DIOCESE OF NASHVILLE

Mathematics Standards

Aligned with:
State of Tennessee Mathematics Standards

Grades PK-8
Updated September 2025

Our Catholic schools, in communion with our parents, inspire students to pursue Truth and form young men and women to live the Gospel of Jesus Christ.

Approved by:
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Philosophy

The Diocese of Nashville recognizes Catholic education goes beyond academic instruction and serves as a profound act of evangelization and human formation. This vision is grounded in the Church's understanding that education is a participation in the divine work of shaping souls and "helping to form Christ in the lives of others" (St. John Paul II, Speech to NCEA, April 16, 1979). Pope Francis echoes this vision by reminding us that education is not only personal but social and for the good of humanity. "We consider education to be one of the most effective ways of making our world and history more human. Education is above all a matter of love and responsibility handed down from one generation to another" (Francis, Video Message, October 15, 2020). Catholic education is more than the transmission of information. It stirs a sense of wonder and cultivates virtue by illuminating truth, revealing beauty, and nurturing goodness. Catholic education serves students by guiding them not only toward knowledge but also toward holiness.

Mathematics, when taught through a Catholic lens, becomes a powerful tool for forming the intellect and guiding the soul toward Truth. By virtue of human nature, there exists both a natural inclination and moral obligation to seek and adhere to truth, especially religious truth (*Catechism of the Catholic Church,* 2467). Promoting the discovery of universal patterns, relationships, and truths in mathematics provides students with opportunities to experience objective truths that are independent of opinion. Math class becomes a space where students can encounter something greater than themselves and reflect on the eternal nature of divine Truth. Therefore, as students grow in their ability to reason and solve problems, and as they come to recognize the beauty and order embedded in creation, they are not only developing intellectual skills but also participating in a deeper search for meaning.

Academic excellence, therefore, is a vital dimension of Catholic education. Providing a rigorous academic experience as well as teaching through ambitious curricula and research-based practices are necessary in supporting the belief that all students are capable of learning and seeking Truth. By holding high academic standards and striving to form the whole person, the educators in the Diocese of Nashville work to honor the dignity of each student. In all grades, students are challenged to think deeply, communicate clearly, and engage virtuously in the world. All subjects, including mathematics, present content-specific knowledge as well as "values to be acquired and truths to be discovered" (*The Catholic School on the Threshold of the Third Millenium*, 14). In this pursuit, the mathematics standards for the Diocese of Nashville are informed by the Tennessee State Standards, the Mathematical Practices established by National Council of Mathematics, and the principles provided by the Cardinal Newman Society, ensuring our students receive instruction rooted in both academic rigor and Catholic identity.

Pre-K Math Standards

DIOCESE OF NASHVILLE

Catholic Identity

Foundational Standards	General Standards
K.1A recognize that every human life is sacred because each person is created and loved by God K.1B describe ways to take part in/be responsible to the community by discerning and using our God-given gifts K.1C recognize and oppose unjust social structures and work toward justice for all K.1D see God at work in all things and as expressed in the sacraments K.1E connect scripture, tradition, and the models of Mary and the saints to guide, grow, and deepen faith	CS.M.K6.GS1 Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry and reasoning. CS.M.K6.GS2 Develop lines of inquiry (as developmentally appropriate) to understand why things are true and why they are false. CS.M.K6.GS3 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. CS.M.K6.GS4 Survey the truths about mathematical objects that are interesting in their own right and independent of human opinions.
Standards for Mathematical Practice	**Mathematical Practice through Catholic Dispositions**
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	CS.M.K6.DS1 Display a sense of wonder about mathematical relationships as well as confidence in mathematical certitude. CS.M.K6.DS2 Respond to the beauty, harmony, proportion, radiance, and wholeness present in mathematics. CS.M.K6.DS3 Show interest in the pursuit of understanding for its own sake. CS.M.K6.DS4 Exhibit joy at solving difficult mathematical problems and operations. CS.M.K6.DS5 Show interest in how the mental processes evident within the discipline of mathematics (such as order, perseverance, and logical reasoning) help us with the development of the natural virtues (such as self-discipline and fortitude).

Instructional Focus

Counting and Cardinality	Know number names and the count sequence.	**PK.CC.A.1** Count forward from 1 to 30. **PK.CC.A.2** *This standard begins in Kindergarten.* **PK.CC.A.3** Begin to print the distinctive features of numerals (i.e., circle, line, diagonal, crossed lines). **PK.CC.A.4** Begin to name numerals 0-10.
	Count to tell the number of objects.	**PK.CC.B.4** Understand the relationship between numbers and quantities; connect counting to cardinality. **a.** When counting objects 1-20, say the number names in the standard order, using one-to-one correspondence. **b.** Understand that the last number name said tells the number of objects counted. **c.** Recognize that one more object added to a group of objects changes the quantity as a whole. **PK.CC.B.5** Understand that a number represents a corresponding quantity. **a.** Subitize quantities up to 5 (i.e., the ability to look at a quantity and say the quantity [1-5] quickly, just by looking). **b.** Given a number from 1-10, count out that many objects. **c.** With guidance and support, count to answer "how many?" questions about as many as 10 things arranged in a line, a rectangular array, or a circle. **d.** With guidance and support, count to answer "how many?" questions about as many as 5 things in a scattered configuration.
	Compare numbers.	**PK.CC.C.6** Use comparative language, such as more/less than or equal to, to compare and describe collections of objects. **PK.CC.C.7** *This standard begins in Kindergarten*
Operations and Algebraic Thinking	Understand addition as putting together and adding to.	**PK.OA.A.1** With guidance and support, begin to represent addition and subtraction with objects, fingers, mental images, drawings, sounds, acting out situations, verbal explanations, expressions, or equations. **PK.OA.A.2** With guidance and support, begin to solve addition and subtraction word problems, and add and subtract within 5 (e.g., by using objects or drawings to represent the problem). **PK.OA.A.3** Compose and decompose numbers to 5, in more than one way, by using objects or drawings. **PK.OA.A.4** Show, through the use of concrete objects or drawings, the number needed to make up to 5 when added to any given number from 0-5. **PK.OA.A.5** *This standard begins in Kindergarten.*
	Understand subtraction as taking apart and taking from.	
Number and Operations in Base Ten	Work with numbers 11-19 to gain foundations of place value.	**K.NBT.A.1** *This standard begins in Kindergarten.*

Major work of the grade; *Supporting work of the grade*

Pre-K Math Standards

DIOCESE OF NASHVILLE

Measurement and Data	Describe and compare measurable attributes.	**PK.MD.A.1** Describe measurable attributes of a single object, such as length, width, height. **PK.MD.A.2** Compare the attributes of two or more concrete objects and use words to define attributes of the objects (i.e. heavier/lighter, longer/shorter, etc.).
	Work with money.	**PK.MD.B.3** Begin to recognize currency and its purpose.
	Classify objects and count the number of objects in each category.	**PK.MD.C.4 Sort a collection of objects into a given category, with 10 or fewer in each category. Compare the categories by group size.**
	Identify time.	*No standards in PreK*
Geometry	Describe shapes and space.	**PK.G.A.1** Begin to use relative position words in appropriate context, such as above, below, beside, and between. **PK.G.A.2** Correctly name some two-dimensional shapes. **PK.G.A.3** Begin to explore shapes as two-dimensional or three-dimensional. **PK.G.A.4** Begin to describe objects in the environment using names of shapes.
	Analyze, compare, create, and compose shapes.	**PK.G.B.4** Describe similarities and differences between two-dimensional shapes. **PK.G.B.5** Model shapes in the world by building and drawing shapes. **PK.G.B.6** Begin to recognize smaller shapes within a larger shape, including that some shapes can be put together to make a new shape.

Kindergarten Math Standards

DIOCESE OF NASHVILLE

Catholic Identity	
Foundational Standards	**General Standards**
K.1A recognize that every human life is sacred because each person is created and loved by God K.1B describe ways to take part in/be responsible to the community by discerning and using our God-given gifts K.1C recognize and oppose unjust social structures and work toward justice for all K.1D see God at work in all things and as expressed in the sacraments K.1E connect scripture, tradition, and the models of Mary and the saints to guide, grow, and deepen faith	CS.M.K6.GS1 Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry and reasoning. CS.M.K6.GS2 Develop lines of inquiry (as developmentally appropriate) to understand why things are true and why they are false. CS.M.K6.GS3 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. CS.M.K6.GS4 Survey the truths about mathematical objects that are interesting in their own right and independent of human opinions.
Standards for Mathematical Practice	**Mathematical Practice through Catholic Dispositions**
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	CS.M.K6.DS1 Display a sense of wonder about mathematical relationships as well as confidence in mathematical certitude. CS.M.K6.DS2 Respond to the beauty, harmony, proportion, radiance, and wholeness present in mathematics. CS.M.K6.DS3 Show interest in the pursuit of understanding for its own sake. CS.M.K6.DS4 Exhibit joy at solving difficult mathematical problems and operations. CS.M.K6.DS5 Show interest in how the mental processes evident within the discipline of mathematics (such as order, perseverance, and logical reasoning) help us with the development of the natural virtues (such as self-discipline and fortitude).

Instructional Focus		
Counting and Cardinality	Know number names and the count sequence.	**K.CC.A.1** Count to 100 by ones, fives, and tens. Count backward from 10. **K.CC.A.2** Count forward by ones beginning from any given number within the known sequence (instead of having to begin at 1). **K.CC.A.3** Write numbers from 0 to 20. Represent a quantity of objects with a written number 0-20. **K.CC.A.4** Recognize, describe, extend, and create patterns and explain a simple rule for a pattern using concrete materials. Analyze the structure of the repeating pattern by identifying the unit (core) of the pattern.
	Count to tell the number of objects.	**K.CC.B.5** Understand the relationship between numbers and quantities; connect counting to cardinality. **a.** When counting objects 1-20, say the number names in the standard order, using one-to-one correspondence. **b.** Recognize that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. **c.** Recognize that each successive number name refers to a quantity that is one greater and each previous number is one less. **K.CC.B.6** Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, a circle, or as many as 10 things in a scattered configuration. Given a number from 1-20, count out that many objects
	Compare numbers.	**K.CC.C.7** Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group. **K.CC.C.8** Compare two given numbers up to 10, when written as numerals, using the terms greater than, less than, or equal to.
Operations and Algebraic Thinking	Understand addition as putting together and adding to. Understand subtraction as taking apart and taking from.	**K.OA.A.1** Represent addition and subtraction with objects, fingers, drawings, acting out situations, verbal explanations, expressions, or equations. **K.OA.A.2** Add and subtract within 10 to solve contextual problems with result/total unknown involving situations of add to, take from, and put together/take apart. Use objects, drawings, or equations to represent the problem. **K.OA.A.3** Decompose numbers less than or equal to 10 into addend pairs in more than one way (e.g., 5 = 2 + 3 and 5 = 4 + 1) by using objects or drawings. Record each decomposition using a drawing or writing an equation. **K.OA.A.4** Find the number that makes 10, when added to any given number, from 1 to 9 using objects or drawings. Record the answer using a drawing or writing an equation. **K.OA.A.5** Use mental strategies flexibly to develop fluency in addition and subtraction within 10.
Number and Operations in Base Ten	Work with numbers 11-19 to gain foundations of place value.	**K.NBT.A.1** Compose and decompose numbers from 11 to 19 into a group of ten ones and some more ones by using objects or drawings (e.g., 18 equals 10 + 8). Record the composition or decomposition using a drawing or by writing an equation.

