

Diocese of Lansing

# **Curriculum Guidelines for Mathematics**

**Kindergarten through Grade Eight**



**Grade 5**

**2008**

# Mathematics K-8

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*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.

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# Integrating Catholic Social Teaching into Mathematics Instruction

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***“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.**

Curriculum Institute Team

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## Purpose of this Document

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- 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

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To Michael Goetz,

Math Department Chair for grades K-8 at Grand Blanc Community Schools

for sharing his expertise, knowledge and materials with us.

# Fifth Grade

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In the fifth grade, emphasis within the number area shifts to understanding of the addition and subtraction of fractions, with continued consolidation of multiplication and division concepts and skills with whole numbers. The idea of remainders in whole number division is addressed.

Students learn the meaning of a fraction as the result of a division problem, and learn to work with decimals and percentages.

In geometry and measurement, there is emphasis on the meaning and measurement of angles, and on solving problems involving areas and angles.

The students will use exponents and factors to develop algebraic skills that will be more visible in grade six.

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)  Number relationships and meaning of operations (MR)  Fluency with operations and estimation (FL)	Patterns, relations, functions, and change (PA)  Representation (RP)  Formulas, expressions, equations, and inequalities (RP)	Units and systems of measurement (UN)  Techniques and formulas for measurement (TE)  Problem solving involving measurement (PS)	Geometric shape, properties, and mathematical arguments (GS)  Location and spatial relationships (LO)  Spatial reasoning and geometric modeling (SR)  Transformation and symmetry (TR)	Data representation (RE)  Data interpretation and analysis (AN)  Probability (PR)

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# 5<sup>th</sup> Grade GLCEs

SOM- GLECS Code	Objectives	Completed	Date	Chapter
<b>Strand 1</b>	<b>NUMBER AND OPERATIONS</b>			
	<b>Understand division of whole numbers</b>			
<b>N.MR.05.01</b>	<b>[Core]</b> Understand the meaning of division of whole numbers with and without remainders; relate division to fractions and to repeated subtraction.			
<b>N.MR.05.02</b>	<b>[Core]</b> Relate division of whole numbers with remainders to the form $a = bq + r$ , e.g., $34 \div 5 = 6 \text{ r } 4$ , so $5 \cdot 6 + 4 = 34$ ; note remainder (4) is less than divisor (5).			
<b>N.MR.05.03</b>	<b>[Ext]</b> Write mathematical statements involving division for given situations.			
	<b>Multiply and divide whole numbers</b>			
<b>N.FL.05.04</b>	<b>[Core – NC]</b> Multiply a multi-digit number by a two-digit number; recognize and be able to explain common computational errors such as not accounting for place value.			
<b>N.FL.05.05</b>	<b>[Core]</b> Solve applied problems involving multiplication and division of whole numbers.			
<b>N.FL.05.06</b>	<b>[Core – NC]</b> Divide fluently up to a four-digit number by a two-digit number.			
	<b>Find prime factorizations of whole numbers</b>			
<b>N.MR.05.07</b>	<b>[Fut]</b> Find the prime factorization of numbers from 2 through 50, express in exponential notation, e.g., $24 = 2^3 \times 3^1$ , and understand that every whole number greater than 1 is either prime or can be expressed as a product of primes.			
	<b>Understand meaning of decimal fractions and percentages</b>			
<b>N.ME.05.08</b>	<b>[Core - NC]</b> Understand the relative magnitude of ones, tenths, and hundredths and the relationship of each place value to the place to its right, e.g., one is 10 tenths, one tenth is 10 hundredths.			

SOM- GLECS Code	Objectives	Completed	Date	Chapter
N.ME.05.09	[Core] Understand percentages as parts out of 100, use % notation, and express a part of a whole as a percentage.			
	<b>Understand fractions as division statements; find equivalent fractions</b>			
N.ME.05.10	[Fut] Understand a fraction as a statement of division, e.g., $2 \div 3 = 2/3$ , using simple fractions and pictures to represent.			
N.ME.05.11	[Fut] Given two fractions, e.g., $1/2$ and $1/4$ , express them as fractions with a common denominator, but not necessarily a least common denominator, e.g., $1/2 = 4/8$ and $3/4 = 6/8$ ; use denominators less than 12 or factors of 100.			
	<b>Multiply and divide fractions</b>			
N.ME.05.12	[Fut – NC] Find the product of two unit fractions with small denominators using an area model.			
N.MR.05.13	[Fut – NC] Divide a fraction by a whole number and a whole number by a fraction, using simple unit fractions.			
	<b>Add and subtract fractions using common denominators</b>			
N.FL.05.14	[Fut – NC] Add and subtract fractions with unlike denominators through 12 and/or 100, using the common denominator that is the product of the denominators of the 2 fractions, e.g., $3/8 + 7/10$ : use 80 as the common denominator.,			
	<b>Multiply and divide by powers of ten</b>			
N.MR.05.15	[Ext – NC] Multiply a whole number by powers of 10: 0.01, 0.1, 1, 10, 100, 1,000; and identify patterns.			
N.FL.05.16	[NASL] Divide numbers by 10's, 100's, 1,000's using mental strategies.			
N.MR.05.17	[Ext – NC] Multiply one-digit and two-digit whole numbers by decimals up to two decimal places.			

SOM- GLECS Code	Objectives	Completed	Date	Chapter
	<b>Solve applied problems with fractions</b>			
N.MR.05.18	[Fut] Solve contextual problems that involve finding sums and differences of fractions with unlike denominators using knowledge of equivalent fractions.			
N.FL.05.19	[Core] Solve applied problems involving fractions and decimals; include rounding of answers and checking reasonableness.			
N.MR.05.20	[Fut-NC] Solve for the unknown in equations such as $\frac{1}{4} + x = \frac{7}{12}$ .			
	<b>Express, interpret, and use ratios; find equivalences</b>			
N.MR.05.21	[Core] Express fractions and decimals as percentages and vice versa.			
N.ME.05.22	[Ext] Express ratios in several ways given applied situations, e.g., 3 cups to 5 people, 3:5, $\frac{3}{5}$ ; recognize and find equivalent ratios.			
<b>Strand 3</b>	<b>MEASUREMENT</b>			
	<b>Know, and convert among, measurement units within a given system</b>			
M.UN.05.01	[Fut] Recognize the equivalence of 1 liter, 1,000 ml and 1,000 cm <sup>3</sup> and include conversions among liters, milliliters, and cubic centimeters.			
M.UN.05.02	[Ext] Know the units of measure of volume: cubic centimeter, cubic meter, cubic inches, cubic feet, cubic yards, and use their abbreviations (cm <sup>3</sup> , m <sup>3</sup> , in <sup>3</sup> , ft <sup>3</sup> , yd <sup>3</sup> ).			
M.UN.05.03	[Ext] Compare the relative sizes of one cubic inch to one cubic foot, and one cubic centimeter to one cubic meter.			
M.UN.05.04	[Core – NC] Convert measurements of length, weight, area, volume, and time within a given system using easily manipulated numbers.			
	<b>Find areas of geometric shapes using formulas</b>			
M.PS.05.05	[Core] Represent relationships between areas of rectangles, triangles, and parallelograms using models.			

SOM- GLECS Code	Objectives	Completed	Date	Chapter
M.TE.05.06	[Core] Understand and know how to use the area formula of a triangle: $A = 1/2bh$ (where b is length of the base and h is the height), and represent using models and manipulatives.			
M.TE.05.07	[Core] Understand and know how to use the area formula for a parallelogram: $A = bh$ , and represent using models and manipulatives			
	<b>Understand the concept of volume</b>			
M.TE.05.08	[NASL] Build solids with unit cubes and state their volumes.			
M.TE.05.09	[NASL] Use filling (unit cubes or liquid), and counting or measuring to find the volume of a cube and rectangular prism.			
M.PS.05.10	[Fut] Solve applied problems about the volumes of rectangular prisms using multiplication and division and using the appropriate units.			
<b>Strand 4</b>	<b>GEOMETRY</b>			
	<b>Know the meaning of angles, and solve problems</b>			
G.TR.05.01	[Ext] Associate an angle with a certain amount of turning; know that angles are measured in degrees; understand that $90^\circ$ , $180^\circ$ , $270^\circ$ , and $360^\circ$ are associated respectively, with $1/4$ , $1/2$ , $3/4$ , and full turns.			
G.GS.05.02	[Core] Measure angles with a protractor and classify them as acute, right, obtuse, or straight.			
G.GS.05.03	[Fut] Identify and name angles on a straight line and vertical angles.			
G.GS.05.04	[Fut] Find unknown angles in problems involving angles on a straight line, angles surrounding a point, and vertical angles.			
G.GS.05.05	[Core] Know that angles on a straight line add up to $180^\circ$ and angles surrounding a point add up to $360^\circ$ ; justify informally by “surrounding” a point with angles.			
G.GS.05.06	[Core] Understand why the sum of the interior angles of a triangle is $180^\circ$ and the sum of the interior angles of a			

SOM- GLECS Code	Objectives	Completed	Date	Chapter
	quadrilateral is $360^\circ$ , and use these properties to solve problems.			
	<b>Solve problems about geometric shapes</b>			
<b>G.GS.05.07</b>	<b>[Fut]</b> Find unknown angles and sides using the properties of: triangles, including right, isosceles, and equilateral triangles; parallelograms, including rectangles and rhombuses; and trapezoids.			
<b>Strand 5</b>	<b>DATA AND PROBABILITY</b>			
	<b>Construct and interpret line graphs</b>			
<b>D.RE.05.01</b>	<b>[Core]</b> Read and interpret line graphs, and solve problems based on line graphs, e.g., distance-time graphs, and problems with two or three line graphs on same axes, comparing different data.			
<b>D.RE.05.02</b>	<b>[Core]</b> Construct line graphs from tables of data; include axis labels and scale.			
	<b>Find and interpret mean and mode for a given set of data</b>			
<b>D.AN.05.03</b>	<b>[Core]</b> Given a set of data, find and interpret the mean (using the concept of fair share) and mode.			
<b>D.AN.05.04</b>	<b>[Fut]</b> Solve multi-step problems involving means.			