# Fair Lawn
## Public Schools
### Fair Lawn, NJ

# 6th Grade Math

The 6th grade Mathematics course has been designed for the regular math student and is aligned with the Grade 6 Student Learning Standards.

**Adopted August**

# 2017

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**Developed August 2013**

# Math 6

# Fair Lawn School District

## Committee Credits
## Grade 6 Math Team

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**Spring 2015**

# Math 6

## I. Course Synopsis

In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

Throughout the course, mathematical concepts will be taught with an emphasis on enduring understandings, essential questions, real-world application, technology, and cross-curricular interaction.

## II. Philosophy & Rationale

The purpose of the math curriculum for the sixth grade class is to integrate communication and mathematics by providing opportunities for students to use reading, writing, and speaking as tools for learning mathematics. Students who complete the sixth grade curriculum will have acquired the necessary skills to solve problems, to reason inductively and deductively, and to apply the concepts necessary to function according to their needs in a technological society.

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).

**MATH.PRACTICE.MP1 - Make sense of problems and persevere in solving them.**
Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic

expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

**MATH.PRACTICE.MP2 - Reason abstractly and quantitatively.**
Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

**MATH.PRACTICE.MP3 - Construct viable arguments and critique the reasoning of others.**
Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

**MATH.PRACTICE.MP4 - Model with mathematics.**
Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply

proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

**MATH.PRACTICE.MP5 - Use appropriate tools strategically.**
Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

**MATH.PRACTICE.MP6 - Attend to precision.**
Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

**MATH.PRACTICE.MP7 - Look for and make use of structure.**
Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see $7 \times 8$ equals the well-remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older

students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers $x$ and $y$.

**MATH.PRACTICE.MP8 - Look for and express regularity in repeated reasoning.**
Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

## III. Scope & Sequence

**Unit 1: Number Properties and Decimals (4 Weeks):**
Properties of Operations
Order of Operations
Understanding Decimals
Adding and Subtracting Decimals
Multiplying Decimals
Dividing Decimals

**Unit 2: Expressions and Equations (5 Weeks):**
Variables and Expressions
Writing Algebraic Expressions
Solving One-Step Equations (Addition, Subtraction, Multiplication, Division)
Writing Equations to solve problems

**Unit 3: Number Theory (5 Weeks):**
Divisibility Rules
Exponents
Prime Numbers and Prime Factorization
Greatest Common Factor
Least Common Multiple
Distributive Property
Simplifying Algebraic Expressions

**Unit 4: Fraction Operations (4 Weeks):**
Multiplying Fractions and Mixed Numbers
Modeling Fraction Division
Dividing Fractions and Mixed Numbers
Equations with Fractions

**Unit 5: Ratios and Percents (5 Weeks):**
Ratios
Unit Rates
Equivalent Ratios and Rates
Using Ratios to Convert Measurement Units
Understanding Percents
Percents, Decimals, Fractions
Finding the Percent of a Number
Finding the Whole

**Unit 6: Integers and Rational Numbers (4 Weeks):**
Exploring Integers
Comparing and Ordering Integers
Integer Operations
Rational Numbers
Comparing and Ordering Rational Numbers
Inequalities
Solving One Step-Inequalities

**Unit 7: The Coordinate Plane (3 Weeks):**
Points in the Coordinate Plane
Polygons in the Coordinate Plane
Functions
Graphing Functions
Functions in the Real World

**Unit 8: Geometry and Measurement (See Dynamic Math Curriculum):**
Areas of Parallelograms and Triangles
Areas of Polygons
Three-Dimensional Figures and Spatial Reasoning
Surface Area of Prisms and Pyramids
Volumes of Rectangular Prisms

**Unit 9: Data and Graphs (See Dynamic Math Curriculum):**
Finding the Mean
Median and Mode
Frequency Tables and Dot Plots
Box and Whisker Plots
Histograms
Variability of Data
Shape of Distributions
Statistical Questions

## IV. Unit Descriptions

**Unit 1: Number Properties and Decimals**
Enduring Understandings
1.  When computing with decimals, lining up the decimal points ensures the proper place value of the numbers.
2.  Multiply decimals as if they were whole numbers, count the number of digits to the right of the decimal point in each factor; then move the decimal point that many places to the left of the product.
3.  If a divisor is a decimal, move the decimal point to the right to make it whole number; next move the decimal point in the dividend to the right the same number of places; then divide the decimals as if they were whole numbers; finally, move the decimal point from its new location in the dividend into the quotient.
4.  Order of operations is a sequence for performing arithmetic operations so that any mathematical expression will always have the same value.

