### Kindergarten

#### Counting and Cardinality
- Count, recognize and compare numbers 0-100
- Recognize ordinal position of first through fifth
- Write numbers 0-20
- Match set of objects to appropriate numerals
- Compare numbers to determine more, fewer, equal
- Identify, create and extend three part patterns

#### Operations and Algebraic Thinking
- Sequence ordinal numbers 1 - 30
- Skip count by 2,5,10 to 100
- Represent addition and subtraction with manipulative and creative expression
- Use graphs to solve problems
- Add and subtract within five with automaticity
- Solve simple story problems using addition and subtraction

#### Number and Operations in Base 10
- Group and regroup numbers 11-20 into tens, ones and further ones
- Solve problems using concrete objects/pictures

#### Measurement and Data
- Sort and classify multiple attributes (color, shape, texture, etc)
- Distinguish between taller, longer and shorter, explore concepts of weight, measure in non-standard units using concrete objects (i.e. height in building blocks)
- Tell time to the hour and half hour

#### Geometry
- Identify 6 basic shapes: circle, square, rectangle, diamond, oval and triangle
- Construct and replicate simple shapes to form larger shapes
### First Grade

#### Numbers and Operations in Base Ten
- Extend the counting sequence to read and write numerals to represent objects
- Use place-value concept to represent amounts of tens and ones and to compare two-digit numbers
- Write ones, tens, hundreds
- Use place-value concepts and properties of operations to add and subtract within 100

#### Operations and Algebraic Thinking
- Expand on addition and subtraction with doubles, doubles plus one related facts, guess and check, mental math, double digits without regrouping, three addends
- Produce fact families and recognize their commutative and associative relationship
- Use addition and subtraction facts to find the missing number in a number sentence
- Select the appropriate operation to solve a word problem

#### Geometry
- Draw lines of symmetry to divide a shape into two equal parts
- Draw, identity, describe and classify two- and three-dimensional geometric shapes and figures
- Divide parts of whole into halves, thirds, and fourths
- Manipulate and describe shapes in terms of flip, turn and slide

#### Measurement and Data
- Write/tell time to the half hour & time to the hour on an analog and digital clock
- Compare graphs to interpret data and make predictions
- Determine best unit of measurement for specific tasks

### Second Grade

#### Numbers and Operations in Base Ten
- Use place-value concepts to represent amounts of tens and ones and to compare three-digit numbers
- Use place-value concept to read, write and skip count to 1000

#### Operations and Algebraic Thinking
- Recall and memorize basic addition and subtraction facts to 20
- Read, interpret, and solve 1 and 2 step word problems involving two-digit addition and subtraction
- Use addition to check subtraction
- Use subtraction strategies to discover and determine the missing number
- Work with equal groups of objects to gain foundations for multiplication

#### Geometry
- Analyze and draw two- and three-dimensional shapes having specified attributes
- Use the understanding of fractions to partition shapes into halves, quarters, and thirds
- Determine area of a rectangle by dividing into equal squares

