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 four, students understand large numbers and addition, subtraction, multiplication, and division of whole numbers. They describe and compare simple fractions and decimals. They can add and subtract fractions. They understand the properties of, and the relationships between, plane geometric figures. They collect, represent, and analyze data to answer questions.

Number Sense

4.MT.NS-1.0	Students understand the place value of whole numbers and decimals to two decimal places and how whole numbers and decimals relate to simple fractions. Students use the concepts of negative numbers:
4.MT.NS-1.1	Read and write whole numbers in the millions.
4.MT.NS-1.2	Order and compare whole numbers and decimals to two decimal places.
4.MT.NS-1.3	Round whole numbers through the millions to the nearest ten, hundred, thousand, ten thousand, or hundred thousand.
4.MT.NS-1.4	Decide when a rounded solution is called for and explain why such a solution may be appropriate.
4.MT.NS-1.5	Explain different interpretations of fractions, for example, parts of a whole, parts of a set, and division of whole numbers by whole numbers; explain equivalence of fractions (see Standard 4.0).
4.MT.NS-1.6	Write tenths and hundredths in decimal and fraction notations and know the fraction and decimal equivalents for halves and fourths (e.g., 1⁄2 = 0.5 or .50; 7⁄4 = 1 3⁄4 = 1.75).
4.MT.NS-1.7	Write the fraction represented by a drawing of parts of a figure; represent a given fraction by using drawings; and relate a fraction to a simple decimal on a number line.
4.MT.NS-1.8	Use concepts of negative numbers (e.g., on a number line, in counting, in temperature, in “owing”).
4.MT.NS-1.9	Identify on a number line the relative position of positive fractions, positive mixed numbers, and positive decimals to two decimal places.
4.MT.NS-2.0	Students extend their use and understanding of whole numbers to the addition and subtraction of fractions and simple decimals:
4.MT.NS-2.1	Estimate and compute the sum or difference of whole numbers and positive decimals to two places.
4.MT.NS-2.2	Round two-place decimals to one decimal or the nearest whole number and judge the reasonableness of the rounded answer.
4.MT.NS-2.3	Add and subtract fractions with like and unlike denominators.
4.MT.NS-3.0	Students solve problems involving addition, subtraction, multiplication, and division of whole numbers and understand the relationships among the operations:
4.MT.NS-3.1	Demonstrate an understanding of, and the ability to use, standard algorithms for the addition and subtraction of multi-digit numbers.
4.MT.NS-3.2	Demonstrate an understanding of, and the ability to use, standard algorithms for multiplying a multi-digit number by a two-digit number and for dividing a multi-digit number by a one-digit number; use relationships between them to simplify computations and to check results.

4.MT.NS-3.3	Solve problems involving multiplication of multi-digit numbers by two-digit numbers.
4.MT.NS-3.4	Solve problems involving division of multi-digit numbers by one-digit numbers.
4.MT.NS-4.0	Students know how to factor small whole numbers:
4.MT.NS-4.1	Understand that many whole numbers break down in different ways (e.g., $12 = 4 \times 3 = 2 \times 6 = 2 \times 2 \times 3$).
4.MT.NS-4.2	Know that numbers such as 2, 3, 5, 7, and 11 do not have any factors except 1 and themselves and that such numbers are called prime numbers.

Algebra and Functions

4.MT.AF-1.0	Students use and interpret variables, mathematical symbols, and properties to write and simplify expressions and sentences:
4.MT.AF-1.1	Use letters, boxes, or other symbols to stand for any number in simple expressions or equations (e.g., demonstrate an understanding and the use of the concept of a variable).
4.MT.AF-1.2	Interpret and evaluate mathematical expressions that now use parentheses.
4.MT.AF-1.3	Know the algorithm for order of operations.
4.MT.AF-1.4	Use and interpret formulas (e.g., area = length × width or $A = lw$) to answer questions about quantities and their relationships.
4.MT.AF-1.5	Understand that an equation such as $y = 3x + 5$ is a prescription for determining a second number when a first number is given.
4.MT.AF-2.0	Students know how to manipulate equations:
4.MT.AF-2.1	Know and understand that equals added to equals are equal.
4.MT.AF-2.2	Know and understand that equals multiplied by equals are equal.

