DIOCESE OF DULUTH
CURRICULUM STANDARDS AND OUTCOMES

The curriculum for the Diocese of Duluth should consider three elements: that which should be taught, that which is taught, and that which is assessed. At the school level, alignment should be distinguished between the written curriculum, the content and skills actually taught in the classroom, the pedagogy used, and the assessment of such instruction. The process of ensuring this alignment is guided by national, state, and diocesan standards. This curriculum forms the minimum standards for all diocesan schools. Local schools often go beyond these standards. The standards address essential concepts, but not the specific delivery of content. The local school is the best level for professional educators to make determinations regarding the pedagogy that best serves their students and community.

We believe that God has placed within the human heart a desire to know and love him and to learn and discover truth. When structured properly, the school's educational program helps us to know the mind and heart of God. There are several purposes behind this curriculum guide for diocesan schools:

1. Recognize our unique identity as Catholic schools and provide guidance for teachers for integrating Catholic teaching and moral virtues in all areas.
2. Promote academic excellence by identifying and correlating essential state and national academic standards with diocesan standards.
3. Sequence concepts and skills to ensure continuity of programs from school to school, grade to grade, and teacher to teacher. Reviewing this sequence helps schools and teachers eliminate potential gaps and overlaps in student learning.
4. Use the *National Standards and Benchmarks for effective Catholic Elementary and Secondary Schools*, March 2012.

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Academic Excellence:

The United States Conference of Catholic Bishops affirms the message of the Congregation on Catholic Education that intellectual development of the person and growth as a Christian go forward hand in hand. Rooted in the mission of the Church, the Catholic school brings faith, culture and life together in harmony. In 2005, the bishops noted that "young people of the third millennium must be a source of energy and leadership in our church and our nation. And, therefore, we must provide young people with an academically rigorous and doctrinally sound program of education" *(Renewing Our Commitment to Catholic Elementary and Secondary School is in the Third Millennium, 2005).*

The essential elements of "an academically rigorous and doctrinally sound program" mandate curricular experiences-including co-curricular and extra-curricular activities-which are rigorous, relevant, research-based, and infused with Catholic faith and traditions.

The following essential elements provide a framework for the design, implementation, and assessment of authentic academic excellence in Catholic school education from pre-kindergarten through secondary school.

Standard 7: An excellent Catholic school has a clearly articulated, rigorous curriculum aligned with relevant standards, 21st century skills, and Gospel values, implemented through effective instruction.

BENCHMARKS:

7.1 The curriculum adheres to appropriate, delineated standards, and is vertically aligned to ensure that every student successfully completes a rigorous and coherent sequence of academic courses based on the standards and rooted in Catholic values.

7.2 Standards are adopted across the curriculum, and include integration of the religious, spiritual, moral, and ethical dimensions of learning in all subjects.

7.3 Curriculum and instruction for the 21st century learning provide students with the knowledge, understanding and skills to become creative, reflective, literate, critical, and moral evaluators, problem solvers, decision makers, and socially responsible global citizens.

7.4 Curriculum and instruction for 21st century learning prepares students to become expert users of technology, able to create, publish, and critique digital products that reflect their understanding of the content and their technological skills.

7.5 Classroom instruction is designed to intentionally address the effective dimensions of learning, such as intellectual and social dispositions, relationship building, and habits of mind.

7.6 Classroom instruction is designed to engage and motivate all students, addressing the diverse needs and capabilities of each student, and accommodating students with special needs as fully as possible.

7.7 Faculty collaborate in professional learning communities to develop, implement and continuously improve the effectiveness of the curriculum and instruction to result in high levels of student achievement.

7.8 The faculty and professional support staff meet (arch) diocesan, state, and/or national requirements for academic preparation and licensing to ensure their capacity to provide effective curriculum and instruction.

7.9 Faculty and professional support staff demonstrate and continuously improve knowledge and skills necessary for effective instruction, cultural sensitivity, and modeling of Gospel values.

7.10 Faculty and staff engage in high quality professional development, including religious formation, and are accountable for implementation that supports student learning.

Standard 8: An excellent Catholic school uses school-wide assessment methods and practices to document student learning and program effectiveness, to make student performances transparent, and to inform the continuous review of curriculum and the improvement of instructional practices.

BENCHMARKS:

8.1 School-wide and student data generated by a variety of tools are used to monitor, review, and evaluate the curriculum and co-curricular programs; to plan for continued and sustained student growth; and to monitor and assess faculty performance.

8.2 School-wide and aggregated student data are normed to appropriate populations and are shared with all stakeholders.

8.3 Faculty use a variety of curriculum-based assessments aligned with learning outcomes and instructional practices to access student learning, including formative, summative, authentic performance, and student self-assessment.

8.4 Criteria used to evaluate student work and the reporting mechanisms are valid, consistent, transparent, and justly administered.

8.5 Faculty collaborate in professional learning communities to monitor individual and class-wide student learning through methods such as common assessments and rubrics.

Standard 9: An excellent Catholic school provides programs and services aligned with the mission to enrich the academic program and support the development of student and family life.

BENCHMARKS:

9.1 School-wide programs for parents/guardians provide opportunities for parents/guardians to partner with school leaders, faculty, and other parents/guardians to enhance the educational experiences for the school community.

9.2 Guidance services, wellness programs, behavior management programs, and ancillary services provide the necessary support for students to successfully complete the school program.

9.3 Co-curricular and extra-curricular activities provide opportunities outside the classroom for students to further identify and develop their gifts and talents and to enhance their creative, aesthetic, social/emotional, physical, and spiritual capabilities.

Diocese of Duluth
Mathematics Philosophy Statement

We believe that mathematical understanding and procedural skill are equally important - students will both make sense of mathematical concepts and persevere in solving problems. Mathematics is not simply a collection of formulas and calculation skills, but rather, a logical and analytical way of understanding everyday life. We believe the focus of the mathematics program is to help students to see math as a quest to find the order of God in the natural world.

Acknowledgement

The Department of Catholic Schools deeply appreciates the work of the math curriculum committee.

Vision Statement

This mathematics curriculum embraces a broad spectrum of skills organized into five content strands. The standards present a vision of what students should know and be able to do in the areas of Number Sense & Operations, Algebra, Geometry & Measurement, Data & Probability, and Problem Solving Strategies.

In addition to mastering mathematical skills in this curriculum, the goal of math instruction is to develop positive attitudes and excitement toward learning mathematics. In order to accomplish this goal, students require a program that provides rich curricular experiences.

This program is designed to accommodate varying levels of learners as they progress through skills. Due to the varied ability of students and the wide variety of instructional situations within the individual schools, this curriculum has been formatted as a continuum appropriate for learners, grades Pre-K through 8.

This curriculum is designed to address specific foundational skills to help students continue their mathematical development and to master essential competencies. Provided in this curriculum is a checklist for outcomes. This checklist provides an organized method to view the experience gained by the math student.

Additionally, elements of the Catholic faith tradition are integrated into this mathematics curriculum in order to provide a meaningful language and cultural experience within the context of the Catholic faith.

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4 = Data Analysis & Probability
Note: Problem Solving is diocesan strand

Citations with only two numbers are diocesan standards beyond MN standards.

Pre	K	1	2	3	4	5	6	7	8	Citation	Outcome: The student will:	Suggested Activities/Assessments
I	M									K.1	Recognize and name numerals 0-20.	
I	M									K.1	Order the numerals 0-5.	
I, M										Pre.1	Rote count to 20.	
I	M									K.1.1.1	Match sets of objects one-to-one when counting.	Example: Take crayons from the box and give one to each student in the group. Explain what you are doing.
I	M									K. 3	Identify whether or not a shape is divided into equal parts. Use terms whole and half.	
I	M	C								K.1	Model addition by joining sets of objects (for any two sets with fewer than 10 objects when joined).	Example: Put together 3 pencils and 2 pencils. Count the total number of pencils.
I	M	C								K.1	Model subtraction by removing objects from sets (for numbers less than 10).	Example: From a pile of 6 crayons, take away 3 crayons. Count the number of crayons left in the pile.
I	M	C								K.3.1.2	Identify, sort, and classify objects by size, number, and other attributes. Identify objects that do not belong to a particular group.	Example: Find the squares in a collection of shapes. Sort these squares into large ones and small ones and explain how you decided which squares went in each pile.
I	M									K.2.1.1	Identify, extend, and create simple patterns with numbers, shapes, colors, size, and rhythm.	
I	M									K.3	Identify and describe common geometric objects: circle, triangle,	

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											square, rectangle, diamond, star, oval, and heart.	
I	M									K.3	Recognize and identify shapes that are half-circles.	
I	R	M								1.3	Use a given object to measure the length of other objects.	Example: Use a small block to measure the length of your arm.
I	M									K.3	Make direct comparisons of the length, capacity, weight, and temperature of objects and recognize which object is shorter, longer, taller, lighter, heavier, warmer, cooler or holds more.	Example: Hold two books side by side to see which is shorter. Hold one in each hand to see which is heavier.
I	M									K.3	Order object shortest to longest, shortest to tallest.	
I	M									K.3	Begin to understand concepts of time: morning, afternoon, evening, today, yesterday, tomorrow, week, month, and year. Understand that clocks and calendars are tools that measure time.	Example: Use a calendar to find the number of days in the month of your birthday.
I	M	C								K.5	Act out a problem situation.	Example: In your class, are there more boys or more girls?
I	M	C								K.5	Use objects to solve and orally explain a problem.	Example: You want to give 2 pencils to each of your 4 friends. Count the pencils to see how many you need.
	I	M								K.1.1.3	Rote count to 20 by 2's.	
I	M	C								K.1.1.2	Read, write and represent whole numbers to at least 31.	

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I	M									K.1.1.5	Count, recognize, represent, name, and order a number of objects (up to 20).	Example: Count a group of seven pennies. Recognize that 7 is the number for this set.
I	M									K.1.1.4	Find the number that is one more than or one less than any whole number* up to 10.	Example: You have a bag of 7 apples. How many apples are in a box that holds one less than the bag of apples?
I	M									K.3	Use correctly the words one/many, none/some/all, more/less, and most/least.	Example: Take some of the blocks out of this box, but not all of them.
I	M	C								K.1	Recognize and develop mathematical situations in children's literature.	Example: Look at a counting book and count the objects in the pictures.
I	M	C								K.1.2.1	Model and describe addition by joining sets of objects (for any two sets with fewer than 10 objects when joined).	Example: Put together 3 pencils and 2 pencils. Count the total number of pencils.
I	M	C								K.1.2.1	Model and describe subtraction by removing objects from sets (for numbers less than 10).	Example: From a pile of 9 crayons, take away 6 crayons. Count the number of crayons left in the pile.
I	R	R	M							K.3.1.1	Identify and describe common geometric objects: circle, triangle, square, rectangle, diamond, cube, hexagon, trapezoid, oval.	Example: Look for cubes and circles at home and at school

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I	M	C								K.3.2.1	Make direct comparisons of the length, capacity, weight, and temperature of objects and recognize which object is shorter, longer, taller, lighter, heavier, warmer, cooler or holds more.	Example: Hold two books side by side to see which is shorter. Hold one in each hand to see which is heavier.
I	R	M								1.3	Understand concepts of time: morning, afternoon, evening, today, yesterday, tomorrow, week, month, and year. Understand that clocks and calendars are tools that measure time.	Example: Use a calendar to find the number of days in the month of your birthday.
I	R	M								1.3.1.1	Identify, describe, compare, sort, and draw triangles, rectangles, squares, and circles.	Example: Draw a square and a circle and write their names next to them.
I	R	R	M							K.3.1.2, 1.3.1.1	Classify and sort familiar plane and solid objects by position, shape, size, roundness, and other attributes. Explain the rule you used.	Example: Group a collection of objects by something they have in common. Explain your grouping.
I	M	C								K.3	Arrange and describe objects in space by position and direction: near, far, under, over, up, down, behind, in front of, next to, to the left or right of.	Example: Name objects that are near your desk and objects that are in front of it. Explain why there may be some objects in both groups.