#### Measurement and Data
- Measure with the appropriate tool to find inches, centimeters, feet, meters, kilometers, and yards
- Represent and interpret data using line plots, picture graphs, and bar graphs
- Identify time to five, fifteen, thirty, and forty-five minute intervals
- Counting of coins to 99 cents
- Making change in amounts through 5 cents
<table>
<thead>
<tr>
<th>Third Grade</th>
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<tbody>
<tr>
<td><strong>Numbers and Operations in Base Ten</strong></td>
</tr>
<tr>
<td>• Round to nearest 10,100, 1,000, 10,000, and 100,000</td>
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<tr>
<td>• Memorize basic multiplication facts 0 – 12</td>
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<tr>
<td>• Apply place-value understanding and properties of operations to perform multi-digit mathematical functions</td>
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<tr>
<td><strong>Numbers and Operations—Fractions</strong></td>
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<tr>
<td>• Develop an understanding of fractions as numbers</td>
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<tr>
<td>• Record fractions in numerical notation and written form</td>
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<tr>
<td>• Recognize relationship between fractions and decimals</td>
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<tr>
<td>• Identify equal parts and equivalent fractions</td>
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<tr>
<td><strong>Operations and Algebraic Thinking</strong></td>
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<tr>
<td>• Multiply two and three digits by one digit</td>
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<td>• Solve word problems using multiplication and division</td>
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<tr>
<td>• Recognize repeated subtraction when dividing</td>
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<tr>
<td>• Understand addition, subtraction, multiplication, and division concepts, properties, and terminology</td>
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<tr>
<td><strong>Geometry</strong></td>
</tr>
<tr>
<td>• Identify, compare, and classify shapes and their attributes</td>
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<tr>
<td>• Name flat shapes and tell number of sides and corners</td>
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<tr>
<td>• Understand that shapes in different categories may share attributes and that the shared attributes can define a larger category</td>
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<tr>
<td><strong>Measurement and Data</strong></td>
</tr>
<tr>
<td>• Recognize, determine and utilize the correct unit and instrument for measurement</td>
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<tr>
<td>• Estimate and compare length, weight, mass and capacity in customary and metric units</td>
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<td>• Create line graphs by plotting data</td>
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### Fourth Grade

#### Numbers and Operations in Base 10
- Recognize a digit in one place represents 10x what it represents in the place to its right
- Compare and order whole numbers to millions place
- Recognize and define the following terms: place value, standard form, expanded for equality, inequality, compare, and ordering
- Choose appropriate sign of “greater than”, “less than” and “equal to” in order to represent the comparison of two whole numbers
- Properly align numbers when setting up a multiplication problem
- Compute multiplication of 2, 3, and 4 digits by 1 digit multipliers
- Multiply 2 two-digit numbers
- Choose appropriate sign of “greater than”, “less than” and “equal to” in order to represent the comparison of two whole numbers
- Compute multiplication of 2, 3, and 4 digits by 1 digit multipliers
- Multiply 2 two-digit numbers

#### Numbers and Operations—Fractions
- Extend the understanding of fractions to show equivalence and ordering
- Construct and use number lines, pictures and models, including rulers, to determine and identify equivalent fractions
- Reduce fractions to lowest terms using greatest common factor
- Recognize like denominators and add/subtract numerators

#### Operations and Algebraic Thinking
- Apply problem solving strategies to word problems
- Use drawings and equations with a variable to represent the problems
- Solve multi-step equations using all four operations
- Substitute for variables
- Develop and/or apply number theory concepts to find factors and multiples

#### Geometry
- Identify intercepting, parallel, and perpendicular lines, rays, and line segments
- Classify angles as right, acute, or obtuse
- Classify triangles (right, scalene, isosceles)
- Build and draw two dimensional shapes
- Identify and name two dimensional and three dimensional figures
- Recognize symmetry in a two dimensional figure
- Draw or fold lines of symmetry
- Explore congruent figures

#### Measurement and Data
- Measure weights and capacity in standard and metric units
- Measure length in standard and metric units
- Express measurement equivalent for weights, capacity, length and time
- Solve word problems using diagrams and number lines
- Express measurement equivalents
- Estimate, compare, and convert length, weight, mass, and capacity in customary and metric units
- Determine time to the minute using both analog and digital
- Calculate elapsed time
- Explore congruent figures
- Apply area and perimeter formula to real world applications
### Fifth Grade