Kindergarten Math Standards

DIOCESE OF NASHVILLE

Measurement and Data	Describe and compare measurable attributes.	*K.MD.A.1* Describe the measurable attributes of an object, such as length (long/short), height (tall/short), or weight (heavy/light). *K.MD.A.2* Directly compare two objects with a measurable attribute in common, to describe which object has more of/less of the attribute. For example, directly compare the heights of two children and describe one child as taller/shorter
	Work with money.	*K.MD.B.3* Identify the penny, nickel, dime, and quarter based on their attributes (size and color) and recognize the value of each.
	Classify objects and count the number of objects in each category.	*K.MD.C.4* Sort a collection of objects into a given category, with 10 or fewer in each category. Compare the categories by group size.
	Identify time.	*K.MD.D.1* Tell time to the hour and half hour using analog and digital clock. *K.MD.D.2* Locate numbers on the calendar (day, month, year).
Geometry	Describe shapes and space.	*K.G.A.1* Describe objects in the environment using names of shapes and solids (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres). Describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, between, and next to. *K.G.A.2* Correctly name shapes and solids (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres) regardless of their orientations or overall size. *K.G.A.3* Identify shapes (squares, circles, triangles, rectangles, and hexagons) as two-dimensional and solids (cubes, cones, cylinders, and spheres) as three-dimensional.
	Analyze, compare, create, and compose shapes.	*K.G.B.4* Describe similarities and differences between two- and three-dimensional shapes/solids, in different sizes and orientations. *K.G.B.5* Model shapes/solids in the world by building or drawing them. *K.G.B.6* Compose a figure using simple shapes/solids and identify smaller shapes/solids within the figure.

Literacy Standards for Mathematics	Literature Suggestions for Kindergarten Math
Use multiple reading strategies. Understand and use correct mathematical vocabulary. Discuss and articulate mathematical vocabulary. Write mathematical arguments.	*Anno's Counting Book* by Misumasa Anno *I'm Trying to Love Math* by Cheryl Bardoe and Barbara McClintock *Spaghetti and Meatballs for All!* By Marilyn Burns and Debbie Tilly *One Grain of Rice: A Mathematical Folktale* by Demi *Feast for 10* by Cathryn Falwell *My Even Day* by Doris Fisher and Dani Sneed *One Odd Day* by Doris Fisher and Dani Sneed *Zero is the Leaves on the Trees* by Betsy Franco and Shino Arihara *The Doorbell Rang* by Pat Hutchins *The Librarian Who Measured the Earth* by Kathryn Lasky and Kevin Kawkes *Two of Everything* by Lily Toy Hong *7 Ate 9* by Tara Lazar and Ross MacDonald *How Many Seeds in a Pumpkin?* *10 Minutes till Bedtime* by Peggy Rathmann *12 Ways to Get to 11* by Eve Merriam and Bernie Karlin *Albert Adds Up!* by Eleanor May *Bear Counts* by Karma Wilson *Bird Count* by Susan Edwards Richmonds *Circus Shapes* by Stuart J. Murphy *Eggs and Legs: Counting by Twos* by Michael Dahl *Fish Eyes* by Lois Ehlert *Pigeon Math* by Asia Citro *Sheep Won't Sleep* by Judy Cox *God Counts* by Irene Sun Resources: *Sarah Mackenzie, Read-Aloud Revival familymath.stanford.edu Eoccc.org

1st Grade Math Standards

DIOCESE OF NASHVILLE

Catholic Identity	
Foundational Standards	**General Standards**
1.1A recognize that every human life is sacred because each person is created and loved by God 1.1B describe ways to take part in/be responsible to the community by discerning and using our God-given gifts 1.1C recognize and oppose unjust social structures and work toward justice for all 1.1D see God at work in all things and as expressed in the sacraments 1.1E connect scripture, tradition, and the models of Mary and the saints to guide, grow, and deepen faith	CS.M.K6.GS1 Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry and reasoning. CS.M.K6.GS2 Develop lines of inquiry (as developmentally appropriate) to understand why things are true and why they are false. CS.M.K6.GS3 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. CS.M.K6.GS4 Survey the truths about mathematical objects that are interesting in their own right and independent of human opinions.
Standards for Mathematical Practice	**Mathematical Practice through Catholic Dispositions**
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	CS.M.K6.DS1 Display a sense of wonder about mathematical relationships as well as confidence in mathematical certitude. CS.M.K6.DS2 Respond to the beauty, harmony, proportion, radiance, and wholeness present in mathematics. CS.M.K6.DS3 Show interest in the pursuit of understanding for its own sake. CS.M.K6.DS4 Exhibit joy at solving difficult mathematical problems and operations. CS.M.K6.DS5 Show interest in how the mental processes evident within the discipline of mathematics (such as order, perseverance, and logical reasoning) help us with the development of the natural virtues (such as self-discipline and fortitude).

Instructional Focus		
Operations and Algebraic Thinking	Represent and solve problems involving addition and subtraction.	**1.OA.A.1** Add and subtract within 20 to solve contextual problems, with unknowns in all positions, involving situations of add to, take from, put together/take apart, and compare. Use objects, drawings, and equations with a symbol for the unknown number to represent the problem. **1.OA.A.2** Add three whole numbers whose sum is within 20 to solve contextual problems using objects, drawings, and equations with a symbol for the unknown number to represent the problem
	Understand and apply properties of operations and the relationship between addition and subtraction	**1.OA.B.3** Apply properties of operations (additive identity, commutative, and associative) as strategies to add and subtract. **1.OA.B.4** Understand the relationship between addition and subtraction by representing subtraction as an unknown-addend problem.
	Add and subtract within 20.	**1.OA.C.5** Add and subtract within 20 using strategies such as counting on, counting back, making 10, related known facts, and composing/decomposing numbers with an emphasis on making ten. **1.OA.C.6** Use mental strategies flexibly and efficiently to develop fluency in addition and subtraction within 20.
	Work with addition and subtraction equations.	**1.OA.D.7** Understand the meaning of the equal sign. Determine if equations involving addition and subtraction are true or false. **1.OA.D.8** Determine the unknown whole number in an addition or subtraction equation with sums/differences within 20, with the unknown in any position.
Number and Operations in Base Ten	Extend the counting sequence.	**1.NBT.A.1** Count to 120, by ones, twos, and fives starting at any multiple of that number. Count backward from 120. Read and write numbers to 120 and represent a quantity of objects with a written number. **1.NBT.A.2** Recognize, describe, extend, and create patterns when counting by ones, twos, fives, and tens and use those patterns to predict the next number in the counting sequence up to 120 through counting or building with concrete materials.
	Understand place value.	**1.NBT.B.3** Know that the digits of a two-digit number represent groups of tens and ones. **1.NBT.B.4** Compare two two-digit numbers based on the meanings of the digits in each place and use the symbols >, =, and < to show the relationship.
	Use place value understanding and properties of operations to add and subtract.	**1.NBT.C.5** Add a two-digit number to a one-digit number and a two-digit number to a multiple of ten (within 100). **1.NBT.C.6** Mentally find 10 more or 10 less than a given two-digit number without having to count by ones and explain the reasoning used. **1.NBT.C.7** Subtract multiples of 10 from any number in the range of 10-99 using concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
Measurement and Data	Measure lengths indirectly and by iterating length units.	**1.MD.A.1** Order three objects by length. Compare the lengths of two objects indirectly by using a third object. **1.MD.A.2** Measure the length of an object using nonstandard units (paper clips, cubes, etc.) and express this length as a whole number of units.
	Work with time and money.	*1.MD.B.3* Recognize a clock as a measurement tool. Tell and write time in hours and half-hours using analog and digital clocks. *1.MD.B.4* Count the value of a set of like coins less than one dollar using the ¢ symbol only.

Major work of the grade; *Supporting work of the grade*

	Represent and interpret data.	*1.MD.C.5* Organize, represent, and interpret data with up to three categories using pictographs, bar graphs, and tally charts. Ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another
Geometry	Reason about shapes/solids and their attributes.	*1.G.A.1* Distinguish between attributes that define a shape (e.g., number of sides and vertices) versus attributes that do not define the shape (e.g., color, orientation, overall size); build and draw two-dimensional shapes to possess defining attributes. *1.G.A.2* Create a composite figure and use the composite figure to make new figures by using two-dimensional shapes (rectangles, squares, hexagons, trapezoids, triangles, half-circles, and quarter-circles) or three dimensional solids (cubes, spheres, rectangular prisms, cones, and cylinders). *1.G.A.3* Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of, the shares. Understand for these examples that partitioning into more equal shares creates smaller shares.

Literacy Standards for Mathematics

Use multiple reading strategies.
Understand and use correct mathematical vocabulary.
Discuss and articulate mathematical vocabulary.
Write mathematical arguments.

"The universe is not the result of chance, as some would want to believe. Contemplating it, we are invited to read something profound into it: the wisdom of the Creator… that reason and the laws of mathematics are not just human inventions but actually discovered in the order of nature." – Pope Benedict XVI

"Whatever is true, whatever is honorable, whatever is just, whatever is pure… think about these things." Philippians 4:8

Literature Suggestions for 1st grade Math

Missing Math by Loreen Leedy
What's New at the Zoo? An Animal Adding Adventure by Suzanne Slade and Joan Waites
12 Ways to Get to 11 by Eve Merriam and Bernie Karlin
Ready, Set, Hop! by Stuart J. Murphy and Jon Buller
Domino Addition by Lynette Long
Anno's Counting Book by Mitsumasa Anno
Math Fables: Lessons that Count by Greg Tang and Heather Cahoon
Applesauce Season by Eden Ross Lipson and Mordecai Gerstein
One Hundred Hungry Ants by Elinor J. Pinczes and Bonnie MacKain
The Penny Pot by Stuart J. Murphy and Lynne Cravath
A Chair for My Mother by Vera B. Williams
The Greedy Triangle by Marilyn Burns and Gordon Silveria
Pigeon Math by Asia Citro
Lulu's Lemonade by Barbara deRubertis
Twenty is Too Many by Kate Duke
Round is a Mooncake: A Book of Shapes by Roseanne Thong
Is It Larger? Is It Smaller? by Tana Hoban
The Line Up Book by Marisabina Russo

Resources:
everydaymath.uchicago.edu
earlymath.erikson.edu
Kateshomeschoolmath.com

2nd Grade Math Standards

DIOCESE OF NASHVILLE

Catholic Identity	
Foundational Standards	**General Standards**
2.1A recognize that every human life is sacred because each person is created and loved by God 2.1B describe ways to take part in/be responsible to the community by discerning and using our God-given gifts 2.1C recognize and oppose unjust social structures and work toward justice for all 2.1D see God at work in all things and as expressed in the sacraments 2.1E connect scripture, tradition, and the models of Mary and the saints to guide, grow, and deepen faith	CS.M.K6.GS1 Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry and reasoning. CS.M.K6.GS2 Develop lines of inquiry (as developmentally appropriate) to understand why things are true and why they are false. CS.M.K6.GS3 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. CS.M.K6.GS4 Survey the truths about mathematical objects that are interesting in their own right and independent of human opinions.
Standards for Mathematical Practice	**Mathematical Practice through Catholic Dispositions**
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	CS.M.K6.DS1 Display a sense of wonder about mathematical relationships as well as confidence in mathematical certitude. CS.M.K6.DS2 Respond to the beauty, harmony, proportion, radiance, and wholeness present in mathematics. CS.M.K6.DS3 Show interest in the pursuit of understanding for its own sake. CS.M.K6.DS4 Exhibit joy at solving difficult mathematical problems and operations. CS.M.K6.DS5 Show interest in how the mental processes evident within the discipline of mathematics (such as order, perseverance, and logical reasoning) help us with the development of the natural virtues (such as self-discipline and fortitude).

