SP.5: Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $1/2$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

7.SP.6: Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.

7.SP.7: Develop a probability model and use it to find probabilities of events. Compare probabilities from a model observed to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

7.SP.8: Find probabilities of compound events using organized lists, tables, tree diagrams, and simulations.

Upon completion of this unit students will be able to:

- Find the mean, median, mode and range of a data set (7.SP.4).
- Display and analyze data in box-&-whisker plots (7.SP.2, 7.SP.3, 7.SP.4).
- Compare and analyze sampling methods (7.SP.1).
- Use informal measures of probabilities (7.SP.5).
- Find experimental probability (7.SP.6, 7.SP.7).
- Use counting methods to determine possible outcomes (7.SP.8).
- Find the theoretical probability of an event (7.SP.6, 7.SP.8).
- Use probability to predict events (7.SP.6, 7.SP.6, 7.SP.8).

- Find the probability of independent and dependent events (7.SP.8).
- Find probabilities of compound events (7.SP.8).

Interdisciplinary Standards (NJCCCS.org)

Standard 9.3 - Career Awareness, Exploration, and Preparation

Standard 8.2 - Technology Education

Standard 9.1 21st - Century Life & Career Skills

Standard 6.3 - Active Citizenship in the 21st Century

Standard 8.1 - Computer and Information Literacy

Activities/ Technology

- Google Classroom
- Mean Solitaire
- GPA
- Explore Box-and-Whisker Plots Lab
- Box-and-Whisker Plot TI-84 Lab
- Explore Samples Lab
- Use Random Samples Lab
- Conduct a Surve
- Using Samples to Compare Populations
- Motivate Spinner Activity
- Experimental & Theoretical Probability Lab
- M&M Lab
- Rolling Number Cubes TI-84 Lab
- Dependent/Independent Events
- Problem Solving/ Real-Life Applications
- Math XL

Enrichment Activities

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
Smart Board Lessons	Entry/ Exit Slips	Unit Quizzes	Think/Pair/Share
Calculator Labs	Thumbs Up/ Thumbs Down	Quarterly Assessments	Entry/ Exit Slips
Google Classroom Exit Slips	Dry Erase Boards	Unit Projects	Whiteboards
Online Quizzes	Think/Pair/Share		Classwork/ Homework
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			Manipulatives
			Open Ended Questions
			Verbal Assessment
			Rhetorical Questions
			Unit Projects
			Error Analysis
			Math Games
			Notebook/ Binder Quiz

Resources/ Online Resources

- Teacher Webpage

- Math XL
- Big Ideas Math Text, Common Core Curriculum
- *On Core Mathematics, Middle School Grade 7, Houghton Mifflin Harcourt*
- Technology (See Appendix B):
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #5: Geometric Properties

Approximate # of Weeks: 7 Weeks

Essential Questions

- How can you draw shapes that satisfy given conditions?
- How can you identify cross sections of three-dimensional figures?
- How can you use angle pairs to solve problems?
- How do you find the circumference of a circle?
- How do you find the area of a circle?
- How do you find the area of composite figures?
- How do you find the surface area of a figure made of prisms?
- How can you use a net to find the surface area of a prism? Cylinder?
- How do you find the volume of a figure made up of cubes and prisms?
- How can you write a proportion that solves a problem in real life?

New Jersey Student Learning Standards

7.RP.2: Recognize and represent proportional relationships between quantities.

7.RP.3: Use proportional relationships to solve multistep ratio and percent problems.

7.G.2: Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

7.G.3: Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

7.G.4: Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

7.G.5: Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

7.G.6: Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.

Upon completion of this unit students will be able to:

- Identify and describe geometric figures.
- Identify angles and angle pairs (7.G.5).
- Find the measures of angles in polygons (7.RP.2, 7.G.5).
- Identify congruent figures and use congruence to solve problems (7.G.2).
- Find the perimeter of a polygon and the circumference of a circle (7.RP.3, 7.G.4).
- Find the area of circles (7.G.4).
- Understand ratios and proportions in scale drawings and use ratios and proportions with scale (7.NS.3, 7.G.1).
- Find the area of irregular figures (7.G.6).
- Identify various three-dimensional figures and sketch and describe cross-sections of three-dimensional figures (7.G.3).
- Find the volume of prisms and cylinders (7.G.6).
- Find the surface area of prisms and cylinders (7.G.6).

