Montessori Academy of Chambersburg
A LEGACY OF LEARNING

Mathematics Curriculum

Upper Elementary

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and make sense of regularity in repeated reasoning.

Upper Elementary - Grade 4

2.1 Numbers and Operations in Base 10

PA Standards

Number Representations and the Number Line

M04.A-T.1.1.1 - Demonstrate an understanding that in a multi-digit whole number (through 1,000,000), a digit in one-place represents ten times what it represents in the place to its right.
M04.A-T.1.1.2 - Read and write whole numbers in expanded, standard, and word form through 1,000,000.
M04.A-T.1.1.3 - Compare two multi-digit numbers through 1,000,000 based on meanings of the digits in each place. Using the >, =, and < symbols.
M04.A-T.1.1.4 - Round multi-digit whole numbers (through 1,000,000) to any place.
M04.A-T.2.1.4 - Estimate the answer to addition, subtraction, multiplication, and division problems using whole numbers through seven digits
M04.A-T.2.1.1 - Add and subtract multi-digit whole numbers
M04.A-T.2.1.2 - Multiply a whole number up to 7-digits by a one-digit, two-digit, and three-digit whole number.
M04.B-0.1.1.2 - Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison.

Expectations for Students

- Identify place value through one million
- Compare and order numbers
- Round numbers
- Estimate the answer to addition, subtraction, multiplication, and division problems

- Multiply a whole number up to 7-digits by a one-digit, two-digit, and three-digit whole number
- Problem solve with addition, subtraction, and multiplication
- Identify Roman numerals through 1,000
- Convert Roman numerals to and from standard form through 1,000

Fractions
M04.A-F.1.1.1 - Recognize and generate equivalent fractions.
M04.A-F.1.1.2 - Compare two fractions with different numerators and different denominators (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100) using the symbols >, =, or <, and justify the conclusions.
M04.A-F.2.1.1 - Add and subtract fractions with a common or no common denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; answers reduced to lowest terms and no improper fractions).
M04.A-F.2.1.2 - Decompose a fraction or a mixed number into a sum of fractions with the same denominator (denominators limited to denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100), recording the decomposition by an equation. Justify decompositions (for example, by using a visual fraction model).
M04.A-F.2.1.3 - Add and subtract mixed numbers with a common or no common denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; no regrouping with subtraction; fractions need to be reduced; no improper fractions as the final answers).
M04.A-F.2.1.4 - Solve word problems involving addition and subtraction of fractions referring to the same whole or set and having like denominators (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100).
M04.A-F.2.1.5 - Multiply a whole number by a unit fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; final answers need to be reduced or written as a mixed number).
M04.A-F.2.1.6 - Multiply a whole number by a non-unit fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; final answers do not need to be reduced or written as a mixed number).
M04.A-F.2.1.7 - Solve word problems involving multiplication of a whole number by a fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100).
M04.A-F.3.1.1 - Add two fractions with respective denominators 10 and 100.

<u>Expectations for Students</u>

- Identify fractions and recognize equivalent fractions
- Order and compare fractions
- Reduce fractions and convert improper fractions to mixed numbers
- Problem solving with fractions and whole numbers (Computation and word problems) by addition and subtraction with and without common denominators, and multiplication of a fraction by a whole number

Decimals
M04.A-F.3.1.2 - Use decimal notation for fractions with denominators 10 or 100.
M04.A-F.3.1.3 - Compare two decimals to hundredths using the symbols >, =, or <, and justify the conclusions
M04.A-F.3.1.4 - Addition and subtraction of decimal numbers

Expectations for Students

- Convert fractions and decimals
- Problem solve with decimals and whole numbers (Computation and word problems) by addition and subtraction

2.2 Operations and Algebraic Thinking

PA Standards
Factors and Multiples
M04.B-O.2.1.1 - Find all factor pairs for a whole number in the interval 1 through 100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the interval 1 through 100 is a multiple of a given one-digit number. Determine whether a given whole number in the interval 1 through 100 is prime or composite.

