MATH

LENGTH OF TIME: One year

GRADE LEVEL: 4

COURSE STANDARDS:
Students will:

1. Standard - CC.2.1.4.B.1: Apply place value concepts to show an understanding of multi-digit whole numbers.

2. Standard - CC.2.1.4.B.2: Use place value understanding and properties of operations to perform multi-digit arithmetic.

3. Standard - CC.2.1.4.C.1: Extend the understanding of fractions to show equivalence and ordering.

4. Standard - CC.2.1.4.C.2: Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

5. Standard - CC.2.1.4.C.3: Connect decimal notation to fractions, and compare decimal fractions (base 10 denominator, e.g, 19/100).

6. Standard - CC.2.2.4.A.1: Represent and solve problems involving the four operations.

7. Standard - CC.2.2.4.A.2: Develop and/or apply number theory concepts to find factors and multiples.

8. Standard - CC.2.2.4.A.4: Generate and analyze patterns using one rule.

9. Standard - CC.2.3.4.A.1: Draw lines and angles and identify these in two-dimensional figures.

10. Standard - CC.2.3.4.A.2: Classify two-dimensional figures by properties of their lines and angles.

11. Standard - CC.2.3.4.A.3: Recognize symmetric shapes and draw lines of symmetry.

12. Standard - CC.2.4.4.A.1: Solve problems involving measurement and conversions from a larger unit to a smaller unit.

13. Standard - CC.2.4.4.A.2: Translate information from one type of data display to another.

14. Standard - CC.2.4.4.A.4: Represent and interpret data involving fractions using information provided in a line plot.

15. Standard - CC.2.4.4.A.6: Measure angles and use properties of adjacent angles to solve problems.

RELATED PA ACADEMIC STANDARDS FOR MATHEMATICS
CC.2.1 Numbers and Operations
CC.2.2 Algebraic Concepts
CC.2.3 Geometry
CC.2.4 Measurement, Data and Probability

PERFORMANCE ASSESSMENTS:
Students will demonstrate achievement of the standards by:
1. Complete unit tests using pencil, paper, and calculator activities with/without rubrics.
2. Demonstration of the problem solving process with routine and non-routine problems.
3. Oral questioning and interviewing.
4. Self and peer assessment.
5. Teacher observation at completion of task or activity.
6. Student portfolio to maintain student work.
7. Math journal, math messages.
8. Oral or written presentation to demonstrate a solution, concept, project, survey, etc. with/without rubrics.
9. Group and individual mathematical investigations.
10. Free response questions with/without rubrics.
11. Class and homework assignments.

DESCRIPTION OF COURSE:
This course stresses the fundamentals, application, and appreciation of mathematics. Students will solve problems using skills commensurate to those standards indicated above and communicate effectively using mathematical language. Students will demonstrate number sense, problem solving skills, reasoning abilities, and technological skills throughout the course.

Instruction will include, but not be limited to:
- 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. Example: Recognize that in the number 770, the 7 in the hundreds place is ten times the 7 in the tens place.
- Read and write whole numbers in expanded, standard, and word form through 1,000,000