Interdisciplinary Standards (NJCCCS.org)

Standard 9.1 21st-Century Life & Career Skills
Standard 8.1 – Computer and Information Literacy
Standard 8.2 – Technology Education

Activities/ Technology

- Google Classroom
- Problem Solving Connections - Buying a Home
- Finding Surface Area
- Classifying Triangles TI-84 Lab
- Nets of Prisms TI-84 Lab
- Pythagorean Theorem TI-84 Lab
- Points, Lines & Angles

- Geometry Flash Cards
- Congruent Figures TI-84 Lab
- Construct Bisectors & Congruent Angles Lab
- Construct Triangles & Given Side Lengths Lab
- Construct Triangles with Given Angle Measures Lab
- Math XL

Enrichment Activities

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
Smart Board Lessons	Entry/ Exit Slips	Unit Quizzes	Think/Pair/Share
Calculator Labs	Thumbs Up/ Thumbs Down	Quarterly Assessments	Entry/ Exit Slips
Google Classroom Exit Slips	Dry Erase Boards	Unit Projects	Whiteboards
Online Quizzes	Think/Pair/Share		Classwork/ Homework
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			Open Ended Questions
			Verbal Assessment

Rhetorical
Questions

Unit Projects

Error Analysis

Math Games

Notebook/ Binder
Quiz

Resources/ Online Resources

- Teacher Webpage
- Math XL
- Big Ideas Math Text, Common Core Curriculum
- *On Core Mathematics, Middle School Grade 7, Houghton Mifflin Harcourt*
- Technology (See Appendix B):
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #6: Proportions and Similarity

Approximate # of Weeks: 2 Weeks

Essential Questions

- How do you use proportions to help make decisions in art, design and layouts?
- What information do you need to know to find the dimensions of a figure that is similar to another figure?
- How do you use proportions and similar figures to find unknown measures?
- How do changes in dimensions of similar geometric figure affect the perimeters and areas of the figures?
- How are similar figures applied in the real world?

New Jersey Student Learning Standards

7.G.1: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

7.EE.4: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

7.RP.2: Recognize and represent proportional relationships between quantities.

7.RP.3: Use proportional relationships to solve multistep ratio and percent problems.

Upon completion of this unit students will be able to:

- Determine if two geometric figures are proportional. (7.EE.4, 7.RP.3)
- Define similarity. (7.G.1, 7.RP.2, 7.RP.3)
- Identify the scale factor. (7.G.17.RP.2, 7.RP.3)
- Find unknown measures when given similar figures. (7.G.1, 7.RP.2, 7.RP.3)
- Determine and use the relationship of similar figures to find the area and perimeters. (7.G.1, 7.EE.4, 7.RP.2, 7.RP.3)
- Use scale in scale drawings and models as a real world context. (7.G.1, 7.EE.4, 7.RP.2)

Interdisciplinary Standards (NJCCCS.org)

Standard 9.3 - Career Awareness, Exploration, and Preparation

Standard 8.2 - Technology Education

Standard 9.1 21st - Century Life & Career Skills

Activities/ Technology

- Google Classroom
- Math XL
- Scale Map Activity

Enrichment Activities

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
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			Unit Projects
			Error Analysis
			Math Games
			Notebook/ Binder Quiz

Resources/ Online Resources

- Teacher Webpage

- Math XL
- Big Ideas Math Text, Common Core Curriculum
- *On Core Mathematics, Middle School Grade 7, Houghton Mifflin Harcourt*
- Technology (See Appendix B):
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #7: Equations & Inequalities

Approximate # of Weeks: 4 Weeks

Essential Questions

- How can you use ordered pairs to locate points in a coordinate plane?
- How do you add, subtract, factor and multiply algebraic expressions?
- How do you solve equations that contain multiple operations?
- In a two-step equation, which step should you do first?
- How do you solve inequalities that involve one operation?
- How do you solve inequalities that involve multiple operations?
- How do you solve problems by using expressions, equations, and inequalities?

New Jersey Student Learning Standards

7.EE.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

7.NS.1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

7.EE.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

7.EE.4: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

Upon completion of this unit students will be able to:

- Plot and identify ordered pairs in a coordinate plane.
- Relate graphs to situations.
- Determine the slope of a line and recognize constant and variable rates of change (7.RP.1, 7.RP.2).
- Identify, write and graph an equation of direct variation (7.RP.2, 7.NS.1).
- Solve two-step equations (7.EE.1).
- Solve multi-step equations (7.EE.1, 7.EE.4).
- Solve equations that have variables on both sides (7.EE.1, 7.EE.4).
- Compare algebraic and numeric solution methods (7.EE.4).
- Read and write inequalities and graph them on a number line.
- Solve one-step inequalities by adding or subtracting (7.EE.4).
- Solve one-step inequalities by multiplying or dividing (7.EE.4).
- Solve simple two-step inequalities (7.EE.4).

Interdisciplinary Standards (NJCCCS.org)

Standard 9.3 - Career Awareness, Exploration, and Preparation

Standard 8.1 - Computer and Information Literacy

Standard 8.2 - Technology Education

Activities/ Technology

- Google Classroom
- Plotting Points in a Coordinate Plane
- Real-Life Application Coordinate Plane
- Algebra Tiles Labs
- Problem Solving Connections - To Buy or not to buy?
- Tic-Tac-Five in a Row Game
- Coordinate Hangman
- Plotting Coordinate Pictures - Graph the Robot (superteacherworksheets.com)
- What's the Point? Game
- Math XL

Enrichment Activities

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
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			Unit Projects
			Error Analysis
			Math Games
			Notebook/ Binder Quiz

Resources/ Online Resources

- Teacher Webpage

- Math XL
- *Big Ideas Math Text*, Common Core Curriculum
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- Technology (See Appendix B):
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #8: Linear Functions

Approximate # of Weeks: 4 Weeks

Essential Questions

- What are the characteristics of direct variation? Inverse variation?
- How do you graph a linear function using a table?
- What do the variables in the equation $y = mx + b$ represent?
- How do you graph a function in slope-intercept form?
- How do you graph a function in standard form?
- How do you write a linear function?

Common Core Standards

7.RP.1: Compute unit rates associated with ratios of fraction, including ratios of lengths, areas and other quantities measured in like or different units.

7.RP.2: Recognize and represent proportional relationships between quantities.

8.EE.5: Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

8.EE.7: Solve linear equations in one variable.

a. 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 as equivalent equation of the form $x = a$, $a = a$, or $a = b$ results.

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

8.F.3: 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.

8.F.4: 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.

8.F.5: 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.

Upon completion of this unit students will be able to:

- Identify direct and inverse variation from a set of ordered pair, table of values or a graph. (7.RP.1, 7.RP.2, 8.EE.5)
- Graph a linear function using a table. (8.F.4, 8.F.5)
- Graph linear functions in slope-intercept form, standard form and point-slope form. (8.EE.5, 8.EE.7, 8.F.3, 8.F.4)
- Interpret the equation of a line. (8.F.3, 8.F.4)
- Rewrite linear equations in slope-intercept form, standard form and point-slope form. (8.F.5)

Interdisciplinary Standards (NJCCCS.org)

Standard 9.3 - Career Awareness, Exploration, and Preparation

Standard 8.2 - Technology Education

Standard 9.1 21st - Century Life & Career Skills

Activities/ Technology

- Google Classroom
- Points Lining Up Activity
- What's My Line? Game
- Equation of a Line TI-84 Lab
- Math XL

Enrichment Activities

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets

- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
Smart Board Lessons	Entry/ Exit Slips	Unit Quizzes	Think/Pair/Share
Calculator Labs	Thumbs Up/ Thumbs Down	Quarterly Assessments	Entry/ Exit Slips
Google Classroom Exit Slips	Dry Erase Boards	Unit Projects	Whiteboards
Online Quizzes	Think/Pair/Share		Classwork/ Homework
	Revisit Essential Questions (Objectives)		Real World Applications
			Manipulatives
			Open Ended Questions
			Verbal Assessment
			Rhetorical Questions
			Unit Projects
			Error Analysis
			Math Games
			Notebook/ Binder Quiz

Resources/ Online Resources

- Teacher Webpage
- Math XL
- *Big Ideas Math Text*, Common Core Curriculum
- *On Core Mathematics*, Middle School Grade 7, Houghton Mifflin Harcourt
- Technology (See Appendix B):
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Appendix A: Course Sequence

Marking Period 1

Unit 1: Number Sense

Unit 1A: Algebraic Reasoning *(2 weeks)*

Order of Operations
Properties of Numbers
Variables and Algebraic Expressions
Translating Words into Math
Simplifying Algebraic Expressions
EXT Rational Numbers & the Number Line

Unit 1B: Integers & Rational Numbers *(2 weeks)*

Integers
Adding Integers
EXT Additive Inverse & Absolute Value
Subtracting Integers
Multiplying & Dividing Integers

Unit 1C: Integers & Rational Numbers *(1 week)*

Solving Equations Containing Integers
(one & two step equations)

Unit 2: Numeric Relationships *(3 weeks)*

Equivalent Fractions and Decimals
Comparing & Ordering Rational Numbers
Adding & Subtracting Decimals
Adding & Subtracting Fractions

