

Curriculum Guidelines for Mathematics

Kindergarten through Grade Eight



**Grade 6
2008**

June, 2008

VISION STATEMENT

Mathematics plays an integral role in the Catholic School, home, community and world, reflecting the beauty, order and unity in God's universe. Basic knowledge and skills in mathematics are important to every individual. Mathematics contributes to the development of the whole person by providing a practical tool for daily living.

Society demands mathematical knowledge which helps students develop their ability to reason and to think logically, as well as to discover creative ways of solving problems.

Our goal is to provide the mathematics teachers with an overview of the broad spectrum of mathematical concepts. These specific standards are provided so that students can learn to apply mathematical concepts through the use of higher level thinking skills, critical analysis, application of technology and problem solving.

Integrating Catholic Social Teaching into Mathematics Instruction

“The Church’s social teaching is a rich treasure of wisdom about building a just society and living lives of holiness amidst the challenges of modern society”.
(United States Council of Catholic Bishops)

Diocese of Lansing mathematics teachers should integrate Catholic social teachings whenever applicable. Examples of this could include faith-based data collection, economics and statistics respectful of the life and dignity of the human person, proportions and graphical representations that are illustrative of solidarity with our brothers and sisters, problem solving that will ensure the right to life and dignity, as well as math-based community service projects to encourage stewardship of creation.

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Purpose of this Document

- This document is designed to be used as a tool to guide instruction.
 - To provide Grade Level Content Expectations (GLECs) as developed by the State of Michigan (SOM) Department of Education
 - To assist schools with grade level and school-wide curriculum mapping.
 - To provide a means of measuring progress at grade level
 - To provide a means of communicating progress between grade levels
 - To provide continuity between schools within the Diocese of Lansing
- This document also offers main focus areas for each grade level.
- This document offers scope and sequence of objectives across grade levels.
- This document contains suggestions for incorporating Catholic faith and values into mathematics instruction.
- This document contains an analysis of current mathematical textbooks from a wide range of publishers.

With appreciation

To Michael Goetz,
Math Department Chair for grades K-8 at Grand Blanc Community Schools
for sharing his expertise, knowledge and materials with us.

Sixth Grade

In sixth grade, work with basic number operations is essentially completed. The students' knowledge of whole numbers and fractions develops into knowledge of ratios and non-zero denominators. Students will be introduced to integers and rational numbers.

The students will use variables, write simple algebraic expressions and equations, and graph linear relationships.

In geometry, students continue to expand their knowledge of shapes and they learn more complex properties such as congruence and transformations.

To allow for ease in referencing expectations, each expectation has been coded with a strand, domain, grade-level, and expectation number.

For example, **M.UN.00.01** indicates:

M-Measurement strand

UN-Units & systems of measurement domain of the Measurement strand

01-First Expectation in the Grade-Level view of the Measurement strand

Strand 1	Strand 2	Strand 3	Strand 4	Strand 5
<u>N</u> umber & <u>O</u> perations	<u>A</u> lgebra	<u>M</u> easurement	<u>G</u> eometry	<u>D</u> ata & <u>P</u> robability
Domains				
Meaning, notation, place value, and comparisons (ME)	Patterns, relations, functions, and change (PA)	Units and systems of measurement (UN)	Geometric shape, properties, and mathematical arguments (GS)	Data representation (RE)
Number relationships and meaning of operations (MR)	Representation (RP)	Techniques and formulas for measurement (TE)	Location and spatial relationships (LO)	Data interpretation and analysis (AN)
Fluency with operations and estimation (FL)	Formulas, expressions, equations, and inequalities (RP)	Problem solving involving measurement (PS)	Spatial reasoning and geometric modeling (SR)	Probability (PR)
			Transformation and symmetry (TR)	

MEAP Correlations: [Core]-core item [Core-NC] No calculator [Ext-NC]- extension no calculator [Ext] -extension of core [Fut] – future core item [NASL] – Not assessed at State level