<table>
<thead>
<tr>
<th>Numbers and Operations in Base Ten</th>
<th>Geometry</th>
</tr>
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<tbody>
<tr>
<td>• Read and write whole numbers (through the hundreds, thousands, millions and billions) in expanded and word format</td>
<td>• Name angles (acute, right and obtuse)</td>
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<tr>
<td>• Differentiate between various place values through hundreds, thousands, millions and billions</td>
<td>• Distinguish various types of polygons, solids, plane figures and lines</td>
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<tr>
<td>• Compute using multiplication of whole numbers and decimals</td>
<td>• Create a coordinate system by using two perpendicular lines to create four quadrants with the intersection of these lines serving as the origin point (0,0)</td>
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<tr>
<td>• Solve division problems involving decimal divisors and dividends</td>
<td>• Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems</td>
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<thead>
<tr>
<th>Numbers and Operations—Fractions</th>
<th>Measurement and Data</th>
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<tbody>
<tr>
<td>• Express numbers as equivalent fractions</td>
<td>• Use addition properties to find perimeter by adding the length of all sides of a given shape</td>
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<tr>
<td>• Distinguish between like and unlike denominators</td>
<td>• Use multiplication principles to find the area of well-known shapes</td>
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<tr>
<td>• Apply least common multiple techniques to calculate equivalent fractions</td>
<td>• Explain the difference between perimeter and area</td>
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<tr>
<td>• Find factors of numbers to obtain a greatest common factor</td>
<td>• Understand the concept of volume and its relationship to multiplication &amp; addition</td>
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<tr>
<td>• Find common denominators to solve addition and subtraction problems</td>
<td>• Apply concepts of volume to solve problems and relate volume to multiplication and to addition</td>
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<tr>
<td>• Use division to convert improper fractions to mixed numbers</td>
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<tr>
<td>• Select greatest common factor to simplify fractions into lowest terms</td>
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<th>Operations and Algebraic Thinking</th>
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<tr>
<td>• Demonstrate the application of the commutative, associative, identity, zero, and distributive properties of multiplication</td>
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<tr>
<td>• Recognize a variable and substitute with a value to solve an equation</td>
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<tr>
<td>• Read a word problem and apply problem solving strategies (understand, plan, solve and look back)</td>
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<tr>
<td>• Select various problem solving strategies to solve multi-step problems: use objects; draw a picture; look for a pattern; guess and check logical reasoning; make an organized list; make a table; solve a simpler problem; work backwards</td>
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### Sixth Grade

#### Ratios and Proportional Relationships
- Model and find percent
- Estimate percent of a number
- Solve proportions using cross products
- Define and calculate unit rates (ex. miles per hour)
- Define and solve problems involving ratios, rates, and percent
- Convert units of measure in Metric and Customary Units
- Examine patterns converting measures within the Metric System

#### The Number System
- Define and find LCM (Lowest Common Multiple)
- Identify equivalent fractions
- Convert between fraction and decimal form
- Illustrate bar notation to express repeating decimals
- Estimate by rounding fractions and mixed numbers to the nearest half or whole
- Multiply and divide mixed numbers and fractions
- Apply integer vocabulary terms including absolute value, additive identity and multiplicative identity

#### Expressions and Equations
- Use powers and exponents in expressions
- Solve and evaluate simple algebraic expressions and equations
- Distinguish among the properties of addition and multiplication to solve algebraic equations
- Write exponential numbers as products of factors and vice versa
- Explain the term "order of operations" and accurately demonstrate the sequence of operations

#### Geometry
- Classify and measure angles using a protractor
- Identify, classify, and draw polygons
- Examine relationship between perimeter and area
- Apply geometric principles in the context of solving real world problems
- Find the area and perimeter of triangles, parallelograms, trapezoids and circles
- Demonstrate accurate usage of protractor and compass
- Identify and measure any angle given
- Find volume and surface areas of 2 and 3 dimensional figures using formulas

#### Statistics and Probability
- Find and interpret the probability of an event using different methods
- Solve probability problems utilizing diagrams and tables
- Use probability to make predictions
- Identify, compute, and explain the concept of mean, median, mode, range and outliers
- Select the appropriate type of graphs, scales and intervals for representing data
- Construct and interpret frequency charts, line graphs, bar graphs, circle graphs, pictograph and stem-and-leaf
SEVENTH GRADE