Expectations for Students

- Identify factors and multiples
- Identify prime and composite numbers; create factor trees

Multiplication and Division
M04.B-O.1.1.1 - Interpret a multiplication equation as a comparison. Represent verbal statements of multiplicative comparisons as multiplication equations. Example: Interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5.
M04.B-0.1.1.4 - Identify the missing symbol (+, -, x, ÷, =, <, >) that makes a number sentence true.
M04.A-T.2.1.3 - Divide up to seven-digit dividends by one-digit and two-digit divisors with answers written as whole-number quotients and remainders.
M04.B-0.1.1.2 - Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison.
M04.B-0.1.1.3 - Solve multi-step word problems posed with whole numbers using the four operations. Answers will be either whole numbers or have remainders that must be interpreted yielding a final answer that is a whole number. Represent these problems using equations with a symbol or letter standing for the unknown quantity.
M04.B-0.3.1.1 - Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
M04.B-0.3.1.2 - Determine the missing elements in a function table (limit to +, -, or x and to whole numbers or money).
M04.B-0.3.1.3 - Determine the rule for a function given a table (limit to +, -, or x and to whole numbers)

Expectations for Students

- Interpret a multiplication equation as a comparison
- Determine missing symbols
- Understand rules for divisibility by 2, 3, 4, 5, 6, 9, 10, 25
- Divide by whole numbers (up to seven-digit dividend by a one-digit or two-digit divisor)
- Problem solve with division
- Recognize and extend number and shape patterns
- Determine elements and rules in function tables

2.3 Geometry

PA Standards

M04.C-G.1.1.1 - Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines.
M04.C-G.1.1.2 - Identify, classify, and construct quadrilaterals based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
M04.C-G.1.1.3 - Identify, classify, and construct triangles into seven categories based on the sides and angles of a triangle, and quadrilaterals into six categories
M04.C-G.1.1.4 - Identify and construct a circle and polygons by using the parts of the figure
M04.C-G.1.1.5 - Identify and classify figures by using symbols to show similarity, equivalency, and congruency
M04.C-G.1.1.6 - Identify and classify figures by using symbols to show similarity, equivalency, and congruency
M04.D-M.3.1.1 - Measure angles in whole-number degrees using a protractor. With the aid of a protractor, sketch angles of specified measure.
M04.D-M.3.1.2 - Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems. (Angles must be adjacent and non-overlapping.)
M04.D-M.1.1.3 - Apply the area and perimeter formulas for rectangles and squares in real-world and mathematical problems (may include finding a missing side length). Whole numbers only. The formulas will be provided.
M05.D-M.3.1 - Use, describe, and develop procedures to solve problems involving volume.
M05.C-G.1.1.1 - Identify parts of the coordinate plane (x-axis, y-axis, and the origin) and the ordered pair (x-coordinate and y-coordinate). Limit the coordinate plane to quadrant I.

Expectations for Students

- Identify and construct points, lines, line segments, rays, and angles
    - Perpendicular, parallel, skew, horizontal, vertical, and curve lines
- Find lines of symmetry in figures
- Identify and construct transformations of figures (reflection, translation, rotation)
- Similarity, equivalency, and congruency of figures
- Using tools to measure angles
- Find the area and perimeter of rectangles and squares using the formula
- Understand that volume is measured in cubic units

- Understand the concept of volume, and measure volume by counting the number of cubes it takes to fill a figure
- Discover the formula for determining the volume of a rectangular prism.
- Locate and graph points in the first quadrant of the coordinate plane
- Form and graph ordered pairs

2.4 Measurement and Data

PA Standards

M04.D-M.1.1.1 - Know relative sizes of measurement units within one system of units including standard units (in., ft., yd., mi.; oz., lb.; c., pt., qt., gal.) metric units (cm, m, km; g, kg; mL, L), and time (sec., min., hr., day, wk., mo., yr.).

M05.D-M.1.1.1 - Convert between different-sized measurement units within a given measurement system. A table of equivalencies will be provided. Example: Convert 5 cm to meters.

M04.D-M.1.1.2 - Use the four operations to solve word problems involving distances, intervals of time (such as elapsed time), liquid volumes, masses of objects; money, including problems involving simple fractions or decimals; and problems that require expressing measurements given in a larger unit in terms of a smaller unit.

M04.D-M.1.1.4 - Identify time (analog or digital) as the amount of minutes before or after the hour.

M04.D-M.2.1.1 - Make a line plot to display a data set of measurements in fractions of a unit (e.g., intervals of 1/2, 1/4 or 1/8).

M04.D-M.2.1.2 - Solve problems involving addition and subtraction of fractions by using information presented in line plots.

M04.D-M.2.1.3 - Translate information from one type of display to another (table, chart, bar graph, or pictograph).

M06.D-S.1.1.2 - Determine quantitative measures of center (e.g., median, mean, and mode) and variability (e.g., range).