- Compare two multi-digit numbers through 1,000,000 based on meanings of the digits in each place, using >, =, and < symbols.
- Round multi-digit whole numbers (through 1,000,000) to any place.
- Add and subtract multi-digit whole numbers (limit sums and subtrahends up to and including 1,000,000).
- Multiply a whole number of up to four digits by a one-digit whole number and multiply 2 two-digit numbers.
- Divide up to four-digit dividends by one-digit divisors with answers written as whole-number quotients and remainders.
- Estimate the answer to addition, subtraction, and multiplication problems using whole numbers through six digits (for multiplication, no more than 2 digits $\times$ 1 digit, excluding powers of 10).
- Recognize and generate equivalent fractions.
- 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.
- Add and subtract fractions with a common denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; answers do not need to be simplified; and no improper fractions as the final answer).
- Decompose a fraction or a mixed number into a sum of fractions with the same denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100), recording the decomposition by an equation. Justify decompositions (e.g., by using a visual fraction model). Example 1: 3/8 = 1/8 + 1/8 + 1/8 OR 3/8 = 1/8 + 2/8 Example 2: 2 1/12 = 1 + 1 + 1/12 = 12/12 + 12/12 + 1/12
- Add and subtract mixed numbers with a common denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; no regrouping with subtraction; fractions do not need to be simplified; and no improper fractions as the final answers).
- 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).
- Multiply a whole number by a unit fraction (denominators limited to 2,3,4,5,6, 8, 10, 12, and 100 and final answers do not need to be simplified or written as a mixed number). Example: 5 $\times$ (1/4) = 5/4
- Multiply a whole number by a non-unit fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100 and final answers do not need to be simplified or written as a mixed number). Example: 3 $\times$ (5/6) = 15/6
- 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).
- Add two fractions with respective denominators 10 and 100. Example: Express 3/10 as 30/100, and add 3/10 + 4/100 = 30/100 + 4/100 = 34/100.
- Use decimal notation for fractions with denominators 10 or 100. Example: Rewrite 0.62 as 62/100 and vice versa.

- Compare two decimals to hundredths using the symbols >, =, or <, and justify the conclusions.
- Interpret a multiplication equation as a comparison. Represent verbal statements of multiplicative comparisons as multiplication equations. Example 1: Interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Example 2: Know that the statement 24 is 3 times as many as 8 can be represented by the equation 24 = 3 × 8 or 24 = 8 × 3.
- Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison. Example: Know that 3 × 4 can be used to represent that Student A has 4 objects and Student B has 3 times as many objects not just 3 more objects.
- 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.
- Identify the missing symbol (+, –, ×, ÷, =, <, and >) that makes a number sentence true (single-digit divisor only).
- 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.
- 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. Example 1: Given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms alternate between odd and even numbers. Example 2: Given the rule "increase the number of sides by 1" and starting with a triangle, observe that the tops of the shapes alternate between a side and a vertex.
- Determine the missing elements in a function table (limit to +, –, or × and to whole numbers or money).
- Determine the rule for a function given a table (limit to +, –, or × and to whole numbers).
- Draw points, lines, line segments, rays, angles (right, acute, and obtuse), and perpendicular and parallel lines. Identify these in twodimensional figures.
- Classify two-dimensional figures 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.
- Recognize a line of symmetry for a twodimensional figure as a line across the figure such that the figure can be folded along the line into mirroring parts. Identify line-symmetric figures and draw lines of symmetry (up to two lines of symmetry).
- Know relative sizes of measurement units within one system of units including standard units (in., ft, yd, mi; oz., lb; and c, pt, qt, gal), metric units (cm, m, km; g, kg; and mL, L), and time (sec, min, hr, day, wk, mo, and yr). Within a single

system of measurement, express measurements in a larger unit in terms of a smaller unit. A table of equivalencies will be provided. Example 1: Know that 1 kg is 1,000 times as heavy as 1 g. Example 2: Express the length of a 4-foot snake as 48 in.

- 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.
- Apply the area and perimeter formulas for rectangles in real-world and mathematical problems (may include finding a missing side length). Whole numbers only. The formulas will be provided.
- Identify time (analog or digital) as the amount of minutes before or after the hour. Example 1: 2:50 is the same as 10 minutes before 3:00. Example 2: Quarter past six is the same as 6:15.
- 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).
- Solve problems involving addition and subtraction of fractions by using information presented in line plots (line plots must be labeled with common denominators, such as 1/4, 2/4, 3/4).
- Translate information from one type of display to another (table, chart, bar graph, or pictograph).
- Measure angles in whole-number degrees using a protractor. With the aid of a protractor, sketch angles of specified measure.
- 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.)

TITLES OF UNITS:
Spiral program – on-going
1. Numbers and Numeration
2. Operations and Computation
3. Data and Chance
4. Measurement
5. Geometry
6. Pattern Functions and Algebra
Technology, estimation, and problem solving (including algebra, graphs, charts, patterns, and interpretation of data) are integrated throughout the year.