Instructional Focus		
Operations and Algebraic Thinking	Represent and solve problems involving addition and subtraction.	**2.OA.A.1** Add and subtract within 100 to solve one- and two-step contextual problems, with unknowns in all positions, involving situations of add to, take from, put together/take apart, and compare. Use objects, drawings, and equations with a symbol for the unknown number to represent the problem.
	Add and subtract within 30.	**2.OA.B.2** Fluently add and subtract within 30 using mental strategies.
	Work with equal groups of objects to gain foundations for multiplication.	*2.OA.A.C.3* Determine whether a group of objects (up to 20) has an odd or even number of members by pairing objects or counting them by 2s. Write an equation to express an even number as a sum of two equal addends. *2.OA.C.4* Use repeated addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.
	Solve problems involving addition and subtraction and identify and explain patterns in arithmetic.	**2.OA.D.5** Identify arithmetic patterns in an addition or hundreds chart and explain them using properties of operations. **2.OA.D.6** Round numbers to the nearest tens.
Number and Operations in Base Ten	Understand place value.	**2.NBT.A.1** Know that the three digits of a three-digit number represent amounts of hundreds, tens, and ones. **2.NBT.A.2** Recognize, describe, extend, and create patterns when counting by ones, twos, fives, tens, and hundreds and use those patterns to predict the next number in the counting sequence up to 1000 through counting. **2.NBT.A.3** Read and write numbers to 1000 using standard form, word form, and expanded form. **2.NBT.A.4** Compare two three-digit numbers based on the meanings of the digits in each place and use the symbols >, =, and < to show the relationship.
	Use place value understanding and properties of operations to add and subtract.	**2.NBT.B.5** Fluently add and subtract within 100 using properties of operations, strategies based on place value, and/or the relationship between addition and subtraction. 2.NBT.B.6 Add up to four two-digit numbers using properties of operations and strategies based on place value. **2.NBT.B.7** Add and subtract within 1000 using concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction to explain the reasoning used. (Explanations may include words, drawing, or objects.) **2.NBT.B.8** Mentally add or subtract 10 or 100 to/from any given number within 1000.

2nd Grade Math Standards

DIOCESE OF NASHVILLE

Measurement and Data	Measure and estimate lengths in standard units.	**2.MD.A.1** Measure the length of an object in whole number units by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. **2.MD.A.2** Measure the length of an object using two different whole number units of measure and describe how the two measurements relate to the size of the unit chosen. **2.MD.A.3** Estimate lengths using whole number units of inches, feet, yards, centimeters, and meters. **2.MD.A.4** Measure, using whole number lengths, to determine how much longer one object is than another and express the difference in terms of a standard unit of length.
	Relate addition and subtraction to length.	**2.MD.B.5** Add and subtract within 100 to solve contextual problems, with the unknown in any position, involving lengths that are given in the same units by using drawings and equations with a symbol for the unknown to represent the problem. **2.MD.B.6** Represent whole numbers as lengths from 0 on a number line and know that the points corresponding to the numbers on the number line are equally spaced. Use a number line to represent whole number sums and differences of lengths within 100.
	Work with time and money.	*2.MD.C.7* Tell and write time in quarter hours and to the nearest five minutes (in a.m. and p.m.) using analog and digital clocks. *2.MD.C.8* Solve contextual problems involving amounts less than one dollar including quarters, dimes, nickels, and pennies using the ¢ symbol appropriately. Solve contextual problems involving whole number dollar amounts up to $100 using the $ symbol appropriately.
	Represent and interpret data.	*2.MD.D.9* Given a set of data, create a line plot, where the horizontal scale is marked off in whole-number units. *2.MD.D.10* Draw a pictograph (with a key of values of 1, 2, 5, or 10) and a bar graph (with intervals of one) to represent a data set with up to four categories. Solve addition and subtraction problems related to the data in a graph.
Geometry	Reason about shapes and their attributes.	*2.G.A.1* Identify triangles, quadrilaterals, pentagons, and hexagons. Draw two dimensional shapes having specified attributes (as determined directly or visually, not by measuring), such as a given number of angles/vertices or a given number of sides of equal length. *2.G.A.2* Partition a rectangle into rows and columns of same-sized squares and find the total number of squares. *2.G.A.3* Partition circles and rectangles into two, three, and four equal shares. Describe the shares using the words halves, thirds, fourths, half of, a third of, and a fourth of, and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Literacy Standards for Mathematics

Use multiple reading strategies.
Understand and use correct mathematical vocabulary.
Discuss and articulate mathematical vocabulary.
Write mathematical arguments.

"True education is directed toward the formation of the human person in view of his final end…and toward the good of those societies of which, as man, he is a member, and in whose responsibilities, as an adult, he will share." Gravissimum Educationis 1965

"Turning your ear to wisdom and applying your heart to understanding—indeed, if you call out for insight… then you will understand the fear of the Lord… For the Lord gives wisdom; from his mouth come knowledge and understanding." Proverbs 2:2-6

Literature Suggestions for 2nd grade Math

Math-terpieces: The Art of Problem-Solving by Greg Tang
Each Orange Had 8 Slices by Paul Giganti Jr. and Donald Crews
If You Were a Plus Sign by Trisha Sue Speed Shaskan and Francesca Carabelli
If You Were a Minus Sign by Trisha Sue Speed Shaskan and Francesca Carabelli
Subtraction Action by Loreen Leedy
Dozens of Doughnuts by Carrie Finison and Brianne Farley
Sir Cumference and All the King's Tens by Cindy Neuschwander and Wayne Geehan
Lemonade in Winter by Emily Jenkins and G. Brian Karas
Is a Blue Whale the Biggest Thing There Is? by Robert E. Wells
Even Steven and Odd Todd by Kathryn Cristaldi
Skip Counting with Meerkats by Tracey Steffora
What's the Place Value? By Shirley Duke

Resources:
everydaymath.uchicago.edu
kateshomeschoolmath.com
thriftyinthirdgrade.com

3rd Grade Math Standards

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Catholic Identity	
Foundational Standards	**General Standards**
3.1A recognize that every human life is sacred because each person is created and loved by God 3.1B describe ways to take part in/be responsible to the community by discerning and using our God-given gifts 3.1C recognize and oppose unjust social structures and work toward justice for all 3.1D see God at work in all things and as expressed in the sacraments 3.1E connect scripture, tradition, and the models of Mary and the saints to guide, grow, and deepen faith	CS.M.K6.GS1 Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry and reasoning. CS.M.K6.GS2 Develop lines of inquiry (as developmentally appropriate) to understand why things are true and why they are false. CS.M.K6.GS3 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. CS.M.K6.GS4 Survey the truths about mathematical objects that are interesting in their own right and independent of human opinions.
Standards for Mathematical Practice	**Mathematical Practice through Catholic Dispositions**
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	CS.M.K6.DS1 Display a sense of wonder about mathematical relationships as well as confidence in mathematical certitude. CS.M.K6.DS2 Respond to the beauty, harmony, proportion, radiance, and wholeness present in mathematics. CS.M.K6.DS3 Show interest in the pursuit of understanding for its own sake. CS.M.K6.DS4 Exhibit joy at solving difficult mathematical problems and operations. CS.M.K6.DS5 Show interest in how the mental processes evident within the discipline of mathematics (such as order, perseverance, and logical reasoning) help us with the development of the natural virtues (such as self-discipline and fortitude).

Instructional Focus		
Operations and Algebraic Thinking	Represent and solve problems involving multiplication and division.	**3.OA.A.1** Interpret the factors and products in whole number multiplication equations. **3.OA.A.2** Interpret the dividend, divisor, and quotient in whole number division equations **3.OA.A.3** Multiply and divide within 100 to solve contextual problems, with the unknown in any positions, in situations involving equal groups, arrays/area, and measurement quantities using strategies based on place value, the properties of operations, and the relationship between multiplication and division. **3.OA.A.4** Determine the unknown whole number in a multiplication or division equation relating three whole numbers within 100.
	Understand properties of multiplication and the relationship between multiplication and division.	**3.OA.B.5** Apply properties of operations as strategies to multiply and divide. **3.OA.B.6** Understand division as an unknown-factor problem.
	Multiply and divide within 100.	**3.OA.C.7** Fluently multiply and divide within 100, using strategies such as the properties of operations or the relationship between multiplication and division.
	Solve problems involving the four operations and identify and explain patterns in arithmetic.	**3.OA.D.8** Solve two-step contextual problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **3.OA.D.9** Identify patterns in a multiplication chart and explain them using properties of operations.
Number and Operations in Base Ten	Use place value understanding and properties of operations to perform multi-digit arithmetic.	*3.NBT.A.1* Round whole numbers to the nearest 10 or 100 using understanding of place value and use a number line to explain how the number was rounded. *3.NBT.A.2* Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. *3.NBT.A.3* Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g. 9 x 80, 5 x 60) using strategies based on place value and properties of operations. *3.NBT.A.4* Read and write multi-digit whole numbers (less than or equal to 100,000) using standard form, word form, and expanded form.
Number and Operations - Fractions	Develop understanding of fractions as numbers.	**3.NF.A.1** Understand a unit fraction, 1/b, as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a non-unit fraction, n/b, as the quantity formed by n parts of size 1/b. **3.NF.A.2** Understand a fraction as a number on the number line. Represent fractions on a number line. **a.** Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint locates the number 1/b on the number line. **b.** Represent a fraction n/b on a number line diagram by marking off n lengths 1/b from 0. Recognize that the resulting interval has size n/b and that its endpoint locates the number n/b on the number line. **3.NF.A.3** Add and subtract fractions with like denominators.