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I	R	M								K.3.1.3	Identify geometric shapes and structures in the environment and specify their location.	Example: Find as many rectangles as you can in your classroom. Record the rectangles that you found by making drawings or using a camera.
I	C	C	C	C	C	C	C	C	C	All grades Problem Solving	Choose the approach, materials, and strategies to use in solving problems.	Example: Solve the problem: "The number 10 can be written in different ways using addition: 10 = 4 + 6 or 10 = 1 + 9 … Find how many ways you can write 10 by adding two numbers." Use blocks to set up the problem.
I	C	C	C	C	C	C	C	C	C	All grades Problem Solving	Use tools such as objects or drawings to model problems.	Example: In the first example, show the number 10 using addition of whole numbers by counting out ten blocks. Divide them into two piles and write a number sentence that shows the number in each pile of blocks.

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I	C	C	C	C	C	C	C	C	C	All grades Problem Solving	Explain the reasoning used and justify the procedures selected in solving a problem.	Example: In the first example, make two piles of ten blocks; separate one block from the first pile and count the number of blocks left. Separate two blocks from the second pile and count the number left. Describe any pattern of numbers that you find.
I	C	C	C	C	C	C	C	C	C	All grades Problem Solving	Make precise calculations and check the validity of the results in the context of the problem.	
I	C	C	C	C	C	C	C	C	C	All grades Problem Solving	Understand and use connections between two problems.	Example: Use the problem you have just solved to find how many ways you can write 16 by adding two numbers.
I	M	C								K.3	Relate time to events (before/after, shorter/longer).	Example: Is recess before or after lunch?
I	M	C								K.3	Recognize the difference between the length of a day, month, and a year	
	I	M								K.1.2.2	Divide sets of ten or fewer objects into equal groups.	Example: Take 6 blocks and give the same number to each of 3 children.

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	I	M								1.3	Identify whether or not a shape is divided into equal parts using the terms whole and half.	
	I	M								K.1.1.1	Place in ordinal position – first, second, third, etc.	
	I	M								1.1.1.1	Count items in a set modeled with groups of 10 and ones.	
	I	M								1.1.1.1	Model a 2-digit numeral using groups of tens and ones	
	I	M	C							1.4	Record and organize information using real graphs and picture graphs.	Example: Ask some of your friends what pets they have. Use pictures of animals to show the number of pets your friends have.
	I	R	M							1.3.1.1	Identify triangles, rectangles, squares, and circles as the faces (flat side) of three-dimensional objects.	Example: Look at a collection of solid objects and find triangles and squares on their sides.
	I	M								1.3.2.1	Use a given object to measure the length of other objects.	Example: Use a small block to measure the lengths of larger blocks.
	I	M								1.3.2.2	Tell time to the hour.	
	I	C	C	C	C	C	C	C	C	All grades Problem Solving	Students make decisions about how to set up a problem.	
	I	C	C	C	C	C	C	C	C	All grades Problem	Act out a problem situation. Example: In your class, are there more boys or more girls? How could	

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										Solving	you ask them all to stand to help you answer this question?	
	I	M								1.1.2.3	Rote count to 100 by 1's, 2's, 5's and 10's.	
	I	M	C							1.1.1.2	Read, and write whole numbers* up to 120.	Example: Write 72 for the number "seventy-two".
	I	M	C							1.1.1.2	Count and group objects in ones and tens.	Example: Separate a group of 34 blocks into three groups of 10 blocks and 4 single blocks.
	I	M								K.1.1.4	Name the number that is one more than or one less than any number up to 100.	Example: Name the number one less than 78.
	I	M	C							1.1.1.5	Compare whole numbers up to 120 and arrange them in numerical order.	Example: Arrange the numbers 5, 2, and 9 in order from greatest to least.
	I	R	M							2.1	Understand the concept of odd and even numbers.	
	I, M									K.1	Match the number names first, second, third, etc. with an ordered set of up to 10 items.	Example: Point out the fifth child from the front of a line of children.
	I	M								1.1.1.7, K.1.1.2	Represent, compare, and interpret data using pictures and picture graphs.	Example: Use a picture graph to show how many dogs, cats, etc. your friends have. Which kind of pet appears most often? Explain your answer.

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	I	M								K.1.2.1, 1.1.2.1	Show the meaning of addition (putting together, increasing) using objects.	Example: Put together 3 pencils and 5 pencils. Tell how many pencils you have and explain what you are doing.
	I	M								K.1.2.1, 1.1.2.1	Show the meaning of subtraction (taking away, comparing, finding the difference) using objects.	Example: Take away 6 blocks from a group of 10. Tell how many blocks are left and explain what you are doing.
	I	M								1.1	Understand the meaning of the symbols +, -, and =.	Example: Use symbols to write the number sentence "one added to three equals four."
	I	M								K.1.2.1	Understand the role of zero in addition and subtraction.	Example: You start with 6 eggs and then give away 6 eggs. How many eggs do you have now?
	I, M	C								K.3.2.1, K.3.2.2	Compare and order objects according to area, capacity, weight, and temperature, using direct comparison or a non-standard unit.	
	I	M	C							1.3.2.3	Identify and give the values of pennies, nickels, dimes, and quarters.	Example: How many pennies have the same value as two nickels?
	I	M	C							1.1.1.3 1.1.2.3	Count by ones, twos, fives, and tens to 100.	Example: Count 74 pencils by groups of tens and twos.

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	I	R	M								Identify odd and even numbers up to 100.	Example: Find the odd numbers in this set: 44, 31, 100, 57, 28.
	I	R	R	M						3.4.1.1	Represent, compare, and interpret data using tables, tally charts, and bar graphs. Example: Make a tally of your classmates' favorite colors and draw a bar graph. Name the color that is most popular and the color that is the favorite of the fewest people.	
	I	R	R	M						2.3.1.2	Identify and construct squares, rectangles, triangles, cubes, and rectangular prisms* with appropriate materials.	Example: Use blocks to make a rectangular prism.
	I	R	R	R	M					2.3.1.2	Describe, classify, and sort plane and solid geometric shapes (triangle, square, rectangle, cube, rectangular prism) according to the number and shape of faces*, and the number of edges and vertices*.	Example: How many corners does a cube have?
	I	M								2.3.1.1	Place a set of similar geometric drawings in order from larger to smaller or vice versa (similar triangles)	
	I	R	M							1.1.1.5	Plot and label whole numbers on a number line up to 100. Estimate positions on the number line.	Example: Draw a number line and label it with 0, 10, 20, 30, …, 90, 100. Estimate the position of 77 on this number line.

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Pre	K	1	2	3	4	5	6	7	8	Citation	Outcome: The student will:	Suggested Activities/Assessments
		I	M							1.1.1.6	Order and compare whole numbers using symbols for "less than" (<), "equal to (=), and greater than (>).	
		I, M	C							1.1.1.1	Identify the number of tens and ones in numbers less than 100.	Example: How many tens and how many ones are in 56? Explain your answer.
		I	M							1.3.1.1	Recognize when a shape is divided into congruent (matching) parts.	Example: Given a rectangle with lines dividing it into parts, decide whether the parts are the same size.
		I	R	M						3.1.3.1	For a shape divided into 8 or fewer congruent (matching) parts, describe a shaded portion as "__ out of __ parts" and write the fraction.	Example: Given a circle divided into 4 equal parts with 3 of the parts shaded, describe the shaded portion as "3 out of 4 parts" and write the fraction for the shaded portion.
		I	R	M						3.1.3.1	For a set of 8 or fewer objects, describe a subset as "__ out of __ parts" and write the fraction.	Example: Given 3 red pencils and 2 blue pencils, describe the subset of red pencils as "3 out of 5 parts" and write the fraction of the pencils that are red.
		I	M							1.1.2.2	Show equivalent forms of the same number (up to **20**) using objects, diagrams, and numbers.	Example: Write 15 as 8 + 7, 5 + 5 + 5, 10 - 5, 15 - 0, 17 - 2, etc.

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		I	M	C						1.2.2.3	Develop strategies for finding a missing addend.	Example: Solve 6 + ___ = 9
		I	M	C						2.1	Know fact family relationships of addition and subtraction, such as 4+3=7 and 7-3=4.	Start with 8 blocks. Add 5 more blocks. How many do you have? Now take away 5 blocks. How many do you have now? Explain your answer.
		I	M							1.2.2.1	Write and solve number sentences from problem situations involving addition and subtraction.	Example: You have 3 pencils and your friend has 2 pencils. You want to know how many pencils you have altogether. Write a number sentence for this problem and use it to find the total number of pencils.
		I	M							2. Problem Solving	Tell a story or draw a picture for a problem that can be solved given a number sentence.	
		I, M								1.2.1.1	Create and extend number patterns using addition.	Example: A number pattern begins with these numbers: 1, 3, 5, … Tell what the next number will be and explain how you decided on that number.

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		I, M								1.3.2.1	Recognize the need for a fixed unit of length. Example: Give students different lengths of string and have them measure the width of a doorway. Talk about why their answers are different and the kinds of problems this can cause.	Measure the length of objects by repeating a non-standard unit or a standard unit. Example: Measure the length of your desk in pencil-lengths. Use different units to measure the length of the same object and predict whether the measure will be greater or smaller when a different unit is used. Example: If you measure your desk with a shorter pencil, will the number of pencil-lengths be more or less? Measure the desk to find out your answer.
		I, M	C							1.3.2.2	Tell time to the hour and half-hour using analog and digital clocks; relate it to daily living	Examples: What time do we go to lunch? What happens on Mondays at 2:30 (art)?
		I, M								1.3.2.3	Count a group of pennies to $0.99, nickels to $1.00, dimes to $1.00, and quarters to $1.00.	
		IM	C							1.1.1.1	Identify the pattern of numbers in each group of ten, from tens through nineties.	Example: Where on a hundreds chart are the numbers 12, 22, 32, etc.?

