PISCATAWAY
TOWNSHIP SCHOOLS

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Accelerated Math 6

Content Area: Mathematics

Grade Span: 6

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Approval date:

COURSE OVERVIEW

Description
This course aims to connect ratio and rate to whole number multiplication and division and use concepts of ratio and rate to solve problems; complete understanding of division of fractions and extend the notion of number to the system of rational numbers, which includes negative numbers; write, interpret, and use expressions and equations; and develop understanding of statistical thinking in an accelerated setting.

Goals

Ratios and Proportional Relationships
- Understand ratio concepts and use ratio reasoning to solve problems

The Number System
- Apply and extend previous understandings of multiplication and division to divide fractions by fractions
- Multiply and divide multi-digit numbers and find common factors and multiples
- Apply and extend previous understandings of numbers to the system of rational numbers

Expressions and Equations
- Apply and extend the previous understanding of arithmetic to algebraic expressions
- Reason about and solve one-variable equations and inequalities
- Represent and analyze quantitative relationships between dependent and independent variables

Geometry
- Solve real-world and mathematical problems involving area, surface area, and volume

Statistics and Probability
- Develop understanding of statistical variability
- Summarize and describe distributions

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

Scope and Sequence

Unit	Topic	Length
Unit 1	Numbers	12 days
Unit 2	Number Operations	11 days
Unit 3	Proportionality: Rates and Ratios	20 days
Unit 4	Equivalent Expressions	10 days
Unit 5	Equations and Inequalities	16 days
Unit 6	Relationships in Geometry	17 days
Unit 7	Measurement and Data	10 days

Resources
Core Text: Go Math

UNIT 1: Numbers

Summary and Rationale
This unit focuses on integers. There will be consistent practice on comparing and ordering rational numbers as well as determining opposites and absolute value. Strategies will be explored for finding greatest common factors and least common multiples.
Recommended Pacing
12 days
State Standards

Standard The Number System

CPI #	Cumulative Progress Indicator (CPI)
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. *For example, express 36 + 8 as 4 (9 + 2).*.
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.
6a	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.
6c	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.
7a	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.
7b	Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3 °C > -7 °C to express the fact that -3 °C is warmer than -7 °C.*
7c	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. *For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars.*
7d	Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.*
Instructional Focus	

Unit Enduring Understandings

- Numeric fluency includes both the understanding of and the ability to appropriately use numbers.
- Integers and their opposites can be used to describe the value of many things in the real world.
- A quantity can be represented numerically in various ways.

Unit Essential Questions
• How do mathematical ideas interconnect and build on one another to produce a coherent whole?
• How does an integer represent a value in the real world?

Objectives

Students will know:

- integers and their opposites.
- how to compare and order rational numbers.
- absolute values.
- strategies for finding common factors, and in particular, the greatest common factor.
- common multiples of whole numbers, in particular the least common multiple.
- *how to perform operations with integers.

Students will be able to:

- understand positive and negative rational numbers and determine their location on a number line.
- recognize and define the set of numbers called integers.
- define, classify and identify rational numbers.
- define and identify opposites.
- use number lines to locate rational numbers and their opposites.
- compare and order integers with and without use of the number line.
- use greater than and less than symbols to compare rational numbers.
- define, compare and find absolute values.
- use absolute value in real-world situations.
- understand, find and apply greatest common factor and least common multiple to solve problems.
- *perform integer operations.

Resources

Core Text: Go Math
Suggested Resources:
www.showme.com
www.illustrativemathematics.org
www.khanacademy.org
Math Quiz- Integer Operations App
Digit Whiz – App

UNIT 2: Number Operations

Summary and Rationale

This unit will focus on operations with rational numbers. There will be consistent practice on dividing whole numbers, fractions and decimals. Operations will also include addition, subtraction and multiplication of fractions and decimals.

