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.

Grade 3 Mathematics Standards

By the end of grade three, students deepen their understanding of place value and their understanding of and skill with addition, subtraction, multiplication, and division of whole numbers. Students estimate, measure, and describe objects in space. They use patterns to help solve problems. They represent number relationships and conduct simple probability experiments.

Number Sense

3.MT.NS-1.0	Students understand the place value of whole numbers:
3.MT.NS-1.1	Count, read, and write whole numbers to 10,000.
3.MT.NS-1.2	Compare and order whole numbers to 10,000.
3.MT.NS-1.3	Identify the place value for each digit in numbers to 10,000.
3.MT.NS-1.4	Round off numbers to 10,000 to the nearest ten, hundred, and thousand.
3.MT.NS-1.5	Use expanded notation to represent numbers (e.g., 3,206 = 3,000 + 200 + 6).
3.MT.NS-2.0	Students calculate and solve problems involving addition, subtraction, multiplication, and division:
3.MT.NS-2.1	Find the sum or difference of two whole numbers between 0 and 10,000.
3.MT.NS-2.2	Memorize to automaticity the multiplication table for numbers between 1 and 10.
3.MT.NS-2.3	Use the inverse relationship of multiplication and division to compute and check results.
3.MT.NS-2.4	Solve simple problems involving multiplication of multi-digit numbers by one-digit numbers (3,671 × 3 =).
3.MT.NS-2.5	Solve division problems in which a multi-digit number is evenly divided by a one-digit number (135 ÷ 5 =).
3.MT.NS-2.6	Understand the special properties of 0 and 1 in multiplication and division.
3.MT.NS-2.7	Determine the unit cost when given the total cost and number of units.
3.MT.NS-2.8	Solve problems that require two or more of the skills mentioned above.
3.MT.NS-3.0	Students understand the relationship between whole numbers, simple fractions, and decimals:
3.MT.NS-3.1	Compare fractions represented by drawings or concrete materials to show equivalency and to add and subtract simple fractions in context (e.g., 1⁄2 of a pizza is the same amount as 2⁄4 of another pizza that is the same size; show that 3⁄8 is larger than 1⁄4).
3.MT.NS-3.2	Add and subtract simple fractions (e.g., determine that $\frac{1}{8} + \frac{3}{8}$ is the same as $\frac{1}{2}$).
3.MT.NS-3.3	Solve problems involving addition, subtraction, multiplication, and division of money amounts in decimal notation and multiply and divide money amounts in decimal notation by using whole-number multipliers and divisors.
3.MT.NS-3.4	Know and understand that fractions and decimals are two different representations of the same concept (e.g., 50 cents is $\frac{1}{2}$ of a dollar, 75 cents is $\frac{3}{4}$ of a dollar).

Algebra and Functions

3.MT.AF-1.0	Students select appropriate symbols, operations, and properties to represent, describe, simplify, and solve simple number relationships:
3.MT.AF-1.1	Represent relationships of quantities in the form of mathematical expressions, equations, or inequalities.
3.MT.AF-1.2	Solve problems involving numeric equations or inequalities.
3.MT.AF-1.3	Select appropriate operational and relational symbols to make an expression true (e.g., if 4 __ 3 = 12, what operational symbol goes in the blank?).
3.MT.AF-1.4	Express simple unit conversions in symbolic form (e.g., inches = feet × 12).
3.MT.AF-1.5	Recognize and use the commutative, associative and identity properties of multiplication (e.g., if 5 × 7 = 35, then what is 7 × 5? and if 5 × 7 × 3 = 105, then what is 7 × 3 × 5?).
3.MT.AF-1.6	Relate problem situation to a number sentence with all operations.
3.MT.AF-2.0	Students represent simple functional relationships:
3.MT.AF-2.1	Solve simple problems involving a functional relationship between two quantities (e.g., find the total cost of multiple items given the cost per unit).
3.MT.AF-2.2	Extend and recognize a linear pattern by its rules (e.g., the number of legs on a given number of horses may be calculated by counting by 4s or by multiplying the number of horses by 4).

Measurement and Geometry

3.MT.MG-1.0	Students choose and use appropriate units and measurement tools to quantify the properties of objects:
3.MT.MG-1.1	Choose the appropriate tools and units (metric and U.S.) and estimate and measure the length, liquid volume, and weight/mass of given objects.
3.MT.MG-1.2	Estimate or determine the area and volume of solid figures by covering them with squares or by counting the number of cubes that would fill them.
3.MT.MG-1.3	Find the perimeter of a polygon with integer sides.
3.MT.MG-1.4	Carry out simple unit conversions within a system of measurement (e.g., centimeters and meters, hours and minutes).
3.MT.MG-1.5	Be able to tell time to the nearest minute on an analogue clock.
3.MT.MG-2.0	Students describe and compare the attributes of plane and solid geometric figures and use their understanding to show relationships and solve problems:
3.MT.MG-2.1	Identify, describe, and classify polygons (including pentagons, hexagons, and octagons).
3.MT.MG-2.2	Identify attributes of triangles (e.g., two equal sides for the isosceles triangle, three equal sides for the equilateral triangle, right angle for the right triangle).
3.MT.MG-2.3	Identify attributes of quadrilaterals (e.g., parallel sides for the parallelogram, right angles for the rectangle, equal sides and right angles for the square).
3.MT.MG-2.4	Identify right angles in geometric figures or in appropriate objects and determine whether other angles are greater or less than a right angle.
3.MT.MG-2.5	Identify, describe, and classify common three-dimensional geometric objects (e.g., cube, rectangular solid, sphere, prism, pyramid, cone, cylinder).
3.MT.MG-2.6	Identify common solid objects that are the components needed to make a more complex solid object.

Statistics, Data Analysis, and Probability

3.MT.SD-1.0	Students conduct simple probability experiments by determining the number of possible outcomes and make simple predictions:
3.MT.SD-1.1	Identify whether common events are certain, likely, unlikely, or improbable.
3.MT.SD-1.2	Record the possible outcomes for a simple event (e.g., tossing a coin) and systematically keep track of the outcomes when the event is repeated many times.
3.MT.SD-1.3	Summarize and display the results of probability experiments in a clear and organized way (e.g., use a bar graph or a line plot).
3.MT.SD-1.4	Use the results of probability experiments to predict future events (e.g., use a line plot to predict the temperature forecast for the next day).

Mathematical Reasoning

3.MT.MR-1.0	Students make decisions about how to approach problems:
3.MT.MR-1.1	Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.
3.MT.MR-1.2	Determine when and how to break a problem into simpler parts.
3.MT.MR-2.0	Students use strategies, skills, and concepts in finding solutions:
3.MT.MR-2.1	Use estimation to verify the reasonableness of calculated results.
3.MT.MR-2.2	Apply strategies and results from simpler problems to more complex problems.
3.MT.MR-2.3	Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
3.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.
3.MT.MR-2.5	Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified place value.
3.MT.MR-2.6	Make calculations and check the validity of the results from the context of the problem.
3.MT.MR-3.0	Students move beyond a particular problem by generalizing to other situations:
3.MT.MR-3.1	Evaluate the reasonableness of the solution in the context of the original situation.
3.MT.MR-3.2	Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.
3.MT.MR-3.3	Develop generalizations of the results obtained and apply them in other circumstances.