

**Course Title:** 5<sup>th</sup> grade Mathematics

**Board Approval Date:** 07/21/14

**Credit / Hours:** NA

**Reviewed Annually**

**Course Description:**

This course focuses on mastery of the PA Core Standards for Mathematics. As students progress through this course they will participate in a systematic study of whole numbers, decimals and percents, fractions, rates, ratios, proportions, geometry and construction, measurement, algebra, and problem solving.

**Learning Activities / Modes of Assessment:**

Large group instruction  
Small group work  
Collaborative Learning  
Odyssey Assignments

Checklists / Teacher Observation  
Tests and quizzes  
AIMS web tests

**Instructional Resources:**

Everyday Mathematics / Common Core State Standards Edition (McGraw Hill, 2012)  
EM online (Instructional Resources through Everyday Math)  
Odyssey  
Brain Pop  
Math Minutes

## Course Pacing Guide

Course: <b>Math – Grade 5</b>	
<b>Course Unit (Topic)</b>	<b>Length of Instruction (Days/Periods)</b>
1. Number Theory	16 days
2. Estimation and Computation	15 days
3. Geometry Explorations	15 days
4. Division	15 days
5. Fractions, Decimals and Percents	15 days
6. Using Data: Addition and Subtraction of Fractions	15 days
7. Exponents and Negative Numbers	15 days
8. Fractions and Ratios	15 days
9. Coordinates Area Volume and Capacity	15 days
10. Using Data; Algebra Concepts and Skills	15 days
11. Volume	15 days
12. Probability, Ratios and Rates	<u>14 days</u>
<b>DAYS TOTAL</b>	<b>180 days</b>

Topic: Unit 1 - Number Theory

Days: 16

Subject(s): Math

Grade(s): 5th

Know:

Understand:

Do:

Single and Double  
Digit Multiplication/  
Factors

Prime and Composite  
Numbers

Divisibility

Square Numbers

Students will  
understand the means,  
uses, and representation  
of numbers.

CC.2.2.5.A.1 - Interpret and evaluate numerical expressions using order of operations.  
CC.2.1.5.B.1 - Apply place value concepts to show an understanding of operations and rounding as they pertain to whole numbers and decimals.  
CC.2.1.5.C.2 - Apply and extend previous understandings of multiplication and division to multiply and divide fractions.  
M05.B-O.1.1.1 - Use multiple grouping symbols (parentheses, brackets, or braces) in numerical expressions, and evaluate expressions containing these symbols.  
M05.B-O.1.1.2 - Write simple expressions that model calculations with numbers, and interpret numerical expressions without evaluating them.  
M05.A-T.1.1.1 - Demonstrate an understanding that in a multi-digit number, a digit in one place represents  $\frac{1}{10}$  of what it represents in the place to its left.  
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.  
M05.A-T.1.1.5 - Round decimals to any place (limit rounding to ones, tenths, hundredths, or thousandths place).

Topic: Unit 10 - Using Data; Algebra Concepts and Skills

Days: 15

Subject(s): Math

Grade(s): 5th

Know:	Understand:	Do:
<p>Determine whether number sentences are true or false.</p> <p>Solve open number sentences and explain solution.</p> <p>Use a letter variable to write an open sentence.</p> <p>Evaluate numeric expressions using grouping and nested grouping symbols. Inserting grouping symbols into number sentences.</p> <p>Describe and use order of operations in algebraic thinking.</p>	<p>Use algebraic notation to represent and analyze situations and structures.</p>	<p>5.NOA.2 - Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as <math>2 \times (8 + 7)</math>. Recognize that <math>3 \times (18932 + 921)</math> is three times as large as <math>18932 + 921</math>, without having to calculate the indicated sum or product.</p> <p>5.NOA.3 - Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For 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, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.</p> <p>CC.2.1.5.B.2 - Extend an understanding of operations with whole numbers to perform operations including decimals.</p> <p>5.NBT.5 - Fluently multiply multi-digit whole numbers using the standard algorithm.</p> <p>5.NBT.7 - Add, subtract, multiply, and divide decimals to hundredths, 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.</p> <p>5.NBT.4 - Use place value understanding to round decimals to any place.</p> <p>5.NBT.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.</p> <p>5.NF.5a - Interpret multiplication as scaling (resizing), by: Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.</p> <p>5.MD.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</p>

Topic: Unit 10 - Using Data; Algebra Concepts and Skills

Days: 15

Subject(s): Math

Grade(s): 5th

Know:

Understand:

Do:

conversions in solving multi-step, real world problems.