Major work of the grade; *Supporting work of the grade*

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		3.NF.A.4 Explain equivalence of fractions and compare fractions by reasoning about their size. **a.** Understand two fractions as equivalent (equal) if they are the same size or the same point on a number line. **b.** Recognize and generate simple equivalent fractions and explain why the fractions are equivalent using a visual fraction model. **c.** Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers. **d.** Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Use the symbols >, =, or < to show the relationship and justify the conclusions.
Measurement and Data	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.	**3.MD.A.1** Solve contextual problems in time and money. **a.** Tell and write time to the nearest minute and measure time intervals in minutes. Solve contextual problems involving addition and subtraction of time intervals in minutes. **b.** Solve one-step contextual problems involving amounts less than one dollar including quarters, dimes, nickels, and pennies using the ¢ symbol appropriately. Solve contextual problems involving whole number dollar amounts up to $1000 using the $ symbol appropriately. **3.MD.A.2** Measure the mass of objects and liquid volume using standard units of grams (g), kilograms (kg), milliliters (ml), and liters (l). Estimate the mass of objects and liquid volume using benchmarks.
	Represent and interpret data.	*3.MD.B.3* Draw a pictograph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in graphs. *3.MD.B.4* Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units: whole numbers, halves, or quarters
	Geometric measurement: understand and apply concepts of area and relate area to multiplication and to addition.	**3.MD.C.5** Recognize that plane figures have an area and understand concepts of area measurement. **a.** Understand that a square with side length 1 unit, called "a unit square," is said to have "one square unit" of area and can be used to measure area. **b.** Understand that a plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units. **3.MD.C.6** Measure areas by counting unit squares (square centimeters, square meters, square inches, square feet, and improvised units). **3.MD.C.7** Relate area of rectangles to the operations of multiplication and addition. **a.** Find the area of a rectangle with whole-number side lengths by tiling it and show that the area is the same as would be found by multiplying the side lengths. **b.** Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real-world and mathematical problems and represent whole-number products as rectangular areas in mathematical reasoning. **c.** Use tiling to show in a concrete case that the area of a rectangle with whole number side lengths a and (b + c) is the sum of (a x b) and (a x c). Use area models to represent the distributive property in mathematical reasoning. **d.** Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real-world problems.
	Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.	*3.MD.D.8* Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exploring rectangles with the same perimeter and different areas or with the same area and different perimeters.
Geometry	Reason about shapes and their attributes.	*3.G.A.1* Understand that shapes in different categories may share attributes and that the shared attributes can define a larger category. Recognize rhombuses, rectangles, and squares as examples of quadrilaterals and recognize examples of quadrilaterals that do not belong to any of these subcategories. *3.G.A.2* Partition shapes into parts with equal areas. Recognize that equal shares of identical wholes need not have the same shape. Express the area of each part as a unit fraction of the whole. *3.G.A.3* Determine if a figure is a polygon. *3.G.A.4* Identify and create acute, obtuse, and right angles.

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Literacy Standards for Mathematics	Literature Suggestions for 3rd grade Math
Use multiple reading strategies. Understand and use correct mathematical vocabulary. Discuss and articulate mathematical vocabulary. Write mathematical arguments.	*Hershey's Milk Chocolate Multiplication* by Jerry Pallotta *The Doorbell Rang* by Pat Hutchins *A Remainder of One* by Elinor J. Pinczes *The Cookie Fiasco* by Dan Santat *Full House: An Invitation to Fractions* by Dayle Ann Dodds *Fraction Fun* by David Adler *Anno's Mysterious Multiplying Jar* by Massaichiro Anno and Mitsumasa Anno *Eating Fractions* by Bruce McMillian *Amanda Bean's Amazing Dream* by Liza Woodruff *7x9=Trouble!* By Claudia Mills *Perimeter, Area, and Volume: A Monster Book of Dimensions* by David Adler *Bigger, Better, Best!* By Stuart J. Murphy *Sam's Sneaker Squares* by Nat Gabriel and Ron Fritz
"To touch the hearts of your students is the greatest miracle you can perform." – St. Jean-Baptiste de la Salle "Lord, how many times shall I forgive my brother or sister who sins against me? Up to seven times?" Jesus answered, "I tell you, not seven times, but seventy-seven times." Matthew 18:21-22	Resources: Mathsthroughstories.org everydaymath.uchicago.edu Teachingwithamountainview.com Theelementaryprofessor.com

4th Grade Math Standards

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Catholic Identity	
Foundational Standards	**General Standards**
4.1A recognize that every human life is sacred because each person is created and loved by God 4.1B describe ways to take part in/be responsible to the community by discerning and using our God-given gifts 4.1C recognize and oppose unjust social structures and work toward justice for all 4.1D see God at work in all things and as expressed in the sacraments 4.1E connect scripture, tradition, and the models of Mary and the saints to guide, grow, and deepen faith	CS.M.K6.GS1 Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry and reasoning. CS.M.K6.GS2 Develop lines of inquiry (as developmentally appropriate) to understand why things are true and why they are false. CS.M.K6.GS3 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. CS.M.K6.GS4 Survey the truths about mathematical objects that are interesting in their own right and independent of human opinions.
Standards for Mathematical Practice	**Mathematical Practice through Catholic Dispositions**
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	CS.M.K6.DS1 Display a sense of wonder about mathematical relationships as well as confidence in mathematical certitude. CS.M.K6.DS2 Respond to the beauty, harmony, proportion, radiance, and wholeness present in mathematics. CS.M.K6.DS3 Show interest in the pursuit of understanding for its own sake. CS.M.K6.DS4 Exhibit joy at solving difficult mathematical problems and operations. CS.M.K6.DS5 Show interest in how the mental processes evident within the discipline of mathematics (such as order, perseverance, and logical reasoning) help us with the development of the natural virtues (such as self-discipline and fortitude).

Instructional Focus		
Operations and Algebraic Thinking	Use the four operations with whole numbers to solve problems.	**4.OA.A.1** Interpret a multiplication equation as a comparison. Represent verbal/written statements of multiplicative comparisons as multiplication equations. **4.OA.A.2** Multiply or divide to solve contextual problems involving multiplicative comparison, and distinguish multiplicative comparison from additive comparison. **4.OA.A.3** Solve multi-step contextual problems (posed with whole numbers and having whole-number answers using the four operations) including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
	Gain familiarity with factors and multiples.	*4.OA.B.4* Find factor pairs for whole numbers in the range 1–100 using models. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number is prime or composite and whether the given number is a multiple of a given one-digit number.
	Generate and analyze patterns.	*4.OA.C.5* Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
Number and Operations in Base Ten	Generalize place value understanding for multi-digit whole numbers.	**4.NBT.A.1** Recognize that in a multi-digit whole number (less than or equal to 1,000,000), a digit in one place represents 10 times as much as it represents in the place to its right. **4.NBT.A.2** Read and write multi-digit whole numbers (less than or equal to 1,000,000) using standard form, word form, and expanded notation. Compare two multi-digit numbers based on meanings of the digits in each place and use the symbols >, =, and < to show the relationship. **4.NBT.A.3** Round multi-digit whole numbers to any place (up to and including the hundred-thousand place) using understanding of place value and use a number line to explain how the number was rounded. **4.NBT.A.4** Use rules of divisibility by 2, 5, and 10.
	Use place value understanding and properties of operations to perform multi-digit arithmetic.	**4.NBT.B.5** Fluently add and subtract within 1,000,000 using efficient strategies and algorithms. **4.NBT.B.6** Multiply a whole number of up to four digits by a one-digit whole number and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **4.NBT.B.7** Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
Number and Operations - Fractions	Extend understanding of fraction equivalence and comparison.	**4.NF.A.1** Explain why a fraction a/b is equivalent to a fraction (a x n)/(b x n) or (a ÷ n)/(b ÷ n) using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

		4.NF.A.2 Compare two fractions with different numerators and different denominators by creating common denominators or common numerators or by comparing to a benchmark such as 0 or 1/2 or 1. Recognize that comparisons are valid only when the two fractions refer to the same whole. Use the symbols >, =, or < to show the relationship and justify the conclusions.
	Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.	**4.NF.B.3** Understand a fraction a/b with a > 1 as a sum of fractions 1/b. **a.** Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. **b.** Decompose a fraction into a sum of fractions with the same denominator in more than one way recording each decomposition by an equation. Justify decompositions using a visual fraction model. **c.** Add and subtract mixed numbers with like denominators by replacing each mixed number with an equivalent fraction and/or by using properties of operations and the relationship between addition and subtraction. **d.** Solve contextual problems involving addition and subtraction of fractions referring to the same whole and having like denominators. **4.NF.B.4** Apply and extend understanding of multiplication as repeated addition to multiply a whole number by a fraction. **a.** Understand a fraction a/b as a multiple of 1/b. **b.** Understand a multiple of a/b as a multiple of 1/b and use this understanding to multiply a whole number by a fraction. **c.** Solve contextual problems involving multiplication of a whole number by a fraction (e.g., by using visual fraction models and equations to represent the problem).
	Understand decimal notation for fractions and compare decimal fractions.	**4.NF.C.5** Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. **4.NF.C.6** Read and write decimal notation for fractions with denominators 10 or 100. Locate these decimals on a number line. **4.NF.C.7** Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Use the symbols >, =, or < to show the relationship and justify the conclusions. **4.NF.C.8** Round decimals to the hundredths.
Measurement and Data	Estimate and solve problems involving measurement.	*4.MD.A.1* Measure and estimate to determine relative sizes of measurement units within a single system of measurement involving length, liquid volume, and mass/weight of objects using customary and metric units. *4.MD.A.2* Solve one- or two-step real-world problems involving whole number measurements (including length, liquid volume, mass/weight, time, and money) with all four operations within a single system of measurement. (Contexts need not include conversions.) *4.MD.A.3* Know and apply the area and perimeter formulas for rectangles in realworld and mathematical contexts.
	Represent and interpret data.	*4.MD.B.4* Make a line plot to display a data set of measurements in fractions of the same unit (1/2 or 1/4 or 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *4.MD.B.5* Investigate the concept of probability as chance, listing possible outcomes of a given situation.
	Geometric measurement: understand concepts of angle and measure angles	*4.MD.C.6* Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint; and understand concepts of angle measurement. *a.* Understand that an angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. *b.* Understand that an angle that turns through 1/360 of a circle is called a "onedegree angle," and can be used to measure angles. An angle that turns through n one-degree angles is said to have an angle measure of n degrees and represents a fractional portion of the circle. *4.MD.C.7* Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. *4.MD.C.8* Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems. (e.g., by using an equation with a symbol for the unknown angle measure).
Geometry	Draw and identify lines and angles and classify shapes by properties of their lines and angles.	*4.G.A.1* Draw points, lines, line segments, rays, angles (right, acute, obtuse, straight, reflex), and perpendicular and parallel lines. Identify these in twodimensional figures. *4.G.A.2* Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size. Classify triangles based on the measure of the angles as right, acute, or obtuse. *4.G.A.3* Recognize and draw lines of symmetry for two-dimensional figures