Measurement and Geometry

4.MT.MG-1.0	Students understand perimeter and area:
4.MT.MG-1.1	Measure the area of rectangular shapes by using appropriate units, such as square centimeter (cm^2), square meter (m^2), square kilometer (km^2), square inch (in^2), square yard (yd^2), or square mile (mi^2).
4.MT.MG-1.2	Recognize that rectangles that have the same area can have different perimeters.
4.MT.MG-1.3	Understand that rectangles that have the same perimeter can have different areas.
4.MT.MG-1.4	Understand and use formulas to solve problems involving perimeters and areas of rectangles and squares. Use those formulas to find the areas of more complex figures by dividing the figures into basic shapes.
4.MT.MG-2.0	Introduce students to the concept of two-dimensional coordinate grids to represent points and graph lines and simple figures:
4.MT.MG-2.1	Draw the points corresponding to linear relationships on graph paper (e.g., draw 10 points on the graph of the equation $y = 3x$ and connect them by using a straight line).
4.MT.MG-2.2	Understand that the length of a horizontal line segment equals the difference of the x-coordinates.
4.MT.MG-2.3	Understand that the length of a vertical line segment equals the difference of the y-coordinates.

4.MT.MG-3.0	Students demonstrate an understanding of plane and solid geometric objects and use this knowledge to show relationships and solve problems:
4.MT.MG-3.1	Identify lines that are parallel and perpendicular.
4.MT.MG-3.2	Identify the radius and diameter of a circle.
4.MT.MG-3.3	Identify congruent figures.
4.MT.MG-3.4	Identify figures that have bilateral and rotational symmetry.
4.MT.MG-3.5	Know the definitions of a right angle, an acute angle, and an obtuse angle. Understand that 90°, 180°, 270°, and 360° are associated, respectively, with ¼, ½, ¾, and full turns.
4.MT.MG-3.6	Visualize, describe, and make models of geometric solids (e.g., prisms, pyramids) in terms of the number and shape of faces, edges, and vertices; interpret two-dimensional representations of three-dimensional objects; and draw patterns (of faces) for a solid that, when cut and folded, will make a model of the solid.
4.MT.MG-3.7	Know the definitions of different triangles (e.g., equilateral, isosceles, scalene) and identify their attributes.
4.MT.MG-3.8	Know the definitions of different quadrilaterals (e.g., rhombus, square, rectangle, parallelogram, trapezoid).

Statistics, Data Analysis, and Probability

4.MT.SD-1.0	Students organize, represent, and interpret numerical and categorical data and clearly communicate their findings:
4.MT.SD-1.1	Formulate survey questions; systematically collect and represent data on a number line; and coordinate graphs, tables, and charts.
4.MT.SD-1.2	Identify the mode(s) for sets of categorical data and the mode(s), median, and any apparent outliers for numerical data sets.
4.MT.SD-1.3	Interpret one- and two-variable data graphs to answer questions about a situation.
4.MT.SD-2.0	Students make predictions for simple probability situations:
4.MT.SD-2.1	Represent all possible outcomes for a simple probability situation in an organized way (e.g., tables, grids, tree diagrams).
4.MT.SD-2.2	Express outcomes of experimental probability situations verbally and numerically (e.g., 3 out of 4; ¾).

Mathematical Reasoning

4.MT.MR-1.0	Students make decisions about how to approach problems:
4.MT.MR-1.1	Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.
4.MT.MR-1.2	Determine when and how to break a problem into simpler parts.
4.MT.MR-2.0	Students use strategies, skills, and concepts in finding solutions:
4.MT.MR-2.1	Use estimation to verify the reasonableness of calculated results.
4.MT.MR-2.2	Apply strategies and results from simpler problems to more complex problems.
4.MT.MR-2.3	Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.

4.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.
4.MT.MR-2.5	Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified place value.
4.MT.MR-2.6	Make precise calculations and check the validity of the results from the context of the problem.
4.MT.MR-3.0	Students move beyond a particular problem by generalizing to other situations:
4.MT.MR-3.1	Evaluate the reasonableness of the solution in the context of the original situation.
4.MT.MR-3.2	Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.
4.MT.MR-3.3	Develop generalizations of the results obtained and apply them in other circumstances.