Essential Questions
1.  What is the order in which operations must be performed?
2.  Why is the placement of decimal points important when computing with decimals?
3.  How can the proper place value be maintained when multiplying decimals?
4.  What steps are used to divide decimals?

Learning Objectives
Students will be able to:
1.  Understand and use the properties of operations.
2.  Use the order of operations to simplify expressions and solve problems.
3.  Read, write and round decimals.
4.  Add and subtract decimals.
5.  Multiply and divide decimals.
6.  Solve problems involving decimals.

New Jersey Student Learning Standards
- **6.NS.2.** – Fluently divide multi-digit numbers using the standard algorithm.
- **6.NS.3.** – Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
- **6.EE.A2.B** – Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.
- **6.EE.A2.C** – Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when

there are no parentheses to specify a particular order (Order of Operations).
**6.EE.A.3** – Apply the properties of operations to generate equivalent expressions.

Suggested Activities/Modifications
*Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:*

1. Activities
    a. Practice/review games
    b. Review Stations
    c. Two quizzes and one test
    d. PARCC Practice
2. English Language Learners.
    a. Read written instructions.
    b. Students may be provided with note organizers / study guides to reinforce key topics.
    c. Model and provide examples
    d. Extended time on assessments when needed.
    e. Establish a non-verbal cue to redirect student when not on task.
    f. Students may use a bilingual dictionary.
3. Special Education/504 Students.
    a. Students may be provided with note organizers / study guides to reinforce key topics.
    b. Extended time on assessments when needed.
    c. Preferred seating to be determined by student and teacher.
    d. Provide modified assessments when necessary.
    e. Student may complete assessments in alternate setting when requested.
    f. Establish a non-verbal cue to redirect student when not on task.
    g. Maintain strong teacher / parent communication.
4. Gifted and Talented Students.
    a. Distributive Property
    b. Order of operations including exponents
    c. Multiplying decimal expressions with three factors
    d. Provide enrichment activities to expand upon the curriculum.
    e. Use higher level questioning techniques in class and on assessments.

New Jersey Student Learning Standards - Technology
- 8.1.8.A.2 Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
- 8.1.8.A.3 Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results.
- 8.2.8.A.4 Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.

Career Readiness Practices
- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.

NJSLS 9.2 - Career Awareness, Exploration, and Preparation
- 9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

**Unit 2: Expressions and Equations**
Enduring Understanding
1. A variable is a letter that represents an unknown number.
2. To translate a word expression into a mathematical expression, operations must be identified by their keywords.
3. Evaluate an expression with a variable or symbols by substituting the given number for the variable or symbol; then follow the order of operations.
4. Solve an equation by isolating the variable on one side of the equal sign by applying inverse operations.  The solution can be checked by substituting it into the original equation to see that it makes a true statement.

Essential Question(s)
1. What is an expression?
2. What is an equation?
3. What is a variable?
4. How can a word phrase be translated into a mathematical expression and vice versa?
5. What are the steps for evaluating an expression?
6. What are the steps for solving an equation?
7. What are inverse operations?

Learning Objectives
Students will be able to:
1. Evaluate algebraic expressions.
2. Write algebraic expressions and use them to solve problems.
3. Solve one-step equations using addition, subtraction, multiplication, or division.

New Jersey Student Learning Standards
- **6.EE.A.2** – Write, read, and evaluate expressions in which letters stand for numbers.
- **6.EE.A2.A** – Write expressions that record operations with numbers and with letters standing for numbers.
- **6.EE.A2.B** – Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.
- **6.EE.A2.C** – Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
- **6.EE.B.5** – Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- **6.EE.B.6** – Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
- **6.EE.B.7** – Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which $p$, $q$ and $x$ are all nonnegative rational numbers.