5.MD.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. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.

5.MD.3a - 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.

5.MD.3b - 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.

5.MD.4 - Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

5.MD.5a - 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 by multiplying the edge lengths, equivalently 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.MD.5b - 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.

5.G.1 - 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).

5.G.2 - Represent real world and mathematical

Topic: Unit 10 - Using Data; Algebra Concepts and Skills

Days: 15

Subject(s): Math

Grade(s): 5th

Know:

Understand:

Do:

		problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
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Topic: Unit 11 - Volume

Days: 15

Subject(s): Math

Grade(s): 5th

Know:	Understand:	Do:
<p>Find the volume of a prism</p>	<p>Understand the systems and process of measurement.</p>	<p>5.NOA.1 - Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.</p> <p>5.NBT.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.</p> <p>5.NBT.4 - Use place value understanding to round decimals to any place.</p> <p>5.NF.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. For example, <math>\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}</math>. (In general, <math>\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}</math>.)</p> <p>5.NF.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. For example, recognize an incorrect result <math>\frac{2}{5} + \frac{1}{2} = \frac{3}{7}</math>, by observing that <math>\frac{3}{7} &lt; \frac{1}{2}</math>.</p> <p>5.NF.4b - Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.</p> <p>5.NF.7c - Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share <math>\frac{1}{2}</math> lb of chocolate equally? How many <math>\frac{1}{3}</math>-cup servings are in 2 cups of raisins?</p> <p>5.MD.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</p>

Topic: Unit 11 - Volume

Days: 15

Subject(s): Math

Grade(s): 5th

Know:

Understand:

Do:

conversions in solving multi-step, real world problems.

5.MD.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. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.

5.MD.3a - 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.

5.MD.3b - 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.

5.MD.4 - Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

5.MD.5 - Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

5.MD.5a - 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 by multiplying the edge lengths, equivalently 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.MD.5b - 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.

5.MD.5c - 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.



Topic: Unit 12 - Probability Ratios and Rates

Days: 14

Subject(s): Math

Grade(s): 5th

Know:

Select and create appropriate graphical representations of collected or given data

Analyze and interpret data using graphical representations.

Describe events using basic probability terms comparing events.

Predict, test, and compare predictions based on theoretical probability with experimental results.

Express the probability of an event as a fraction, decimal, and percent.

Understand:

Understand and apply basic concepts of probability

Do:

5.NBT.7 - Add, subtract, multiply, and divide decimals to hundredths, 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.

5.NF.7a - Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for  $(1/3) \div 4$ , and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that  $(1/3) \div 4 = 1/12$  because  $(1/12) \times 4 = 1/3$ .

5.NF.7b - Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for  $4 \div (1/5)$ , and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that  $4 \div (1/5) = 20$  because  $20 \times (1/5) = 4$ .

5.NF.7c - Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share  $1/2$  lb of chocolate equally? How many  $1/3$ -cup servings are in 2 cups of raisins?

5.G.1 - 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).