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		I	M							2.1.1.2	Identify numbers up to 1000 in various combinations of tens and ones.	Example: 32 = 3 tens + 2 ones, 2 tens + 12 ones, etc.
		I	M							2.1.1.3	Name the number that is ten more or ten less than any number 10 through 90.	Example: Name the number ten more than 54.
		I	M							2.1.1.5	Compare whole numbers up to 1000 and arrange them in numerical order.	Example: Put the numbers in order of size: 95, 28, 42, 31.
		I	M							2.1	Order and compare whole numbers using symbols for "less than" (<), "equal to (=), and greater than (>).	
		I	M							2.1	Match the number names first, second, third, etc. with an ordered set of up to 100 items.	Example: Identify the seventeenth letter of the alphabet.
		I	M							2.1.2.2	Demonstrate mastery of the addition facts (for totals up to 18) and the corresponding subtraction facts.	Example: Add 11 + 8, subtract 16 - 9, add 4 + 7.
		I	R	M						3.1.3.1	Know that, when all fractional parts are included, the result is equal to the whole and to one. Example: What is another way of saying six sixths? Explain your answer.	
		I	M							2.1.1.1	Model addition of numbers less than 100 with objects and pictures. Example: Use blocks to find the sum of 26 and 15.	
		I	M	C							Know how to work an equation vertically and horizontally	

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		I	M							2.1.2.3	Use estimation to decide whether answers are reasonable in addition problems up to 100.	Example: Your friend says that 13 + 24 = 57.Without solving, explain why you think the answer is wrong.
		I	M							2.1	Use mental arithmetic to add or subtract 0, 1, 2, 3, 4, 5, or 10 with numbers less than 100.	
		I	M							2.2.1.1	Create, describe, and extend number patterns using addition and subtraction.	Example: What is the next number: 23, 21, 19, 17, . . . How did you find your answer?
		I	M							2.3.1.2	Identify objects as two- or three-dimensional. Example: Sort various objects (cube, square, triangle, prism) into the categories "two-dimensional" and "three-dimensional". Explain your choices.	
		I	M	C	C					4.3.3.4	Identify congruent* two-dimensional shapes in any position.	Example: In a collection of rectangles, pick out those that are the same shape and size.

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		I	M	C						2.3.2.2	Measure and estimate length to the nearest inch, foot, yard, centimeter, and meter.	Example: Have some students measure the width of the doorway in inches and some measure it in centimeters. Discuss why these are better ways of measuring than using the pieces of string.
		I	R	M						2.3.2.1	Describe the relationships among inch, foot, and yard. Describe the relationship between centimeter and meter. Example: How many inches are in a foot?	
		I	M							2.3.2.1	Decide which unit of length is most appropriate in a given situation. Example: Would you use yards or inches to measure the length of your schoolbooks? Explain your answer.	

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		I	R	R	M					4.3	Estimate weight and use a given object to measure the weight of other objects.	Example: About how many jellybeans will you need to put on one side of a balance scale to balance with a box of chalk? Count out the number of jellybeans that you guessed would be needed and see whether your estimate was close. Explain the results of your estimation and weighing.
		I	C	C	C	C	C	C	C	All grades Problem Solving	Estimate and solve one-step problems pertaining to life situations.	
		I	C	C	C	C	C	C	C	All grades Problem Solving	Use problem clues to decide on an operation	
		I	C	C	C	C	C	C	C	All grades Problem Solving	Write a problem sentence from available information	
		I	R	M						3.3.3.2	Know relationships of time: seconds in a minute, minutes in an hour, hours in a day, days in a week, and days, weeks, and months in a year.	Example: How many days are in a year?
		I	M	C						2.3.3.2	Find the value of a collection of pennies, nickels, dimes, quarters, half-dollars, and dollars.	Example: You have 3 pennies, 4 nickels, and 2 dimes. How much money do you have? Explain your answer.

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		I	R	M	C					3.4	Identify whether everyday events are certain, likely, unlikely, or impossible.	Example: It is raining in your neighborhood. Is it certain, likely, unlikely, or impossible that the tree in your front yard will get wet?
		I	R	M	C					3.4	Record the possible outcomes for a simple probability experiment.	Example: Predict how many heads and tails will occur if a coin is tossed 10 times. Have a partner toss a coin while you keep a tally of the outcomes. Exchange places with your partner and repeat the experiment. Explain your results to the class.
		I	R	M	C	C	C	C	C	3.1.1.4	Use estimation to decide whether answers are reasonable in addition and subtraction problems.	
		I	R	M						3.1.3.1	Read and write fractions with words and symbols.	
		I	R	M	C					3.1.2.2	Understand the relationship between addition and subtraction and use the relationship to check for reasonableness of results.	Example: The calculation 117-83=34 can be checked by adding 83+34.
		I	R	R	M					4.1	Choose appropriate symbols for operations and relations to make a number sentence true.	Example: What symbol is needed to make the number sentence 4 _ 3 = 12 true?

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		I	R	M	C					3.2.1.1	Solve simple problems involving a functional relationship between two quantities using addition and subtraction. (Input/output tables)	Example: Ice cream sandwiches cost 20 cents each. Find the costs of 1,2,3,4,… ice cream sandwiches. What pattern do you notice? Continue the pattern to find the cost of enough ice cream sandwiches for the class.
		I	R	R	R	M	C	C		5.3.1.1	Identify, describe, and classify: cube, sphere, prism, pyramid, cone, cylinder.	Example: Describe the faces of a pyramid and identify its characteristics.
		I	R	R	M	C	C	C		4.3.2.4	Identify common solid objects that are the parts needed to make a more complex solid object.	Example: Describe and draw a house made from a prism and a pyramid.
		I	R	R	R	M	C	C			Identify and/or draw shapes that are congruent and similar.	Example: Draw a triangle that is congruent to a given triangle. You may use a ruler and pencil or the drawing program on a computer.
		I	R	M						3.3.2.2	Find the perimeter of a polygon.	Example: Find the perimeter of a table in centimeters. Explain your method.
		I	R	R	R	M				5.3.2.3	Estimate or find the volume of objects by counting the number of cubes that would fill them.	Example: How many of these cubes will fill the box?

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		I	R	R	R	M				6.3.3.2	Estimate and measure capacity using quarts, gallons, and liters.	Example: This bottle holds one liter. Estimate how many liters the sink holds.
		I	R	R	R	M				6.3.3.2	Estimate and measure capacity using cups and pints.	Example: Make a reasonable estimate of the number of pints a juice pitcher holds.
		I	R	R	R	M				6.3.3.2	Estimate and measure weight using pounds and kilograms.	Example: Estimate the weight of your book bag in pounds.
		I	M	C						2.3.3.2	Find the value of any collection of coins and bills. Write amounts less than a dollar using the $ symbol and write larger amounts in decimal notation using the $ symbol.	Example: You have 5 quarters and 2 dollar bills. How much money is that? Write the amount.
		I	M	C						2.3.3.2	Use play or real money to decide whether there is enough money to make a purchase.	
		I	R	M						3.3.3.1	Understand the functions of the minute hand and minute markings on the clock.	
			I	M						2.1.2.5	Add two whole numbers less than 100 with and without regrouping.	Example: 36 + 45 =
			I	M						2.1.2.5	Subtract two whole numbers less than 100 without regrouping.	Example: 86 - 55 =
			I	M						2.2.2.1	Understand how to interpret number sentences involving addition, subtraction, and unknowns represented by letters with or without manipulatives.	Example: n + 16 = 19

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			I, M	C						2.3.3.1	Tell time to the nearest quarter hour and know the difference between a.m. and p.m.	Example: When does your favorite TV program start?
			I	M	C					3.1.2.3	Represent the concept of multiplication as repeated addition.	Example: Lynn made 3 baskets each week for 4 weeks. Draw a picture to show how many baskets she made.
			I	R	M					3.1.2.1	Use mental arithmetic to add or subtract with numbers less than 100.	Example: Subtract 35 from 86 without using pencil and paper.
			I	R	M					4.3.3.2	Sketch the mirror image reflections of shapes to show symmetry.	Example: Hold up a cardboard letter F to a mirror. Draw the letter and the shape you see in the mirror.
			I	M						3.3.2.1	Measure line segments to the nearest half-inch.	Example: Measure the length of a side of a triangle.
			I	M						3.3.3.4	Estimate temperature. Read a thermometer in Celsius and Fahrenheit.	Example: What do you think the temperature is today? Look at the thermometer to check.

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			I	R	M					3.3.3.4	Compare temperatures in Celsius and Fahrenheit.	Example: Measure the room temperature using a thermometer that has both Celsius and Fahrenheit units. If the temperature in the room measures 70º F, will the Celsius measurement be higher or lower?
			I	C	C	C	C	C	C	All grades Problem Solving	Analyze problems by identifying relationships, telling relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.	Example: Solve the problem: "Start with any number. If it is even, halve it. If it is odd, add 1. Do the same with the result and keep doing that. Find what happens by trying different numbers." Try two or three numbers and look for patterns.
			I	C	C	C	C	C	C	All grades Problem Solving	Decide when and how to break a problem into simpler parts.	Example: In the first example, find what happens to all the numbers up to 10.
			I	C	C	C	C	C	C	All grades Problem Solving	Apply strategies and results from simpler problems to solve more complex problems.	Example: In the first example, use your results for the numbers up to 10 to find what happens to all the numbers up to 20.

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			I	C	C	C	C	C	C	All grades Problem Solving	Express the solution clearly and logically by using the appropriate mathematical terms and notation. Support solutions with evidence in both verbal and symbolic work.	Example: In the first example, explain what happens to all the numbers that you tried.
			I	C	C	C	C	C	C	All grades Problem Solving	Recognize the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.	Example: Measure the length and width of a room to the nearest meter to find how many student desks will fit in it. Would this be an accurate enough method if you were carpeting the room?
			I	C	C	C	C	C	C	All grades Problem Solving	Know and use strategies for estimating results of whole-number addition and subtraction.	Example: You buy 2 bags of candy for $1.05 each. The cashier tells you that will be $1.70. Does that surprise you? Why or why not?
			I	C	C	C	C	C	C	All grades Problem Solving	Decide whether a solution is reasonable in the context of the original situation.	Example: In the example about fitting desks into a room, would an answer of 1,000 surprise you?
			I	C	C	C	C	C	C	All grades Problem Solving	Note the method of finding the solution and show a conceptual understanding of the method by solving similar problems.	Example: Change the first example so that you multiply odd numbers by 2 or 3 or 4 or 5, before adding 1. Describe the pattern you see.