Suggested Activities/Modifications
*Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:*
1. Activities
   a. Practice/review games
   b. Scavenger Hunt
   c. Modeling Expressions/Equations with Algebra Tiles
   d. Three quizzes and one test
   e. PARCC Practice
2. English Language Learners.
   a. Read written instructions.
   b. Students may be provided with note organizers / study guides to reinforce key topics.
   c. Model and provide examples
   d. Extended time on assessments when needed.
   e. Establish a non-verbal cue to redirect student when not on task.
   f. Students may use a bilingual dictionary.
3. Special Education/504 Students.

      a. Students may be provided with note organizers / study guides to reinforce key topics.

      b. Extended time on assessments when needed.

      c. Preferred seating to be determined by student and teacher.

      d. Provide modified assessments when necessary.

      e. Student may complete assessments in alternate setting when requested.

      f. Establish a non-verbal cue to redirect student when not on task.

      g. Maintain strong teacher / parent communication.

4. Gifted and Talented Students.

      a. Write algebraic expressions for everyday situations.

      b. Solve two step equations.

      c. Provide enrichment activities to expand upon the curriculum.

      d. Use higher level questioning techniques in class and on assessments.

## New Jersey Student Learning Standards - Technology

- 8.1.8.A.2 Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
- 8.1.8.A.3 Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results.
- 8.2.8.A.4 Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.

## Career Readiness Practices

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.

## NJSLS 9.2 - Career Awareness, Exploration, and Preparation

- 9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

**Unit 3: Number Theory**

Enduring Understanding

1. An inequality is another way to describe a relationship between expressions; instead of showing that the values of two expressions are equal, inequalities indicate that the value of

one expression is greater than (or greater than or equal to) the value of the other expression.

2. The properties of equality are used to solve inequalities.
3. In solving an inequality, multiplying or dividing both expressions by a negative number reverses the sign that indicates the relationship between the two expressions.
4. A number line shows that there are an infinite number of solutions to an inequality.

Essential Question(s)

1. What are the divisibility tests for 2, 3, 5, 9 and 10?
2. What are the steps for evaluating a base raised to an exponent?
3. What is the prime factorization of a number?
4. What is a factor?
5. What are common factors and what is the greatest common factor (GCF)?
6. What is a multiple?
7. What are common multiples and what is the least common multiple (LCM)?
8. How is the Distributive Property used to simplify expressions or used to factor?
9. What are like terms?
10. What are the steps used to simplify expressions?

Learning Objectives

Students will be able to:
1. Check for divisibility using mental math and use divisibility to solve problems.
2. Use exponents and to simplify expressions with exponents.
3. Factor numbers and find the prime factorization of numbers.
4. Find the GCF of two or more numbers.
5. Find the LCM of two or more numbers.
6. Use the distributive property to simplify expressions in problem solving situations.
7. Simplify algebraic expressions.

New Jersey Student Learning Standards

- **6.EE.A.1** – Write and evaluate numerical expressions involving whole-number exponents.
- **6.EE.A.2** – Write, read, and evaluate expressions in which letters stand for numbers.
- **6.EE.A2.B** – Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.
- **6.EE.A2.C** – Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
- **6.EE.A.3** – Apply the properties of operations to generate equivalent expressions.

- **6.EE.A.4** – Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).
- **6.NS.B.4** – Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

Suggested Activities/Modifications

*Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:*

1. Activities
    a. Practice/review games
    b. Task cards
    c. Two quizzes and one test
    d. PARCC Practice
2. English Language Learners.
    a. Read written instructions.
    b. Students may be provided with note organizers / study guides to reinforce key topics.
    c. Model and provide examples
    d. Extended time on assessments when needed.
    e. Establish a non-verbal cue to redirect student when not on task.
    f. Students may use a bilingual dictionary.
3. Special Education/504 Students.
    a. Students may be provided with note organizers / study guides to reinforce key topics.
    b. Extended time on assessments when needed.
    c. Preferred seating to be determined by student and teacher.
    d. Provide modified assessments when necessary.
    e. Student may complete assessments in alternate setting when requested.
    f. Establish a non-verbal cue to redirect student when not on task.
    g. Maintain strong teacher / parent communication.
4. Gifted and Talented Students.
    a. Find the GCF or LCM of larger numbers.
    b. Complex order of operation problems with exponents.
    c. Provide enrichment activities to expand upon the curriculum.
    d. Use higher level questioning techniques in class and on assessments.

New Jersey Student Learning Standards - Technology

- 8.1.8.A.2 Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.

- 8.1.8.A.3 Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results.
- 8.2.8.A.4 Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.