Expectations for Students

- Use tools to measure length, capacity, weight, and temperature
- Make conversions between units in customary and metric systems
- Use a customary and metric measurements in real-world situations
- Identify times on an analog and digital clock as the amount of time before and after the hour
- Determine an amount of elapsed time in hours and minutes
- Explain the relationship between minutes, hours, days, weeks, months, and years using a calendar
- Read and understand data on a chart, table, line graph, bar graph, or pictograph
- Collect data and display it on a table, chart, line graph, bar graph, or pictograph
- Draw conclusions about mathematical situations, recognize patterns, and make predictions using the data from a graph, table, or chart
- Find the mean, median, mode, and range for a set of data

Upper Elementary - Grade 5

2.1 Numbers and Operations in Base 10

PA Standards

Number Representations and the Number Line

M05.A-T.1.1.1 - Demonstrate an understanding that in a multi-digit number, a digit in one place represents 1/10 of what it represents in the place to its left. Example: Recognize that in the number 770, the 7 in the tens place is 1/10 the 7 in the hundreds place.

M05.A-T.1.1.2 - 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. Example 1: $4 \times 10^2 = 400$ Example 2: $0.05 \div 10^3 = 0.00005$

M05.A-T.1.1.3 - Read and write decimals to millionths using base-ten numerals, word form, and expanded form. Example: $347.392 = 300 + 40 + 7 + 0.3 + 0.09 + 0.002 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (0.1) + 9 \times (0.01) + 2 \times (0.001)$

M05.A-T.1.1.4 - Compare two decimals to thousandths based on meanings of the digits in each place using >, =, and < symbols.

M05.A-T.1.1.5 - Round decimals to any place (limit rounding to ones, tenths, hundredths, or thousandths place).

M06.A-N.2.2.1 - Find the greatest common factor and least common multiple of at least two whole numbers

M06.A-N.3.1.1 - Represent quantities in real-world contexts using positive and negative numbers, explaining the meaning of 0 in each situation (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge).

M06.A-N.3.1.3 - Locate and plot integers and other rational numbers on a horizontal or vertical number line

Expectations for Students

- Understand the relationship between the value of digits in different places in a multi-digit number
- Read and write decimals to the millionths place in word form, base-ten form, and expanded form
- Understand powers of ten
- Compare two decimals to the thousandths
- Round decimals to any place
- Find the greatest common factor of given whole numbers
- Identify prime and composite numbers; create factor trees
- Find the least common multiple of given whole numbers
- Recognize the use of positive and negative numbers in real life situations
- Locate positive and negative numbers on a number line
- Identify Roman numerals through 1,000
- Convert Roman numerals to and from standard form through 1,000

Whole Number and Decimal Operations
M05.A-T.2.1.1 - Multiply multi-digit whole numbers.
M05.A-T.2.1.2 - Find whole-number quotients of whole numbers with up to seven-digit dividends and three-digit divisors.
M05.A-T.2.1.3 - Add, subtract, multiply, and divide decimals to millionths (no divisors with decimals).

Expectations for Students

- Understand and fluently use a standard algorithm for multiplying multi-digit whole numbers
- Explore whole number division with up to seven-digit dividends and 3-digit divisors using place value strategies and an understanding of inverse operations
- Use place value understanding to add and subtract decimals to millionths
- Make connections between the procedures for whole number computations and decimal computations
- Use decimal understanding to estimate sums and differences and determine the reasonableness of an answer
- Multiply a decimal by a whole number and by a decimal
- Divide whole numbers by decimals, decimals by whole numbers, and decimals by decimals
- Understand the placement of the decimal point when multiplying and dividing decimals

Fractions
M05.A-F.1.1.1 - Add and subtract fractions (including mixed numbers) with like and unlike denominators. (May include multiple methods and representations).
M05.A-F.2.1.1 - Solve word problems involving division of whole numbers leading to answers in the form of fractions (including mixed numbers).
M05.A-F.2.1.2 - Multiply a fraction (including mixed numbers) by a fraction.
M05.A-F.2.1.4 - Divide unit fractions by whole numbers and whole numbers by unit fractions; divide fraction by fraction.

Expectations for Students

- Generate common denominators and use them to find equivalent fractions
- Use strategies, including common denominators as shown by visual models, to add and subtract fractions, including mixed numbers
- Understand that fractions represent division
- Multiply a fraction, including mixed numbers, by a whole number or a fraction
- Make sense of the product when multiplying fractions
- Understand what happens when a unit fraction is divided by a whole number
- Understanding what happens when a fraction is divided by a fraction
- Model and solve problems involving division with fractions
- Problem solve with fractions

2.2 Operations and Algebraic Thinking

PA Standards

M05.B-O.1.1.2 - Write simple expressions that model calculations with numbers and interpret numerical expressions without evaluating them. Example 1: Express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Example 2: Recognize that 3 × (18,932 + 921) is three times as large as 18,932 + 921 without having to calculate the indicated sum or product.
M05.B-O.2.1.1 - Generate two numerical patterns using two given rules. Example: Given the rule "add 3" and the starting number 0 and given the rule "add 6" and the starting number 0, generate terms in the resulting sequences.
M05.B-O.2.1.2 - Identify apparent relationships between corresponding terms of two patterns with the same starting numbers that follow different rules. Example: Given two patterns in which the first pattern follows the rule "add 8" and the second pattern follows the rule "add 2," observe that the terms in the first pattern are 4 times the size of the terms in the second pattern.
M06.A-R.1.1.1 - Use ratio language and notation (such as 3 to 4, 3:4, 3/4) to describe a ratio relationship between two quantities.
M06.A-R.1.1.5 - 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 percentage.
M06.B-E.1.1.1 - Write and evaluate numerical expressions involving whole-number exponents.

Expectations for Students

- Interpret math expressions and write expressions for mathematical situations
- Compare two expressions without evaluating them
- Generate numerical patterns using two given rules
- Identify apparent relationships between corresponding terms of two patterns with the same starting numbers that follow different rules
- Write ratios to compare two quantities
- Interpret ratios
- Write a percent as a decimal and decimal as a percent; write a percent as a fraction or mixed number; write a fraction or mixed number as a percent
- Understand and solve whole-number exponents

2.3 Geometry

PA Standards

M05.C-G.2.1.1 - Classify two-dimensional figures in a hierarchy based on properties.

Example 1: All polygons have at least three sides, and pentagons are polygons, so all pentagons have at least three sides.

Example 2: A rectangle is a parallelogram, which is a quadrilateral, which is a polygon; so, a rectangle can be classified as a parallelogram, as a quadrilateral, and as a polygon.

M05.D-M.3.1 - Use, describe, and develop procedures to solve problems involving volume.
M05.D-M.3.1.1 - Apply the formulas V = l × w × h and V = B × 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. Formulas will be provided.

M05.D-M.3.1.2 - Find volumes of solid figures composed of two non-overlapping right rectangular prisms.
M06.C-G.1.1.1 - Determine the area of triangles and special quadrilaterals (i.e., square, rectangle, parallelogram, rhombus, and trapezoid). Formulas will be provided.
M06.C-G.1.1.2 - Determine the area of compound polygons
M05.C-G.1.1.1 - Identify parts of the coordinate plane (x-axis, y-axis, and the origin) and the ordered pair (x-coordinate and y-coordinate). Limit the coordinate plane to quadrant I.
M05.C-G.1.1.2 - Represent real-world and mathematical problems by plotting points in quadrant I of the coordinate plane and interpret coordinate values of points in the context of the situation.

Expectations for Students

- Understand that all attributes that belong to a category of two-dimensional shapes also belong to all subcategories of that category
- Classify two-dimensional figures in a hierarchy based on the properties of the shapes
- Identify and understand the relationship between the base and height for all polygons
- Use a formula to find the area of triangles and quadrilaterals
- Understand that volume is measured in cubic units
- Explore the volume of rectangular prisms and make connections between volume and area
- Solve problems about volume
- Recognize volume as additive and find the volumes of complex figures
- Find the interior and exterior angles of triangles
- Locate and graph points in the first quadrant of the coordinate plane
- Solve problems by graphing points
- Form ordered pairs, graph them, and identify relationships between them
- Identify and construct transformations of figures (reflection, translation, rotation)

2.4 Measurement and Data

PA Standards
M05.D-M.1.1.1 - Convert between different-sized measurement units within a given measurement system. A table of equivalencies will be provided. Example: Convert 5 cm to meters.
M05.D-M.2.1.2 - Display and interpret data shown in tallies, tables, charts, pictographs, bar graphs, line graphs, and use a title, appropriate scale, and labels. A grid will be provided to display data on bar graphs or line graphs.
M05.D-M.2.1.1 - Solve problems involving computation of fractions by using information presented in line plots.
M06.D-S.1.1.2 - Determine quantitative measures of center (e.g., median, mean, and mode) and variability (e.g., range).