Recommended Pacing

11 days

State Standards

Standard The Number System

CPI #	Cumulative Progress Indicator (CPI)
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. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?.*
2	Fluently divide multi-digit numbers using the standard algorithm.
3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
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. *For example, express 36 + 8 as 4 (9 + 2).*

Instructional Focus

Unit Enduring Understandings

- Multiplication does not always make a number larger.
- Division of a fraction involves multiplying with a reciprocal. Reciprocals are number pairs that have a product of 1.
- Computational fluency includes understanding the meaning and the appropriate use of numerical operations.
- The magnitude of numbers affects the outcome of operations of them.

Unit Essential Questions

- What is the best way to solve this? What counting strategy works best here?
- What makes a computational strategy both effective and efficient?
- How do operations affect numbers?

Objectives

Students will know:
- how to apply GCF and LCM to fraction operations.
- division of fractions and mixed numbers.
- how to solve multistep problems with fractions and mixed numbers.
- division of whole numbers.
- addition and subtraction of decimals.
- multiplication of decimals.
- division of decimals.
- *how to apply operations with integers and rational numbers.

Students will be able to:
- add and subtract fractions and mixed numbers.
- multiply fractions and fractions by whole numbers.
- model fraction division.
- define and identify reciprocals.
- divide fractions and mixed numbers.
- use fraction operations to solve problems.
- divide whole numbers using long division and interpret the remainders.
- model decimal addition and subtraction.
- understand place value and use it to add and subtract decimals.
- model decimal multiplication.
- multiply decimals and use estimation to determine reasonableness of the solution.
- model decimal division.
- divide decimals by whole numbers and decimals by decimals.
- use operations with rational numbers to solve problems.
- convert between fractions and decimals to aid in solving problems.
- *perform integer operations.

Resources

Core Text: Go Math
Suggested Resources:
www.showme.com
www.illustrativemathematics.org
www.khanacademy.org
Fractions App- Braining Camp
Chicken Coop Fractions
Virtual Manipulatives
*Pizzeria Profits
*--End of marking period one cumulative
assessment*
*Restaurant Depot
*Webstaurant

UNIT 3: Proportionality: Ratio and Rates

Summary and Rationale
This unit will focus on ratios, rates, proportions and percent. There will be consistent practice on using ratios, rates and percent to solve problems as well as the relationships between percent, fractions, and decimals.

Recommended Pacing
20 days

State Standards

Standard Ratios and Proportional Relationships

CPI #	Cumulative Progress Indicator (CPI)
1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*
3a	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.
3b	Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*
3c	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.
3d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Instructional Focus

Unit Enduring Understandings

- There are various ways to represent the relationship between two quantities.

Unit Essential Questions

- What are some ways to represent the relationship between two quantities?
- How do you use ratios and rates to compare quantities?
- How can you use ratios and rates to make predictions?

Objectives

Students will know:

- ratios.
- rates.
- how to use ratios and rates to solve problems.
- ratios and rates in tables and graphs.
- how to solve problems with proportions.

- conversion within measurement systems.
- conversion between measurement systems.
- percent.
- relationship between percent, fractions, and decimals.
- how to solve percent problems.

Students will be able to:

- use models to represent ratios.
- write ratios from various situations.
- define, identify and create equivalent ratios and be able to represent them in a table.
- define and calculate unit rates and use them to solve problems.
- use ratios to make comparisons.
- use rates to make predictions.
- represent problems involving ratios and rates in tables and graphs.
- use equivalent ratios and unit rates to solve proportions.
- use proportions to find distances on a map.
- use proportions and unit rates to convert units of measure.
- use grids to model percent.
- convert between fractions and percent and use benchmarks to write percent and estimate fractions.
- convert between fractions, decimals and percent and model their equivalencies.
- model and solve percent problems (include percent of a number, find percent given a part and a whole, find a whole given a part and a percent).
- *extend percent work beyond multiples of 5%.