6th Grade GLCEs

SOM-GLCEs Code	Objectives	Completed	Date	Chapters
Strand 1	NUMBER AND OPERATIONS			
	Multiply and divide fractions			
N.MR.06.01	[Core] Understand division of fractions as the inverse of multiplication, e.g., if $4/5 \div 2/3 = \square$, then $2/3 \cdot \square = 4/5$, so $\square = 4/5 \cdot 3/2 = 12/10$.			
N.FL.06.02	[Core] Given an applied situation involving dividing fractions, write a mathematical statement to represent the situation.			
N.MR.06.03	[Fut] Solve for the unknown in equations such as: $\square \div \square = 1$, $3\square \div \square = 1/4$, and $1/2 = 1 \cdot \square$.			
N.FL.06.04	[Core – NC] Multiply and divide any two fractions, including mixed numbers, fluently.			
	Represent rational numbers as fractions or decimals			
N.ME.06.05	[Ext] Order rational numbers and place them on the number line.			
N.ME.06.06	[Ext] Represent rational numbers as fractions or terminating decimals when possible, and translate between these representations.			
N.ME.06.07	[Fut] Understand that a fraction or a negative fraction is a quotient of two integers, e.g., $-8/3$ is -8 divided by 3 .			
	Add and subtract integers and rational numbers			
N.MR.06.08	[Fut] Understand integer subtraction as the inverse of integer addition.			
	Understand integer division as the inverse of integer multiplication.			
N.FL.06.09	[Fut – NC] Add and multiply integers between -10 and 10 ; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.			
N.FL.06.10	[Core – NC] Add, subtract, multiply and divide positive rational numbers fluently.			
	Find equivalent ratios			
N.ME.06.11	[Core] Find equivalent ratios by scaling up or scaling down.			
	Solve decimal, percentage and rational number problems			
N.FL.06.12	[Ext– NC] Calculate part of a number given the percentage and the number.			
N.MR.06.13	[Core] Solve contextual problems involving percentages such as sales taxes and tips.			

SOM-GLCEs Code	Objectives	Completed	Date	Chapters
N.FL.06.14	[Core] For applied situations, estimate the answers to calculations involving operations with rational numbers.			
N.FL.06.15	[Core] Solve applied problems that use the four operations with appropriate decimal numbers.			
	Use exponents			
N.ME.06.16	[Fut] Understand and use integer exponents, excluding powers of negative bases; express numbers in scientific notation.			
	Understand rational numbers and their location on the number line			
N.ME.06.17	[Core] Locate negative rational numbers (including integers) on the number line; know that numbers and their negatives add to 0, and are on opposite sides and at equal distance from 0 on a number line.			
N.ME.06.18	[Ext] Understand that rational numbers are quotients of integers (non-zero denominators), e.g., a rational number is either a fraction or a negative fraction.			
N.ME.06.19	[Ext] Understand that 0 is an integer that is neither negative nor positive.			
N.ME.06.20	[Ext] Know that the absolute value of a number is the value of the number ignoring the sign; or is the distance of the number from 0.			
Strand 2	ALGEBRA			
	Calculate rates			
A.PA.06.01	[Core] Solve applied problems involving rates, including speed, e.g., if a car is going 50 mph, how far will it go in 3 1/2 hours?			
	Understand the coordinate plane			
A.RP.06.02	[Core] Plot ordered pairs of integers and use ordered pairs of integers to identify points in all four quadrants of the coordinate plane.			
	Use variables, write expressions and equations, and combine like terms			
A.FO.06.03	[Core] Use letters, with units, to represent quantities in a variety of contexts, e.g., y lbs., k minutes, x cookies			
A.FO.06.04	[Ext] Distinguish between an algebraic expression and an equation.			
A.FO.06.05	[Fut] Use standard conventions for writing algebraic expressions, e.g., $2x + 1$ means "two times x, plus 1" and $2(x + 1)$ means "two times the quantity (x + 1)."			
A.FO.06.06	[Core] Represent information given in words using algebraic expressions and equations.			