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			I	M						3.3.3.2	Carry out simple unit conversions (e.g., hours to minutes). Example: How many minutes are in 3 hours?	
			I	M						3.3.3.1	Tell time to the minutes.	
			I	R	M					3.3.3.1	Determine elapsed time.	
			I	M	C					4.1.1.5	Understand and use standard algorithms* for addition and subtraction.	Example: 45,329 + 6,984 = ?, 36,296 - 12,075 = ?
				I, M							Tell time to the nearest five-minute intervals.	
				IM						3.1.1.1	Count, read, and write whole numbers up to 100,000	
				IM						3.1.1.2	Identify and interpret place value in whole numbers up to 100,000.	Example: Understand that the 7 in 479 represents 7 tens or 70.
				IM						3.1.1.1	Use words, models, and expanded form to represent numbers up to 100,000.	Example: Recognize that 492 = 400 + 90 + 2.
				M						3.1.1.5	Compare whole numbers up to 100,000 and arrange them in numerical order.	Example: What is the smallest whole number you can make using the digits 4, 9,and 1? Use each digit exactly once.
				M						3.1	Order and compare whole numbers using symbols for “less than” (<), “equal to (=), and greater than (>).	
				M						3.1.1.4	Round numbers less than 10,000 to the nearest ten and the nearest	Example: Round 548 to the nearest ten.

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											hundred.	
				M						3.1	Identify odd and even numbers up to 1,000 and describe their characteristics.	Example: Find the even numbers: 47, 106, 357, 629.
				I	M					3.1.3.1	Show equivalent fractions* using equal parts.	Example: Draw pictures to show that 3 /5, 6 /10, and 9 /15 are equivalent fractions.
				I	M					3.1.3.3	Recognize, name, and compare the unit fractions: 1/2, 1/3, 1/4, 1/5, 1/6, 1/8, 1/10, and 1/12.	Example: Which is larger, 1/3 or 1/6? Explain your answer.
				I	M					3.1.3.3	Identify and use correct names for numerators and denominators.	Example: In the fraction 3 /5, name the numerator and denominator.
				I	M					3.1.3.3	Given a pair of fractions, decide which is larger or smaller by using objects or pictures.	Example: Is 3 /4 of a medium pizza larger or smaller than 1 /2 of a medium pizza? Explain your answer.
				I	M					4.1.2.4	Given a set* of objects or a picture, name and write a decimal to represent tenths and hundredths (introductory level).	Example: You have a pile of 100 beans and 72 of them are lima beans. Write the decimal that represents lima beans as a part of the whole pile of beans.
				I	M					4.1.2.4	Given a decimal for tenths, show it as a fraction using a place-value model (introductory level).	Example: Show the decimal 0.7 as a fraction using pennies.

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				I	M					3.4.1.1	Interpret data displayed in a circle graph and answer questions about the situation.	Example: Have the students in your class choose the pizza they like best from these choices: cheese, sausage, pepperoni. Create a circle graph of the data. Determine the most popular and the least popular kind of pizza, and explain what the circle and each pie slice represent.
				I	M					3.1.2.1	Add and subtract whole numbers up to 1,000 with or without regrouping, using relevant properties of the number system.	Example: 854 - 427 = ? Explain your method.
				I	M					4.1.1.5	Know fact family relationships of multiplication and division, such as 6 x 7 = 42, 42 ÷ 7 = 6, 7 x 6 = 42, 42 ÷ 6 = 7.	
				I	M					3.1.3.3	Read, write, illustrate, and compare fractions with like denominators	
				I	M					3.1.2.4	Solve real world mathematical problems involving multiplication and division.	Example: If you have 27 people and 9 tables. If each table seats the same number of people, how many people will you put at each table?

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				I	R	M	C	C	C	3.1.2.5	Understand and use the commutative and associative rules of multiplication.	Example: Multiply the numbers 7, 2, and 5 in this order. Now multiply them in the order 2, 5, and 7. Which was easier? Why?
				I	M					3.1.2.3	Create, describe, and extend number patterns using multiplication.	Example: What is the next number: 3, 6, 12, 24,…? How did you find your answer?
				I	M					3.2.1.1	Solve simple problems involving a functional relationship between two quantities using multiplication. (Input/output tables)	
				I	M					3.2.2.2	Insert the missing term in multiplication and division sentences.	
				I	M	C	C	C		4.3.1.2	Identify quadrilaterals as four-sided shapes.	Example: Which of these are quadrilaterals: square, triangle, rectangle?
				I	M	C	C	C		4.3.2.2	Identify right angles in shapes and objects and decide whether other angles are greater or less than a right angle.	Example: Identify right angles in your classroom. Open the classroom door until it makes a right angle with one wall and explain what you are doing.

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				I	M	C	C	C		4.3	Use the terms point, line, and line segment in describing two-dimensional shapes.	Example: Describe the way a triangle is made of points and line segments and how you know it is a triangle.
				I	M	C	C	C		4.3	Draw line segments and lines.	Example: Draw a line segment three inches long.
				I	M	C	C	C		4.3	Identify and draw lines of symmetry in geometric shapes (by hand or using technology).	Example: Use pencil and paper or a drawing program to draw lines of symmetry in a square. Discuss your findings.
				I	M					4.3.2.4	Estimate or find the area of shapes by covering them with squares.	Example: How many square tiles do we need to cover this desk?
				I	R	M					Carry out simple unit conversions within a measurement system (e.g., centimeters to meters).	
				I	M					4.1.2.5	Use place value to align numbers.	
				I	M					3.1.2.3	Represent as division any situation involving the sharing of objects or the number of groups of shared objects.	Example: Divide 12 cookies equally among 4 students. Divide 12 cookies equally so that each person gets 4 cookies. Compare your answers and methods.
				I	M					4.1.1.1	Demonstrate mastery of the multiplication tables through 12 and the corresponding division facts.	Example: Know the answers to 9 x 4 and 35 ¸ 7.

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				I	M					4.1.1.3	Use a standard algorithm to multiply numbers up to 100 by numbers up to 10, using relevant properties of the number system.	Example: 67 x 3 = ?
				I	M					4.1.1.6	Use a standard algorithm to divide numbers up to 100 by numbers up to 10 without remainders, using relevant properties of the number system.	Example: 69 ¸ 3 = ?
				M						3.1	Understand the special properties of 0 and 1 in multiplication and division.	Example: Know that 73 x 0 = 0 and that 42 ¸ 1 = 42.
				I	M					4.1.2.3	Add and subtract simple fractions with like denominators.	
				I	M					2.2.2.1 3.2.2.1 4.2.2.2	Use letters, boxes, or other symbols to represent any number in simple expressions, equations, or inequalities (i.e., demonstrate an understanding and the use of the concept of a variable).	Example: In the expression 3 + X = 8,what does X represent?
				I	M					4.2.1.1	Continue number patterns using multiplication and division.	Example: What is the next number: 160, 80, 40, 20, ….? Explain your answer.
				I	M					4.2.2.2	Recognize and apply the relationships between addition and multiplication, between subtraction and division, and the inverse relationship between multiplication and division to solve problems.	Example: Find another way of writing 13 + 13 + 13 + 13 + 13.

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				I	M					4.2.2.1	Relate problem situations to number sentences involving multiplication and division.	Example: You have 150 jellybeans to share among the 30 members of your class. Write a number sentence for this problem and use it to find the number of jelly beans each person will get.
				I	R	M				5.3.2.3	Use volume and capacity as different ways of measuring the space inside a shape.	Example: Use cubes to find the volume of a fish tank and a pint jug to find its capacity.
				I	R	M	C	C		4.4.1.1	Interpret data graphs to answer questions about a situation.	Example: The line plot below shows the heights of fast-growing plants reported by third-grade students. Describe any patterns that you can see in the data using the words “most” “few” and “none.”
				I	R	M				3.3.3.3	Determine the amount of change from a purchase.	Example: You buy a chocolate bar priced at $1.75. How much change do you get if you pay for it with a five-dollar bill?
				I	M	C				5.3.1.1	Identify and describe prisms* and pyramids.	

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				I	R	M	C	C	C	5.4.1.2	Explain which types of displays are appropriate for various sets of data.	Example: Conduct a survey to find the favorite movies of the students in your class. Decide whether to use a bar, line, or picture graph to display the data. Explain your decision.
					I	M	C	C		5.3	Add units of length that may require regrouping of inches to feet or centimeters to meters.	Example: Add the lengths of three sheets of paper. Give your answer in feet and inches.
					M					4.1	Read and write whole numbers up to 1,000,000.	Example: Read aloud the number 394,734.
					M					4.1	Identify and write whole numbers up to 1,000,000, given a place-value model.	Example: Write the number that has 2 hundred thousands, 7 ten thousands, 4 thousands, 8 hundreds, 6 tens, and 2 ones.
					M					4.1	Round whole numbers up to 10,000 to the nearest ten, hundred, and thousand.	Example: Is 7,683 closer to 7,600 or 7,700? Explain your answer.
					M					4.1	Order and compare whole numbers using symbols for “less than” (<), “equal to (=), and greater than (>).	Example: Put the correct symbol in 328 __142.
					I	M				5.1	Rename and rewrite whole numbers as fractions.	Example: 3 = 6/2 = 9/3 = ?/4 = ?/5.

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					IM					4.1.2.1	Name and write mixed numbers.	Example: You have 5 whole straws and half a straw. Write the number that represents these objects.
					I	M				4.1.2.2	Name and write mixed numbers as improper fractions.	Example: Use a picture of 3 rectangles, each divided into 5 equal pieces, to write 2 3/5 as an improper fraction.
					I	M				4.1.2.6	Write tenths and hundredths in decimal and fraction notations.	Example: Write 26/100 and 2 3/4 as decimals.
					IM					4.1.2.4	Know the fraction and decimal equivalents for halves and fourths (e.g., 1/2 = 0.5 = 0.50, 7/4 = 1 3/4 = 1.75).	
					IM					4.1.2.7	Round two-place decimals to tenths or to the nearest whole number.	Example: You ran the 50-yard dash in 6.73 seconds. Round your time to the nearest tenth.
					I	M				4.1.1.5	Multiply using one and two digit multipliers, and divide up to the thousands place by a one-digit and begin two-digit divisors.	
					I	M	C			5.1.3.1	Add and subtract decimals (to hundredths) including money, using objects or pictures.	Example: Use coins to help you find $0.43 - $0.29.

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					IM					4.1.1.4	Know and use strategies for estimating results of any whole-number computations for multiplication and division.	Example: Your friend says that 45,329 + 6,984 = 5,213. Without solving, explain why you think the answer is wrong.
					I	M				Problem Solving	Use mental arithmetic to add or subtract numbers rounded to hundreds or thousands.	Example: Add 3,000 to 8,000 without using pencil and paper.
					I	M	C	C	C	5.2.2.3	Use and interpret formulas to answer questions about quantities and their relationships.	Example: Write the formula for the area of a rectangle in words. Now let l stand for the length, w for the width, and A for the area. Write the formula using these symbols.
					I	M	C	C	C	5.2.2.1	Understand that multiplication and division are performed before addition and subtraction in expressions without parentheses. (Order of Operations)	Example: You go to a store with 90¢ and buy 3 pencils that cost 20¢ each.
					I	M	C	C		4.3.2.2	Identify, describe, and draw rays, right angles, acute angles, obtuse angles and straight angles using appropriate mathematical tools and technology.	Example: Draw two rays that meet in an obtuse angle.