Multiplying Decimals, Fractions, & Mixed Numbers
Dividing Decimals, Fractions, & Mixed Numbers
Solving Equations Containing Decimals & Fractions

Marking Period 2

Unit 3: Proportional Relationships

Unit 3A: Proportional Relationships (2 weeks)

The Coordinate Plane
Slope
Ratios & Rates
Identifying & Writing Proportions
Writing & Solving Proportions

Unit 3B: Percents (2 weeks)

Converting Between Fractions, Decimals & Percents
Estimating Percents
Modeling Percents

Unit 3C: Applications of Percents (3 weeks)

Percents of Change
Discounts & Markups
Simple Interest

Unit 4: Statistics & Probability

Unit 4A: Collecting, Displaying, and Analyzing Data (2 weeks)

Measures of Central Tendency
Relative Frequencies
Box-and-Whisker Plots
Populations & Samples
Mean Absolute Deviation

Marking Period 3

Unit 4B: Probability (2 weeks)

Probability & Sample Spaces
Theoretical Probability & Making Predictions
Experimental Probability
Probability of Independent & Dependent Events

Unit 5: Geometric Properties

Unit 5A: Geometric Figures (2 weeks)

- Building Blocks of Geometry
- Classifying Angles
- Line & Angle Relationships
- Triangle Constructions
- Angles in Polygons
- Congruent Figures

Unit 5B: Measurement and Geometry (1 week)

- Perimeter & Circumference
- Area of Circles & Polygons
- Area of Irregular Figures (Composite Figures)

Unit 5C: Volume & Surface Area of 3D Figures (2 weeks)

- Introductions to 3D Figures & Cross Sections
- Surface Area of Prisms & Cylinders
- Volume of Prisms & Cylinders
- Composite Volume and Surface Areas

Unit 6: Proportions and Similarity (2 weeks)

- Identifying Similar Figures
- Finding Unknown Measures of Similar Figures
- Indirect Measurements
- Perimeter & Area of Similar Figures
- Scale Drawing & Models

Marking Period 4

Unit 7: Equations & Inequalities

Unit 7A: Solving Equations (2 weeks)

- Solving One & Two-Step Equations
- Solving Multi-step Equations
- Solving Equations with Variables on Both Sides
- Rewriting Equations & Formulas
(Literal Equations)

Unit 7B: Solving Inequalities (2 weeks)

- Introduction to Inequalities
- Solving One-Step Inequalities

Solving Multi-Step Inequalities

Unit 8: Linear Functions (8th grade concepts)

Unit 8A: Direct & Inverse Variation (1 week)

Direct Variation

Inverse Variation

Unit 8B: Graphing Linear Functions (2 weeks)

Graphing Using a Table (& Coordinate Plane Review)

Slope of a Line

Slope-Intercept Form

Standard Form

Unit 8C: Writing Linear Functions (1 week)

Writing the Equations of a Line in Slope-Intercept Form

Point-Slope Form

Appendix B: Selected Websites

Website Title	Description	URL
Illustrative Mathematics	Concept tasks divided by domain and substandard.	https://www.illustrativemathematics.org/
Khan Academy	A forum that allows a class to be set-up and progress through a content missions to be monitored.	http://www.khanacademy.org
Virtual Nerd	Video tutorials on mathematics concepts.	http://www.virtual
Math Bits	A website that offers lessons and activities that are challenging in secondary mathematics and computer programming.	http://www.mathbits.com/

Shodor	A national resource for computational science education.	http://www.shodor.org/interactivate/activities
Illuminations by NCTM	Activities developed by standard created by the National Council of Teachers of Mathematics.	http://illuminations.nctm.org/Activities.aspx?grade=all
Engage NY	Common core curriculum and applications by grade level.	https://www.engageny.org/resource/grade-7-mathematics https://www.engageny.org/resource/grade-8-mathematics
Brain Pop	Video clips and quizzes on various elementary and middle school concepts.	http://www.brainpop.com/
Quia	A website that allows the teacher to create or search for educational games.	http://www.quia.com/
Desmos	A virtual calculator and graphing tool.	http://www.desmos.com/
Super Teacher Tools	Website that offers tools for teachers such as random name chooser, group makers, seating charts, timers, jeopardy, who wants to be a millionaire, plus other flash games to use for review, plus search pre-made review games to use in the classroom.	http://www.superteachertools.com
Math Open Reference	Website that offers animation of many geometric constructions.	http://www.mathopenref.com/constructions.html

Kahoot

An interactive game site that allows you to search and create a competitive computer engaged game based on specific content.

<http://www.kahoot.com>