Expectations for Students

- Use tools to measure length, capacity, weight, and temperature

- Make conversions between units in customary and metric systems and use conversions to solve multistep word problems
- Determine an amount of elapsed time in hours and minutes in real-world situations
- Read and understand data on a chart, table, line graph, bar graph, pictograph, or circle graph
- Collect data and display it on a table, chart, line graph, bar graph, pictograph, or circle graph
- Draw conclusions about mathematical situations, recognize patterns, and make predictions using the data from a graph, table, or chart
- Make line plots with units in halves, fourths, and eighths
- Solve multistep problems about the data shown
- Determine the mean, median, mode, and range for a set of data

Upper Elementary - Grade 6

2.1 Numbers and Operations - The Number System

PA Standards
Number Representations & the Number Line
M06.A-N.2.1.1 - Solve problems involving operations (+, -, x, ÷) with whole numbers, decimals (through thousandths), straight computation, or word problems.
M06.A-N-2.2.1 - 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.
M06.A-N.2.2.2 - Apply the distributive property to express a sum of two whole numbers, 1 through 100, with a common factor as a multiple of a sum of two whole numbers with no common factor.
M06.A-N.3.1.1 - Represent quantities in real-world contexts using positive and negative numbers, explaining the meaning of 0 in each situation (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge).
M06.A-N.3.1.2 - Determine the opposite of a number and recognize that the opposite of the opposite of a number is the number itself (e.g., – (–3) = 3; 0 is its own opposite).
M06.A-N.3.1.3 - Locate and plot integers and other rational numbers on a horizontal or vertical number line; locate and plot pairs of integers and other rational numbers on a coordinate plane.
M06.A-N.3.2.1 - Write, interpret, and explain statements of order for rational numbers in real-world contexts.
M06.B-E.1.1.1 - Write and evaluate numerical expressions involving whole-number exponents.
M06.B-E.1.1.5 - Apply the properties of operations to generate equivalent expressions.
M05.B-O.1.1.1 - Use multiple grouping symbols (parentheses, brackets, or braces) in numerical expressions and evaluate expressions containing these symbols.
CC.2.1.6.E.2 - Identify and choose appropriate processes to compute fluently with multi-digit numbers.
CC.2.1.6.E.3 - Develop and/or apply number theory concepts to find common factors and multiples.
CC.2.1.6.E.4 - Apply and extend previous understandings of numbers to the system of rational numbers

Expectations for Students

- Represent numbers on a number line
- Compare numbers using an inequality symbol (<, >, =)
- Compare numbers in different forms (decimal, fraction, mixed number, improper fraction)
- Write a composite number as a product of its primes
- Identify common factors of given whole numbers
- Identify the greatest common factor of given whole numbers
- Identify the least common multiple of given whole numbers
- Determine when a least common multiple or greatest common factor would be used in a real life application.
- Find the square and cube root of a whole number

- Recognize the use of positive and negative numbers in real-life situations
- Interpret and explain the order of positive and negative numbers in real-life situation
- Write the absolute value of a number
- Simplify expressions using order of operations
- Identify Roman numerals through 1,000
- Convert Roman numerals to and from standard form through 1,000

Multiplying and Dividing Fractions and Decimals
M06.A-N.1.1.1- Interpret and compute quotients of fractions (including mixed numbers), and solve word problems involving division of fractions by fractions.
M06.A-N.2.1.1.1 - Solve problems involving operations (+, –, ×, ÷) with whole numbers, decimals (through thousandths), straight computation, or word problems.
M06.A-N.3.1.3 - Locate and plot integers and other rational numbers on a horizontal or vertical number line; locate and plot pairs of integers and other rational numbers on a coordinate plane.
CC.2.1.6.E.1 - Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
CC.2.1.7.E.1 - Apply and extend previous understandings of operations with fractions to operations with rational numbers.