Resources

Core Text: Go Math
Suggested Resources:
wodb.ca
www.showme.com
www.illustrativemathematics.org
www.khanacademy.org
Digit Whiz
Percent Bar Models
6th Grade Math Test Prep App
*Road Trip
--*End of marking period cumulative assessment*
*Google Slides
*Google Maps
*iMovie

UNIT 4: Equivalent Expressions

Summary and Rationale
This unit will focus on the building of algebraic understanding. There will be consistent practice on exponents and order of operations. Understanding of numerical expressions will be expanded to evaluating, writing, and generating algebraic expressions.
Recommended Pacing
10 days
State Standards

Standard Expressions and Equations

CPI #	Cumulative Progress Indicator (CPI)
1	Write and evaluate numerical expressions involving whole-number exponents.
2a	Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 - y.*
2b	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. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.*
2c	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). *For example, use the formulas $V = s^3$ and $A = 6 s^2$ to find the volume and surface area of a cube with sides of length s = 1/2.*
3	Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*
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). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*
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.
Instructional Focus

Unit Enduring Understandings

- The nth terms of a pattern can be found using algebraic techniques.
- One representation may sometimes be more helpful than another; and, used together, multiple representations give a fuller understanding of a problem

Unit Essential Questions

- Can the knowledge of patterns help you make predictions?
- How do you use exponents to represent numbers?

Objectives

Students will know:

- exponents.
- prime factorization.
- order of operations.
- modeling and writing expressions.
- evaluating expressions.
- generating equivalent expressions.
- *identify like terms.
- *combine like terms to generate equivalent expressions.

Students will be able to:

- understand that exponents represent repeated multiplication.
- define the terms base, power and exponent.
- rewrite numerical expressions using exponents.
- find the value of a power, including the zero power.
- find factors of a number and use them to solve problems.
- use various methods to find the prime factorization of a number.
- use the order of operations to simplify numerical operations.
- define algebraic expression, variable and constant.
- translate verbal phrases into algebraic expressions.
- use models to represent and compare expressions.
- model real world situations using algebraic expressions.
- evaluate algebraic and real world expressions for a given variable.
- identify and write equivalent expressions using mathematical properties.
- define terms, coefficients and like terms.
- *identify like terms.
- *combine like terms to generate equivalent expressions.

Resources

Core Text: Go Math
Suggested Resources:
wodb.ca
www.showme.com
www.illustrativemathematics.org
www.khanacademy.org
This equals that App
Singapore Math Bar Models
Digit Whiz App

UNIT 5: Equations and Inequalities

Summary and Rationale

This unit will focus on the similarities and differences among expressions, equations, and inequalities. There will be consistent practice on writing and solving one-step equations. There will be study of the coordinate plane and the algebraic relationships between tables and graphs.

Recommended Pacing

16 days

State Standards

Standard Expressions and Equations

CPI #	Cumulative Progress Indicator (CPI)
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	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.
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.
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.
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. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.

Standard The Number System

CPI #	Cumulative Progress Indicator (CPI)
6b	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.

Instructional Focus

Unit Enduring Understandings

- Patterns and relationships can be represented graphically, numerically, symbolically, and verbally.
- The symbolic language of algebra is used to communicate and generalize the patterns in mathematics.

Unit Essential Questions
• How can change be best represented mathematically? • How can you use equations and relationships to solve real-world problems?

Objectives

Students will know:

- writing equations to represent situations.
- addition and subtraction of equations.
- writing equations from tables.
- inequalities.
- graphing on the coordinate plane.
- independent and dependent variables in tables and graphs.
- algebraic relationships in tables and graphs.
- *how to solve multistep equations and inequalities.

Students will be able to:

- define equations and solution.
- understand the difference between expressions and equations.
- determine if a value is a solution to a given equation.
- write equations to represent situations.
- write a situation for a given equation.
- solve one-step equations using addition, subtraction, multiplication and division.
- understand the similarities and differences between equations and inequalities.
- recognize each of the inequality symbols.
- graph the solutions to an inequality on a number line.
- write inequalities from a given sentence or situation.
- define and locate x-axis, y-axis, origin, quadrants, ordered pairs, coordinates.
- identify and graph points on a coordinate plane.
- understand the scales on axes.
- understand the difference between independent and dependent variables.
- recognize independent and dependent variables in tables and graphs.
- write an equation in two variables based on a table of values.
- use tables and their equations to solve problems.
- write and equation from a graph.
- represent equations in table and graph form.
- *solve multistep equations and inequalities.

Resources

Core Text: Go Math
Suggested Resources:
wodb.ca
www.showme.com
www.illustrativemathematics.org

www.khanacademy.org
Digit Whiz App
Inequality Kick Off App
Desmos
Algebra games with linear equations App
*Escape Room
--*End of the marking period cumulative assessment*
*How to create an escape room puzzle
*Escape Room Introduction

UNIT 6: Relationships in Geometry

Summary and Rationale
This unit will focus on area of two-dimensional figures and the surface area and volume of three-dimensional figures. These measurements will be found both on and off of the coordinate plane.
Recommended Pacing
17 days
State Standards

Standard Expressions and Equations

CPI #	Cumulative Progress Indicator (CPI)
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.

Standard Geometry

CPI #	Cumulative Progress Indicator (CPI)
1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
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.
4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Standard The Number System

CPI #	Cumulative Progress Indicator (CPI)
6b	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.
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.

Instructional Focus

Unit Enduring Understandings

- Geometric properties can be used to construct geometric figures.
- Geometric relationships provide a means to solve real-life problems.

Unit Essential Questions

- How can spatial relationships be described by careful use of geometric language?
- How do geometric relationships help us to solve problems?

Objectives

Students will know:

- area of quadrilaterals.
- area of triangles.
- area equations.
- area of polygons.
- distance in the coordinate plane.
- polygons in the coordinate plane.
- nets and surface area.
- *surface area of cylinders, cones, spheres.
- volume of rectangular prisms.
- solving volume equations.
- *volume of pyramids, cones, cylinders, spheres, pyramids.

Students will be able to:

- find the area of parallelograms, rhombuses, trapezoids, and triangles.
- find the area of polygons by breaking them into smaller shapes.
- use equations to solve for missing measurements in parallelograms, rhombuses, trapezoids and triangles.
- use absolute value to find horizontal and vertical distances in the coordinate plane.
- use coordinate planes to solve real world problems involving distance.
- find perimeter and area of polygons on the coordinate plane.
- understand the difference between a plane and solid figure.
- define, create and identify nets of three-dimensional figures.
- understand surface area.
- use nets to find surface area of pyramids and prisms.
- understand volume.
- find volume of prisms to solve real world problems.
- use volume equations to solve for unknown lengths in a prism.
- *find the volume of cones, cylinders and spheres to solve real world problems.
- *use volume equations to find the unknown dimensions of pyramids, cylinders, spheres, cones.

Resources

Core Text: Go Math
Suggested Resources:
wodb.ca
www.showme.com
www.illustrativemathematics.org
www.khanacademy.org
Battleship App
Geometry!!

*Par for the Course
--*end of the marking period cumulative assessment*

UNIT 7: Measurement and Data

Summary and Rationale
This unit will focus on measures of center and data representations.

Recommended Pacing
10 days

State Standards

Standard Statistics and Probability

CPI #	Cumulative Progress Indicator (CPI)
1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*
2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
3	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
5a	Reporting the number of observations.
5b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
5c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
5d	Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Instructional Focus

Unit Enduring Understandings

- The message conveyed by the data depends on how the data is collected, represented, and summarized.
- The results of a statistical investigation can be used to support an answer.

Unit Essential Questions

- How can collection, organization, interpretation and display of data be used to answer questions?

Objectives

Students will know:

- measures of center.
- mean absolute deviation.
- box plots.

- dot plots and data distribution.
- histograms.

Students will be able to:

- define measure of center, mean, and median.
- use measures of center to describe data and determine which measure best describes the data.
- find means and medians.
- define measure of variability and mean absolute deviation.
- use mean absolute deviation to answer real world statistical questions.
- define a box plot and locate and identify its parts (the least value, the lower quartile, the median, the upper quartile, the greatest value).
- make box plots for given sets of data.
- find and compare the interquartile ranges in a box plot.
- define range and find the range of a data set.
- make and interpret a dot plot.
- find measures of center from a dot plot.
- state and answer statistical questions – know the difference between a question and a statistical question.
- define, create and analyze histograms.

Resources

Core Text: Go Math
Suggested Resources:
wodb.ca
www.showme.com
www.illustrativemathematics.org
www.khanacademy.org