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					M	C				3.3.1.1	Identify, describe and draw parallel, perpendicular, and oblique lines using appropriate mathematical tools and technology.	Example: Use the markings on the gymnasium door to identify two lines that are parallel. Place a jump rope across the parallel lines and identify any obtuse angles created by the jump rope and the lines.
					M	C				4.3.1.2	Identify, describe and draw parallelograms*, rhombuses*, and trapezoids*, using appropriate mathematical tools and technology.	Example: Use a geoboard to make a parallelogram. How do you know it is a parallelogram?
					I	M	C	C		4.3.3	Identify congruent* quadrilaterals* and give reasons for congruence using sides, angles, parallels and perpendiculars.	Example: In a collection of parallelograms, rhombuses, and trapezoids, pick out those that are the same shape and size and explain your decisions.
					I	M	C	C		4.3.3.2	Identify and draw lines of symmetry in polygons.	Example: Draw a rectangle and then draw all its lines of symmetry.
					I	M				5.3	Measure length to the nearest quarter-inch, eighth-inch, and millimeter.	Example: Measure the width of a sheet of paper to the nearest millimeter.

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					I	M				5.3	Subtract units of length that may require renaming of feet to inches or meters to centimeters.	Example: The shelf was 2 feet long. Jane shortened it by 8 inches. How long is the shelf now?
					I	M				3.3.2.2 3.3.2.3	Know and use formulas for finding the perimeters of rectangles and squares.	Example: The length of a rectangle is 4 cm and its perimeter is 20 cm. What is the width of the rectangle?
					I	M	C	C		4.3.2.3 4.3.2.4	Know and use formulas for finding the areas of rectangles and squares.	Example: Draw a rectangle 5 inches by 3 inches. Divide it into one-inch squares and count the squares to find its area. Can you see another way to find the area? Do this with other rectangles.
					I	M	C	C		4.3.2.4	Estimate and calculate the area of rectangular shapes by using appropriate units, such as square centimeter (cm^2), square meter (m^2), square inch (in^2), or square yard (yd^2).	Example: Measure the length and width of a basketball court and find its area in suitable units.

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					I	M	C	C		4.3.2.3	Understand that rectangles with the same area can have different perimeters and that rectangles with the same perimeter can have different areas.	Example: Make a rectangle of area 12 units on a geoboard and find its perimeter. Can you make other rectangles with the same area? What are their perimeters?
					I	M	C	C		4.3.2.3 4.3.2.4	Find areas of shapes by dividing them into basic shapes such as rectangles and triangles.	Example: Find the perimeter and area of your school building.
					I	M	C	C		4.4.1.1	Represent data on a number line and in tables, including frequency tables.	Example: The students in your class are growing plants in various parts of the classroom. Plan a survey to measure the height of each plant in centimeters on a certain day. Record your survey results on a line plot.
					I	C	C	C	C	4.1.1.5 4.1.1.6	Use a variety of methods, such words, numbers, symbols, charts, graphs, tables, diagrams, tools, and models to solve problems, justify arguments, and make conjectures.	

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					I	M				3.3.3.1 3.3.3.2	Add time intervals involving hours and minutes.	Example: During the school week, you have 5 recess periods of 15 minutes. Find how long that is in hours and minutes.
					I	M				5.1.2.1	Convert between numbers in words and numbers in figures, for numbers up to billions and decimals to thousandths.	Write the number 198.536 in words.
					I	M				5.1.2.5	Round whole numbers and decimals to any place value.	Example: Is 7,683,559 closer to 7,600,000 or 7,700,000? Explain your answer.
					I	M				5.1.2.3	Arrange in numerical order and compare whole numbers or decimals to three decimal places by using the symbols for less than (<), equals (=),and greater than (>).	Example: Write from smallest to largest: 0.5, 0.26, 0.08.
						I	R	M		6.1.1.3	Interpret percents as a part of a hundred. Find decimal and percent equivalents for common fractions and explain why they represent the same value.	Example: Shade a 100-square grid to show 30%. What fraction is this?
					I	M				3.1.3.2	Explain different interpretations of fractions: as parts of a whole, parts of a set, and division of whole numbers by whole numbers.	Example: What fraction of a pizza will each person get when 3 pizzas are divided equally among 5 people?

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					I	I	M			6.1	Describe and identify prime and composite numbers.	Example: Which of the following numbers are prime: 3, 7, 12, 17, 18? Justify your choices.
						M				5.1.2.3	Identify on a number line the relative position of simple positive fractions, positive mixed numbers, and positive decimals.	Example: Find the positions on a number line of 1 1/4 and 1.4.
					I	M				5.1.1.4	Solve problems involving multiplication and division of any whole numbers. **(three digit)**	Example: 2,867 x 34 = ? Explain your method.
					I	M				5.1.3.1	Add and subtract fractions (including mixed numbers) with different denominators.	Example: 3 4/5 - 2 2/3 = ?
					I	M	C			6.1.3.1	Use models to show an understanding of multiplication and division of fractions.	Example: Draw a rectangle 5 squares long and 3 squares wide. Shade 4/5 of the rectangle, starting from the left. Shade 2 /3 of the rectangle, starting from the top. Look at the fraction of the squares that you have double-shaded and use that to show how to multiply 4/5 by 2/3.

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					I	R	M			5.1.1.4	Use estimation to decide whether answers are reasonable in addition, subtraction, multiplication, and division problems.	Example: Your friend says that 2,867 x 34 = 20,069.Without solving, explain why you think the answer is wrong.
					I	M				5.1.3.1	Use mental arithmetic to add or subtract simple decimals.	Example: Add 0.006 to 0.027 without using pencil and paper.
					I	M	C			5.2.1.2	Identify and graph ordered pairs of positive numbers.	Example: Plot the points (3,1), (6,2), and (9,3). What do you notice?
					I	M	C	C		4.3.2.1	Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, triangles, and circles by using appropriate tools (e.g., ruler, compass, protractor, appropriate technology, media tools).	Example: Draw a rectangle with sides 5 in and 3 in.
					I	M	C	C		4.3.1.1	Identify, describe, draw, and classify triangles as equilateral*, isosceles*, scalene*, right*, acute*, obtuse*, and equiangular*.	Example: Draw an isosceles right triangle.
					I	M				4.3.3.4	Identify congruent* triangles and justify your decisions by referring to sides and angles.	Example: In a collection of triangles, identify those that are the same shape and size and explain your decisions.

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					I	M				5.3	Identify, describe, draw, and classify polygons*, such as pentagons and hexagons.	Example: In a collection of polygons, pick out those with the same number of sides.
					I	M				5.3	Identify and draw the radius and diameter of a circle and understand the relationship between the radius and diameter.	Example: On a circle, draw a radius and a diameter and describe the differences and similarities between the two.
					I	M				4.3.3.4	Identify shapes that have reflectional and rotational symmetry*.	Example: What kinds of symmetries have the letters M, N, and O?
					I	M				4.3.3.3	Understand that 90°, 180°, 270°, and 360° are associated with 1/4, 1/2, 3/4, and full turns, respectively.	Example: Face the front of the room. Turn through four right angles. Which way are you now facing?
					I	M				5.3.2.1	Understand and apply the formulas for the area of a triangle, parallelogram, and trapezoid (introductory level).	Example: Find the area of a triangle with base 4 m and height 5 m.
					I	M	C	C		4.3.2.3 4.3.2.4	Solve problems involving perimeters and areas of rectangles, triangles, parallelograms, and trapezoids, using appropriate units.	Example: A trapezoidal garden bed has parallel sides of lengths 14 m and 11 m and its width is 6 m. Find its area and the length of fencing needed to enclose it. Be sure to use correct units.

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					I	M				5.3.2.1	Use formulas for the areas of rectangles and triangles to find the area of complex shapes by dividing them into basic shapes.	
					I	R	R	M		7.3	Understand and use the smaller and larger units for measuring weight (ounce, gram, and ton) and their relationship to pounds and kilograms.	Example: How many ounces are in a pound?
					I	M				5.3	Compare temperatures in Celsius and Fahrenheit, knowing that the freezing point of water is 0° C and 32° F and that the boiling point is 100° C and 212° F.	Example: What is the Fahrenheit equivalent of 50 °C? Explain your answer.
					I	R	M	C	C	5.4.1.1	Find the mean*, median*, mode*, and range*of a set of data and describe what each does, and does not, tell about the data set.	Example: Find the mean, median, and mode of a set of test results and describe how well each represents the data.
					I	I	R	M		6.1.1.6	Find the least common multiple* and the greatest common factor* of whole numbers. Use them to solve problems with fractions (e.g., to find a common denominator to add two fractions or to find the reduced form for a fraction).	Example: Find the smallest number that both 12 and 18 divide into. How does this help you add the fractions 5/12 and 7/18?
					I	R	M			6.1.3.1	Add, subtract, multiply, and divide with money in decimal notation.	Example: Share $7.25 among five people.

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					I	R	M			6.2.2.1	Interpret and evaluate mathematical expressions that use grouping symbols such as parentheses.	Example: Find the values of 10 - (7 - 3) and of (10 - 7) - 3.
					I	R	M			7.2.3.3	Use parentheses to indicate which operation to perform first when writing expressions containing more than two terms and different operations.	Example: Write in symbols: add 19 and 34 and double the result.
					I	R	R	M	C	6.2.2.1	Apply the correct order of operations and the properties of real numbers (e.g., identity, inverse, commutative*, associative*, and distributive* properties) to evaluate numerical expressions. Justify each step in the process.	Example: Simplify 3(4 - 1) + 2. Explain your method. Example: A plant is 3 cm high the first time you measure it (on Day 0). Each day after that the plant grows by 2 cm. Write an equation connecting the height and the number of the day and draw its graph.
					I	R	M			6.3.2.3	Draw quadrilaterals* and triangles from given information about them.	Example: Draw a quadrilateral with equal sides but no right angles.
					I	R	M			6.3.2.2	Understand that the sum of the interior angles of any triangle is 180° and that the sum of the interior angles of any quadrilateral is 360°. Use this information to solve problems.	Example: Find the size of the third angle of a triangle with angles of 73° and 49°.
					I	R	M			6.3	Identify and draw two-dimensional shapes that are similar*.	Example: Draw a rectangle similar to a given rectangle, but twice the size.