Expectations for Students
- Divide a whole number by a fraction, and a mixed number
- Divide a fraction by a fraction and a mixed number
- Divide a mixed number by a mixed number
- Multiply a whole number by a decimal and a decimal by a decimal
- Divide a whole number by a decimal and a decimal by a decimal
- Solve problems involving fractions and decimals

2.2 Operations and Algebraic Thinking

PA Standards
Ratio & Proportion
M06.A-N.2.1.1 - Solve problems involving operations (+, –, ×, ÷) with whole numbers, decimals (through thousandths), straight computation, or word problems.
M06.A-R.1.1.1 - Use ratio language and notation (such as 3 to 4, 3:4, 3/4) to describe a ratio relationship between two quantities.
M06.A-R.1.1.2 -Find the unit rate a/b associated with a ratio a:b (with $b \neq 0$) and use rate language in the context of a ratio relationship.
M06.A-R.1.1.3 - Construct tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and/or plot the pairs of values on the coordinate plane. Use tables to compare ratios.
M06.A-R.1.1.4 - Solve unit rate problems including those involving unit pricing and constant speed.
CC.2.1.6.D.1 - Understand ratio concepts and use ratio reasoning to solve problems.

Expectations for Students

- Write ratios to compare two quantities
- Interpret and compare ratios
- Solve real-world problems involving ratios
- Find the missing term of a pair of equivalent ratios
- Explain the difference between a ratio and a rate
- Apply the concept of rates and unit rates to real-world problems

Percent

M06.A-R.1.1.5 - 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 percentage.
M06.A-N.2.1.1 - Solve problems involving operations (+, –, ×, and ÷) with whole numbers, decimals (through thousandths), straight computation, or word problems.
CC.2.1.6.E.2 - Identify and choose appropriate processes to compute fluently with multi−digit numbers.
CC.2.1.6.D.1 - Understand ratio concepts and use ratio reasoning to solve problems.

Expectations for Students

- Write a percent as a decimal and decimal as a percent; write a percent as a fraction or mixed number; write a fraction or mixed number as a percent
- Write equivalent fractions, decimals and percents
- Find a given percent of a given number
- Use percentages to solve real-world situations

Algebraic Expressions

M06.B-E.1.1.1 - Write and evaluate numerical expressions involving whole-number exponents.
M06.B-E.1.1.2 - Write algebraic expressions from verbal descriptions.
M06.B-E.1.1.3 - Identify parts of an expression using mathematical terms (e.g., sum, term, product, factor, quotient, coefficient).
M06.B-E.1.1.4 - Evaluate expressions at specific values of their variables, including expressions that arise from formulas used in real-world problems.
M06.B-E.1.1.5 - Apply the properties of operations to generate equivalent expressions.
CC.2.2.6.B.1 - Apply and extend previous understandings of arithmetic to algebraic expressions.

Expectations for Students

- Use variables to write algebraic expressions
- Evaluate algebraic expressions for given values of the variable
- Simplify algebraic expressions for given values of the variable
- Simplify algebraic expressions with one variable
- Recognize that the expression obtained after simplifying is equivalent to the original expression
- Expand simple algebraic expressions
- Factor simple algebraic expressions
- Solving real-world problems involving algebraic expressions

Equations and Inequalities
M06.B-E.2.1.1 - Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
M06.B-E.2.1.2 - Write algebraic expressions to represent real-world mathematical problems.
M06.B-E.2.1.3 - 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 non-negative rational numbers.
M06.B-E.2.1.4 - Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem and/or represent solutions of such inequalities on number lines.
M06.B-E.3.1.1 - Write an equation to express the relationship between the dependent and independent variables.
M06.B-E.3.1.2 - Analyze the relationship between the dependent and independent variables using graphs and tables and/or relate these to an equation.
CC.2.2.6.B.2 - Understand the process of solving a one−variable equation or inequality and apply to real−world and mathematical problems.
CC.2.2.6.B.3 - Represent and analyze quantitative relationships between dependent and independent variables.

Expectations for Students

- Solve equations containing one variable
- Solve equations using the substitution method
- Complete a table by identifying the pattern
- Write an equation or inequality to represent a situation
- Use substitution to determine whether a given number is a solution of the inequality
- Represent the solution of an inequality on a number line
- Write and solve real-word problems by writing equations or inequalities.

2.3 Geometry

PA Standards
M06.C-G.1.1.1 - Determine the area of triangles and special quadrilaterals (i.e., square, rectangle, parallelogram, rhombus, and trapezoid). Formulas will be provided.
M06.C-G.1.1.2 - Determine the area of irregular or compound polygons
M06.A-N.3.1.3 - Locate and plot integers and other rational numbers on a horizontal or vertical number line; locate and plot pairs of integers and other rational numbers on a coordinate plane.
M06.C-G.1.1.4 - Given coordinates for the vertices of a polygon in the plane, use the coordinates to find side lengths and area of the polygon (limited to triangles and special quadrilaterals).
M06.A-N.3.2.3 - Solve real-world and mathematical problems by plotting 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.
M06.C-G.1.1.3 - Determine the volume of right rectangular prisms with fractional edge lengths.

M06.C-G.1.1.5 - Represent three-dimensional figures using nets made of rectangles and triangles.
M06.C-G.1.1.6 - Determine the surface area of triangular and rectangular prisms (including cubes). Formulas will be provided.
CC.2.3.6.A.1 - Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.

Expectations for Students

- Identify the base and height for all polygons
- Use a formula to find the area of a triangle
- Find the height of a triangle given its area and base and the base of a triangle given its area and height
- Use a formula to find the area of quadrilaterals
- Find the area of a polygon (regular and irregular) by composing into rectangles or decomposing into triangles.
- Find the area of a shaded region by decomposing into triangles and other shapes.
- Match corresponding solids to their nets
- Classify solids as pyramids or prisms
- Use the area formulas to find the surface area of prisms and pyramids
- Compare surface area and volume of prisms and pyramids
- Compute the volume of prisms
- Solve problems involving surface area and volume
- Plot Points in all four quadrants on the coordinate plane given their ordered pair
- Write an ordered pair forgiven points on a coordinate plane
- Draw and identify polygons on the coordinate plane
- Identify and construct transformations of figures (reflection, translation, rotation)

2.4 Measurement and Data

PA Standards
M06.D-S.1.1.1 - Display numerical data in plots on a number line, including line plots, histograms, and box-and-whisker plots.
M06.D-S.1.1.2 - Determine quantitative measures of center (e.g., median, mean, and mode) and variability (e.g., range, interquartile range).
M06.D-S.1.1.3 - Describe any overall pattern and any deviations from the overall pattern with reference to the context in which the data were gathered.
M06.D-S.1.1.4 - Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
CC.2.4.6.B.1 - Demonstrate an understanding of statistical variability by displaying, analyzing, and summarizing distributions.

Expectations for Students

- Calculate the mean, median, mode, and range of a set of data and use the mean to solve real-world problems.

- Interpret a set of data and choose the appropriate measure of central tendency to best describe the data.
- Collect, organize and tabulate sets of data.
- Display and analyze data using a dot plot/line plot, histogram, or box and whisker.

Activities and Experiences

Practice Exercises
Projects & Presentations
Fact Fluency
Math Games
Computer Activities

Materials and Resources

Pegboard
Golden Beads
Checkerboard
Racks and Tubes
Fraction Box
Fraction (Parts of a Circle)
Centesimal Circle
Decimal Yellow Board
Decimal Stamp Game
Negative Snake Game
Decanomial Materials
Guide Squares
Cubing Material
Algebraic Trinomial Cube

Albanesi Junior and Advanced Elementary Math Cards
Conceptual Learning Materials
Computation, Montessori Made Manageable
Application, Montessori Made Manageable
Graphing, ETC Montessori
enVision - Grade 4; enVision - Grade 5; *enVision - Grade 6,* Pearson Education
Pre-Algebra, ETC Montessori
Pre-Algebra, Pearson
Mad Minute Math/ Beat the Clock, Montessori Made Manageable
Charts & Teacher-created materials, Center for Montessori Teacher Training/New York
3-Part Cards

Geometry:

Montessori Material:

Geometric Cabinet
Geometry Stick Box
Montessori Protractor
Constructive Triangles
Detective Adjective Game
Equivalency Material I (Squares divided into rectangles and triangles)
Insets of Equivalency
Yellow Triangle Area Material
Stand for Height of Triangle
Circle Circumference and Area Materials
Volume Solid and Hollow Blue Shapes; Volume Box with 250 cubes; Volume Box with 1,000 cubes
Theorem of Pythagoras Plates

Albanesi Junior and Advanced Elementary Geometry Cards
Conceptual Learning
Geometric Constructions, ETC Montessori
Charts & Teacher-created materials, Center for Montessori Teacher Training/New York
Nomenclature 3-Part Cards
Geoboards
Supplies - ruler, scale, calculator, thermometer, protractor, compass

Assessments
Practice Assignments
Projects & Presentations
Teacher Observation & Progress Checklist
Albanesi Assessments