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Literacy Standards for Mathematics	Literature Suggestions for 4th grade Math
Use multiple reading strategies. Understand and use correct mathematical vocabulary. Discuss and articulate mathematical vocabulary. Write mathematical arguments.	*Do You Wanna Bet? Your Chance to Find Out About Probability* by Jean Cuschman *Reflections* by Ann Jonas *Sir Cumference and the Great Knight of Angleland* by Cindy Neuschwander *On Beyond a Million: An Amazing Math Journey* by David Schwartz *A Million Dots* by Andrew Clements and Mike Reed *The Wishing Club* by Donna Jo Napoli and Anna Currey *The Great Divide* by Dayle Ann Dodds and Tracy Mitchell *Millions to Measure* by David Schwartz and Steven Kellogg *The Multiplying Menace Divides* by Pam Calvert and Wayne Geehan *Show and Tell! Great Graphs and Smart Charts: An Introduction to Infographics* by Stuart J. Murphy and Teresa Bellon *Let's Estimate: A Book About Estimating and Rounding Numbers* by David Adler *Sir Cumference and the Fraction Faire* by Cindy Neuschwander *Grandfather Tang's Story: A Tale Told with Tangrams* by Ann Tompert *Rabbits Rabbits Everywhere: A Fibonacci Tale* by Ann McCallum
"Since faith rests upon infallible truth, and since the contrary of a truth can never be demonstrated, it is clear that the truth of faith can never be in conflict with the truth of reason." – St. Thomas Aquinas "Come now, let us reason together, says the Lord." Isaiah 1:18	Resources: Everydaymath.uchicago.edu Kateshomeschoolmath.com thriftyinthirdgrade.com Cdlex.org

5th Grade Math Standards

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Catholic Identity	
Foundational Standards	**General Standards**
5.1A recognize that every human life is sacred because each person is created and loved by God 5.1B describe ways to take part in/be responsible to the community by discerning and using our God-given gifts 5.1C recognize and oppose unjust social structures and work toward justice for all 5.1D see God at work in all things and as expressed in the sacraments 5.1E connect scripture, tradition, and the models of Mary and the saints to guide, grow, and deepen faith	CS.M.K6.GS1 Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry and reasoning. CS.M.K6.GS2 Develop lines of inquiry (as developmentally appropriate) to understand why things are true and why they are false. CS.M.K6.GS3 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. CS.M.K6.GS4 Survey the truths about mathematical objects that are interesting in their own right and independent of human opinions.
Standards for Mathematical Practice	**Mathematical Practice through Catholic Dispositions**
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	CS.M.K6.DS1 Display a sense of wonder about mathematical relationships as well as confidence in mathematical certitude. CS.M.K6.DS2 Respond to the beauty, harmony, proportion, radiance, and wholeness present in mathematics. CS.M.K6.DS3 Show interest in the pursuit of understanding for its own sake. CS.M.K6.DS4 Exhibit joy at solving difficult mathematical problems and operations. CS.M.K6.DS5 Show interest in how the mental processes evident within the discipline of mathematics (such as order, perseverance, and logical reasoning) help us with the development of the natural virtues (such as self-discipline and fortitude).

Instructional Focus		
Operations and Algebraic Thinking	Write and interpret numerical expressions.	*5.OA.A.1* Use parentheses and/or brackets in numerical expressions involving whole numbers and evaluate expressions having these symbols using the conventional order by applying the Order of Operations. (When applying the order of operations, the evaluation of exponents need not be included.) *5.OA.A.2* Write numerical expressions that record calculations with numbers and interpret numerical expressions without evaluating them.
	Analyze patterns and relationships.	*5.OA.B.3* Generate two numerical patterns using two given rules. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences. *a.* Identify relationships between corresponding terms in two numerical patterns. *b.* Form ordered pairs (limited to first quadrant) consisting of corresponding terms from two numerical patterns and graph the ordered pairs on a coordinate plane.
Number and Operations in Base Ten	Understand the place value system.	**5.NBT.A.1** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. **5.NBT.A.2** Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. **5.NBT.A.3** Read and write decimals to thousandths using standard form, word form, and expanded notation (e.g., the expanded notation of 347.392 is written as (3 x 100) + (4 x 10) + (7 x 1) + (3 x (1/10)) + (9 x (1/100)) + (2 x (1/1000))). Compare two decimals to thousandths based on meanings of the digits in each place and use the symbols >, =, and < to show the relationship. **5.NBT.A.4** Round decimals to the nearest hundredth, tenth, or whole number using understanding of place value, and use a number line to explain how the number was rounded.
	Perform operations with multi-digit whole numbers and with decimals to hundredths.	**5.NBT.B.5** Fluently multiply multi-digit whole numbers (up to three-digit by four-digit factors) using efficient strategies and algorithms. **5.NBT.B.6** Find whole-number quotients and remainders of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between operations. Assess the reasonableness of answers using estimation strategies. **5.NBT.B.8** Write remainder as a fraction or as a decimal.
Number and Operations - Fractions	Use equivalent fractions as a strategy to add and subtract fractions.	**5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. **5.NF.A.2** Solve contextual problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	**5.NF.B.3** Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve contextual problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers by using visual fraction models or equations to represent the problem. **5.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number or a fraction by a fraction. **a.** Interpret the product a/b x q as a x (q ÷ b) (partition the quantity q into b equal parts and then multiply by a). Interpret the product a/b x q as (a x q) ÷ b (multiply a times the quantity q and then partition the product into b equal parts). **b.** Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas. **5.NF.B.5** Interpret multiplication as scaling (resizing). **a.** Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. **b.** Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explain why multiplying a given number by a fraction between 0 and 1 results in a product less than the given number; and relate the principle of fraction equivalence a/b = (a x n)/(b x n) to the effect of multiplying a/b by 1. **5.NF.B.6** Solve real-world problems involving multiplication of fractions and mixed numbers by using visual fraction models or equations to represent the problem. **5.NF.B.7** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. **a.** Interpret division of a unit fraction by a non-zero whole number and compute such quotients. **b.** Interpret division of a whole number by a unit fraction and compute such quotients. **c.** Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions and non-unit fractions by using visual fraction models and equations to represent the problem.
Measurement and Data	Convert like measurement units within a given measurement system from a larger unit to a smaller unit.	*5.MD.A.1* Convert customary and metric measurement units within a single system by expressing measurements of a larger unit in terms of a smaller unit. Use these conversions to solve multi-step real-world problems involving distances, intervals of time, liquid volumes, masses of objects, and money (including problems involving simple fractions or decimals).
	Represent and interpret data.	*5.MD.B.2* Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.
	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.	**5.MD.C.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement. **a.** Understand that a cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume and can be used to measure volume. **b.** Understand that a solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units. **5.MD.C.4** Measure volume by counting unit cubes, using cubic centimeters, cubic inches, cubic feet, and improvised units. **5.MD.C.5** Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume of right rectangular prisms. **a.** Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent whole-number products of three factors as volumes (e.g., to represent the associative property of multiplication). **b.** Know and apply the formulas V = l x w x h and V = B x h (where B represents the area of the base) for rectangular prisms with whole number edge lengths in the context of solving real-world and mathematical problems. **c.** Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the nonoverlapping parts, applying this technique to solve real-world problems.
Geometry	Graph points on the coordinate plane to solve real-world and mathematical problems.	*5.G.A.1* Graph ordered pairs and label points using the first quadrant of the coordinate plane. Understand in the ordered pair that the first number indicates the horizontal distance traveled along the x-axis from the origin and the second number indicates the vertical distance traveled along the y-axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and xcoordinate, y-axis and y-coordinate). *5.G.A.2* Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation. *5.G.A.3* Identify and use symbols for points, line segments, angles, lines, rays, planes, parallel lines, and perpendicular lines.
	Classify two-dimensional figures into categories based on their properties.	*5.G.B.4* Classify two-dimensional figures in a hierarchy based on properties. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.

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Literacy Standards for Mathematics	Literature Suggestions for 5th grade Math
Use multiple reading strategies. Understand and use correct mathematical vocabulary. Discuss and articulate mathematical vocabulary. Write mathematical arguments.	*Less than Nothing is Really Something* by Robert Froman *Only One* by Marc Harshman *Gator Pie* by Louise Matthews *Sir Cumference and the Sword in the Cone* by Cindy Neuschwander *If You Were a Divided-By Sign* by Trisha Speed Shaskan *Problem-Solving Ninja* by Mary Nhin *The Amazing Impossible Erie Canal* by Cheryl Harness
"A Catholic school is a place to learn how to live, how to be human, how to be free. It is not just about passing on content, but about forming hearts." – Pope Francis "Which of you wishing to build a tower does not first sit down and count the cost, to see if he has the resources to complete it?" Luke 14:28	Resources: Everydaymath.uchicago.edu Weareteachers.com Cdlex.org

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Catholic Identity	
Foundational Standards	**General Standards**
6.1A recognize that every human life is sacred because each person is created and loved by God 6.1B describe ways to take part in/be responsible to the community by discerning and using our God-given gifts 6.1C recognize and oppose unjust social structures and work toward justice for all 6.1D see God at work in all things and as expressed in the sacraments 6.1E connect scripture, tradition, and the models of Mary and the saints to guide, grow, and deepen faith	CS.M.K6.GS1 Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry and reasoning. CS.M.K6.GS2 Develop lines of inquiry (as developmentally appropriate) to understand why things are true and why they are false. CS.M.K6.GS3 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. CS.M.K6.GS4 Survey the truths about mathematical objects that are interesting in their own right and independent of human opinions.
Standards for Mathematical Practice	**Mathematical Practice through Catholic Dispositions**
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	CS.M.K6.DS1 Display a sense of wonder about mathematical relationships as well as confidence in mathematical certitude. CS.M.K6.DS2 Respond to the beauty, harmony, proportion, radiance, and wholeness present in mathematics. CS.M.K6.DS3 Show interest in the pursuit of understanding for its own sake. CS.M.K6.DS4 Exhibit joy at solving difficult mathematical problems and operations. CS.M.K6.DS5 Show interest in how the mental processes evident within the discipline of mathematics (such as order, perseverance, and logical reasoning) help us with the development of the natural virtues (such as self-discipline and fortitude).

