Integrated Faith Standards for Academic Curriculum

Mathematics Curriculum

Kindergarten – Grade 12

*Revised 2022

"Education is an important mission, which draws young people to what is good, beautiful, and true."
Pope Francis

Mathematics is the study of quantity, structure, space, and change. Attention should be paid to the needs of today's society in teaching mathematicsby fostering real world application, enabling students to undertake responsibilities in society both locally and globally while witnessing to the faith.

Individual subjects must be taught according to their own particular methods. It would be wrong to consider subjects as mere adjuncts to faith or as a useful means of teaching apologetics. They enable the pupil to assimilate skills, knowledge, intellectual methods and moral and social attitudes, all of which help to develop his personality and lead him to take his place as an active member of the community of man. Their aim is not merely the attainment of knowledge but the acquisition of values and the discovery of truth. *The Catholic School, 39*

After extensive research and review, the Diocesan Academic Committee determined that the *Mathematics Content Standards for California Public Schools* adopted by the California State Board of Education in 1997 and revised in 2000 (pre-Common Core and No Child Left Behind Act), contained the necessary competencies vital to a high-quality mathematics program. "Mathematics is critical for all students, not only those who will have careers that demand advanced mathematical preparation but all citizens who will be living in the twenty-first century. These standards are based on the premise that all students are capable of learning rigorous mathematics and learning it well, and all are capable of learning far more than is currently expected." (Eastin, 2000).

In studying mathematics, we desire that our students in Catholic Schools will be able to:
- Demonstrate the mental practices of precise, determined, meticulous and accurate questioning, inquiry and reasoning
- Respond to the beauty, harmony, proportion, and wholeness existing in mathematics
- Appreciate how mathematical arguments and procedures can be inferred and practiced in other areas of study, including theology and philosophy
- Propose how mathematical objects or proofs (including the Fibonacci numbers, the musical scale, and geometric proofs) support Divine origin.

We believe that the proposed Diocesan Curriculum Standards for Mathematics adapted and reprinted *Mathematic Content Standards for California Public Schools – Kindergarten Through Grade Twelve* (2000) with permission from the California Department of Education, will help us begin building an educational paradigm that will enable our students to grow in logic and reason with the ability to discern and grow in academic acumen. "Yet the human mind invented mathematics in order to understand creation; but if nature is really structured with a mathematical language and mathematics invented by man can manage to understand it, this demonstrates something extraordinary" Pope Benedict XVI (2006).

Basic Principles Underlying All Standards to be Used for the Planning of Curriculum for the Diocese of Manchester

- A passion for mission should inform every curriculum decision.
- All knowledge reflects God's Truth, Beauty, and Goodness.
- Curriculum and instruction enable deeper incorporation of the children into the Church, the formation of community within the school, and respect for the uniqueness and dignity of each person as created in the image and likeness of God.
- Education fosters growth in Christian virtue and contributes to development and formation of the whole person for the good of the society of which he/she is a member, and in recognition of their destiny, an eternal life in Christ.

- Each subject is to be examined in the context of the Catholic faith through Scripture and Tradition and is to be illuminated by Gospel values.
- Learning and formation are interconnected, as are the natural and spiritual development of each student.
- Curriculum and instruction seek to promote a synthesis of faith, life, and culture, forming students as disciples of Jesus.
- All curricula must support a commitment to strong and consistent Catholic identity.
- Curriculum will assist the student's ability to think critically, problem solve, innovate, and lead towards a supernatural vision.

In a Catholic School, Curricular Formation…

1. Involves the integral formation of the whole person, body, mind, and spirit, in light of his or her ultimate end and the good of society.[i]
2. Promotes human virtues and the dignity of the human person as created in the image and likeness of God and modeled on the person of Jesus Christ.[ii]
3. Seeks to know and understand objective reality, which includes transcendent Truth, is knowable by reason and faith, and finds its origin, unity, and end in God.
4. Develops a Catholic worldview and enables a deeper incorporation of the student into the heart of the Catholic Church.[iii]
5. Encourages a synthesis of faith, life, and culture.[iv]