Career Readiness Practices
- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.

NJSLS 9.2 - Career Awareness, Exploration, and Preparation
- 9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

**Unit 4:  Fraction Operations**
Enduring Understanding
1. A model can help for multiplying and dividing fractions.
2. Find the reciprocal by switching the numerator and the denominator.
3. Divide fractions by multiplying the dividend by the reciprocal of the divisor.

Essential Question(s)
1. What are the steps for multiplying fractions and mixed numbers?
2. What are the steps for dividing fractions and mixed numbers?
3. How can multiplication and division of fractions be modeled?
4. What is a reciprocal of a number?
5. How are reciprocals used when dividing by a fraction?
6. What are the steps for solving equations involving fractions?

Learning Objectives
Students will be able to:
1. Solve problems by multiplying fractions by fractions and fractions by mixed numbers.
2. Use models to interpret and perform fraction division and solve word problems involving fraction division.
3. Divide fractions and solve problems by dividing fractions.
4. Estimate and compute the quotient of mixed numbers.
5. Solve equations with fractions.

New Jersey Student Learning Standards
- **6.EE.B.6** – Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
- **6.EE.B.7** – Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which $p$, $q$ and $x$ are all nonnegative rational numbers.
- **6.NS.A.1** – Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Suggested Activities/Modifications
*Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:*
1. Activities
   a. Practice/review games
   b. Modeling Fractions with diagrams
   c. Two quizzes and one test
   d. PARCC Practice
2. English Language Learners.
   a. Read written instructions.
   b. Students may be provided with note organizers / study guides to reinforce key topics.
   c. Model and provide examples
   d. Extended time on assessments when needed.
   e. Establish a non-verbal cue to redirect student when not on task.
   f. Students may use a bilingual dictionary.
   g. Fraction strips
3. Special Education/504 Students.
   a. Students may be provided with note organizers / study guides to reinforce key topics.
   b. Extended time on assessments when needed.
   c. Preferred seating to be determined by student and teacher.
   d. Provide modified assessments when necessary.
   e. Student may complete assessments in alternate setting when requested.
   f. Establish a non-verbal cue to redirect student when not on task.
   g. Maintain strong teacher / parent communication.
   h. Fraction strips
4. Gifted and Talented Students.
   a. Challenging word problems involving fractions and mixed numbers.
   b. Two step equations with fractions.

c.  Provide enrichment activities to expand upon the curriculum.
d.  Use higher level questioning techniques in class and on assessments.

New Jersey Student Learning Standards - Technology
- 8.1.8.A.2 Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
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- 9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

**Unit 5: Ratios and Percents**
Enduring Understanding
1.  Ratios can be written in three ways: 2 to 3, 2:3, 2/3.
2.  Percent means out of one hundred and represents the parts of a whole that are divided into 100 equal parts.
3.  A percent is a ratio per 100.
4.  If given the percent and the whole, the part of the whole that the percent represents can be found.
5.  A rate is a ratio that compares two different units.
6.  A unit rate is a ratio that compares two different units where one of the measurements is one.
7.  Rations can be used to convert from one unit to another in either the US Customary or metric system.

Essential Question(s)
1.  What is a ratio?

2.  How can a ratio be expressed?
3.  What is a rate and unit rate?
4.  What are equivalent ratios and how are they found?
5.  How is a ratio used to convert units?
6.  What is a percent?
7.  How is a ratio with any denominator written as a percent?
8.  How are equivalent forms of decimals, fractions, and percents found?
9.  How is percent of a number found?
10. How is the whole found when the percent of a number and the part are known?

Learning Objectives
Students will be able to:
1.  Write ratios to compare real world quantities.
2.  Find and use unit rates and unit costs.
3.  Use equivalent ratios and rates to solve real world and mathematical problems.
4.  Use ratios to convert from one unit of measure to another.
5.  Model percents and write percents using equivalent ratios.
6.  Find equivalent forms of fractions, decimals, and percents.
7.  Use percents to find part of a whole.
8.  Solve problems involving finding the whole, given a part and the percent.