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					M	C	C	C		4.3.3.1 4.3.3.2	Draw the translation (slide) and reflection (flip) of shapes.	Example: Draw a square and then slide it 3 inches horizontally across your page. Draw the new square in a different color.
					I	M	C	C		5.3.1.2	Visualize and draw two-dimensional views of three-dimensional objects made from rectangular solids.	Example: Draw a picture of an arrangement of rectangular blocks from the top, front, and right-hand side.
					I	R	M			6.3.3.2	Understand and use larger units for measuring area by comparing acres and square miles to square yards and square kilometers to square meters.	
					I	R	M			6.3.3.1	Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.	Example: A triangular sheet of metal is about 1 foot across. Describe the units and tools you would use to measure its weight, its angles, and the lengths of its sides.
					I	R	M			6.3.3.2	Understand and use larger units for measuring length by comparing miles to yards and kilometers to meters.	
						I	R	M		5.3.2.2 5.3.2.4	Find the surface area and volume of rectangular solids using appropriate units. Example: Find the volume of a shoe box with length 30 cm, width 15	

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											cm, and height 10 cm.	
						I	M			3.2.2.1	Use a variable to represent an unknown number.	Example: When a certain number is multiplied by 3 and then 5 is added, the result is 29. Let x stand for the unknown number and write an equation for the relationship.
						I	M	C	C	5.2.3.3	Write simple algebraic expressions in one or two variables and evaluate them by substitution.	Example: Find the value of 5x + 2 when x = 3.
						I	R	M	C	5.2.2.1	Use the distributive property* in numerical equations and expressions.	Example: Rewrite 3(16 - 11) by removing the parentheses.
						I	M			6.4.1.1	Summarize and display the results of probability experiments in a clear and organized way.	Example: Roll a number cube 36 times and keep a tally of the number of times that 1,2,3,4,5, and 6 appear. Draw a bar graph to show your results.
						M				6.4.1.2	Understand that probability can take any value between 0 and 1,events that are not going to occur have probability 0,events certain to occur have probability 1,and more likely events have a higher probability than less likely events.	Example: What is the probability of rolling a 7 with a number cube?

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						I	R	M		6.4.1.3	Express outcomes of experimental probability situations verbally and numerically (e.g., 3 out of 4, 3/4).	Example: What is the probability of rolling an odd number with a number cube?
						I	R	M		6.1.1.7	Convert between any two representations of numbers (fractions, decimals, and percents) without the use of a calculator.	Example: Write 5/8 as a decimal and as a percent.
						I	M	C		6.1.1.4	Recognize decimal equivalents for commonly used fractions without the use of a calculator.	Example: Know that 1/3 = 0.333…, 1/2 = 0.5, 2 /5 = 0.4, etc.
						I	M	C		6.1.1.3	Use models to represent ratios. Example: Divide 27 pencils to represent the ratio 4:5.	
						I	M	C		6.1.3.1	Multiply and divide decimals.	Example: 3.265 x 0.96 = ?, 56.79 x 2.4 = ?
						I	M	C		6.1.3.2	Explain how to multiply and divide positive fractions and perform the calculations.	Example: Explain why 5/8 ÷ 15/16 = 5/8 x 16/15 = 2 /3.
						I	M	C		6.1.3.4	Solve problems involving addition, subtraction, multiplication, and division of positive fractions and explain why a particular operation was used for a given situation.	Example: You want to place a towel bar 9 3/4 inches long in the center of a door 27 ½ inches wide. How far from each edge should you place the bar? Explain your method.

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						I	M	C		6.1.2.1	Interpret and use ratios to show the relative sizes of two quantities. Use the notations: a/b, a to b , a : b	Example: A car moving at a constant speed travels 130 miles in 2 hours. Write the ratio of distance to time and use it to find how far the car will travel in 5 hours.
						I	R	M		7.2	Use variables in expressions describing geometric quantities.	Example: Let l, w , and P be the length, width, and perimeter of a rectangle. Write a formula for the perimeter in terms of the length and width.
						I	M	C		6.3	Identify and draw vertical*, adjacent*, complementary*, and supplementary* angles and describe these angle relationships.	Example: Draw two parallel lines with another line across them. Identify all pairs of supplementary angles.
						I	R	M	C	7.3.1.1	Understand the concept of the constant π as the ratio of the circumference to the diameter of a circle. Develop and use the formulas for the circumference and area of a circle.	Example: Measure the diameter and circumference of several circular objects. (Use string to find the circumference.) With a calculator, divide each circumference by its diameter. What do you notice about the results?

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						I	R	M		6.3.1.1	Construct a cube and rectangular box from two-dimensional patterns and use these patterns to compute the surface area of these objects.	Example: Find the total surface area of a shoe box with length 30 cm, width 15 cm, and height 10 cm.
						I	R	M		6.3.1.1	Use strategies to find the surface area and volume of right prisms* and cylinders using appropriate units.	Example: Find the volume of a cylindrical can 15 cm high and with a diameter of 8 cm.
						I	M			6.4	Make frequency tables for numerical data, grouping the data in different ways to investigate how different groupings describe the data. Understand and find relative and cumulative frequency for a data set. Use histograms of the data and of the relative frequency distribution, and a broken line graph for cumulative frequency to interpret the data.	Example: A bag contains pens in three colors. Nine students each draw a pen from the bag without looking, then record the results in the frequency table shown. Complete the column showing relative frequency.

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						I	M			6.4	Show all possible outcomes for compound events in an organized way and find the theoretical probability of each outcome.	Example: A box contains four cards with the numbers 1 through 4 written on them. Show a list of all the possible outcomes if you draw two cards from the box without looking. What is the theoretical probability that you will draw the numbers one and two? Explain your answer.
						I	C	C	C	Problem Solving	Make and justify mathematical guesses based on a general description of a mathematical question or problem.	Example: In the first example, decide that you need to test only the prime numbers as divisors, and explain it in the same way.
						I	C	C	C	Number & Operation AND Problem Solving	Express the solution clearly and logically by using the appropriate mathematical terms and notation. Support solutions with evidence in both verbal and symbolic work.	Example: In the first example, use a hundreds chart to cross off all multiples of 2 (except 2), then all multiples of 3 (except 3),then all multiples of 5 (except 5),etc. Explain why you are doing this.

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						I	C	C	C	Problem Solving	Recognize the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.	Example: Calculate the perimeter of a rectangular field that needs to be fenced. How accurate should you be: to the nearest kilometer, meter, centimeter, or millimeter? Explain your answer.
						I	R	R	M	7.2.3.3	Apply understanding of order of operations and grouping symbols when using calculators and other technologies.	
						I	R	M		7.3.1.1	Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle and that the unit rate (constant of proportionality) is π . Calculate the circumference and area of circles and sectors of circles to solve problems in various contexts.	
						I	R	M		7.3.2.4	Graph and describe translations and reflections of figures on a coordinate grid and determine the coordinates of the vertices of the figure after the transformation.	

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Pre	K	1	2	3	4	5	6	7	8	Citation	Outcome: The student will:	Suggested Activities/Assessments
						I	R	R	M	7.4.1.1	Design simple experiments and collect data. Determine mean, median and range for quantitative data and from data represented in a display. Use these quantities to draw conclusions about the data, compare different data sets, and make predictions.	
						I	R	M		7.4.2.1	Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using a spreadsheet or other graphing technology.	
						I	R	R	M	7.4.3.2	Calculate probability as a fraction of sample space or as a fraction of area. Express probabilities as percents, decimals and fractions.	
							I	M		7.1.1.4	Compare and represent on a number line positive and negative integers, fractions, decimals (to hundredths), and mixed numbers.	Example: Find the positions on a number line of 3.56, -2.5, 1 5/6, and -4.
							I	M		6.1.3.1	Multiply and divide fractions to solve problems.	Example: You have 3 1/2 pizzas left over from a party. How many people can have 1/4 of a pizza each?

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							I	M		7.2.1.1	Understand proportions and use them to solve problems.	Example: Sam made 8 out of 24 free throws. Use a proportion to show how many free throws Sam would probably make out of 60 attempts.
							I	M	C	6.1.3.3	Calculate given percentages of quantities and solve problems involving discounts at sales, interest earned, and tips.	Example: In a sale, everything is reduced by 20%. Find the sale price of a shirt whose pre-sale price was $30.
							I	M	C	6.2.3.2	Write and solve one-step linear equations and inequalities in one variable and check the answers.	Example: The area of a rectangle is 143 cm^2 and the length is 11 cm. Write an equation to find the width of the rectangle and use it to solve the problem. Describe how you will check to be sure that your answer is correct.
							I	R	M	6.2.1.2	Find ordered pairs (positive numbers only) that plot a linear equation, graph the ordered pairs, and draw the line they determine.	Example: For x = 1, 2, 3,and 4, find points that fit the equation $y = 2x + 1$. Plot those points on graph paper and join them with a straight line.

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							I	M		7.2	Understand that the length of a horizontal line segment on a coordinate plane equals the difference between the x -coordinates and that the length of a vertical line segment on a coordinate plane equals the difference between the y -coordinates.	Example: Find the distance between the points (2, 5) and (7, 5) and the distance between the points (2, 1) and (2, 5).
							I	M		7.2	Use information taken from a graph or equation to answer questions about a problem situation.	Example: The speed (v = feet per second) of a car t seconds after it starts is given by the formula v =12 t. Find the car's speed after 5 seconds
							I	M		6.3.2.1	Use the properties of complementary, supplementary, and vertical angles to solve problems involving an unknown angle. Justify solutions.	Example: Find the size of the supplement to an angle that measures 122°. Explain how you obtain your answer.
							I	M		7.3	Use a formula to convert temperatures between Celsius and Fahrenheit.	Example: What is the Celsius equivalent of 100° F? Explain your method.
							I		R	7.4	Organize and display single-variable data in appropriate graphs and stem-and-leaf plots*, and explain which types of graphs are appropriate for various data sets.	Example: This stem-and-leaf diagram shows a set of test scores for your class:

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							I	R	M	6.4.1.2	Use data to estimate the probability of future events.	Example: Teams A and B have played each other 3 times this season and Team A has won twice. When they play again, what is the probability of Team B winning? How accurate do you think this estimate is?
							I	C	C	Problem Solving	Select and apply appropriate methods for estimating results of rational-number computations.	
							I	M		7.1.1.4	Compare positive and negative rational numbers expressed in various forms using the symbols $<$, $>$, $=$, $\leq$, $\geq$.	
							I	M		7.1.1.5	Recognize and generate equivalent representations of positive and negative rational numbers, including equivalent fractions.	
							I	R	M	7.1.2.1	Add, subtract, multiply and divide positive and negative rational numbers that are integers, fractions and terminating decimals; use efficient and generalizable procedures, including standard algorithms; raise positive rational numbers to whole-number exponents.	

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							I	M	C	7.1.2.2	Use real-world contexts and the inverse relationship between addition and subtraction to explain why the procedures of arithmetic with negative rational numbers make sense.	
							I	M	C	7.1.2.3	Understand that calculators and other computing technologies often truncate or round numbers.	
							I	R	M	7.1.2.4	Solve problems in various contexts involving calculations with positive and negative rational numbers and positive integer exponents, including computing simple and compound interest. Make direct comparisons of the length, capacity, weight, and temperature of objects and recognize which object is shorter, longer, taller, lighter, heavier, warmer, cooler or holds more.	
							I	R	M	7.2.3.1	Use properties of algebra to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents. Properties of algebra include associative, commutative and distributive laws.	
							I	M		7.3.1.2	Calculate the volume and surface area of cylinders and justify the formulas used.	