Instructional Focus		
Ratios and Proportional Relationships	Understand ratio concepts and use ratio reasoning to solve problems.	**6.RP.A.1** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. Make a distinction between ratios and fractions. **6.RP.A.2** Understand the concept of a unit rate a/b associated with a ratio a:b with $b \neq 0$. Use rate language in the context of a ratio relationship. **6.RP.A.3** Use ratio and rate reasoning to solve real-world and mathematical problems (e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations). **a.** Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. **b.** Solve unit rate problems including those involving unit pricing and constant speed. **c.** Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. **d.** Use ratio reasoning to convert customary and metric measurement units (within the same system); manipulate and transform units appropriately when multiplying or dividing quantities. **6.RP.A.4** Solve problems that relate the mass of an object to its volume.
The Number System	Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	**6.NS.A.1** Interpret and compute quotients of fractions, and solve real-world and mathematical problems involving division of fractions by fractions (e.g., connecting visual fraction models and equations to represent the problem is suggested).
	Compute fluently with multi-digit numbers and find common factors and multiples.	*6.NS.B.2* Fluently divide multi-digit numbers using a standard algorithm. *6.NS.B.3* Fluently add, subtract, multiply, and divide multi-digit decimals using a standard algorithm and making connections to previous conceptual work with each operation. *6.NS.B.4* Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

	Apply and extend previous understandings of numbers to the system of rational numbers (continued)	**6.NS.C.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation as well as describing situations in which opposite quantities can combine to make 0. **6.NS.C.6** Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. **a.** Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself. For example, – (–3) = 3, and that 0 is its own opposite. **b.** Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. **c.** Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. **6.NS.C.7** Understand ordering and absolute value of rational numbers. **a.** Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. **b.** Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write –3º C > –7º C to express the fact that –3º C is warmer than –7º C. **c.** Understand the absolute value of a rational number as its distance from 0 on the number line and distinguish comparisons of absolute value from statements about order in a real-world context. **6.NS.C.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
Expressions and Equations	Apply and extend previous understandings of arithmetic to algebraic expressions.	**6.EE.A.1** Write and evaluate numerical expressions involving whole-number exponents. **6.EE.A.2** Write, read, and evaluate expressions in which variables stand for numbers. **a.** Write expressions that record operations with numbers and with variables. **b.** Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. **c.** Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). **6.EE.A.3** Apply the properties of operations (including, but not limited to, commutative, associative, and distributive properties) to generate equivalent expressions. (The distributive property of multiplication over addition is prominent here. Negative coefficients are not an expectation at this grade level.) **6.EE.A.4** Identify when expressions are equivalent (i.e., when the expressions name the same number regardless of which value is substituted into them).
	Reason about and solve one-variable equations and inequalities.	**6.EE.B.5** Understand that a solution to an equation or inequality is the value(s) that makes that statement true. Use substitution to determine whether a given number in a specified set makes an equation or inequality true. **6.EE.B.6** Use variables to represent numbers and write expressions when solving real-world and mathematical problems; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. **6.EE.B.7** Solve real-world and mathematical problems by writing and solving one-step equations of the form x + p = q, px = q, x – p = q, and x/p = q for cases in which p, q, and x are all nonnegative rational numbers and p ≠ 0. (Complex fractions are not an expectation at this grade level.) **6.EE.B.8** Interpret and write an inequality of the form x > c, x < c, x ≤ c, or x ≥ c which represents a condition or constraint in a real-world or mathematical problem. Recognize that inequalities have infinitely many solutions; represent solutions of inequalities on number line diagrams.
	Represent and analyze quantitative relationships between dependent and independent variables.	**6.EE.C.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another. **a.** Write an equation in the form of y = px where y, p, and x are all non-negative and p ≠ 0, to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. **b.** Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
Geometry	Solve real-world and mathematical problems involving area, surface area, and volume.	*6.G.A.1* Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; know and apply these techniques in the context of solving real-world and mathematical problems. *6.G.A.2* Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = lwh and V = Bh where B is the area of the base to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. *6.G.A.3* Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side that joins two vertices (vertical or horizontal segments only). Apply these techniques in the context of solving real-world and mathematical problems. *6.G.A.4* Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Statistics and Probability	Develop understanding of statistical variability.	*6.SP.A.1* Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *6.SP.A.2* Understand that a set of data collected to answer a statistical question has a distribution which can be described by its measures of center (mean, median, mode), measures of variation (range only), and overall shape. *6.SP.A.3* Recognize that a measure of center (mean, median, mode) for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
	Summarize and describe distributions.	*6.SP.B.4* Read and interpret circle graphs. *6.SP.B.5* Display a single set of numerical data using dot plots (line plots), box plots, pie charts and stem plots. *6.SP.B.6* Summarize numerical data sets in relation to their context. *a.* Report the number of observations. *b.* Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. *c.* Give quantitative measures of center (median and/or mean) and variability (range) as well as describing any overall pattern with reference to the context in which the data were gathered. *d.* Relate the choice of measures of center to the shape of the data distribution and the context in which the data were gathered.

Literacy Standards for Mathematics	Literature Suggestions for 6th grade Math
Use multiple reading strategies. Understand and use correct mathematical vocabulary. Discuss and articulate mathematical vocabulary. Write mathematical arguments.	*If the World Were a Village* by David J. Smith *A Very Improbable Story* by Edward Einhorn *Sir Cumference and the Dragon of Pi* by Cindy Neuschwander *Chances: Probability in Everyday Life* by Sarah C. Campbell *Anno's Mysterious Multiplying Jar* by Masaichiro Anno *One Grain of Rice* by Demi *Grapes of Wrath* by Greg Tang *Bean Thirteen* by Matthew McElligott *Ed Emberley's Picture Pie* *Harlem Grown* by Tony Hillery and Jessie Hartland *Beanstalk: The Measure of a Giant* by Ann McCallum and James Balkovek *Pythagoras and the Ratios* by Julie Ellis and Phyllis Hornung Peacock *Ratios and Rates Reasoning* by Melanie Alvarez
"The mind of man is naturally inclined to truth…Hence the intellectual virtues, such as wisdom, science, and understanding, are perfections of the human soul." – St. Thomas Aquinas "The house which King Solomon built for the Lord was sixty cubits long, twenty wide, and thirty high." 1 Kings 6:2	Resources: Cognitivecardiomath.com Uvu.edu Ourjourneywestward.com

7th Grade Math Standards

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Catholic Identity	
Foundational Standards	**General Standards**
7.1A recognize that every human life is sacred because each person is created and loved by God 7.1B describe ways to take part in/be responsible to the community by discerning and using our God-given gifts 7.1C recognize and oppose unjust social structures and work toward justice for all 7.1D see God at work in all things and as expressed in the sacraments 7.1E connect scripture, tradition, and the models of Mary and the saints to guide, grow, and deepen faith	CS.M.712.GS1 Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry and reasoning in the pursuit of transcendent truths. CS.M.712.GS2 Develop lines of inquiry to understand why things are true and why they are false. CS.M.712.GS3 Have faith in the glory and dignity of human reason as both a gift from God and a reflection of Him in whose image and likeness we are made. CS.M.712.GS4 Explain how mathematics in its reflection of the good, true, and beautiful reveals qualities and the presence of God.

Standards for Mathematical Practice	Intellectual Standards	Mathematical Practice through Catholic Dispositions
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	CS.M.712.IS1 Explain the nature of rational discourse and argument and the desirability of precision and deductive certainty which mathematics makes possible and is not possible to the same degree in other disciplines. CS.M.712.1S2 Demonstrate how sound logical arguments and other processes of mathematics are foundational to its discipline. CS.M.712.IS3 Recognize how mathematical arguments and processes can be extrapolated to other areas of study, including theology and philosophy. CS.M.712.IS4 Explain how it is possible to mentally abstract and construct mathematical objects from direct observations of reality and how one's perception of reality is important to what one is doing. CS.M.712.IS5 Recognize personal bias in inquiry and articulate why inquiry should be undertaken in a fair and independent manner. CS.M.712.IS6 Evaluate the ongoing nature of mathematical inquiry, its inexhaustibility and its openness to the infinite. CS.M.712.IS7 Explain man's limitations of understanding and uncovering all mathematical knowledge. CS.M.712.IS8 Explain how fundamental questions of values, common sense, and religious and human truths and experiences are beyond the scope of mathematical inquiry and its syllogisms.	CS.M.712.DS1 Display a sense of wonder about mathematical relationships, especially mathematical certitude which is independent of human opinion. CS.M.712.DS2 Share with others the beauty, harmony, proportion, radiance, and wholeness present in mathematics. CS.M.712.DS3 Advocate for the pursuit of understanding for its own sake and the intrinsic value or discovery of the true and the beautiful often at the requirement of great sacrifice, discipline, and effort. CS.M.712.DS4 Exhibit appreciation for the ongoing nature of mathematical inquiry. CS.M.712.DS5 Exhibit habits of thinking quantitatively and in an orderly manner, through immersion in mathematical observations found within creation. CS.M.712.DS6 Propose how mathematical objects or proofs (such as the golden mean, the Fibonacci numbers, the musical scale, and geometric proofs) suggest divine origin. CS.M.712.DS7 Exhibit appreciation for the process of discovering meanings and truths existing within the solution of the problem and not just arriving at an answer. CS.M.712.DS8 Exhibit humility at knowing that as a human being man can only grasp a portion of the truths of the universe. CS.M.712.DS9 Advance an understanding of the ability of the human intellect to know and the desire of the will to want to know more.

Instructional Focus		
Ratios and Proportional Relationships	Analyze proportional relationships and use them to solve real-world and mathematical problems.	**7.RP.A.1** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. **7.RP.A.2** Recognize and represent proportional relationships between quantities. **a.** Decide whether two quantities are in a proportional relationship (e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin). **b.** Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. **c.** Use the concept of equality to represent proportional relationships with equations. **7.RP.A.3** Use proportional relationships to solve multi-step ratio and percent problems.

Major work of the grade; *Supporting work of the grade*

7th Grade Math Standards

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The Number System	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	**7.NS.A**.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. **a**. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real- world contexts. **b**. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. **c**. Apply properties of operations as strategies to add and subtract rational numbers. **7.NS.A.2** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. **a.** Understand that multiplication is extended from fractions to all rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (– 1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. **b.** Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real-world contexts. **c.** Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates or eventually repeats. **7.NS.A.3** Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.) **7.NS.A.4** Understand how to evaluate square roots of perfect squares and estimate non-perfect squares.
Expressions and Equations	Use properties of operations to generate equivalent expressions.	**7.EE.A.1** Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. **7.EE.A.2** Rewrite and connect equivalent expressions in different forms in a contextual problem to provide multiple ways of interpreting the problem and investigating how the quantities in it are related
	Solve real-world and mathematical problems using numerical and algebraic expressions and equations and inequalities.	**7.EE.B.3** Solve multi-step real-world and mathematical problems posed with positive and negative rational numbers presented in any form (whole numbers, fractions, and decimals). **a.** Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. **b.** Assess the reasonableness of answers using mental computation and estimation strategies. **7.EE.B.4** Use variables to represent quantities in a real-world and mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. **a**. Solve real-world and mathematical problems leading to equations of the form px + q = r and p(x + q) = r where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. **b.** Solve real-world and mathematical problems leading to inequalities of the form px + q > r, px + q < r, px + q ≥ r, and px + q ≤ r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality on a number line and interpret it in the context of the problem. **c.** Understand functions can be represented as ordered pairs on a graph.
Geometry	Draw, construct, and describe geometrical figures and describe the relationships between them.	*7.G.A.1* Solve problems involving scale drawings of congruent and similar geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. *7.G.A.2* Draw triangles with given conditions: three angle measures or three side measures. Notice when the conditions determine a unique triangle, more than one triangle, or no triangle. *7.G.A.3* Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
	Solve real-world and mathematical problems involving angle measure, area, surface area, and volume.	*7.G.B.4* Know the formulas for the area and circumference of a circle and use them to solve problems. Explore the relationships between the radius, the circumference, and the area of a circle, and the number π. *7.G.B.5* Know and use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. *7.G.B.6* Solve real-world and mathematical problems involving area of two-dimensional figures composed of triangles, quadrilaterals, and polygons, and volume and surface area of three-dimensional objects composed of cubes and right prisms.
Statistics and Probability	Use random sampling to draw inferences about a population.	*7.SP.A.1* Explore how statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. *7.SP.A.2* Collect and use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