SOM-GLCEs Code	Objectives	Completed	Date	Chapters
A.FO.06.07	[Fut] Simplify expressions of the first degree by combining like terms, and evaluate using specific values.			
	Represent linear functions using tables, equations, and graphs			
A.RP.06.08	[Ext] Understand that relationships between quantities can be suggested by graphs and tables.			
A.PA.06.09	[Fut] Solve problems involving linear functions whose input values are integers; write the equation; graph the resulting ordered pairs of integers, e.g., given c chairs, the “leg function” is $4c$; if you have 5 chairs, how many legs?; if you have 12 legs, how many chairs?			
A.RP.06.10	[Fut] Represent simple relationships between quantities using verbal descriptions, formulas or equations, tables, and graphs, e.g., perimeter-side relationship for a square, distance-time graphs, and conversions such as feet to inches.			
	Solve equations			
A.FO.06.11	[Core] Relate simple linear equations with integer coefficients, e.g., $3x = 8$ or $x + 5 = 10$, to particular contexts and solve.			
A.FO.06.12	[Core] Understand that adding or subtracting the same number to both sides of an equation creates a new equation that has the same solution.			
A.FO.06.13	[Core] Understand that multiplying or dividing both sides of an equation by the same non-zero number creates a new equation that has the same solutions.			
A.FO.06.14	[Fut] Solve equations of the form $ax + b = c$, e.g., $3x + 8 = 15$ by hand for positive integer coefficients less than 20, use calculators otherwise, and interpret the results.			
Strand 3	MEASUREMENT			
	Convert within measurement systems			
M.UN.06.01	[Core] Convert between basic units of measurement within a single measurement system, e.g., square inches to square feet.			
	Find volume and surface area			
M.PS.06.02	[Fut] Draw patterns (of faces) for a cube and rectangular prism that, when cut, will cover the solid exactly (nets).			
M.TE.06.03	[Fut] Compute the volume and surface area of cubes and rectangular prisms given the lengths of their sides, using formulas.			

SOM-GLCEs Code	Objectives	Completed	Date	Chapters
Strand 4	GEOMETRY			
	Understand and apply basic properties			
G.GS.06.01	[Fut] Understand and apply basic properties of lines, angles, and triangles, including:			
	• triangle inequality			
	• relationships of vertical angles, complementary angles, supplementary angles			
	• congruence of corresponding and alternate interior angles when parallel lines are cut by a transversal, and that such congruencies imply parallel lines			
	• locate interior and exterior angles of any triangle, and use the property that an exterior angle of a triangle is equal to the sum of the remote (opposite) interior angles			
	• know that the sum of the exterior angles of a convex polygon is 360° .			
	Understand the concept of congruence and basic transformations			
G.GS.06.02	[Core] Understand that for polygons, congruence means corresponding sides and angles have equal measures.			
G.TR.06.03	[Core] Understand the basic rigid motions in the plane (reflections, rotations, translations), relate these to congruence, and apply them to solve problems.			
G.TR.06.04	[Ext] Understand and use simple compositions of basic rigid transformations, e.g., a translation followed by a reflection.			
	Construct geometric shapes			
G.SR.06.05	[NASL] Use paper folding to perform basic geometric constructions of perpendicular lines, midpoints of line segments and angle bisectors; justify informally.			
Strand 5	DATA AND PROBABILITY			
	Understand the concept of probability and solve problems			
D.PR.06.01	[Core] Express probabilities as fractions, decimals, or percentages between 0 and 1; know that 0 probability means an event will not occur and that probability 1 means an event will occur.			
D.PR.06.02	[Ext] Compute probabilities of events from simple experiments with equally likely outcomes, e.g., tossing dice, flipping coins, spinning spinners, by listing all possibilities and finding the fraction that meets given conditions.			