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							I	R	M	7.3.2.3	Use proportions and ratios to solve problems involving scale drawings and conversions of measurement units.	
							I	R	M	8.1.1.3	Determine rational approximations for solutions to problems involving real numbers.	
								I	R	6.4.1.2	Understand and represent probabilities as ratios, measures of relative frequency, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable.	Example: The weather forecast says that the chance of rain today is 30%. Should you carry an umbrella? Explain your answer.
								I	M	7.1.1.1	Know that every rational number can be written as the ratio of two integers or as a terminating or repeating decimal. Recognize that π is not rational, but that it can be approximated by rational numbers such as 22 and 3.14.	
								I	M	7.1.1.2	Understand that division of two integers will always result in a rational number. Use this information to interpret the decimal result of a division problem when using a calculator.	

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								I	M	7.1.1.3	Locate positive and negative rational numbers on a number line, understand the concept of opposites, and plot pairs of positive and negative rational numbers on a coordinate grid.	
								I	M	7.1.2.5	Use proportional reasoning to solve problems involving ratios in various contexts.	
								I	M	7.1.2.6	Demonstrate an understanding of the relationship between the absolute value of a rational number and distance on a number line. Use the symbol for absolute value.	
								I	R	7.2.1.1	Understand that a relationship between two variables, x and y, is proportional if it can be expressed in the form y/x-k = or y =kx . Distinguish proportional relationships from other relationships, including inversely proportional relationships (xy =k or k x y =).	
								I	R	7.2.1.2	Understand that the graph of a proportional relationship is a line through the origin whose slope is the unit rate (constant of proportionality). Know how to use graphing technology to examine what happens to a line when the unit rate is changed.	

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								I	R	7.2.2.1	Represent proportional relationships with tables, verbal descriptions, symbols, equations and graphs; translate from one representation to another. Determine the unit rate (constant of proportionality or slope) given any of these representations.	
								I	R	7.2.2.2	Solve multi-step problems involving proportional relationships in numerous contexts.	
								I	R	7.2.2.3	Use knowledge of proportions to assess the reasonableness of solutions.	
								I	R	7.2.2.4	Represent real-world or mathematical situations using equations and inequalities involving variables and positive and negative rational numbers.	
								I	R	7.2.3.2	Evaluate algebraic expressions containing rational numbers and whole number exponents at specified values of their variables.	
								I	R	7.2.4.1	Represent relationships in various contexts with equations involving variables and positive and negative rational numbers. Use the properties of equality to solve for the value of a variable. Interpret the solution in the original context.	

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								I	R	7.2.4.2	Solve equations resulting from proportional relationships in various contexts.	
								I	R	7.3.2.1	Describe the properties of similarity, compare geometric figures for similarity, and determine scale factors.	
								I	R	7.3.2.2	Apply scale factors, length ratios and area ratios to determine side lengths and areas of similar geometric figures.	
								I	R	7.4.1.2	Describe the impact that inserting or deleting a data point has on the mean and the median of a data set. Know how to create data displays using a spreadsheet to examine this impact.	
								I	M	7.4.3.3	Use proportional reasoning to draw conclusions about and predict relative frequencies of outcomes based on probabilities.	
								I	R	8.1.1.1	Classify real numbers as rational or irrational. Know that when a square root of a positive integer is not an integer, then it is irrational. Know that the sum of a rational number and an irrational number is irrational, and the product of a non-zero rational number and an irrational number is irrational.	

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								I	R	8.1.1.2	Compare real numbers; locate real numbers on a number line. Identify the square root of a positive integer as an integer, or if it is not an integer, locate it as a real number between two consecutive positive integers.	
								I	R	8.2.2.4	Represent arithmetic sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems.	
								I	R	8.2.2.5	Represent geometric sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems.	
								I	R	8.2.3.1	Evaluate algebraic expressions, including expressions containing radicals and absolute values, at specified values of their variables.	
								I	R	8.2.3.2	Justify steps in generating equivalent expressions by identifying the properties used, including the properties of algebra. Properties include the associative, commutative and distributive laws, and the order of operations, including grouping symbols.	

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								I	R	8.2.4.2	Solve multi-step equations in one variable. Solve for one variable in a multi-variable equation in terms of the other variables. Justify the steps by identifying the properties of equalities used.	
								I	R	8.3.1.1	Use the Pythagorean Theorem to solve problems involving right triangles.	
									I	8.1.1.4	Know and apply the properties of positive and negative integer exponents to generate equivalent numerical expressions.	
									I	8.1.1.5	Express approximations of very large and very small numbers using scientific notation; understand how calculators display numbers in scientific notation. Multiply and divide numbers expressed in scientific notation, express the answer in scientific notation, using the correct number of significant digits when physical measurements are involved.	
									I	8.2.1.1	Understand that a function is a relationship between an independent variable and a dependent variable in which the value of the independent variable determines the value of the dependent variable. Use functional	

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											notation, such as f(x), to represent such relationships.	
									I	8.2.1.2	Use linear functions to represent relationships in which changing the input variable by some amount leads to a change in the output variable that is a constant times that amount.	
									I	8.2.1.3	Understand that a function is linear if it can be expressed in the form f (x)=mx+b or if its graph is a straight line.	
									I	8.2.1.4	Understand that an arithmetic sequence is a linear function that can be expressed in the form f (x)=mx+b , where x = 0, 1, 2, 3,….	
									I	8.2.1.5	Understand that a geometric sequence is a non-linear function that can be expressed in the form f (x)=abx , where x = 0, 1, 2, 3,….	
									I	8.2.2.1	Represent linear functions with tables, verbal descriptions, symbols, equations and graphs; translate from one representation to another.	

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									I	8.2.2.2	Identify graphical properties of linear functions including slopes and intercepts. Know that the slope equals the rate of change, and that the y-intercept is zero when the function represents a proportional relationship.	
									I	8.2.2.3	Identify how coefficient changes in the equation f (x) = mx + b affect the graphs of linear functions. Know how to use graphing technology to examine these effects.	
									I	8.2.4.1	Use linear equations to represent situations involving a constant rate of change, including proportional and nonproportional relationships.	
									I	8.2.4.3	Express linear equations in slope-intercept, point-slope and standard forms, and convert between these forms. Given sufficient information, find an equation of a line.	
									I	8.2.4.4	Use linear inequalities to represent relationships in various contexts.	
									I	8.2.4.5	Solve linear inequalities using properties of inequalities. Graph the solutions on a number line.	
									I	8.2.4.6	Represent relationships in various contexts with equations and inequalities involving the absolute value of a linear expression. Solve	

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											such equations and inequalities and graph the solutions on a number line.	
									I	8.2.4.7	Represent relationships in various contexts using systems of linear equations. Solve systems of linear equations in two variables symbolically, graphically and numerically.	
									I	8.2.4.8	Understand that a system of linear equations may have no solution, one solution, or an infinite number of solutions. Relate the number of solutions to pairs of lines that are intersecting, parallel or identical. Check whether a pair of numbers satisfies a system of two linear equations in two unknowns by substituting the numbers into both equations.	
									I	8.2.4.9	Use the relationship between square roots and squares of a number to solve problems.	
									I	8.3.1.2	Determine the distance between two points on a horizontal or vertical line in a coordinate system. Use the Pythagorean Theorem to find the distance between any two points in a	

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											coordinate system.	
									I	8.3.1.3	Informally justify the Pythagorean Theorem by using measurements, diagrams and computer software.	
									I	8.3.2.1	Understand and apply the relationships between the slopes of parallel lines and between the slopes of perpendicular lines. Dynamic graphing software may be used to examine these relationships.	
									I	8.3.2.2	Analyze polygons on a coordinate system by determining the slopes of their sides.	
									I	8.3.2.3	Given a line on a coordinate system and the coordinates of a point not on the line, find lines through that point that are parallel and perpendicular to the given line, symbolically and graphically.	
									I	8.4.1.1	Collect, display and interpret data using scatterplots. Use the shape of the scatterplot to informally estimate a line of best fit and determine an equation for the line. Use appropriate titles, labels and units. Know how to use graphing technology to display	

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											scatterplots and corresponding lines of best fit.	
									I	8.4.1.2	Use a line of best fit to make statements about approximate rate of change and to make predictions about values not in the original data set.	
									I	8.4.1.3	Assess the reasonableness of predictions using scatterplots by interpreting them in the original context.	

Christian Disciple:

Standard 8: Students through the study of mathematics will learn ways to obtain and share truthful information, build healthy relationships, grow in virtue, and share the Good News of Jesus Christ.

P	K	1	2	3	4	5	6	7	8	Outcome: The student will	Suggested Activities/Assessments
										Become familiar with St Hubert, patron of t Mathematicians.	Prayer before class. St. Hubert Patron Saint of Mathematicians **Facts:** **Feast day:** November 3 **Patron** of hunters, mathematicians, opticians and metalworkers **Death:** 727 Explore why St. Hubert was chosen as patron saint of the Mathematicians.
										Recognize the beauty of God's creation and the intricacy and magnificence of God's work.	Identify shapes in nature, appreciating God's creation. Symmetry found in God's creation: butterfly, honeycomb, snowflake, stripes on a zebra, etc. Track student height and discuss the wonder of growth, Use the Story of Creation in Genesis and identify what God made on each day, Fibonacci sequence: Use the sequence to study the occurrence of patterns in nature.

Christian Disciple:

Standard 8: Students through the study of mathematics will learn ways to obtain and share truthful information, build healthy relationships, grow in virtue, and share the Good News of Jesus Christ.

P	K	1	2	3	4	5	6	7	8	Outcome: The student will	Activities/Assessments
										Use Catholic references to identify numeration.	Numbers in the Bible, use the Rosary to help the development of counting by 10's, fractions to establish equal parts(fairness, sharing, kindness), Track money collected for missions and use the figures to calculate the mean, median, and range of a given month as well as the percent of increase and decrease from week to week. Construct a line graph of donations over time. Tie in themes of stewardship Research to gather statistics about homelessness, poverty rates, etc. Create graphs to present the data. Find out about programs that address these needs in the community and ways students can support these programs. Create bar graphs showing the average monthly precipitation and line graphs showing the average monthly temperature in various biomes. Discuss diversity in God's creation.
										Recognize how geometric shapes relate to the Catholic Church.	Visit a church and identify shapes that are found in the Church: host, trinity, cross, pillars and columns, rose window for concentric etc. Use the internet to explore shapes of famous cathedrals Use scale drawings to make models of the church. Build a manger using scale figures and proportions.

Christian Disciple:

Standard 8: Standard 8: Students through the study of mathematics will learn ways to obtain and share truthful information, build healthy relationships, grow in virtue, and share the Good News of Jesus Christ.