New Jersey Student Learning Standards
- **6.RP.A.1** – Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
- **6.RP.A.2** – Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship.
- **6.RP.A.3** – Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
- **6.RP.A.3.A** – Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
- **6.RP.A.3.B** – Solve unit rate problems including those involving unit pricing and constant speed.
- **6.RP.A.3.C** – Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
- **6.RP.A.3.D** – Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Suggested Activities/Modifications

*Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:*

1. Activities
   a. Practice/review games
   b. Real-World Applications
   c. Two quizzes and one test
   d. PARCC Practice
2. English Language Learners.
   a. Read written instructions.
   b. Students may be provided with note organizers / study guides to reinforce key topics.
   c. Model and provide examples
   d. Extended time on assessments when needed.
   e. Establish a non-verbal cue to redirect student when not on task.
   f. Students may use a bilingual dictionary.
   g. Conversion chart
3. Special Education/504 Students.
   a. Students may be provided with note organizers / study guides to reinforce key topics.
   b. Extended time on assessments when needed.
   c. Preferred seating to be determined by student and teacher.
   d. Provide modified assessments when necessary.
   e. Student may complete assessments in alternate setting when requested.
   f. Establish a non-verbal cue to redirect student when not on task.
   g. Maintain strong teacher / parent communication.
   h. Conversion chart
4. Gifted and Talented Students
   a. Converting between metric and customary systems.
   b. Converting unit rates from metric system to the customary system and vice versa.
   c. Provide enrichment activities to expand upon the curriculum.
   d. Use higher level questioning techniques in class and on assessments.

New Jersey Student Learning Standards - Technology
- 8.1.8.A.2 Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
- 8.1.8.A.3 Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results.

- 8.2.8.A.4 Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.

Career Readiness Practices
- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.

NJSLS 9.2 - Career Awareness, Exploration, and Preparation
- 9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

## Unit 6: Integers and Rational Numbers
Enduring Understanding
1. Integers are whole numbers, their opposites and zero.
2. Find the opposite of a number by using a number line to determine the distance from zero to the original number and then from zero on the opposite side to the same number.
3. The opposite of a positive number is its negative, and the opposite of a negative number is its positive.
4. Absolute value is the distance of a number from zero
5. A rational number can be expressed as a fraction and has an exact location on a number line.
6. An inequality is a mathematical sentence that compares two expressions; the symbols $<, \leq, >$ and $\geq$ are used.
7. To solve an inequality, follow the same rules for solving equations.

Essential Question(s)
1. What are integers?
2. How are integers compared?
3. How can a number line be used to determine a number's opposite?
4. What is absolute value?
5. What is a rational number?
6. How can it be shown that a number is a rational number?
7. How are rational numbers compared and ordered?
8. When graphing inequalities when is an open circle or a closed circle used?
9. What are the steps to solve one-step inequalities?

Learning Objectives

Students will be able to:

1. Use integers, opposites, and absolute values to represent real world situations.
2. Compare and order integers.
3. Add, subtract, multiply and divide integers and solve problems involving integers.
4. Show that numbers are rational and plot rational numbers on a number line.
5. Compare and order rational numbers.
6. Express and identify solutions of inequalities.
7. Solve one step inequalities.

New Jersey Student Learning Standards

- **6.EE.B.5** – Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- **6.EE.B.6** – Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
- **6.EE.B.8** – Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
- **6.NS.C.5** – Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- **6.NS.C.6** – Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
- **6.NS.C.6.A** – Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(-3) = 3, and that 0 is its own opposite.
- **6.NS.C.6.C** – Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
- **6.NS.C.7.A** – Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
- **6.NS.C.7.B** – Write, interpret, and explain statements of order for rational numbers in real-world contexts.

- **6.NS.C.7.C** – Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
- **6.NS.C.7.D** – Distinguish comparisons of absolute value from statements about order.

Suggested Activities/Modifications
*Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:*
1. Activities
   a. Practice/review games
   b. Integer project
   c. Three-five quizzes and one test
   d. PARCC Practice
2. English Language Learners.
   a. Read written instructions.
   b. Students may be provided with note organizers / study guides to reinforce key topics.
   c. Model and provide examples
   d. Extended time on assessments when needed.
   e. Establish a non-verbal cue to redirect student when not on task.
   f. Students may use a bilingual dictionary.
3. Special Education/504 Students.
   a. Students may be provided with note organizers / study guides to reinforce key topics.
   b. Extended time on assessments when needed.
   c. Preferred seating to be determined by student and teacher.
   d. Provide modified assessments when necessary.
   e. Student may complete assessments in alternate setting when requested.
   f. Establish a non-verbal cue to redirect student when not on task.
   g. Maintain strong teacher / parent communication.
4. Gifted and Talented Students
   a. Solving two step inequalities.
   b. Order of operations with integers.
   c. Provide enrichment activities to expand upon the curriculum.
   d. Use higher level questioning techniques in class and on assessments.