Topic: Unit 2 - Estimation and Computation

Days: 15

Subject(s): Math

Grade(s): 5th

Know:	Understand:	Do:
<p>Understand equivalent names for numbers</p>	<p>Students will investigate several methods for adding, subtracting, and multiplying whole numbers and decimals.</p>	<p>CC.2.2.5.A.1 - Interpret and evaluate numerical expressions using order of operations.            CC.2.1.5.B.1 - Apply place value concepts to show an understanding of operations and rounding as they pertain to whole numbers and decimals.            CC.2.1.5.B.2 - Extend an understanding of operations with whole numbers to perform operations including decimals.            CC.2.4.5.A.1 - Solve problems using conversions within a given measurement system.            CC.2.4.5.A.4 - Solve problems involving computation of fractions using information provided in a line plot.            M05.B-O.1.1.1 - Use multiple grouping symbols (parentheses, brackets, or braces) in numerical expressions, and evaluate expressions containing these symbols.            M05.B-O.1.1.2 - Write simple expressions that model calculations with numbers, and interpret numerical expressions without evaluating them.            M05.A-T.1.1.1 - Demonstrate an understanding that in a multi-digit number, a digit in one place represents <math>\frac{1}{10}</math> of what it represents in the place to its left.            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.            M05.A-T.1.1.3 - Read and write decimals to thousandths using base-ten numerals, word form, and expanded form.            M05.A-T.1.1.5 - Round decimals to any place (limit rounding to ones, tenths, hundredths, or thousandths place).            M05.A-T.2.1.1 - Multiply multi-digit whole numbers (not to exceed 3-digit by 3-digit).            M05.A-T.2.1.2 - Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors.            M05.A-T.2.1.3 - Add, subtract, multiply, and divide decimals to hundredths (no divisors with decimals).            M05.D-M.1.1.1 - Convert among different-sized</p>

Topic: Unit 2 - Estimation and Computation

Days: 15

Subject(s): Math

Grade(s): 5th

Know:

Understand:

Do:

		measurement units within a given measurement system. A table of equivalencies will be provided.
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Topic: Unit 3 - Geometry Explorations

Days: 15

Subject(s): Math

Grade(s): 5th

Know:

Understand:

Do:

Students will examine the properties of basic plane figures and the use of the tools of geometry.

CC.2.1.5.B.1 - Apply place value concepts to show an understanding of operations and rounding as they pertain to whole numbers and decimals.

CC.2.1.5.C.2 - Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

CC.2.3.5.A.2 - Classify twodimensional figures into categories based on an understanding of their properties.

M05.A-T.1.1.1 - Demonstrate an understanding that in a multi-digit number, a digit in one place represents  $\frac{1}{10}$  of what it represents in the place to its left.

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.

M05.A-T.1.1.3 - Read and write decimals to thousandths using base-ten numerals, word form, and expanded form.

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

Topic: Unit 4 - Division

Days: 15

Subject(s): Math

Grade(s): 5th

Know:

Understand:

Do:

Students will be able to develop division concepts using whole numbers and decimals.

CC.2.2.5.A.1 - Interpret and evaluate numerical expressions using order of operations.  
 CC.2.1.5.B.1 - Apply place value concepts to show an understanding of operations and rounding as they pertain to whole numbers and decimals.  
 CC.2.1.5.B.2 - Extend an understanding of operations with whole numbers to perform operations including decimals.  
 CC.2.1.5.C.2 - Apply and extend previous understandings of multiplication and division to multiply and divide fractions.  
 CC.2.3.5.A.2 - Classify twodimensional figures into categories based on an understanding of their properties.

Topic: Unit 5 - Fractions Decimals and Percents

Days: 15

Subject(s): Math

Grade(s): 5th

Know:

Comparing and Ordering Fractions

Create Equivalent Fractions

Interpret and Analyze graphs (Bar and Circle)

Understand:

Students will be able to name numbers as fractions, decimals, and percents. Students will also be able to convert fractions as well as analyze and interpret graphs.

Do:

CC.2.2.5.A.1 - Interpret and evaluate numerical expressions using order of operations.

CC.2.1.5.B.1 - Apply place value concepts to show an understanding of operations and rounding as they pertain to whole numbers and decimals.

CC.2.1.5.B.2 - Extend an understanding of operations with whole numbers to perform operations including decimals.

