



PISCATAWAY TOWNSHIP SCHOOLS

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Math 5

Content Area: Mathematics

Grade Span: 5

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COURSE OVERVIEW

Description

This course aims to: enable students to make sense of problems and persevere in solving them, develop students ability to reason abstractly and quantitatively, encourage students to construct viable arguments and critique the reasoning of others, allow students to use and apply models within mathematics, develop students ability to use appropriate tools strategically, encourage students to attend to precision, build students ability to look for and make use of structure, have students look for and express regularity and repeated reasoning.

Goals

Operations and Algebraic Thinking

- Write and interpret numerical expressions.
- Analyze patterns and relationships.

Number and Operations in Base Ten

- Understand the place value system.
- Perform operations with multi-digit whole numbers and with decimals to thousandths.

Number and Operations—Fractions

- Use equivalent fractions as a strategy to add and subtract fractions.
- Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Measurement and Data

- Convert like measurement units within a given measurement system.
- Represent and interpret data.
- Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition

Geometry

- Graph points on the coordinate plane to solve real-world and mathematical problems.
- Classify two-dimensional figures into categories based on their properties.

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
1	Place Value and Whole Numbers	27 days
2	Decimals	39 days
3	Fractions	40 days
4	Geometry and Data	40 days

Resources

Core Text: Go Math!

Suggested Resources: IXL, Waggle

UNIT 1: Place Value and Whole Numbers

Summary and Rationale	
This unit gives consistent practice of whole number operations that enables students to be fluent in multiplication and division. Students will work to understand the place-value system and perform operations with multi-digit whole numbers.	
Recommended Pacing	
27 days Chapter 1: Place Value and Whole Numbers Chapter 2: Understand Multiplication & Division of Whole Numbers Chapter 3: Practice Multiplication & Division of Whole Numbers	
State Standards	
Standard: Number & Operation in Base Ten	
CPI #	Cumulative Progress Indicator (CPI) : Understand the place value system.
1	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
2	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
3	Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem
CPI #	Cumulative Progress Indicator (CPI) : Perform operations with multi-digit whole numbers and with decimals to hundredths.
5	Fluently multiply multi-digit whole numbers using the standard algorithm.
6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> • Relationships exist among the basic operations • A quantity can be represented numerically in various ways • Computational fluency includes understanding, not only in meaning, but also the appropriate use of numerical operations • Numeric fluency includes both the understanding of and the ability to appropriately use numbers • Problem solving is a process of analyzing the situation, selecting an appropriate method, implementing it, and evaluating the procedure and the results for reasonableness and the degree of accuracy • Technology is a tool that can be used to assist students • Mathematics can be explained in the oral or written form • Numeric fluency includes both the understanding of and ability to appropriately use numbers • One representation may sometimes be more helpful than another; and, used together, multiple representations give a fuller understanding of a problem • Patterns and relationships can be represented graphically, numerically, symbolically, or verbally 	
Unit Essential Questions	

- What is the best way to compute it?
- How do operations affect numbers?
- How can we decide when to use an exact number and when to use an estimate?
- What is an effective way to solve the problem?
- How can pattern relations and functions be used as a tool to best describe and help explain real-life situations?
- How do mathematical ideas interconnect and build on one another to produce a coherent whole?

Objectives

Students will know:

- place value and patterns
- place value of whole numbers
- properties of addition and multiplication
- powers of ten and exponents
- multiplication patterns
- multiplication by multi-digit numbers
- relationships between multiplication and division
- partial quotients
- estimating with 2-digit divisors
- division by 2-digit divisors
- interpreting remainders
- adjusting quotients
- drawing to solve division problems
- modeling multiplication and division equations
- representing multi-step problems with bar models

Students will be able to:

- describe the relationship between two place-value positions
- read, write, and represent whole numbers through hundred millions
- use properties of operations to solve problems
- use an exponent to show powers of ten
- use a basic fact and a pattern to multiply by a 2-digit number
- multiply by multi-digit whole numbers
- use manipulatives and drawings to represent and divide multi-digit whole numbers
- use partial quotients to divide multi-digit whole numbers by 2-digit divisors
- use compatible numbers to estimate quotients
- divide by 2-digit divisors
- interpret remainders when solving a division problem
- adjust the quotient if their estimate is too high or too low
- draw a diagram to help solve a division problem
- model and solve multiplication and division equations
- represent and solve multi-step problems using bar models and equations

Resources

Core Text: Go Math!