	Draw informal comparative inferences about two populations.	*7.SP.B.3* Informally compare the measures of center (mean, median, mode) of two numerical data distributions with similar variabilities. *7.SP.B.4* Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.
	Investigate chance processes and develop, use, and evaluate probability models.	*7.SP.C.5* Recognize that the probability of a chance event is a number between 0 and 1 and interpret the likelihood of the event occurring. *7.SP.C.6* Calculate theoretical and experimental probability of simple events. *a.* Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *b.* Calculate the theoretical probability of a simple event. *c.* Compare theoretical probabilities to experimental probabilities; explain any possible sources of discrepancy. *7.SP.C.7* Develop a probability model and use it to find experimental or theoretical probabilities of events. *a.* Use a uniform probability model, with equal probability assigned to all outcomes, to determine probabilities of events. *b.* Develop a probability model, including non-uniform models, by observing frequencies in data generated from a chance process. Use the model to estimate the probabilities of events.
	Summarize and describe numerical data sets.	*7.SP.D.8* Summarize a numerical data set in relation to its context. *a.* Give quantitative measures of center (median and/or mean) and variability (range and/or interquartile range), as well as describe any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. *b.* Relate and understand the choice of measures of center (median and/or mean) and variability (range and/or interquartile range) to the shape of the data distribution and the context in which the data were gathered.

Literacy Standards for Mathematics	Literature Suggestions for 7th grade Math
Use multiple reading strategies. Understand and use correct mathematical vocabulary. Discuss and articulate mathematical vocabulary. Write mathematical arguments.	*What's Your Angle, Pythagoras?* By Julie Ellis and Phyllis Hornung *Pythagoras and the Ratios* by Julie Ellis and Phyllis Hornung Peacock *Nothing Stopped Sophie: The Story of Unshakeable Mathematician Sophie Germain* by Cheryl Bardoe and Barbara McClintock *Blockhead: The Life of Fibonacci* by Joseph D'Agnese and John O'Brien *The Librarian who Measured the Earth* by Kathryn Lasky and Kevin Hawkes *Hidden Figures: The True Story of Four Black Women and the Space Race* by Margaret Lee Shetterly and Laura Freeman *The Girl with a Mind for Math: The Story of Raye Montague* by Julia Finley Mosca and Daniel Rieley *The Warlord's Alarm: A Mathematical Adventure* by Virginia Walton Pilegard and Nicolas Debon
"The task of the teacher is to lead others to truth." – St. Thomas Aquinas "All wisdom comes from the Lord and with him it remains forever." Sirach 1:1	Resources: Readaloudrevival.com

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Catholic Identity	
Foundational Standards	**General Standards**
8.1A recognize that every human life is sacred because each person is created and loved by God 8.1B describe ways to take part in/be responsible to the community by discerning and using our God-given gifts 8.1C recognize and oppose unjust social structures and work toward justice for all 8.1D see God at work in all things and as expressed in the sacraments 8.1E connect scripture, tradition, and the models of Mary and the saints to guide, grow, and deepen faith	CS.M.712.GS1 Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry and reasoning in the pursuit of transcendent truths. CS.M.712.GS2 Develop lines of inquiry to understand why things are true and why they are false. CS.M.712.GS3 Have faith in the glory and dignity of human reason as both a gift from God and a reflection of Him in whose image and likeness we are made. CS.M.712.GS4 Explain how mathematics in its reflection of the good, true, and beautiful reveals qualities and the presence of God.

Standards for Mathematical Practice	Intellectual Standards	Mathematical Practice through Catholic Dispositions
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	CS.M.712.IS1 Explain the nature of rational discourse and argument and the desirability of precision and deductive certainty which mathematics makes possible and is not possible to the same degree in other disciplines. CS.M.712.1S2 Demonstrate how sound logical arguments and other processes of mathematics are foundational to its discipline. CS.M.712.IS3 Recognize how mathematical arguments and processes can be extrapolated to other areas of study, including theology and philosophy. CS.M.712.IS4 Explain how it is possible to mentally abstract and construct mathematical objects from direct observations of reality and how one's perception of reality is important to what one is doing. CS.M.712.IS5 Recognize personal bias in inquiry and articulate why inquiry should be undertaken in a fair and independent manner. CS.M.712.IS6 Evaluate the ongoing nature of mathematical inquiry, its inexhaustibility and its openness to the infinite. CS.M.712.IS7 Explain man's limitations of understanding and uncovering all mathematical knowledge. CS.M.712.IS8 Explain how fundamental questions of values, common sense, and religious and human truths and experiences are beyond the scope of mathematical inquiry and its syllogisms.	CS.M.712.DS1 Display a sense of wonder about mathematical relationships, especially mathematical certitude which is independent of human opinion. CS.M.712.DS2 Share with others the beauty, harmony, proportion, radiance, and wholeness present in mathematics. CS.M.712.DS3 Advocate for the pursuit of understanding for its own sake and the intrinsic value or discovery of the true and the beautiful often at the requirement of great sacrifice, discipline, and effort. CS.M.712.DS4 Exhibit appreciation for the ongoing nature of mathematical inquiry. CS.M.712.DS5 Exhibit habits of thinking quantitatively and in an orderly manner, through immersion in mathematical observations found within creation. CS.M.712.DS6 Propose how mathematical objects or proofs (such as the golden mean, the Fibonacci numbers, the musical scale, and geometric proofs) suggest divine origin. CS.M.712.DS7 Exhibit appreciation for the process of discovering meanings and truths existing within the solution of the problem and not just arriving at an answer. CS.M.712.DS8 Exhibit humility at knowing that as a human being man can only grasp a portion of the truths of the universe. CS.M.712.DS9 Advance an understanding of the ability of the human intellect to know and the desire of the will to want to know more.

Instructional Focus		
The Number System	Know that there are numbers that are not rational, and approximate them by rational numbers.	*8.NS.A.1* Know that real numbers that are not rational are called irrational (e.g., π, √2, etc.). Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually or terminates, and convert a decimal expansion which repeats eventually or terminates into a rational number. *8.NS.A.2* Use rational approximations of irrational numbers to compare the size of irrational numbers by locating them approximately on a number line diagram. Estimate the value of irrational expressions (such as π2).
Expressions and Equations	Work with radicals and integer exponents.	**8.EE.A.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 x 3-5 = 3-3 = 1/33 = 1/27. **8.EE.A.2** Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. **8.EE.A.3** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities and to express how many times as much one is than the other. **8.EE.A.4** Using technology, solve real-world problems with numbers expressed in decimal and scientific notation. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading).

		8.EE.A.5 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities.
	Understand the connections between proportional relationships, lines, and linear equations.	**8.EE.B.6** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. **8.EE.B.7** Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; know and apply the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b. **8.EE.B.8** Introduce standard form of the equation of a line, Ax + By = C.
	Analyze and solve linear equations, linear inequalities, and systems of two linear equations.	**8.EE.C.9** Solve linear equations in one variable. **a.** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms. **8.EE.C.10** Analyze and solve systems of two linear equations graphically. **a.** Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. **b.** Estimate solutions by graphing a system of two linear equations in two variables. Identify solutions by inspecting graphs of a system of linear equations in two variables. **c.** Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair. **8.EE.C.11** By graphing on the coordinate plane or by analyzing a given graph, determine the solution set of a linear inequality in one or two variables.
Functions	Define, evaluate, and compare functions	**8.F.A.1** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in 8th grade.) **8.F.A.2** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). **8.F.A.3** Know and interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. **8.F.A.4** Identify and find the y-intercept and slope of a line on the coordinate plane including graphs that represent a real-world context.
	Use functions to model relationships between quantities.	**8.F.B.5** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values. **8.F.B.6** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
Geometry	Understand and describe the effects of transformations on two-dimensional figures and use informal arguments to establish facts about angles.	**8.G.A.1** Describe the effect of translations, rotations, reflections, and dilations on two-dimensional figures using coordinates. **a.** Verify informally that lines are taken to lines, and determine when line segments are taken to line segments of the same length. **b.** Verify informally that angles are taken to angles of the same measure. **c.** Verify informally that parallel lines are taken to parallel lines. **d.** Make connections between dilations and scale factors. **8.G.A.2** Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
	Understand and apply the Pythagorean Theorem.	**8.G.B.3** Explain a model of the Pythagorean Theorem and its converse. **8.G.B.4** Know and apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. **8.G.B.5** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	*8.G.C.6* Apply the formulas for the volumes of cones, cylinders, and spheres to solve real-world and mathematical problems. *8.G.C.7* Identify angles formed by parallel lines cut by a transversal (vertical, adjacent, supplementary, and complementary) and find their measurements.
Statistics and Probability	Investigate patterns of association in bivariate data.	*8.SP.A.1* Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. *8.SP.A.2* Know that straight lines are widely used to model linear relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line and informally assess the model fit by judging the closeness of the data points to the line. *8.SP.A.3* Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercepts.

	Investigate chance processes and develop, use, and evaluate probability models.	*8.SP.B.4* Find probabilities of and represent sample spaces for compound events using organized lists, tables, tree diagrams, and simulation. *a.* Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. *b.* Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.
Computation and Fluency	Understand operations with fractions, decimals, and percents.	*8.CF.A.1* Refine proficiency and fluency of computing and converting basic fraction, decimal, and percent operations. Demonstrate the ability to add, subtract, multiply, and divide with negative fractions and decimals. *8.CF.A.2* Solve problems involving interest, rate, time, and distance, discount, mark-up, and sales tax.

Literacy Standards for Mathematics	Literature Suggestions for 8th grade Math
Use multiple reading strategies. Understand and use correct mathematical vocabulary. Discuss and articulate mathematical vocabulary. Write mathematical arguments.	*The Phantom Tollbooth* by Norton Juster *Sir Cumference and the Sword in the Cone* by Cindy Neuschwander *Sadako and the Thousand Paper Cranes* by Eleanor Coerr *Counting on Frank* by Rod Clement *One Grain of Rice* by Demi *Gulliver's Travels* by Jonathan Swift *Chasing Vermeer* by Blue Balliett and Brett Helquist *The Book of Think: How to Solve a Problem Twice your Size* by Marilyn Burns and Martha Weston *Math for Smarty Pants* by Marilyn Burns and Martha Weston Resources: Ourjourneywestward.com Marilynburnsmath.com
"God has given me a great deal to do, and I must begin." – St. Elizabeth Ann Seton "But you have arranged all things by measure and number and weight." Wisdom 11:20	

Algebra 1 Standards

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Standards for Mathematical Practice	Intellectual Standards	Mathematical Practice through Catholic Dispositions
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	CS.M.712.IS1 Explain the nature of rational discourse and argument and the desirability of precision and deductive certainty which mathematics makes possible and is not possible to the same degree in other disciplines. CS.M.712.1S2 Demonstrate how sound logical arguments and other processes of mathematics are foundational to its discipline. CS.M.712.IS3 Recognize how mathematical arguments and processes can be extrapolated to other areas of study, including theology and philosophy. CS.M.712.IS4 Explain how it is possible to mentally abstract and construct mathematical objects from direct observations of reality and how one's perception of reality is important to what one is doing. CS.M.712.IS5 Recognize personal bias in inquiry and articulate why inquiry should be undertaken in a fair and independent manner. CS.M.712.IS6 Evaluate the ongoing nature of mathematical inquiry, its inexhaustibility and its openness to the infinite. CS.M.712.IS7 Explain man's limitations of understanding and uncovering all mathematical knowledge. CS.M.712.IS8 Explain how fundamental questions of values, common sense, and religious and human truths and experiences are beyond the scope of mathematical inquiry and its syllogisms.	CS.M.712.DS1 Display a sense of wonder about mathematical relationships, especially mathematical certitude which is independent of human opinion. CS.M.712.DS2 Share with others the beauty, harmony, proportion, radiance, and wholeness present in mathematics. CS.M.712.DS3 Advocate for the pursuit of understanding for its own sake and the intrinsic value or discovery of the true and the beautiful often at the requirement of great sacrifice, discipline, and effort. CS.M.712.DS4 Exhibit appreciation for the ongoing nature of mathematical inquiry. CS.M.712.DS5 Exhibit habits of thinking quantitatively and in an orderly manner, through immersion in mathematical observations found within creation. CS.M.712.DS6 Propose how mathematical objects or proofs (such as the golden mean, the Fibonacci numbers, the musical scale, and geometric proofs) suggest divine origin. CS.M.712.DS7 Exhibit appreciation for the process of discovering meanings and truths existing within the solution of the problem and not just arriving at an answer. CS.M.712.DS8 Exhibit humility at knowing that as a human being man can only grasp a portion of the truths of the universe. CS.M.712.DS9 Advance an understanding of the ability of the human intellect to know and the desire of the will to want to know more.

Instructional Focus		
Number and Quantity		
Quantities	Reason quantitatively and use units to understand problems	**A1.NQ.A.1** Use units as a way to understand real-world problems. a. Choose and interpret the scale and the origin in graphs and data displays, b. Use appropriate quantities in formulas, converting units as necessary.* c. Define and justify appropriate quantities within a context for the purpose of modeling.* d. Choose an appropriate level of accuracy when reporting quantities.*
Algebra		
Seeing Structure in Expressions	Interpret the structure of expressions	**A1.A.SSE.A.1** Interpret expressions that represent a quantity in terms of its context.* a. Interpret parts of an expression, such as terms, factors, and coefficients.* b. Interpret complicated expressions by viewing one or more of their parts as a single entity.*

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Algebra 1 Standards

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Arithmetic with Polynomials and Rational Expressions	Perform arithmetic operations on polynomials	**A1.A.APR.A.1** Add, subtract, and multiply polynomials. Use these operations to demonstrate that polynomials form a closed system that adhere to the same properties of operations as the integers.
Creating Equations	Create equations that describe numbers or relationships	**A1.A.CED.A.1** Create equations and inequalities in one variable and use them to solve problems in a real-world context.* *Tasks are limited to linear, quadratic, and absolute value equations and inequalities.* **A1.A.CED.A.2** Create equations in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.* *Tasks are limited to linear, quadratic, and absolute value equations and inequalities.* **A1.A.CED.A.3** Create individual and systems of equations and/or inequalities to represent constraints in a contextual situation, and interpret solutions as viable or non-viable.* (e.g., represent inequalities describing nutritional and cost constraints on combinations of different foods) **A1.A.CED.A.4** Rearrange formulas to isolate a quantity of interest using algebraic reasoning.* *Tasks are limited to formulas involving linear, quadratic, and absolute value expressions.*
Reasoning with Equations and Inequalities	Understand solving equations as a process of reasoning and explain the reasoning	**A1.A.REI.A.1** Understand solving equations as a process of reasoning and explain the reasoning. Construct a viable argument to justify a solution method. *Tasks are limited to linear, quadratic, and absolute value equations.*
	Solve equations and inequalities in one variable	**A1.A.REI.B.2** Solve linear and absolute value equations and inequalities in one variable. a. Solve linear equations and inequalities, including compound inequalities, in one variable. Represent solutions algebraically and graphically. b. Solve absolute value equations and inequalities in one variable. Represent solutions algebraically and graphically. *Equations and inequalities should include integer, rational, and/or irrational coefficients. If coefficients are irrational, rationalization of a denominator is not required. Tasks may or may not have a real-world context.* **A1.A.REI.B.3** Solve quadratic equations and inequalities in one variable. a. Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, knowing and applying the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when a quadratic equation has solutions that are not real numbers. b. Solve quadratic inequalities using the graph of the related quadratic equation. *Tasks may or may not have a real-world context.*
	Solve system of equations	**A1.A.REI.C.4** Write and solve a system of linear equations in real-world context.* *Systems are limited to at most two equations in two unknowns.*
	Represent and solve equations and inequalities graphically	**A1.A.REI.D.5** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). **A1.A.REI.D.6** Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x). Find approximate solutions by graphing the functions or making a table of values, using technology when appropriate.* *Include cases where f(x) and/or g(x) are linear, quadratic, absolute value, and exponential functions.* *When finding solutions approximately, students may be expected to produce graphs of functions that are linear, quadratic, exponential, or absolute value, but may be given graphs of other function types.* *Exponential functions are limited to domains in the integers.* **A1.A.REI.D.7** Graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
Functions		
Interpreting Functions	Understand the concept of a function and use function notation	**A1.F.IF.A.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x). **A1.F.IF.A.2** Use function notation.* **a.** Use function notation to evaluate functions for inputs in their domains, including functions of two variables.* **b.** Interpret statements that use function notation in terms of a context.* *Use function notation with various functions of two variables. See functions as defined symbolically (e.g., f(a,b) = 3ab – a or a newly defined symbol like a % b = 3ab – a).* **A1.F.IF.A.3** Understand geometric formulas as functions. * *Limit to linear functions. For example, see geometric formulas such as interior angle sum, perimeter of a square, and circumference of a circle as linear functions.*

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	Interpret functions that arise in applications in terms of the context	**A1.F.IF.B.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.* *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.* *Tasks are limited to linear functions, absolute value functions, quadratic functions, and exponential functions with integer exponents* **A1.F.IF.B.5** Relate the domain of a function to its graph and, where applicable, to the context of the function it models *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.* *Tasks are limited to linear functions, piecewise functions (including step and absolute value functions), quadratic functions, and exponential functions with integer exponents.* **A1.F.IF.B.6** Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate and interpret the rate of change from a graph.* *Tasks are limited to linear functions, piecewise functions (including step and absolute value functions), quadratic functions, and exponential functions with integer exponents.*
	Analyze functions using different representations	**A1.F.IF.C.7** Graph functions expressed algebraically and show key features of the graph by hand and using technology. * *Function types are limited to linear functions, quadratic functions, absolute value functions, and exponential functions with integer exponents.* **A1.F.IF.C.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. * **a.** Rewrite quadratic functions to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a real-world context. **A1.F.IF.C.9** Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions.* **a.** Compare properties of two different functions. Functions may be of different types and/or represented in different ways.* **b.** Compare properties of the same function on two different intervals or represented in two different ways.* *Functions may or may not have a real-world context. Function types are limited to linear functions, quadratic functions, absolute value functions, and exponential functions with integer exponents.*
Building Functions	Build a function that models a relationship between two quantities	**A1.F.BF.A.1** Build a function that describes a relationship between two quantities.* **a.** Determine steps for calculation, a recursive process, or an explicit expression from a context.* *Tasks are limited to linear and exponential relationships. For example, create a function from a visual pattern and describe how each component of their function relates to characteristics of figures in the pattern.*
	Build new functions from existing functions	**A1.F.BF.B.2** Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given graphs. *Experiment with cases and illustrate an explanation of the effects on the graph using technology. Tasks are limited to absolute value and quadratic functions.*
Linear and Exponential Models	Construct and compare linear and exponential models and solve problems	**A1.F.LE.A.1** Distinguish between situations that can be modeled with linear functions and with exponential functions.* **a.** Know that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.* **b.** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.* **c.** Recognize situations in which a quantity grows or decays by a constant factor per unit interval relative to another.* **A1.F.LE.A.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or input-output pairs. * *Tasks are limited to constructing linear and exponential functions in simple context (not multi-step).*
	Interpret expressions for functions in terms of the situation they model	**A1.F.LE.B.3** Interpret the parameters in a linear or exponential function in terms of a context.* *For example, the total cost of an electrician who charges 35 dollars for a house call and 50 dollars per hour would be expressed as the function y = 50x + 35. If the rate were raised to 65 dollars per hour, describe how the function would change.* *For example, a population is modeled by a function y = 30000 (1.04)x. Interpret the value 30000 as the initial population and 1.04 as a 4% increase per year.*
Statistics and Probability		
Interpreting Categorical and Quantitative Data	Summarize, represent, and interpret data on a single count or measurement variable	**A1.S.ID.A.1** Use measures of center to solve real-world and mathematical problems.* *Measures of center should include mean (including weighted averages), median, and mode.* **A1.S.ID.A.2** Use statistics appropriate to the shape of the data distribution to compare center (mean, median, and/or mode) and spread (range, interquartile range) of two or more different data sets.* *Students may be given a numerical data set or a visual and/or verbal depiction of a data set. Shapes of distribution are limited to: uniform, symmetric, right skewed, and left skewed.* **A1.S.ID.A.3** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points.* *Students may be given a numerical data set or a visual and/or verbal depiction of the data set.*

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	Summarize, represent, and interpret data on two categorical quantitative variables	**A1.S.ID.B.4** Represent data from two quantitative variables on a scatter plot, and describe how the variables are related. Fit a function to the data; use functions fitted to data to solve problems in the context of the data.* *Fitted functions are limited to linear, exponential, and quadratic functions.*
	Interpret linear models	**A1.S.ID.C.5** Interpret the rate of change and the constant term of a linear model in the context of data.* **A1.S.ID.C.6** Use technology to compute the correlation coefficient of a linear model; interpret the correlation coefficient in the context of the data.* **A1.S.ID.C.7** Explain the differences between correlation and causation. Recognize situations where an additional factor may be affecting correlated data.*