New Jersey Student Learning Standards - Technology
- 8.1.8.A.2 Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
- 8.1.8.A.3 Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results.
- 8.2.8.A.4 Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.

Career Readiness Practices
- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.

NJSLS 9.2 - Career Awareness, Exploration, and Preparation
- 9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

**Unit 7: The Coordinate Plane**
Enduring Understanding
1. A system of two number lines is called a coordinate plane: the horizontal line is called the x-axis and the vertical line is called the y-axis.   The 2 axes intersect at the origin, written as the point (0, 0).
2. A point on the coordinate plane can be described by its distance along both number lines.  An ordered pair (x, y) is used to locate that point.
3. The axes divide the coordinate plane into 4 parts, called quadrants.
4. I can use absolute value to determine the distance between two points.
5. I can draw a polygon using a coordinate plane.
6. I can use tables, graphs and equations to represent functions and real- world situations.

Essential Question(s)
1. What is a coordinate plane?
2. What is a quadrant on the coordinate plane?
3. How can one find, identify or place a point on the coordinate plane?
4. When plotting a point, which variable comes first?
5. How is the distance found between two points on a coordinate plane?
6. How can an equation represent a function table?
7. What does linear mean?
8. What is a function?
9. What is the difference between independent and dependent variables?
10. How can a function be used to solve a problem?

Learning Objectives

Students will be able to:

1. Name and graph points on a coordinate plane.
2. Graph polygons in a coordinate plane.
3. Make a function table and write an equation.
4. Graph functions using data in a table.
5. Use equations, tables, and graphs to represent real world function situations.

New Jersey Student Learning Standards

- **6.NS.C.6** – Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
- **6.NS.C.6.B** – Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
- **6.NS.C.6.C** – Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
- **6.NS.C.8** – Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
- **6.EE.C.9** – Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
- **6.G.A.3** – Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Suggested Activities/Modifications

*Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:*

1. Activities
   a. Practice/review games
   b. Coordinate Graphing Mystery Picture
   c. Two quizzes and one test
   d. PARCC Practice
2. English Language Learners.
   a. Read written instructions.

     b. Students may be provided with note organizers / study guides to reinforce key topics.
     c. Model and provide examples
     d. Extended time on assessments when needed.
     e. Establish a non-verbal cue to redirect student when not on task.
     f. Students may use a bilingual dictionary.

3. Special Education/504 Students.
     a. Students may be provided with note organizers / study guides to reinforce key topics.
     b. Extended time on assessments when needed.
     c. Preferred seating to be determined by student and teacher.
     d. Provide modified assessments when necessary.
     e. Student may complete assessments in alternate setting when requested.
     f. Establish a non-verbal cue to redirect student when not on task.
     g. Maintain strong teacher / parent communication.

4. Gifted and Talented Students
     a. Comparing two functions on the same coordinate plane.
     b. Functions with integers and/or fractions.
     c. Provide enrichment activities to expand upon the curriculum.
     d. Use higher level questioning techniques in class and on assessments.

New Jersey Student Learning Standards - Technology

- 8.1.8.A.2 Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
- 8.1.8.A.3 Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results.
- 8.2.8.A.4 Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.

Career Readiness Practices

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.

NJSLS 9.2 - Career Awareness, Exploration, and Preparation
- 9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

## V. Course Materials

1. Charles, Randall I. Prentice Hall Mathematics, Course 1: Common Core. 2013 ed. Boston, Mass.: Pearson Prentice Hall, 2013.
2. Course 1 Mathematics Common Core Workbook
3. Textbook website:   http://www.phschool.com
4. Calculators

## VI. Assessments

1. Do now
2. Exit Ticket
3. Quiz
4. Test
5. Project
6. Midterm and Final

## VII. Cross Curricular Aspects

1. Conversions within/between the customary and metric systems. (Science)
2. Timelines with integers. (Social Studies)
3. Writing a story/poem/song for integer rules. (Language Arts)