P	K	1	2	3	4	5	6	7	8	Outcome	Activities/Assessments
										Understand how Social Justice relates to mathematics.	Research how mathematics can be used to respond to the needs of people in one's local community and throughout the world. (tally foods donated to the food pantry, sort foods by kinds, use bar graphs to chart and interpret and explain data, when teaching about money connections can be made to the importance of donations and giving to those who are less fortunate such as missions or disaster relief funds, create a budget to plan a meal or food basket for a family in need Develop problem solving scenarios that incorporate real-world situations and foster awareness of social justice themes. Explore what poverty looks like through a mathematical lens.
										Become familiar with Gospel values as they are fostered in the classroom.	Emphasize the importance of treating others with respect, helping one another, sharing supplies, group learning, fostering a faith-filled community within the classroom, honesty, patience, etc. Use student created faith messages using Math terms and concepts.
										Demonstrate how mathematics is used to promote the New Evangelization.	Research careers in mathematics and its connection to sharing the Good News of Jesus Christ. Use math in a creative way to share an aspect of the faith with others.

Examples of Biblical Texts in Relation to Mathematics:

- You shall have just balances, just weights, a just ephah, and a just hin; I am the LORD your God, who brought you out from the land of Egypt. (Lev 19:36)
- A false balance is an abomination to the Lord, but a just weight is His delight. A just balance and scales belong to the Lord; all the weights of the bag are His concern. (Prov 11:1; 16:11)
- A beka a head (that is, half a shekel according to the shekel of the sanctuary), for each one who passed over to those who were numbered, from twenty years old and upward, for 603,550 men. (Ex 38:26)
- This is how you shall make it: the length of the ark three hundred cubits, its breadth fifty cubits, and its height thirty cubits. You shall make a window for the ark, and finish it to a cubit from the top; and set the door of the ark in the side of it; you shall make it with lower, second, and third decks. (Gen 6:15-16)
- The ephah and the bath shall be the same quantity, so that the bath will contain a tenth of a homer and the ephah a tenth of a homer; their standard shall be according to the homer. The shekel shall be twenty gerahs; twenty shekels, twenty-five shekels, *and* fifteen shekels shall be your maneh. (Ez 45:11-12)
- Or what woman, if she has ten silver coins and loses one coin, does not light a lamp and sweep the house and search carefully until she finds it? (Luke 15:8)
- Where were you when I laid the foundation of the earth? Tell me, if you have understanding, who set its measurements? Since you know. Or who stretched the line on it? (Job 38:4-5)
- Who has measured the waters in the hollow of His hand, And marked off the heavens by the span, And calculated the dust of the earth by the measure, And weighed the mountains in a balance And the hills in a pair of scales? (Is 40:12)
- And behold, there was a wall on the outside of the temple all around, and in the man's hand was a measuring rod of six cubits, *each of which was* a cubit and a handbreadth. So he measured the thickness of the wall, one rod; and the height, one rod. (Ez 40:5)
- And these are the measurements of the altar by cubits (the cubit being a cubit and a handbreadth): the base *shall be* a cubit and the width a cubit, and its border on its edge round about one span; and this *shall be* the *height* of the base of the altar. Ez 43:13)

- And he measured its wall, seventy-two yards, *according to* human measurements, which are *also* angelic *measurements*. (Rev 21:17)
- There is an appointed time for everything. And there is a time for every event under heaven—(Ecc 3:1)
- He said to me, "For 2,300 evenings *and* mornings; then the holy place will be properly restored." (Dan 8:14)
- And He took him outside and said, "Now look toward the heavens, and count the stars, if you are able to count them." And He said to him, "So shall your descendants be." (Gen 15:5)
- Therefore there was born even of one man, and him as good as dead at that, *as many descendants* AS THE STARS OF HEAVEN IN NUMBER, AND INNUMERABLE AS THE SAND WHICH IS BY THE SEASHORE. (Heb 11:12)
- Then I looked, and I heard the voice of many angels around the throne and the living creatures and the elders; and the number of them was myriads of myriads, and thousands of thousands, (Rev 5:11)
- "I am the Alpha and the Omega," says the Lord God, "who is and who was and who is to come, the Almighty." (Rev 1:8)

The Symbolism of Numbers in the Bible

In many ancient cultures, including Ancient Judaism and Early Christianity, numbers were not used as precisely as we might presuppose today. Thus, numbers in the Old Testament and New Testament books are often meant symbolically, not literally. For example:

When the Israelites wanted to say "a long time," they would say "40 days" or "40 years." Not concerned with meticulous precision as much as we are today, saying "forty" did not mean that they counted carefully, and the result was exactly between 39 and 41, no more and no less. Similarly, to say "a short time," the Scriptures often say "on the third day" or "in three days," but without meaning exactly 72 hours!

The symbolism of numbers used in biblical texts:

1 - singularity; God in monotheism (Deut 6:4); unity for humans (John 10:16; Eph 4:4)
2 - duality: contrary (light/dark, good/evil) or complimentary (material/spiritual; human/divine)
3 - God's actions: 3 "visitors" (Gen 18:2); "third day" (Exod 19:11); later "Trinity" (Matt 28:19) 3½ half of seven; thus things in process, still incomplete
4 - earth, directions, winds, empires; later the four Gospels or four Evangelists
6 - human work/effort (Luke 13:14); incompleteness, imperfection, lack (not yet 7)
7 - days in a week, Sabbath rest (Gen 2:1-3); thus natural & divine completeness/perfection
8 - Jewish day of Circumcision (Exod 22:30); Christian day of Resurrection (John 20:26)
10 - completion; basis of many number systems (# digits on fingers/toes!)
11 - incompletion; only eleven apostles remain after Judas' death
12 - months per year, tribes of Israel, apostles of Jesus; human completion
13 - [used in later superstition; based on Judas, but not used in Bible itself]
14 - value of the name "David" in Hebrew gematria (a type of numerology popular in ancient Judaism) obtained by summing the value of its three consonants (dalet=4, vav=6; thus D+V+D = 4+6+4)
24 - Christian number for completion/restoration: OT tribes + NT apostles
30 - days in month in ancient lunar calendars
40 - very long time: years of Israel's Exodus, days of Jesus' temptation
42 - number of months in 3½ years (half of seven years; see also 1260 days) 100 = 10x10
144 - = 12x12, thus perfect completion
360 - number of days in a lunar year
365 - number of days in a solar year (cf. Gen 5:23)
666 - number of the beast (Rev 13:18 only; variant reading is 616) 1000 = 10x10x10
1260 - number of days in 3½ years (thus incompletion) 10,000 "myriad"; highest ancient number with its own name

Larger numbers in the Bible are often multiples of these basic numbers, thus combining their significance: 7000 = 7 x 1000; 12,000 = 12 x 1000; 20,000 = 2 x 10,000; 144,000 = 12 x 12,000

"200 million" in Rev 9:16 is an English equivalent for 20,000 x 10,000; but there is no word in Hebrew or Greek for "million" or "billion"

(Felix Just, S.J., Ph.D. - http://catholic-resources.org/Bible/Numbers.htm)

Catholic Mathematicians

Leonardo Pisano Bigollo (1170-1250) a.k.a."Fibonacci" famed for coming up with the "Fibbonacci Sequence."
Ramon Llull (c. 1232-1315), a.k.a. Ramond Lully
Spanish Catholic (and Franciscan tertiary) who invented a device considered to be the first computer, earning him the title the "Father of Computer Science" (he was beautified by Pope Pius IX in 1857).
Thomas Bradwardine (1290-1349) English Catholic Archbishop, physicist, and mathematician who came up with the Law of Falling Bodies (hundreds of years before Galileo).
Nicole Oresme (1320-1382) French Catholic Bishop who invented abstract graphing (pre-Cartesian but which seemed to inspire Descartes' system), first use of fractional components, the first to write about the divergence of harmonic series, and the first to write about general curvature (and, relatedly, the first to discover the curvature of light through atmospheric refraction).
Filippo Brunellescchi (1377-1446) Florentine Catholic engineer, architect, and artist who discovered geometric optical linear perspective (and also designed the largest masonry dome in the world, still the biggest to this day).
Nicholas of Cusa (1401–1464) German Catholic Bishop (and Cardinal) who developed the concept of the infinitesimal in mathematics
Leon Battista Alberti (1404-1472) Italian Catholic priest whose great talents earned him the titles "Father of Modern Architecture," "Father of Modern Surveying," and "Father of Western Cryptography."
Johannes Muller von Konigsberg (1436-1476) a.k.a. "Regiomantanus" German Catholic Bishop, astronomer, and mathematician considered by many as the "Father of Modern Astronomy" and was among the first to use symbolic algebra.
Johannes Widmann (1460-1498) German Catholic mathematician who, among other things, came up with the plus sign (+) and minus sign (-) still used today.
Niccolò Fontana Tartaglia (1499/1500-1557) Italian Catholic mathematician and engineer who came up with the formula to solve cubic equations and the first to apply mathematics to projectiles, earning him the title the "Father of Ballistics."
Gerolamo Cardano (1501-1576) Italian Catholic mathematician, physician, and astronomer who was the first to make systematic use of numbers less than zero.
Lodovico Ferrari (c. 1522-1565) Italian Catholic mathematician who came up with the formula to solve quartic equations.
François Viète (1540-1603) French Catholic mathematician, considered to be the "Father of Modern Algebra."
Giovanni Domenico Cassini (1625-1712) French Catholic mathematician and astronomer who discovered the first four moons of Saturn.
Giovanni Girolamo Saccharin (1667-1733) Italian Jesuit mathematician who was the first in the modern age to pioneer into non-Euclidean geometry.
Ruđer Josip Bošković (1711-1787) a.k.a. Roger Joseph Boscovich Italian/Slavic Catholic priest (and Jesuit) who developed modern atomic theory and the theory of relativity (200 years before Einstein, according to Tesla).

Maria Gaetana Agnesi (1718-1799) Italian Catholic mathematician who wrote the first book discussing both differential and integral calculus (and the most important woman in mathematics for over a millennium, earning her great honor from the Pope).
Alessandro Volta (1745-1827) Italian Catholic physicist who invented the battery and after whom "voltage" is named (and accordingly the unit "volts").
Jean-Baptiste Biot (1774-1862) French Catholic physicist, astronomer, and mathematician who made important breakthroughs regarding the polarization of light, magnetism, and electricity (the “biot” unit is named after him, which measures electric current).
André-Marie Ampère (1775-1836) French Catholic physicist, founder of the science of Electromagnetism and after whom the unit "ampere" (i.e. "amps") is named (he also discovered the element Fluorine).
Bernard Bolzano (1781-1848) Bohemian Catholic priest and mathematician who gave the first purely analytical proof of the fundamental theorem of algebra.
Augustin-Louis Cauchy (1789-1857) French Catholic mathematician, after which more concepts and theorems are named than any other mathematician