Unit Pacing Completion
Unit 1 – Naming and Constructing Geometric Figures – mid September
Unit 2 – Using Numbers and Organizing Data – mid October
Unit 3 – Multiplication and Division, Numbers Sentences and Algebra – mid November
Unit 4 – Decimals – mid December
Unit 5 – Big Numbers, Estimation and Computation – mid January
Unit 6 – Division/Measuring Angles – mid February

Unit 7 – Fractions, Chance and Probability – end of February
Unit 8 – Perimeter and Area – mid/end March
Unit 9 – Fractions, Decimals and Percents – beginning of April
Unit 10 – Reflection and Symmetry – end of April
Unit 11 – 3-D Shapes, Weight, Volume and Capacity – mid/end May
Unit 12 – Rates - June

SAMPLE INSTRUCTIONAL STRATEGIES:
1. Teacher/student made activities
2. Teacher/student led discussions and activities
3. Problem solving strategies
4. Calculators and computers
5. Individual and group explorations and investigations
6. Games and manipulatives
7. Written explanations and journal activities
8. Teacher/peer modeling
9. Math Word Wall

MATERIALS:
1. Common Core State Standards Everyday Mathematics: The University of Chicago School Mathematics Project, Everyday Learning Corporation, 2012, Chicago, Illinois.
2. Calculators, TI-15
3. Computers
4. Materials suggested by Everyday Math, Everyday Math games
5. Computer software
6. Standard related games and manipulatives
7. Base 10 blocks
8. Number lines and number grids
9. Everyday Math templates
10. Student reference book
11. Reflective mirrors

METHODS OF ASSISTANCE AND ENRICHMENT:
A.   Assistance
    1. IST
    2. Cooperative groups
    3. Peer helpers
    4. Volunteer tutors
    5. Flexible/modified grouping
    6. Re-teaching with alternative strategies
    7. Extended instructional time
    8. Differentiated grouping – Everyday Math Differentiation Handbook
    9. Teacher assessment CD – Everyday Math
    10. Modified testing

B. Enrichment
1. Enhanced curriculum
2. Peer tutoring
3. Modified testing
4. Math journal and/or projects
5. Individual mathematical investigations
6. IST
7. PAL
8. Differentiated grouping – Everyday Math Differentiation Handbook
9. Teacher assessment CD – Everyday Math

PORTFOLIO DEVELOPMENT:
1. Teacher/student assessments
2. Math journals
3. Individual/group investigations, projects, and/or activities
4. Written explanation of problem solving strategies
5. Student reflections
6. Pre/post grade level assessment

METHODS OF EVALUATION:
1. Recognizing student achievement checklists
2. Self assessments – Everyday Math
3. Written unit assessments – Everyday Math
4. Investigations, projects, and/or journals (on-going assessments)
5. Problem solving activities
6. Written and oral presentations
7. Pre and Post grade level district assessments

INTEGRATED ACTIVITIES:
1. Concepts
   -demonstrate knowledge of the basic concepts and principles for the above
    mentioned standards

2. Communication
   -compose and make oral presentations using appropriate mathematical language
   -written entries in math journal using appropriate mathematical terms and
    vocabulary
   -explains solutions and strategies clearly and logically with supporting evidence
   -listen to, and understand, oral math presentations

3. Thinking/Problem Solving
   -apply the concepts of the above mentioned standards to formulate and solve
    problems
   -make critical judgments using the learned skills
   -draw conclusions and show relationships in mathematical settings

-make decisions and predictions based upon the application of learned skills

4.   Application of Knowledge
-use learned skills to solve authentic problems
-exhibit skills with calculators and computer software and application programs
-examine, evaluate, and solve routine and non-routine problems

5.   Interpersonal Skills
-work cooperatively with others on projects and investigations
-work effectively with others on projects and investigations
-communicate effectively using appropriate mathematical language