Suggested Resources: IXL, Waggle

UNIT 2: Decimals

Summary and Rationale

This unit gives consistent practice of decimal operations that enables students to be fluent in addition, subtraction, multiplication and division. Students will work to integrate decimals into the place value system and develop understanding of operations with decimals to the thousandths, and develop fluency with decimal operations

Recommended Pacing

39 days

- Chapter 4: Place value and decimals
- Chapter 5: Add and subtract decimals
- Chapter 6 : Multiply decimals and whole numbers
- Chapter 7 : Multiply decimals
 - Infuse Lesson 14.1: Find perimeter and area of rectangles with decimal side lengths
- Chapter 8: Divide decimals

State Standards

Decimals: Numbers and Operations in Base Ten

Standard: Understanding the place value system

CPI #	Cumulative Progress Indicator (CPI)
1	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.
2	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
3	Read, write, and compare decimals to thousandths.
4	Use place value understanding to round decimals to any place.

Standard Perform operations with multi-digit whole numbers and with decimals to thousandths.

CPI #	Cumulative Progress Indicator (CPI)
5	Add, subtract, multiply, and divide decimals to thousandths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Instructional Focus

Unit Enduring Understandings

- Relationships exist among the basic operations
- Computational fluency includes understanding, not only in meaning, but also the appropriate use of numerical operations
- Numeric fluency includes both the understanding of and the ability to appropriately use numbers
- Problem solving is a process of analyzing the situation, selecting an appropriate method, implementing it, and evaluating the procedure and the results for reasonableness and the degree of accuracy
- Technology is a tool that can be used to assist students
- Mathematics can be explained in the oral or written form
 - Numeric fluency includes both the understanding of and ability to appropriately use numbers
 - One representation may sometimes be more helpful than another; and, used together, multiple representations give a fuller understanding of a problem

Unit Essential Questions

- What is the best way to compute it?
- How do operations affect numbers?
- How can we decide when to use an exact number and when to use an estimate?
- What is an effective way to solve the problem?
- How mathematical ideas interconnect and build on one another to produce a coherent whole?
- How can pattern relations and functions be used as a tool to best describe and help explain real-life situations?

Objectives

Students will know:

- thousandths.
- place value of decimals.
- comparison and ordering of decimals.
- rounding decimals.
- decimal addition.
- decimal subtraction.
- decimal sums and differences.
- patterns with decimals.
- problem solving with money.
- multiplication patterns with decimals.
- multiplication of decimals and whole numbers.
- multiplication with expanded form.
- problem solving: Draw a Diagram.
- decimal multiplication with models.
- decimal points in products.
- zeros in the product.
- division patterns with decimals.
- division of decimals by whole numbers.
- estimation of quotients.
- decimal division.
- zeros in the dividend.
- problem solving: work backwards.
- how to use formulas to find area and perimeter using decimal lengths.

Students will be able to:

- model, read, and write decimals to thousandths.
- read and write decimals through thousandths.
- compare and order decimals to thousandths using place value.
- round decimals to any place.
- model decimal addition using base-ten blocks.
- model decimal subtraction using base-ten blocks.
- make reasonable estimates of decimal sums and differences.
- add decimals using place value. • subtract decimals using place value.
- identify, describe, and create numeric patterns with decimals.
- solve problems using the strategy to make a table.
- choose a method to find a decimal sum or difference.
- find patterns in products when multiplying by powers of 10.
- model multiplication of whole numbers and decimals.
- multiply a decimal and a whole number using drawings and place value.

- use expanded form and place value to multiply a decimal and a whole number.
- solve problems using the strategy to draw a diagram to multiply money.
- place the decimal point in decimal multiplication.
 - multiply decimals with zeros in the product.
 - find patterns in quotients when dividing by powers of 10.
 - model division of decimals by whole numbers.
 - estimate decimal quotients.
 - divide decimals by whole numbers.
 - model division by decimals.
 - place the decimal point in decimal division.
 - write a zero in the dividend to find a quotient.
 - solve multi-step decimal problems using the strategy work backward.
 - solve formulas to find area and perimeter using decimal lengths.

Resources

Core Text: Go Math!

Suggested Resources: IXL, Waggle

UNIT 3: Fractions

Summary and Rationale	
<p>This unit gives consistent practice of fraction operations that enables students to be fluent in addition and subtraction, as well as multiplication and division in limited cases. Students will work to develop fluency with addition and subtraction of fractions, and develop understanding of the multiplication and division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions).</p>	
Recommended Pacing	
<p>40 days</p> <ul style="list-style-type: none"> ● Chapter 9: Add & Subtract Fractions with Unlike Denominators ● Chapter 10: Add and Subtract Fractions and Mixed Numbers with Unlike Denominators ● Chapter 11: Multiply Fractions <ul style="list-style-type: none"> ○ Infuse Lesson 14.2: Find Perimeter and Area of Rectangles with Fractional Side Lengths ● Chapter 12: Divide Fractions 	
State Standards	
Standard: Number & Operations - Fractions	
CPI #	Cumulative Progress Indicator (CPI)
<i>Use equivalent fractions as a strategy to add and subtract fractions.</i>	
1	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
2	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.
<i>Apply and extend previous understandings of multiplication and division to multiply and divide fractions.</i>	
CPI #	Cumulative Progress Indicator (CPI)
3	Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem
4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
5	Interpret multiplication as scaling (resizing)
6	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> • A quantity can be represented numerically in various ways • Relationships exist among the basic operations. • Computational fluency includes understanding, not only in meaning, but also the appropriate use of numerical operations • Numeric fluency includes both the understanding of and the ability to appropriately use numbers 	

- Problem solving is a process of analyzing the situation, selecting an appropriate method, implementing it, and evaluating the procedure and the results for reasonableness and the degree of accuracy
- Technology is a tool that can be used to assist students
- One representation may sometimes be more helpful than another; and, used together, multiple representations give a fuller understanding of a problem

Unit Essential Questions

- Is Math a language?
- What is the best way to compute it?
- How do operations affect numbers?
- How can we decide when to use an exact number and when to use an estimate?
- What is an effective way to solve the problem?
- How do mathematical ideas interconnect and build on one another to produce a coherent whole?

Objectives

Students will know:

- modeling addition with unlike denominators
- modeling subtraction with unlike denominators
- estimate fraction sums and differences
- rewrite fractions with common denominators
- addition and subtraction with unlike denominators
- addition and subtraction of mixed numbers with unlike denominators
- rename mixed numbers to find difference
- identify a pattern or sequence with fractions
- apply properties of addition to fractions
- problem solving: work backwards to solve addition and subtraction of fractions
- find parts of a group
- multiply whole number and fraction
- multiply fraction and whole numbers
- multiply fractions
- relationships between fractions factors and products.
- relationships between mixed number factors and products.
- compare relative sizes with multiplying fractions and whole numbers
- problem solving: finding unknown lengths by guessing, checking, revising.
- divide whole numbers and unit fractions
- relate multiplication and division of fractions
- interpret a fraction as division
- divide fractions and whole numbers
- divide whole numbers and fractions
- model equations to represent division with fractions
- find perimeter and area with fractional side lengths

Students will be able to:

- use visual models to add fractions with unlike denominators
- use visual models to subtract fractions that have unlike denominators
- make reasonable estimates of fraction sums and differences
- rewrite a pair of fractions so that they have a common denominator
- use a common denominator to add and subtract fractions with unlike denominators
- add and subtract mixed numbers with unlike denominators
- use renaming to find the difference of two mixed numbers
- use addition and subtract to describe a pattern or create a sequence with fractions
- use properties to help add fractions with unlike denominators

- use the strategy *work backward* to help solve a problem with fractions that involves addition and subtraction
- find a part of a group by multiplying a whole number by a fraction
- use models to multiply fractions by whole numbers or whole numbers by fractions
- solve real-world problems that multiply a fraction by a whole number or a whole number by a fraction
- use visual models to show the product of two fractions
- compare the size of a product to the size of one factor when multiplying fractions
- multiply fractions and explain how the size of a product compares to the size of the factors
- compare the size of a product to the size of one factor when multiplying fractions greater than one
- solve real-world problems involving fractional lengths
- divide a whole number by a fraction and divide a fraction by a whole number
- use diagrams and multiplication to solve fraction division problems
- interpret fractions with division
- divide fractions by solving a related multiplication equation
- use diagrams, equations and story problems to represent division
- use formulas to find the area and perimeter of shapes with fractional side lengths

Resources

Core Text: Go Math!

Suggested Resources: IXL, Waggle

UNIT 4: Geometry, Measurement, Patterns, and Data

Summary and Rationale	
<p>In this unit, students will work to identify and classify 2-D and 3-D figures, develop an understanding of volume, write and evaluate numerical expressions, convert units of measurement, analyze patterns and relationships, represent and interpret data, and graph points on a coordinate grid. Within this work, students will continue to use their whole number, decimal, and fraction operations from earlier in the year.</p>	
Recommended Pacing	
<p>40 days</p> <ul style="list-style-type: none"> • Chapter 15: Classify 2-Dimensional and 3-Dimensional Figures • Chapter 16: Volume • Chapter 13: Expressions • Chapter 17: Convert Units of Measure • Chapter 18: Graphs and Patterns • Chapter 19: Collect, Represent, and Interpret Data 	
State Standards	
Standard: Geometry	
CPI #	Cumulative Progress Indicator (CPI)
<i>Classify two-dimensional and three-dimensional figures into categories based on their properties</i>	
1	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
2	Classify two-dimensional figures in a hierarchy based on properties.
3	Identify and classify three-dimensional figures based on properties.
Standard: Volume	
<i>Understand concepts of volume and relate volume to multiplication and to addition</i>	
CPI #	Cumulative Progress Indicator (CPI)
1	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.
2	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
3	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units.
4	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found (1) by multiplying the edge lengths or (2) by multiplying the height by the area of the base. Represent threefold whole number products as volumes, e.g., to represent the associative property of multiplication.
5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. Apply the formulas $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.
6	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. Recognize volume as additive. Find volumes of solid figures composed of two

	non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.
Standard: Numerical Expressions	
<i>Write and evaluate numerical expressions</i>	
1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
Standard: Units of Measure	
<i>Convert like measurement units within a given measurement system</i>	
CPI #	Cumulative Progress Indicator (CPI)
1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
Standard: Operations and Algebraic Thinking	
<i>Analyze patterns and relationships.</i>	
1	Identify apparent relationships between corresponding terms in graphs and tables. Represent pattern relationships using Input/Output tables and/or algebraic equations with variables. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.
2	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
3	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
Standard: Data Analysis	
<i>Represent and interpret data</i>	
1	Collect, organize, and display data in a variety of ways, including tally tables, charts, line plots, and graphs.
2	Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots.
3	Apply concepts of mean, median, mode, and range to analyze and interpret data.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> • Spatial sense and various geometric terms, concepts, and properties are used to model, identify, interpret, and describe relationships as they exist in the world; the terms, properties, and concepts chosen are based on the situation and what is to be communicated. • Everyday objects have a variety of attributes, each of which can be measured in many ways • The symbolic language of algebra is used to communicate and generalize the patterns in mathematics • What we measure affects how we measure it • Patterns and relationships can be represented graphically, numerically, symbolically, and verbally • Patterns can grow or repeat • Reading, understanding, interpreting, and communicating data are critical in modeling a variety of real-world situations, drawing appropriate inferences, making informed decisions, and justifying those decisions 	

- One representation may sometimes be more helpful than another; and, used together, multiple representations give a fuller understanding of a problem
- Mathematics is based on patterns, relationships, and a defined set of rules that interconnect and explain all mathematical concepts and natural phenomena

Unit Essential Questions

- What is the best way to use geometry?
- How can spatial relationships be described by careful use of geometric language?
- How do geometric relationships help in solving problems?
- What is the best way to measure?
- How can measurements be used to solve problems?
- How can change be best represented mathematically?
- How can change be best represented mathematically?
- What is the best way to use data?
- How can patterns, relations, and functions be used as tools to best describe and help explain real-life situations?
- What is the best way to communicate mathematically?
- How can the collection, organization, interpretation, and display of data be used to answer questions?

Objectives

Students will know:

- polygons
- triangles
- quadrilaterals
- properties of two dimensional figures
- three dimensional figures
- unit cubes and solid figures
- volume
- estimating volume
- volume of rectangular prisms
- volume formulas
- volume of composed figures
- numerical expressions
- evaluate numerical expressions using the Order of Operations
- grouping symbols in numerical expressions
- customary length
- customary capacity
- customary weight
- multistep measurement problems
- metric measures
- problem solving: customary and metric conversions
- line plots
- ordered pairs
- graphing data
- line graphs
- numerical patterns
- problem solving: Find a Rule
- graph and analyze relationships
- mean, median, mode, and range

Students will be able to:

- identify and classify polygons
- classify and draw triangles using their properties

- classify and compare quadrilaterals using their properties
- identify, describe, and classify three-dimensional figures
- understand unit cubes and how they can be used to build a solid figure
- count unit cubes that fill a solid figure to find volume
- estimate the volume of a rectangular prism
- find the volume of a rectangular prism
- use a formula to find the volume of a rectangular prism
- find the volume of combined rectangular prisms
- write numerical expressions
- use the order of operations to evaluate numerical expressions
- evaluate numerical expressions with parentheses, brackets, and braces
- compare, contrast, and convert customary units of length
- compare, contrast, and convert customary units of capacity
- compare, contrast, and convert customary units of weight
- convert measurement units to solve multistep problems
- compare, contrast, and convert metric units
- solve problems about customary and metric conversions using the strategy: Make a table
- make and use line plots with fractions to solve problems
- graph and name points on a coordinate grid using ordered pairs
- collect, organize, and graph data on a coordinate grid
- analyze and display data in a line graph
- use two rules to generate a numerical pattern and identify the relationship between the corresponding terms in the patterns
- represent number patterns in an Input/Output table
- represent number patterns in an algebraic equation
- graph the relationship between two numerical patterns on a coordinate grid
- understand mean as a balance point and as a “fair share”
- interpret data using mean, median, mode, and range

Resources

Core Text: Go Math!

Suggested Resources: IXL, Waggle