Ratios and Proportional Relationships
- Compute unit rate as ratios of length, area, time and other measurements
- Find equivalent ratios and use equivalency to solve proportions
- Construct and interpret graphs and charts
- Recognize whether two quantities are in proportional relationships
- Solve word problems with word proportions involving rates and scale factors
- Convert between fraction, decimal and percent forms
- Identify, apply and use percent to make comparisons and solve problems

The Number System
- Find the opposite and absolute value of integers
- Understand that absolute value is a distance, and magnitude and it is always positive
- Estimate and describe operations with rational numbers
- Identify and use the properties of all integers in every operation
- Use the order of operations to evaluate and simplify expressions

Expressions and Equations
- Utilize problem solving strategies
- Understand that expressions can be combined using like terms or expanded using the distributive property
- Solve algebraic equations and formulas for a given variable
- Write and solve algebraic equations from real-life word problems
- Translate word problems into algebraic expressions

Geometry
- Solve problems involving geometric figures
- Apply and solve problems involving a scale drawing of geometric figures
- Compute actual lengths and areas from a scale drawing
- Use a scale to draw different geometric figures
- Measure and construct angles
- Construct parallel and perpendicular lines as well as line and angle bisectors
- Solve real world problems with right triangles and application of the Pythagorean Theorem
- Know the formulas for the area and circumference of a circle and use them to solve problems
- Formulate the surface area and volume of three dimensional figures
- Measure and construct supplementary and complementary angles
- Use the facts about angles to solve equations for an unknown angle

Statistics and Probability
- Collect data using appropriate methodology
- Explain the effects of sample size and sampling techniques
- Understand how generalizations about a sample population are valid only for that type of sample
- Make inferences after examining a representative sample of a population
- Find mean, median, mode and range of a set of data
- Use data from samples to make inferences about an event and populations
- Use standard deviation when making predictions
### Eighth Grade

#### The Number System
- Perform all operations with decimals including rounding
- Identify rational and irrational numbers
- Convert between fraction, percentage and decimal including repeating decimals
- Demonstrate the relationship between percentage, fraction and decimal
- Interpret rational and irrational numbers on a number line
- Graph decimals on the number line

#### Expressions and Equations
- Simplify and evaluate expressions with variables
- Analyze and solve linear equations and pairs of simultaneous linear equations
- Perform operations with integer exponents
- Evaluate square roots of small perfect squares and cube roots of small perfect cubes
- Perform operations including estimation using Scientific Notation
- Graph and interpret a linear equation using slopes and intercepts applied to real world situations
- Compute slope and y-intercept using similar triangles
- Explain the relationship of slope and the coordinate plane
- Evaluate and solve linear equations and inequalities

#### Functions
- Perform operations and evaluate problems using patterns and functions
- Identify a relation and a function
- Use a table to find the solution of an equation in two variables
- Compare functions using multiple strategies
- Interpret graphs and give examples of linear and non-linear functions
- Construct a function

#### Geometry
- Apply and explain properties of angles and triangles to determine measurement of triangles and parallel lines
- Use the Pythagorean theorem to find the sides of a right triangle in a coordinate system
- Transform parallel and perpendicular lines and angles.
- Transform geometric figures on a coordinate plane and draw the result
- Use formulas to find the volume of solid figures in word problems
- Apply the concepts of volume of cones, cylinders, and spheres to solve real world and mathematical problems

#### Statistics and Probability
- Calculate mean, median, mode, range, and identify outliers
- Interpret graphs and describe the correlations found in the data
- Describe patterns of association between two quantities
- Analyze and predict outcomes using varied data
- Collect and evaluate data using appropriate methodologies
- Analyze and predict outcome using varied data
- Identify misleading data in charts and graphs
- Determine between dependent and independent results
- Perform experimental probabilities
Diocese of Altoona-Johnstown Elementary Curriculum
Mathematics PK-8th Grade

All standards are derived from the following public resources:

❖ Pennsylvania State Board of Education--Academics Standards for Mathematics Pre-K thru High School