CC.2.1.5.C.2 - Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Topic: Unit 6 - Using Data: Addition and Subtraction of Fractions

Days: 15

Subject(s): Math

Grade(s): 5th

Know:

Understand:

Do:

<p>Organize data- using landmarks</p> <p>Analysis of Sample Data</p> <p>Adding and Subtracting Fractions with like and unlike denominators</p>	<p>Students will be able to add and subtract fraction and analyze data.</p>	<p>CC.2.1.5.B.1 - Apply place value concepts to show an understanding of operations and rounding as they pertain to whole numbers and decimals.</p> <p>CC.2.1.5.B.2 - Extend an understanding of operations with whole numbers to perform operations including decimals.</p> <p>CC.2.1.5.C.1 - Use the understanding of equivalency to add and subtract fractions.</p> <p>CC.2.1.5.C.2 - Apply and extend previous understandings of multiplication and division to multiply and divide fractions.</p> <p>CC.2.4.5.A.1 - Solve problems using conversions within a given measurement system.</p> <p>CC.2.4.5.A.4 - Solve problems involving computation of fractions using information provided in a line plot.</p>
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Topic: Unit 7 - Exponents and Negative Numbers

Days: 15

Subject(s): Math

Grade(s): 5th

Know:

Understand:

Do:

<p>Exponential Notation</p> <p>Scientific Notation</p> <p>Order of Operation</p> <p>Ordering and Comparing Negative Numbers</p> <p>Addition and Subtraction of Positive and Negative Numbers</p> <p>Interpreting Line Plots</p>	<p>Students will be able to investigate pre-algebra concepts and skills.</p>	<p>CC.2.2.5.A.1 - Interpret and evaluate numerical expressions using order of operations.</p> <p>CC.2.1.5.B.1 - Apply place value concepts to show an understanding of operations and rounding as they pertain to whole numbers and decimals.</p> <p>CC.2.1.5.B.2 - Extend an understanding of operations with whole numbers to perform operations including decimals.</p> <p>CC.2.1.5.C.1 - Use the understanding of equivalency to add and subtract fractions.</p> <p>CC.2.1.5.C.2 - Apply and extend previous understandings of multiplication and division to multiply and divide fractions.</p> <p>CC.2.4.5.A.4 - Solve problems involving computation of fractions using information provided in a line plot.</p>
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Topic: Unit 8 - Fractions and Ratios

Days: 15

Subject(s): Math

Grade(s): 5th

Know:

Estimating and  
Calculating the percent  
of a number

Rename fractions as  
equivalent fractions

Use equivalent names  
for fractions and mixed  
numbers to perform  
operations

Multiply fractions and  
mixed numbers

Divide fractions using  
visual models

Understand:

Students will be able to  
calculate percents,  
rename fractions, use  
equivalent fraction to  
perform operation, and  
multiply and divide  
fractions and mixed  
numbers.

Do:

CC.2.2.5.A.1 - Interpret and evaluate numerical  
expressions using order of operations.

CC.2.1.5.C.1 - Use the understanding of equivalency  
to add and subtract fractions.

CC.2.1.5.C.2 - Apply and extend previous  
understandings of multiplication and division to  
multiply and divide fractions.

CC.2.3.5.A.2 - Classify twodimensional figures into  
categories based on an understanding of their  
properties.

Topic: Unit 9 - Coordinates Area Volume and Capacity

Days: 15

Subject(s): Math

Grade(s): 5th

Know:

Plot points on a coordinate grid

Transform figures in a plane

Find the area of rectangles, triangles, and parallelograms

Calculate Volume and Capacity

Understand:

Students will be able to work with coordinate graphs, extend area concepts, and develop a formula for volume and consider capacity relationships.

Do:

CC.2.1.5.B.1 - Apply place value concepts to show an understanding of operations and rounding as they pertain to whole numbers and decimals.

CC.2.1.5.B.2 - Extend an understanding of operations with whole numbers to perform operations including decimals.

CC.2.1.5.C.1 - Use the understanding of equivalency to add and subtract fractions.

CC.2.1.5.C.2 - Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

CC.2.4.5.A.1 - Solve problems using conversions within a given measurement system.

CC.2.3.5.A.1 - Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems.