

DIOCESE OF PHOENIX MATHEMATICS GLOSSARY

The purpose of this glossary is to help the user better implement the Elementary Mathematics Curriculum Standards of the Diocese of Phoenix. It is not an exhaustive list of mathematical terms.

Absolute Value A number's distance from zero on a number line. The absolute value of -4 is 4; the absolute value of 4 is 4.

Addends

Numbers to be added.

$$\begin{array}{r} 584 \\ +401 \\ \hline 985 \end{array}$$

These are
addends.

Algebra

A mathematical language that uses letters along with numbers. The letters stand for numbers that are unknown. $x - 3 = 17$ is an example of an algebra problem.

Algebraic Methods

The use of symbols to represent quantities and signs to represent their relationships.

Algebraic Sentence

A general term for equations and inequalities.

Algorithms

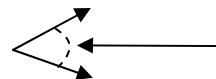
A mechanical procedure for performing a given calculation or solving a problem through step-by-step procedures such as those used in long division.

Analog Time

Time displayed on a timepiece having hour and minutes hands.

Angle

Two rays with a common endpoint form an angle



Angle Measure

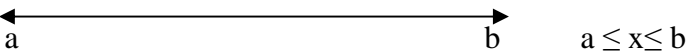
The measure of the space between two lines that meet in a point. Angles are measured in degrees or radians.

Area

The number of square units needed to cover a surface like a wall, floor or other two-dimensional shape.

Array

Arrangement of a series of items according to the values of the items, e.g., largest to smallest.

Associative Property	$a+(b+c)=(a+b)+c$ or $ax(bxc)=(axb)xc$. Changing the order in which you group numbers when adding or multiplying does not change the answer.
Axiomatic Systems	Systems that include self-evident truths; truths without proof and from which further statements, or theorems, can be derived.
Binomial	In algebra, an expression consisting of two terms connected by a plus or minus sign, such as $4a + 6$.
Box-and-Whisker Plot	A graphic method for showing a summary of data using median, quartiles and extremes of data. A box plot shows where the data are spread out and where they are concentrated.
Capacity	The volume of a container given in units of liquid measure.
Cardinality (of a set)	The number of elements in a set. Example: $A = \{4, 6, -9, 12\}$ $n(A)=4$ (because there are 4 elements in set A)
Census	The count of a population.
Closed Interval	An interval which includes both endpoints. 
Combinations	Subsets of a larger number of items (e.g., the number of different teams of three that can be chosen from a group of 21).
Common Factor	A number that is a factor of two or more numbers. Common factors of 2 and 8 are 1 and 2.
Common Multiple	Multiple that two or more numbers share. Some multiples of 2 are 2, 4, 6, 8, 10, 12. Some multiples of 3 are 3, 6, 9, 12. The first two common multiples of 2 and 3 are 6 and 12.
Commutative Property	$axb=bxa$ or $a+b=b+a$. Changing the order of the numbers when multiplying or adding numbers does not change the answer.
Composite Numbers	Any positive integer exactly divisible by one or more positive integers other than itself and 1. Numbers that have 3 or more factors.
Computational Techniques	Operations or tools-number lines, calculators.
Complex Numbers	Numbers that have the form $a + bi$ where a and b are real numbers and i is an imaginary number.
Congruency	The state of having the same size and shape.

Conjecture	An inference drawn from observed patterns in several examples.
Constant	Monomials that contain no variables.
Contextual Situation	Relating mathematical problems to real, modeled or illustrated circumstance.
Coordinate System	Any set of two or more magnitudes used to locate points, lines or curves. Commonly placed by using a horizontal axis (x-axis) and vertical axis (y-axis).
Correlation Coefficient	A statistical measure that relates how well a set of data points can be modeled by a line.
Cosine	The trigonometric function that is defined as the ratio of the leg adjacent to an angle to the hypotenuse of its right triangle.
Counterexample	An example of a conditional statement in which the hypothesis is true and the conclusion is false.
Curve Fitting	Plotting data and observing the pattern to predict trends.
Customary System	A system of weights and measures frequently used in the United States. The basic unit of weight is the pound; the basic unit of capacity is the quart.
Deductive Reasoning	A series of logical steps in which a conclusion is drawn directly from a set of statements that are known or assumed to be true.
Diameter	The distance across a circle through its center.
Dilation	A transformation that either enlarges or reduces a geometric figure proportionately.
Direct Proof	A conclusion proved through deductive reasoning.
Direct Variation	When two variables are so related that their ratio remains constant, one of them is said to vary directly as the other.
Discrete Math	The study of mathematical properties of sets and systems that have only a specific number of elements. For example, the results of tossing dice form a discrete set of events, since a die has to land on one of its six faces.
Disjoint Sets	Sets with no elements in common. If sets A and B are disjoint, then $A \cap B = \emptyset$.
Distributive Property	$a(b + c) = ab + ac$ The multiplication “is distributed” over the addition.
Domain	The set of all possible replacements for the placeholder in an open sentence.

Empirical	Relating to the collection of actual data.
Equation	A statement of equality between two mathematical expressions. (e.g., $x + 5 = y - 2$). A number sentence with an equal sign, $5 \times 4 = 20$.
Equivalent Forms	Different forms of numbers that name the same number; e.g., fraction, decimal, percent as $\frac{1}{2}$, .5, 50%.
Euclidean Transformations	In geometry, the process of changing one configuration into another, including slides, rotations and reflections.
Exponent	A numeral used to tell how many times a number or variable is used as a factor (e.g., a^2 , 2^n , y^x).
Exponential Function	A function whose general equation is $y = a \times b^x$ or $y = a \times b k^x$, where a, b and k stand for constants.
Expression	A mathematical phrase with no equal sign, such as $3x$, 6, $2n + 3m$.
Faces	Sides of a box.
Factorial	The expression $n!$ (n factorial) is the product of all the numbers from 1 to n for any positive integer n.
Factors	Any of two or more quantities that are multiplied together.
Finite Graph	A structure consisting of vertices and edges, where the edges indicate a mapping among the vertices (e.g., the vertices may represent players in a tournament, and the edges indicate who plays whom).
Flip	A transformation, also called a reflection, that produces a mirror image of a geometric figure.
Fractal	An algebraically generated complex geometric shape having the property of being endlessly self-similar under magnification. Some computer screen savers utilize fractals.
Function	A dependent relationship between two sets of numbers in which a value in the first set has only one defined element in the second set.
Geoboard	A board with pegs aligned in grid fashion which permits rubber bands to be wrapped around pegs to form geometric figures.
Graphing Calculator	A calculator that will store and draw the graph of several functions at once.

Greatest Common Factor The largest number that is a factor of two or more indicated numbers.

Hexagon A polygon with six sides.

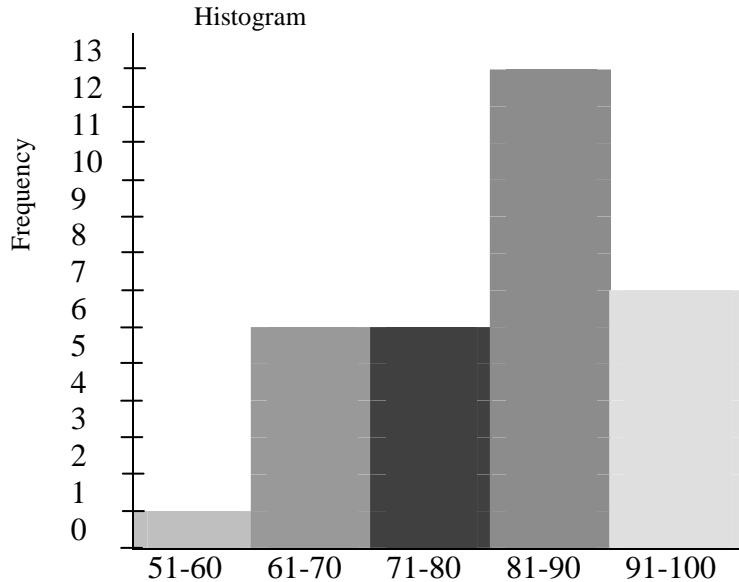


Regular Hexagon



Non-Regular Hexagon

Histogram A special kind of bar graph that displays the frequency of data that has been organized into equal number groupings. The number groupings cover all possible values of data, therefore there are no spaces between the bars.



Identify To state, match, select, write.

Identity Property of One (multiplication) Property which states that the product of 1 and any factor is that factor.

Identity Property of Zero (addition) Property which states that the sum of any number and zero is that number.

Imaginary Numbers The square root of a negative number usually expressed using i , e.g., $(\sqrt{-9}) = 3i$.

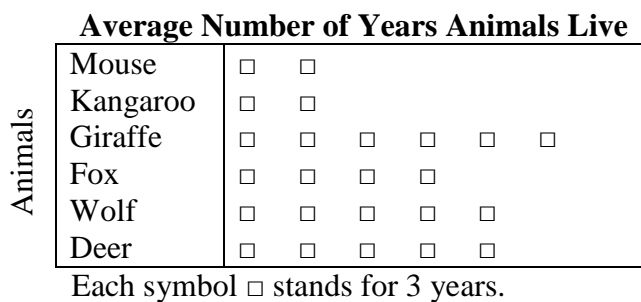
Independent Events Events such that the outcome of the first event has no effect on the probabilities of the outcome of the second event. (e.g., two tosses of the same coin are independent events).

Indirect Proof	A deductive proof using contradiction or elimination to rule out all except the desired conclusion.
Inductive Reasoning	A form of reasoning from individual cases to general ones or from observed instances to unobserved ones.
Inequalities	Statements indicating that two quantities are not equal, utilizing symbols $>$ (greater than) or $<$ (less than) and \neq .
Integers	A set of numbers consisting of the whole numbers and their opposites $\{\dots-2, -1, 0, 1, 2\dots\}$.
Inverse	A related but opposite process or number such as multiplication being the inverse of division and $2/1$ being the inverse of $1/2$.
Inverse Operations	Operations that undo each other. (e.g., addition and subtraction are inverse operations, multiplication and division are inverse operations).
Inverse Variation	When the ratio of one variable to the reciprocal of the other is constant, one of them is said to vary inversely as the other.
Irrational Numbers	A set of numbers that cannot be represented as an exact ratio of two integers. For example, the square root of 2.
Iterative Processes	In discrete math, a method of calculating an amount by using an initial value and applying a function repeatedly.
Least Common Denominator	Of two or more fractions, a denominator that is the least common multiple of the denominators of the fractions.
Least Common Multiple	The smallest number that is a common multiple of two or more given numbers.
Limit	A number to which the terms of a sequence get closer so that beyond a certain term all terms are as close as desired to that number.
Line of Best Fit	The line that fits a set of data points with the smallest value for the sum of the squares of the errors (vertical distances) from the data points to the line. Also called the regression line.
Linear Function	A function that has a constant rate of change and can be modeled by a straight line.
Linear Measurement	Measurement in a straight line.
Logarithm	The exponent indicating the power to which a fixed number, the base, must be raised to produce a given number. For example, if $n^x = a$, the logarithm of

a, with n as the base, is x; symbolically, $\log_n a = x$. If the base is 10, the log of 100 is 2 or 10^2 .

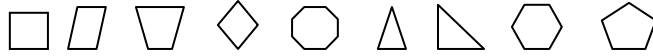
Logic	A system of reasoning used to validate arguments.
Magnitude	Size or quantity.
Manipulatives	A wide variety of physical materials and supplies that students use to foster the learning of abstract ideas in mathematics.
Mathematical Induction	A formal method of proving that a statement about a positive integer n is true for all positive integers n, by: 1) proving that the statement is true for the first integer, then, 2) proving that if the statement is true for n, it must be true for (n-1).
Mathematical Mode	A representation in the mathematical world of some phenomenon in the real world. It frequently consists of a function or relation specifying how two variables are related.
Matrix	A rectangular array of numbers or letters arranged in rows and columns.
Mean	In statistics, the average obtained by dividing the sum of two or more quantities by the number of these quantities.
Measures of Central Tendency	Numbers that communicate the “center” or “middle” of a set of data. The mean, median and mode are statistical measures of central tendency.
Median	In statistics, the quantity designating the middle value in a set of numbers.
Metric System	A system of measurement used throughout the world based on factors of 10. It includes measures of length, weight, and capacity.
Missing Addend	A member of an addition number sentence in which that term is missing. (e.g., $5 + _ = 8$).
Mode	In statistics, the value that occurs most frequently in a given series of numbers.
Model (noun)	A display of concrete materials, objects or drawings.
Model (verb)	Use of concrete materials, symbolic.
Monomial	In algebra, an expression consisting of a single term such as 5y.
Multiple	A number into which another number may be divided with no remainder.
Negative Integers	Whole numbers less than zero; found to the left of zero on the number line (without decimals or fractions), example -2, -7, but not -2.5, or -2½.

- Nonstandard Measurement** Measurement expressed in terms of objects such as paper clips, sticks of gum, shoes, etc.
- Normal Curve** In statistics, the distribution of data along a bell-shaped curve that reaches its maximum height at the mean.
- One-to-One Correspondence** When one and only one element of a second set is assigned to an element of a first set, all elements of the second set are assigned, and every element of the first set has an assignment, the mapping is called one-to-one. (e.g., in the set Bill Clinton, George Bush, Ronald Reagan, Jimmy Carter, Hillary Clinton, Barbara Bush, Nancy Reagan, and Rosalyn Carter, there is a one-to-one correspondence between the pairs.)
- Open Sentence** A statement that contains at least one unknown. For example, $6 + x = 14$.
- Order of Operations** Rules for evaluating an expression: work first within parentheses; then calculate all powers from left to right; then do multiplications or divisions, from left to right; then do additions and subtractions, from left to right.
- Parallelism** The state of being parallel, not intersecting.
- Parameter** A quantity whose value varies with the circumstances of its application, such as the radius of a group of circles.
- Patterns** Regularities in situations such as those in nature, events, shapes, designs and sets of numbers (for example, spirals on pineapples, geometric designs in quilts, the number sequence 3, 6, 9, 12,...).
- Permutations** Ordered arrangements of a given number of items in a set.
- Perpendicular Lines** Two lines which intersect to form right angles. (e.g., \perp \lrcorner \llcorner)
- Pictographs** A kind of graph that uses pictures or symbols where each symbol or picture represents a certain number of some thing.



- Plotting Points** Locating points by means of coordinates, or a curve by plotted points, and to represent an equation by means of a curve so constructed.

Polygon A union of segments connected end to end, such that each segment intersects exactly two others at its endpoints.



Polynomial In algebra, an expression consisting of two or more terms such as $x^2 - 2xy + y^2$.

Powers A number expressed using an exponent. The number 5^3 is read five to the third power or five cubed.

Primes Counting numbers that can only be evenly divided by two numbers which are the number itself and 1. For example, the numbers 2, 3, 5, 7.

Probability A number from 0 to 1 that indicates how likely something is to happen.

Problem Solving Finding ways to reach a goal when no routine path is apparent.

Proof by Contradiction A proof in which, if s is to be proven, one reasons from not s until a contradiction is deduced; from this it is concluded that not s is false, which means that s is true.

Proportion An equality between ratios. For example, $2/6 = 3/9$.

Quadratic Function A function that has an equation of the form $y = Ax^2 + Bx + C$ where A does not equal 0.

Quadrilateral A polygon (2-dimensional figure) with four sides.

Quartiles The three values that divide an ordered set into four subsets of approximately equal size. The second quartile is the median.

Radian The size of the central angle of a circle when the arc length equals the radius.

Random Variable A quantity that can take any one of a number of unpredicted values.

Range In statistics, the difference between the greatest and smallest values in a set of data.

Rate of Change The limit of the ratio of an increment of the function value at the point to that of the independent variable as the increment of the variable approaches zero.

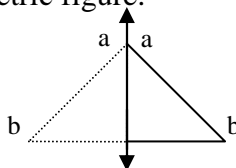
Ratio A comparison expressed as indicated division. For example, there is a ratio of three boys to two girls in our class $3/2$, $3:2$).

Rational Numbers Numbers that can be expressed as an exact ratio of two integers.

Real Numbers All rational and irrational numbers.


- Reasonableness** Quality of a solution such that it is not extreme or excessive.
- Reciprocal** The fractional number that results from dividing one by the number.
- Rectangular Array** An organized arrangement of square units (tiles).
- Rectangular Prism** A three-dimensional figure whose sides are all rectangles, (eg., a box).
- Recurrence Relations** In discrete mathematics, a value in a series is derived by applying a formula to the previous value.
- Recursive Sequence** In discrete mathematics, a series of numbers in which values are derived by applying a formula to the previous value.

Reflection In geometry, a transformation, also called a flip, that produces a mirror image of a geometric figure.



- Regression** The line that represents the least deviation from the points in a scatter plot of data.
- Regular Polygon** A polygon in which all sides have the same measure and all angles have the same measure.
- Relation** A set of ordered pairs.
- Reliability** The extent to which a measuring procedure yields the same results on repeated trials.
- Repeated Addition** A model for multiplication. (e.g., $2 + 2 + 2 = 3 \times 2$).
- Rotation** In geometry, a transformation that turns a figure about a point.
- Sample** A part of the total population. Used in statistics to make predictions about the characteristics of the entire group.
- Scatter Plots** A graph of the points representing a collection of data.
- Scientific Calculator** A calculator which represents very large or very small numbers in scientific notation and with the powering, factorial, square root, negative, and reciprocal keys.
- Scientific Notation** A shorthand way of writing very large or very small numbers. A number expressed in scientific notation is expressed as a decimal number between 1 and 10 multiplied by a power of 10.

Sequence	A set of ordered quantities. (e.g., positive integers).
Series	The indicated sum of the terms of a sequence.
Similarity	In geometry, objects or figures that are the same shape but not necessarily the same size.
Simple Event	An event whose probability can be obtained from consideration of a single occurrence. (e.g., the tossing of a coin in a simple event).
Simulation	Modeling a real event without actually observing the event.
Sine	A trigonometric function that is defined as the ratio of the leg opposite the angle to the hypotenuse of its right triangle.
Skip Counting	Counting by equal intervals.
Slides	In geometry, a transformation where a figure moves in a given direction.
Slope	The slope of a line is the ratio of the change in y to the corresponding change in x . (The constant m in the linear function equation.) (Rise/run.) $y = mx + b$
Square Root	Two equal factors of a number. For example, 4 is the square root of 16.
Standard Deviation	A statistic that measures the dispersion of a sample.
Stem-and-Leaf Plot	A table utilizing digit(s) of a number as stems and the other digit(s) as leaves. For example, 5 7, 8 shows 57 and 58.
Survey	Interview, questionnaire and/or polling.
Syllogism	An argument in which two statements are made and a logical conclusion is drawn from them.
Symmetry	A correspondence in size, form and arrangement of parts on opposite sides of a plane, line or point. For example, a figure that has line symmetry has two halves that coincide if folded along its line of symmetry.
Synthetic Representation	The geometric form as opposed to the algebraic representation of a figure.
Systems of Equations	Two or more equations that are conditions imposed simultaneously on all the variables, but may or may not have common solutions. (e.g., $x + y = 2$, and $3x + 2y = 5$).
T-test	A statistical test done to test the difference of means of two samples.
Tangent	A trigonometric function of an angle which is defined as the ratio of the lengths of the leg opposite to the leg adjacent to an angle in its right triangle. Also a line having one point in common with a curve.

Tessellations	A mosaic formed by repetitions of a single shape.
Theoretical (mathematical)	Relating to the probability of a given event, using mathematical relationships (e.g., the chance of a red side coming up on the flip of a two-colored counter is one in two or $\frac{1}{2}$).
Transformation	A geometric process for changing one figure into another.
Translations	A transformation that moves a geometric figure by sliding each of the points the same distance in the same direction.
Tree Diagram	A diagram used to show the total number of possible outcomes in a probability experiment.
Trigonometric Functions	A function (sine, cosine, tangent, cotangent, secant, cosecant) whose independent variable is an angle measure, usually in degrees or radians.
Trigonometric Ratios	The ratios of the lengths of pairs of sides in a right triangle, i.e., sine, cosine and tangent.
Trigonometry	The branch of mathematics involving triangles that combines arithmetic, algebra and geometry. Trigonometry is used in surveying, navigation and physics.
Valid Argument	An argument with the property no matter what statements are substituted in the premises, the truth value of the form is true. If the premises are true, then the conclusion is true.
Validity	An argument that is correctly inferred or deduced from a premise.
Variability	Numbers that describe how spread out a set of data is (e.g., range and quartile).
Variable	A place holder in algebraic expressions. In $3x + y = 23$, x and y are variables.
Variance	In a data set, the sum of the squared deviations divided by one less than the number of elements in the set (sample variance s^2) or by the number of elements in the set (population variance).
Vector	Quantity that has magnitude (length) and direction. It may be represented as a directed line segment (\rightarrow).
Venn Diagram	A display that pictures unions and intersections of sets.
	
Volume	The amount of space enclosed in a space (3-dimensional) figure, measured in cubic units, (how many small cubes would fit inside the figure.)

Whole Numbers

The counting numbers and zero {1, 1, 2, 3...}.

Y-Intercept

The y-intercept of a line is the y-coordinate of the point at which the graph of an equation crosses the y-axis.

π

pi, the ratio of the circumference of a circle to its diameter: about 3.1415926535.

State Standards

For the State Standards K-12, please go to the web address listed below:

<http://www.ade.state.az.us/standards/math/default.asp>

ELEMENTARY MATHEMATICS RESOURCES

There are a lot of changes happening in the field of publishing. The Resources indicated here for Elementary Mathematics are suggestions only. When your school plans to change or update Mathematics resources, these suggestions are a good place to start. Go to the publishers' website to view new offerings, and companies that have merged; in addition find information about how to secure examination copies of materials along with ordering information.

The Trace Method of text evaluation, both horizontal and vertical, was used. The three topics reviewed in depth are measurements, fractions, and graphing.

Included in the listing is a rationale as determined by the Elementary Mathematics Committee as the materials were reviewed.

Glencoe/McGraw-Hill (now Macmillian McGraw/Hill)

<http://www.macmillanmh.com/>

Math Counts (Pre-K to 6) also has an Algebra Series that meets state standards.

This series is recommended. It contains many review/practice activities along with options for differential instruction. An excellent program. The teacher edition is easy to follow and contains tips for new teachers along with homework options. Meets diocesan and state requirements.

Harcourt School Publishers

<http://www.harcourtschool.com/hspmath/samples/hsp-preview-national>

Harcourt HSP Math 2009

“Highly Recommended”

The Program supports the Diocesan Mathematics Curriculum Standards. It provides various activities for individual needs and multiple intelligences learning styles. The manipulative component is integral to the series especially at the early grades.

Diocesan Standards exceed the standards addressed in this program **and** in all other programs reviewed.

Holt McDougal

<http://www.holtmcdougal.com>

Math Course 1,2,3 2007
(Grades 6, 7, 8, and Algebra)

This book incorporates all the Diocesan and State Standards. It is easy to follow and has excellent support materials with on-line resources.

The series also has available Pre-Algebra and Algebra I which meet the 7th and 8th grade Diocesan and State Standards.

Kendall/Hunt Publishing

<http://www.kendallhunt.com>

Trailblazers 3rd edition 2008
K-5

This math text is a different way to teach math. The series promotes critical thinking. It incorporates math with science and Language Arts. Lessons are taught, using the concept, in small groups using manipulatives. It offers practice pages for homework use. The students journal incorporating Language Arts. The assessments utilize verbal interpretation to complete.

Moving with Math Learning System

<http://www.movingwithmath.com>

Math Teachers Press, Inc
4850 Park Glen Road
Minneapolis, MN 55416

Local Representative: Barry Persby
1-800-852-2435
(952) 545-6535
bpersby@movingwithmath.com

Manipulative based Math Program. The program is organized in the following sequence: Objectives, assessments, interpretation, connections, differentiated instruction, review and reteach, and reassess.

Pearson Addison Wesley Scott Foresman

<http://www.pearsoned.com>

enVisionMATH 2009 K-6

This series does cover the required objectives according to the Diocese of Phoenix Mathematics Standards.

In the primary grades the text is cumbersome and not user friendly. The teacher editions are non-traditional and not comprehensive in materials. The series is very computer enhanced and internet accessibility is critical.

Grades 3-6 differentiations are plentiful and easy to follow and use. Units are in separate modules and are repeat with online and digital resources. Assessments accurately match instruction and objectives.

Overall this is a progressive and innovative system which may require representative orientation in order to implement adequately.

Pearson Diagnostic and Special Needs Assessment
5601 Green Valley Drive
Bloomington, MN 55437

<http://www.pearsonassessments.com>

Key Math 3

The newly revised Key Math 3 Diagnostic Assessment is designed to measure the understanding and application of critical mathematical concepts and skills from pre-K through grade 9. All content aligns with NCTM Standards – Diocese of Phoenix Mathematics Standards align with NCTM Standards through the Arizona State Standards. Results of this assessment tool will help measure math performance and monitor progress to make well-informed decisions.

Also available:

ASSIST Scoring and Reporting Software
KeyMath 3 Essential Resources

Prentice-Hall

<http://www.prenticehall.com>

Mathematics Course 1, 2 and 3 (Grades 7 & 8) 2008

This series meets and exceeds Diocesan Math Curriculum Standards – all curricular outcomes are covered. It has good differentiated instruction, excellent review and varied assessment for each lesson, incorporates multiple intelligences, and higher order thinking skills.

Sadlier - Oxford

<http://www.sadlier-oxford.com/math/student.cfm>

Progress in Mathematics - 2006

K-6

The 2006 edition of this series was reviewed by the Mathematics Committee and did not receive rave reviews. The committee felt the series did meet a majority of the curriculum standards set by the diocese. The series did not provide the extensive support materials necessary to address all learning styles. Cross-curricular connections were also lacking. The student textbook appears cumbersome and not manageable. However the teacher's edition is easy to follow and implement.

The 2009 edition of Progress in Mathematics is now available and promises a vigorous content aligned with NCTM Standards and Curriculum Focal Points. The student-centered textbooks instill confidence in all learners. Superior teacher support makes teaching easy and fun.

Fundamentals in Algebra for grades 7 and 8/9 is also new and stresses problem solving that develops algebraic thinking. Fundamentals has an acceleration expansion, and extension enrichment lessons that deepen student understanding of and appreciation for the power and beauty of mathematics.