Kindergarten - Grade 8 Mathematics   Catholic Integrated Faith Standards

Kindergarten through Grade 5 Mathematics Integration of Faith

K-5.MA.IF.1	Recognize the power of the human mind as both a gift from God and a reflection of Him in whose image and likeness we are made.
K-5.MA.IF.2	Display a sense of wonder about mathematical relationships as well as confidence in mathematical certitude.
K-5.MA.IF.3	Respond to the beauty, harmony, proportion, radiance, and wholeness present in mathematics.
K-5.MA.IF.4	Show interest in the pursuit of understanding for its own sake.
K-5.MA.IF.5	Exhibit joy at solving difficult mathematical problems and operations.
K-5.MA.IF.6	Show interest in how the mental processes evident within the discipline of mathematics (such as order, perseverance, and logical reasoning) help us to develop natural virtues (such as self-discipline and fortitude).
K-5.MA.IF.7	Understand why things are true and why they are false.

Grade 6 through Grade 8 Mathematics Integration of Faith

6-8.MA.IF.1	Recognize the power of the human mind as both a gift from God and a reflection of Him in whose image and likeness we are made.
6-8.MA.IF.2	Display a sense of wonder about mathematical relationships as well as confidence in mathematical certitude.
6-8.MA.IF.3	Respond to the beauty, harmony, proportion, radiance, and wholeness present in mathematics.
6-8.MA.IF.4	Show interest in the pursuit of understanding for its own sake.
6-8.MA.IF.5	Exhibit joy at solving difficult mathematical problems and operations.
6-8.MA.IF.6	Show interest in how the mental processes evident within the discipline of mathematics (e.g., order, perseverance, and logical reasoning) help us with the development of natural virtues (such as self-discipline and fortitude).
6-8.MA.IF.7	Further connecting the discipline within mathematics to the development of natural virtues.
6-8.MA.IF.8	Survey the truths about mathematical objects that are interesting in their own right and independent of human opinions.
6-8.MA.IF.9	Demonstrate the mental habits of precise, determined, careful,and accurate questioning, inquiry, and reasoning.
6-8.MA.IF.10	Continue to develop lines of inquiry (as developmentally appropriate) to understand why things are true and why they are false.

By the end of grade five, students increase their facility with the four basic arithmetic operations applied to fractions, decimals, and positive and negative numbers. They know and use common measuring units to determine length, perimeter, and area and know and use formulas to determine the volume of simple geometric figures. Students know the concept of angle measurement and use a protractor and compass to solve problems. They use grids, tables, graphs, and charts to record and analyze data.

Number Sense

5.MT.NS-1.0	Students compute with very large and very small numbers, positive integers, decimals, and fractions and understand the relationship among decimals, fractions, and percents. They understand the relative magnitudes of numbers:
5.MT.NS-1.1	Estimate, round, and manipulate very large (e.g., millions) and very small (e.g., thousandths) numbers.
5.MT.NS-1.2	Interpret percents as a part of a hundred; find decimal and percent equivalents for common fractions and explain why they represent the same value; compute a given percent of a whole number.
5.MT.NS-1.3	Understand and compute positive integer powers of nonnegative integers; compute examples as repeated multiplication.
5.MT.NS-1.4	Determine the prime factors of all numbers through 50 and write the numbers as the product of their prime factors by using exponents to show multiples of a factor (e.g., $24 = 2 \times 2 \times 2 \times 3 = 2^3 \times 3$).
5.MT.NS-1.5	Introduce identifying and representing on a number line decimals, fractions, mixed numbers, and positive and negative integers.
5.MT.NS-2.0	Students perform calculations and solve problems involving addition, subtraction, and simple multiplication and division of fractions and decimals:
5.MT.NS-2.1	Add, subtract, multiply, and divide with decimals; add with negative integers; subtract positive integers from negative integers; and verify the reasonableness of the results.
5.MT.NS-2.2	Demonstrate proficiency with division, including division with positive decimals and long division with multi-digit divisors.
5.MT.NS-2.3	Solve simple problems, including ones arising in concrete situations, involving the addition and subtraction of fractions and mixed numbers (like and unlike denominators of 20 or less), and express answers in the simplest form.
5.MT.NS-2.4	Compute and perform simple multiplication and division of fractions and apply these procedures to solving problems.

Algebra and Functions

5.MT.AF-1.0	Students use variables in simple expressions, compute the value of the expression for specific values of the variable, and plot and interpret the results:
5.MT.AF-1.1	Use information taken from a graph or equation to answer questions about a problem situation.
5.MT.AF-1.2	Use a letter to represent an unknown number; write and evaluate simple algebraic expressions in one variable by substitution.

5.MT.AF-1.3   Know and use the distributive property in equations and expressions with variables.

5.MT.AF-1.4   Identify and graph ordered pairs in the four quadrants of the coordinate plane.

5.MT.AF-1.5   Solve problems involving linear functions with integer values; write the equation; and graph the resulting ordered pairs of integers on a grid.

Measurement and Geometry

5.MT.MG-1.0   Students understand and compute the volumes and areas of simple objects:

5.MT.MG-1.1   Derive and use the formula for the area of a triangle and of a parallelogram by comparing it with the formula for the area of a rectangle (i.e., two of the same triangles make a parallelogram with twice the area; a parallelogram is compared with a rectangle of the same area by cutting and pasting a right triangle on the parallelogram).

5.MT.MG-1.2   Construct a cube and rectangular box from two-dimensional patterns and use these patterns to compute the surface area for these objects.

5.MT.MG-1.3   Understand the concept of volume and use the appropriate units in common measuring systems (i.e., cubic centimeter [cm^3], cubic meter [m^3], cubic inch [in^3], cubic yard [yd^3]) to compute the volume of rectangular solids.

5.MT.MG-1.4   Differentiate between, and use appropriate units of measures for, two- and three-dimensional objects (i.e., find the perimeter, area, volume).

5.MT.MG-2.0   Students identify, describe, and classify the properties of, and the relationships between, plane and solid geometric figures:

5.MT.MG-2.1   Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, and triangles by using appropriate tools (e.g., straightedge, ruler, compass, protractor, drawing software).

5.MT.MG-2.2   Know that the sum of the angles of any triangle is 180° and the sum of the angles of any quadrilateral is 360° and use this information to solve problems.

5.MT.MG-2.3   Visualize and draw two-dimensional views of three-dimensional objects made from rectangular solids.

Statistics, Data Analysis, and Probability

5.MT.SD-1.0   Students display, analyze, compare, and interpret different data sets, including data sets of different sizes:

5.MT.SD-1.1   Know the concepts of mean, median, range, and mode; compute and compare simple examples to show that they may differ.

5.MT.SD-1.2   Organize and display single-variable data in appropriate graphs and representations (e.g., histogram, circle graphs) and explain which types of graphs are appropriate for various data sets.

5.MT.SD-1.3   Use fractions and percentages to compare data sets of different sizes.

5.MT.SD-1.4   Identify ordered pairs of data from a graph and interpret the meaning of the data in terms of the situation depicted by the graph.

5.MT.SD-1.5   Know how to write ordered pairs correctly; for example, (x, y).

Mathematical Reasoning

5.MT.MR-1.0	Students make decisions about how to approach problems:
5.MT.MR-1.1	Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.
5.MT.MR-1.2	Determine when and how to break a problem into simpler parts.
5.MT.MR-2.0	Students use strategies, skills, and concepts in finding solutions:
5.MT.MR-2.1	Use estimation to verify the reasonableness of calculated results.
5.MT.MR-2.2	Apply strategies and results from simpler problems to more complex problems.
5.MT.MR-2.3	Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
5.MT.MR-2.4	Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.
5.MT.MR-2.5	Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified place value.
5.MT.MR-2.6	Make calculations and check the validity of the results from the context of the problem.
5.MT.MR-3.0	Students move beyond a particular problem by generalizing to other situations:
5.MT.MR-3.1	Evaluate the reasonableness of the solution in the context of the original situation.
5.MT.MR-3.2	Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.
5.MT.MR-3.3	Develop generalizations of the results obtained and apply them in other circumstances.